ThyssenKrupp
Industrial Solutions

ThyssenKrupp

100% BIG PLAYER

ThyssenKrupp Industrial Solutions

The business area Industrial Solutions, which comprises the Business Units Process Technologies, Resource Technologies, System Engineering, and Marine Systems, unites the plant engineering and construction excellence of the ThyssenKrupp Group under one roof.

As in other industrial sectors, global players in the plant engineering and construction industry are faced with new challenges as a result of international competition. Customers increasingly see in large-scale contractors a guarantee that their investments will be given the necessary boost: globally networked man power with a substantial capacity for added value, great enthusiasm for advanced technologies, and reliable project execution competence that make large-scale and megaprojects competitive, sustainable, and viable for the future.

The former companies ThyssenKrupp Uhde (now Process Technologies), ThyssenKrupp Polysius, and ThyssenKrupp Fördertechnik (now both Resource Technologies) have, over many decades, made a name as successful global player and, since January 2014, have established a distinctive brand in the 21st-century global market as ThyssenKrupp Industrial Solutions.

In merging its diverse expertise in global plant engineering and construction, ThyssenKrupp Industrial Solutions has become a real force to be reckoned with: comprehensive EPC competence in the engineering and construction of chemical, refining, coke oven, cement, and other industrial complexes as well as machinery, plants, and systems for the mining, treatment, and handling of raw materials. Now, more than ever, we need to turn the international spotlight on all that we are and showcase our full range of capabilities.

Read on to find out what orders, projects, and construction sites played a major role in our large-scale plant engineering and construction business over the past fiscal year.

360°

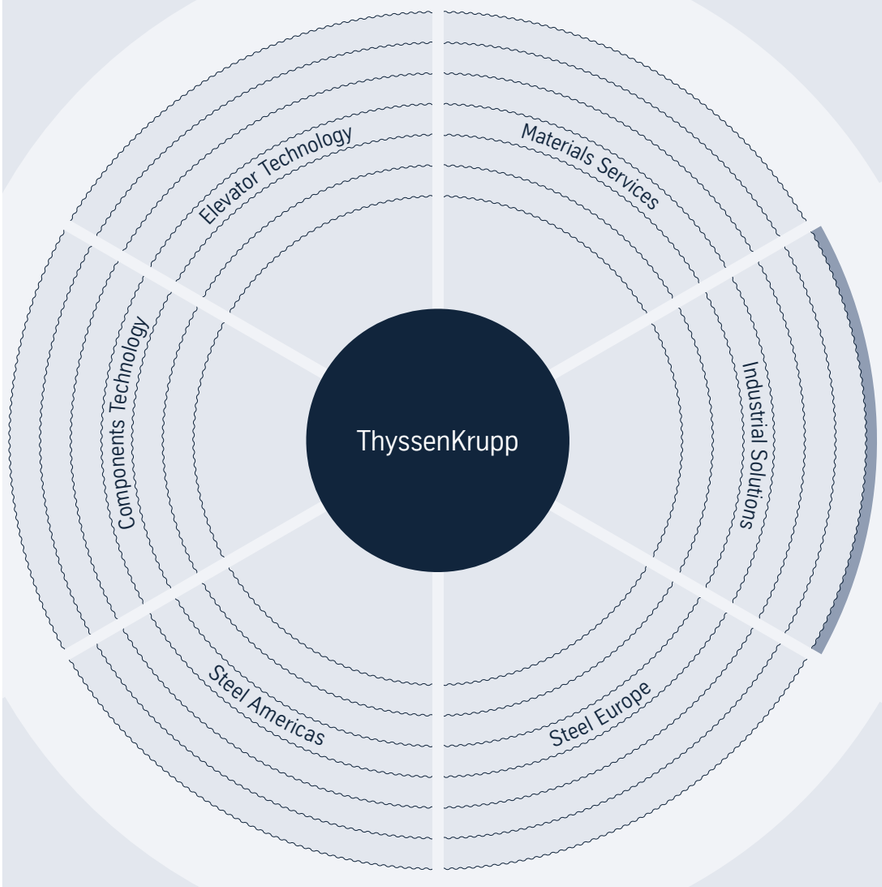
FOCUS ON THE COMPETITIVE STRENGTH OF OUR CUSTOMERS

Process Technologies

The Business Unit Process Technologies is one of the world's leading engineering specialists in the engineering and construction of chemical, refining, coke oven, and other industrial plants. Our portfolio comprises cost-efficient high-tech solutions in the industrial plant contracting sector as well as the entire range of services associated with an EPC contractor and comprehensive service covering the entire life cycle of a plant.

Resource Technologies

Resource Technologies offers a comprehensive product portfolio and a close-meshed sales and service network for customers in the mining and cement industries. With its innovative solutions, the Business Unit sets standards in the mining, processing, and handling of raw materials, from the individual machine to the complete plant, and in the construction of efficient, environment-friendly cement plants.

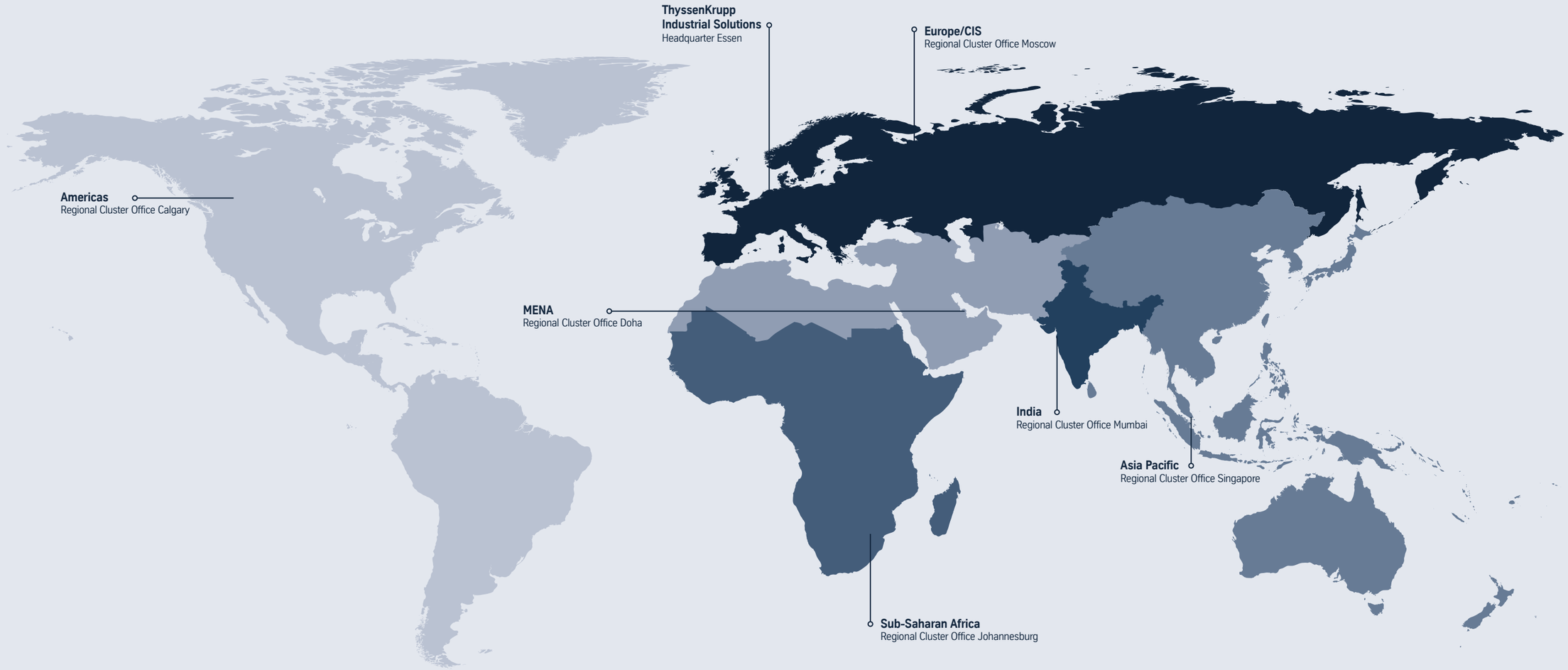


Marine Systems	Submarines	HDW class 212A submarine • HDW class 214 submarine • HDW class 209 submarine • HDW Dolphin AIP class submarine • Modernization services
	Surface Vessels	Blohm+Voss MEKO® A-200 frigate • Blohm+Voss class 130 corvette • Blohm+Voss class 125 frigate Combat support ship class 702
	Services	Training services • Advanced training solutions
Process Technologies	Chemical Industry Coke Plant Technologies Oil & Gas Industry Plastics Industry Services	Ammonia • Urea • Nitrates • Hydrogen • Electrolysis • Gas technologies • Organic chemicals biotechnologies Polymers • High-pressure technologies Integrated Asset Management • Revamps & Upgradings • Spare Parts Management Local Workshops & Field Service • Consulting & Training
Resource Technologies	Mining & Materials Handling Industry Cement Industry Services	Bucket wheel excavator systems • Conveyor systems • Stackers • In-pit crushing systems • Crushing plants • Grinding and processing plants • Stockyard and port handling systems for bulk materials Raw material preparation • Clinker and cement manufacturing • Factory automation Strategic spare parts and service contracts Integrated Asset Management • Revamps & Upgradings • Spare Parts Management Local Workshops & Field Service • Consulting & Training
System Engineering	Testing Solutions Assembly Systems Car Body Technologies Forming Dies Lightweight Solutions	Engine test • Gearbox test • Axle test • Battery test Engine assembly • Gearbox assembly • Axle assembly • Aerospace Body manufacturing • Battery plant technologies Hot forming • Final assembly systems Process and component development Prototype construction • Toolmaking Autobody manufacturing • Hydro-forming • New materials

100 % REGIONAL

CLUSTER ORGANIZATION & LOCATIONS

With over 40 branch offices in 25 countries that are split into six regions, we are truly global. Our regional structure allows us to tailor our engineering services as well as the other services we offer to the respective local conditions. So we are close to our customers.



AMERICAS

Perfect global networking on a huge scale

As expected, the US plant contracting industry again vastly increased its capital expenditure in 2014. Not least as a result of the merger of the Business Units Process Technologies and Resource Technologies, ThyssenKrupp Industrial Solutions succeeded in further consolidating its market presence.

The remarkable benefits reaped from our new prowess as an EPC partner include two fertilizer projects for our customer CF Industries. Combining two megacontracts within a single task force is a first – the synchronized execution is already a perfect example of the efficiency of the global matrix organization. Thanks to the continuing shale gas boom, a number of other fertilizer contracts and other gas-based plants are expected from the United States. For instance, ThyssenKrupp Industrial Solutions was able to win back a lost large-scale fertilizer project from CHS in North Dakota as we managed to convince the customer of our increasing local expertise and our close cooperation with Bechtel. With Bechtel as the chosen EPC partner for this project, ThyssenKrupp Industrial Solutions and Bechtel are currently preparing a turnkey fixed price for this project of almost three billion US dollars, which is to be jointly executed by our offices in Dortmund, Denver, Mumbai, and Houston.

Our Denver office is already benefiting from the integration of Process Technologies and Resource Technologies: thanks to decades of EPC experience, particularly in the field of oil sands plants in Canada, all EPC disciplines with many years of experience are at the Denver office. Through the integration and merger with Process Technologies, it was possible to achieve accelerated market entry by adding the specific Process Technologies components – such as process engineering, technological sales, piping engineering, and tools and systems typical of Process Technologies – to the existing Resource Technologies functions.

Just a few weeks ago, the biggest ever Resource Technologies EPC turnkey project (MLMR), with an order value of more than 900 million Canadian dollars, commenced operation. The plant is located in Alberta and has a capacity of up to 14,000 metric tons of oil sand per hour.

For our partner Praxair, we also commissioned the second of two identical hydrogen plants with a capacity of 150,000 Nm³/h of pure hydrogen in St. Charles, Louisiana (USA).

MENA

Rapidly growing infrastructure offers good opportunities

Rapid growth and political and economic change are currently shaping the MENA region. In some countries, political instability is still an obstacle, while other areas currently recovering from unrest expect tangible economic growth. After all, the region has 60 % of the world's oil reserves and 45 % of the world's natural-gas reserves. In the Arab states of the Persian Gulf, huge opportunities are opening up in the EPC sector, offering ThyssenKrupp Industrial Solutions a chance to establish itself as a key player. There is a boom in the infrastructure sector, with the greatest opportunities in cement production, against the background of considerable population growth and transportation needs. In addition, high-value polymers, chemicals, and plastics processing are expected to experience strong growth up to 2017. Major projects in 2014 included production line 2 of the Aïn El Kébira Cement Plant (Algeria) with a capacity of 6,000 metric tons per day, and production line 2 of the Al Safwa Cement Plant (Saudi Arabia) with a capacity of 5,300 metric tons per day.

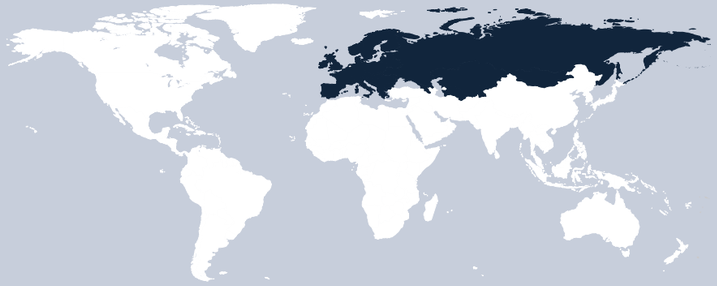
SUB-SAHARAN AFRICA

Efficient strategy for business development

Given the abundance of natural resources, there is a growing demand for infrastructure and power-generating plants in Sub-Saharan countries. This results in business opportunities in sectors such as oil & gas, minerals, and mining & construction. In time, the plan is that Mozambique, Kenya, Ghana, and Nigeria will serve as a hub to support the neighboring countries.

In 2013, the Cement and Lime team secured an order from Handyman's Paradise Lime Manufacturing to supply and construct a complete lime plant in Zambia. For AfriSam, ThyssenKrupp Industrial Solutions is converting a Polysius open-circuit cement mill to closed-circuit milling at the customer's Ulco site. We also secured a follow-up order for an autogenous mill for the Catoca diamond mine in Angola; it is expected to come on stream at the end of April 2015. The first coal-fired power station to be built in South Africa in over 20 years is being constructed by the power utility Eskom in the coal-mining town of Lephalale. Materials Handling received its biggest EPC commissioning order to date when it was awarded the turnkey contract for a coal stockyard.

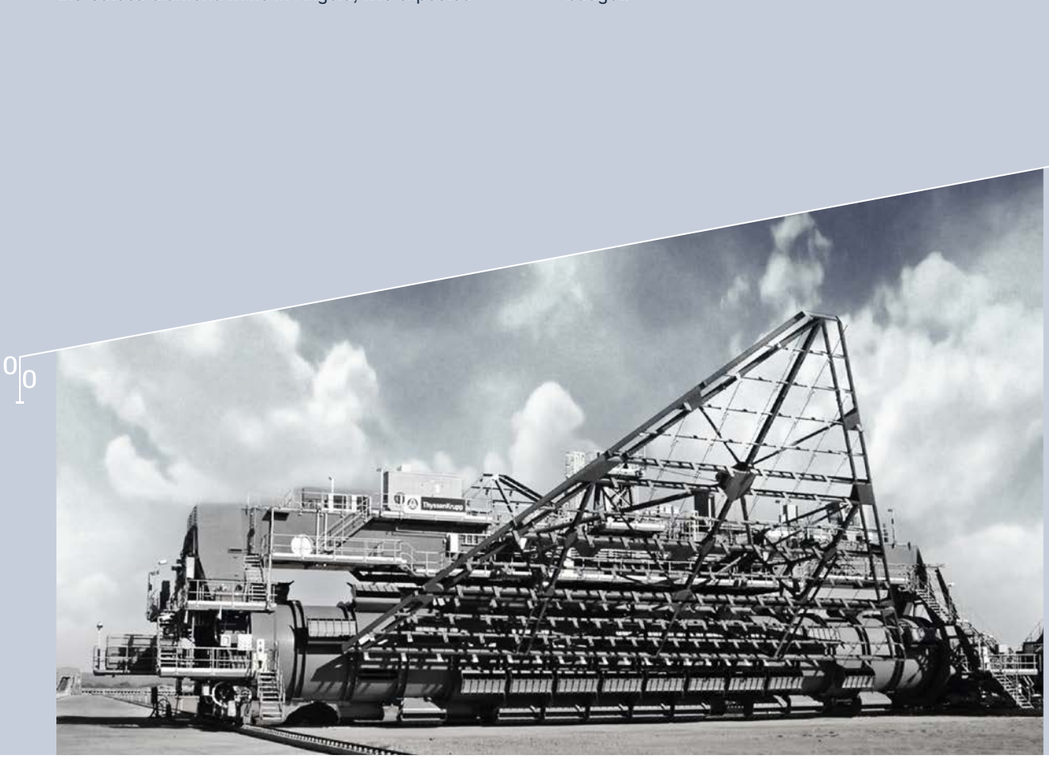
With the partial replacement of an ammonia vent line inside a 301 m smoke stack, the team from ThyssenKrupp Industrial Solutions earned the "Project of the Year" award from the customer Sasol. The highlight: under extremely tough conditions, the team on-site in Secunda (South Africa) were injury- and safety-incident-free in completing the work ahead of schedule and within budget.



EUROPE/CIS

Strong presence and good prospects

Over the past ten years, the Commonweatlh of Independent States (CIS) has states have benefited from the growing demand for raw materials, such as oil, gas, coal, copper, and gold, as well as from the need to modernize plants. However, growth has slowed down due to, among other factors, the political tension between Russia and Ukraine as well as the sanctions imposed by other countries. Nevertheless, the economic development continues. The resource-rich countries are pursuing major projects in the fields of exploitation, refineries, petrochemicals, and power stations. Kazakhstan, for example, plans to build three new and to modernize two existing coal-fired power stations; this creates business opportunities in the mining sector. The trend towards large-scale plants, the replacement of old plants, the increase in energy efficiency, the awareness of compliance, and the execution of EPC projects all offer good prospects for ThyssenKrupp Industrial Solutions. Larger projects executed in the past year included the engineering for a 500,000-metric-ton-per-year polypropylene plant – currently being progressed in its EP phase – for a major petrochemical company, permitting for a 500,000-metric-ton-per-year plant for the production of polyethylene terephthalate (PET) for textile fibers, and the successful revamp of an EO/EG plant. ThyssenKrupp Industrial Solutions has one of its three major engineering centers in Russia. Process Technologies has been represented in the Russian market with its own company for over 20 years and there are now over 500 employees working there.



In 2014, a new coke oven battery and a gas treatment unit were successfully completed on the Hüttenwerke Krupp Mannesmann site in Duisburg (Germany).

INDIA

The motto is “make in India”

Despite unfavorable market conditions, fiscal year 2013/2014 was highly successful for the ThyssenKrupp Industrial Solutions cluster in India, which comprises ThyssenKrupp Industries India (Resource Technologies) and ThyssenKrupp Industrial Solutions India (Process Technologies). The new Indian government is implementing reforms to boost the confidence of investors. Modernization work is clearly noticeable in the infrastructure and production sectors in particular. The new motto is “make in India”, which aims to make the country more attractive through, among other things, liberalization of the directives for foreign direct investors.

The series of newly acquired projects in the Business Unit Resource Technologies includes the EPC orders for material handling systems from Bharat Petroleum Corporation, from the Sabah urea-handling plant in Malaysia, and from Reliance Industries. Engineering and procurement services were undertaken for a cement clinker plant in Malawi. Several EP and EPC projects are being implemented for the cement industry. These include, among others, a plant for 10,000 metric tons per day of cement clinker in Madhya Pradesh (India).

Our company has established a good reputation for boilers and power plants based on circulating fluidized-bed combustion technology with emission-control devices. We are currently executing an EPC order for a 45 MW power plant for Orient Cement and have been successful in exporting boilers and power plants to the Philippines, Vietnam, and Indonesia.

In the Business Unit Process Technologies, projects acquired include an EPCM contract for a 2× 1,000 mt/day fertilizer granulation plant and a PMC contract for a 2× 340,000 mt/year polypropylene plant, as well as a 165,000 mt/year coker LPG treatment unit for Indian Oil Corporation’s Paradeep refinery and an engineering and lump-sum services contract for a caustic soda project for Aditya Birla Chemicals (India). In addition to supporting the major CFI project in the United States, the team from India continued work on the SIPCHEM project in Saudi Arabia and other major projects in India and South Africa in its core competencies.

ASIA PACIFIC

Together we build the future

In 2014, ThyssenKrupp Industrial Solutions (Asia Pacific), headquartered in Singapore, commenced with the merger of its core plant businesses across the Asia Pacific region, starting in Australia, later followed by China and Southeast Asia. The combined portfolio of ThyssenKrupp Industrial Solutions (Asia Pacific) covers 25 % of Group revenues.

In May, ThyssenKrupp Industrial Solutions (Australia) signed an EPC-m contract for a CO_2-removal and gas-processing facility in Moomba. For Orica, the company has undertaken extensive brownfield EPCM projects to improve handling and storage of ammonia on Kooragang Island. The three-year program focuses on safety and environmental upgrades for start-up, operations, and shut-downs. In Victoria, ThyssenKrupp Industrial Solutions (Australia) provided FEED, detailed design and procurement services at Quenos to revamp and upgrade the existing ethylene plant to 630 metric tons per day including ethylene splitter and compressors. For BHP, two new ship loaders for iron ore export in Port Hedland were delivered through a design, supply, and installation contract. The new shiploaders increase exported iron ore by over 24,000 tonnes per hour.

ThyssenKrupp Industrial Solutions (Thailand) operation has been awarded an EPC contract from Thai Polyethylenes Company (TPE) for the expansion of their Low-Density Polyethylene (LDPE) project. For Thailand National Oil Company (Thai Oil), we have completed and handed over the Inside Battery Limits (ISBL) works of a Solvent Recovery Facility in Map Ta Phut after more than two million injury-free man-hours. A typical modular design project is the Lump-Sum Turnkey (LSTK) modules designed and delivered for ALTER NRG for the Tees Valley EFW project. Modules 1 and 2 were designed and fabricated in Thailand and shipped to the United Kingdom for final assembly. In Tuban (Indonesia), ThyssenKrupp Industrial Solutions is completing two world-scale cement plants with a capacity of 4,000 metric tons per day each for its client Holcim Group. In Vietnam, a Low-Density Ammonia Nitrate (LDAN) plant was completed two weeks ahead of schedule by a consortium between Toyo Thai, Leilama, and ThyssenKrupp Industrial Solutions. In Japan, several new major projects were acquired in both the coke oven segment for steel production as well as for incinerators.

RESEARCH & DEVELOPMENT

We don’t leave innovation to chance. By developing new products and processes, we help shape the markets of the future. Better solutions for our customers lie in the conservation of raw materials and resources, in improving operating efficiency, in larger production units, and in increasing plant availability.

STORAGE SYSTEMS FOR THE ENERGY TURNAROUND

The hope is to base future energy systems on renewable resources. However, if electricity is produced via wind turbines and photovoltaic systems, there are strong fluctuations in supply depending on the weather. ThyssenKrupp Industrial Solutions is developing storage systems that keep the power grid stable. They involve storing large amounts of energy electrochemically in so-called redox-flow batteries. Their biggest advantages: high efficiency, a modular design, and the individual scalability of the maximum power and amount of energy stored.

SOLID BIOFUELS

Compared with coal, raw biomass has a higher moisture content and a lower calorific value, and its comminution not only involves substantial cost but is also energy intensive. This is where torrefaction in the POLTORR multiple-hearth furnace refined by ThyssenKrupp Industrial Solutions comes in. A mild pyrolysis converts chunky biomass, such as wood chips or pellets, into a biocoal that can easily be ground and burned at standard plants. The process, for which a patent application has been filed, utilizes the high-calorific gases given off to dry the biomass.

ENERGY-EFFICIENT CHLORINE PRODUCTION

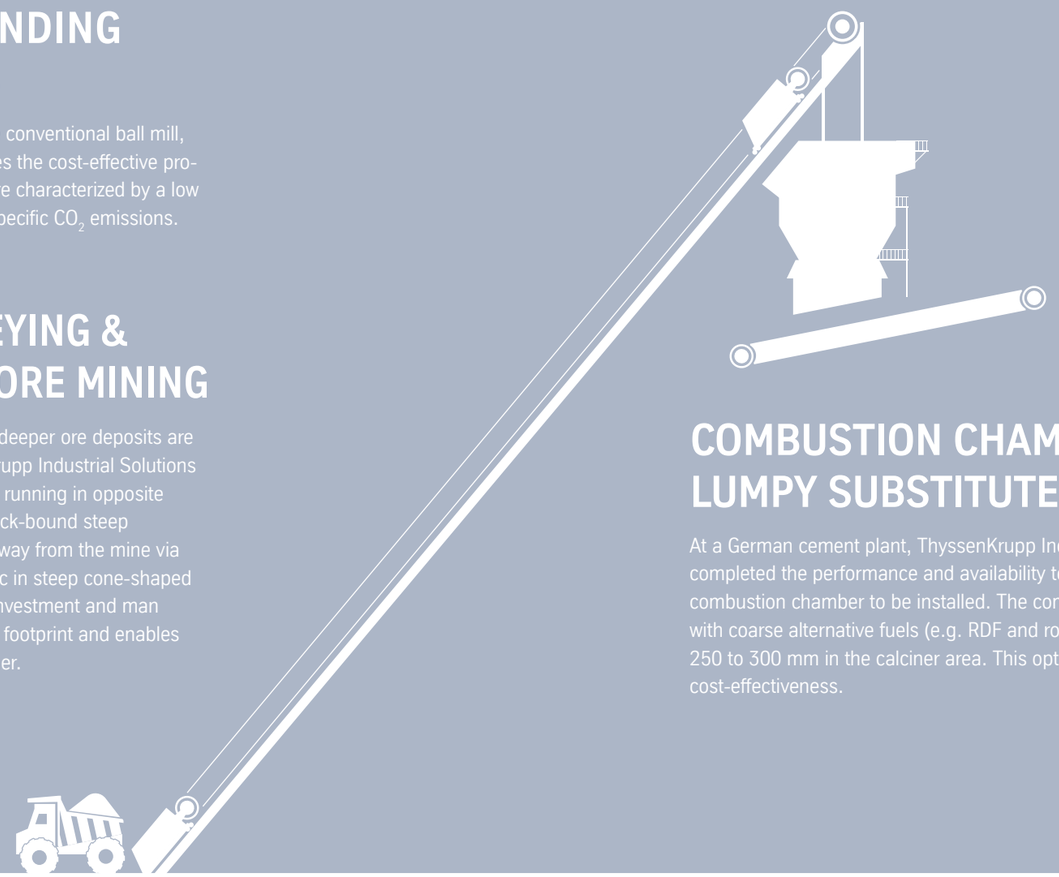
Specialists from ThyssenKrupp Industrial Solutions have, in conjunction with Bayer Material Science, developed a new technology for the production of chlorine that uses oxygen-depolarized cathodes combined with an innovative cathode compartment design to cut power consumption by over 30 % compared with conventional processes.

ROLLER MILL CUTS GRINDING ENERGY BY UP TO 50 %

By using the QUADROPOL RD roller mill instead of the conventional ball mill, grinding energy can be cut by up to 50 %. This enables the cost-effective production of even ultrafine composite cements, which are characterized by a low percentage of clinker and contribute to reducing the specific CO_2 emissions.

INTEGRATED SKIP CONVEYING & CRUSHING SYSTEM FOR ORE MINING

Owing to the globally high demand for raw materials, deeper ore deposits are also increasingly being mined. For this job, ThyssenKrupp Industrial Solutions offers a tailored steep conveyor system with two skips running in opposite directions. The dynamically balanced, rope-driven, track-bound steep conveying, combined with processing and transport away from the mine via conveyor, considerably reduces heavy-load truck traffic in steep cone-shaped opencast mines. The complete system not only cuts investment and man power costs, but also significantly reduces the carbon footprint and enables the raw materials to be transported even in bad weather.



COMBUSTION CHAMBER FOR LUMPY SUBSTITUTE FUELS

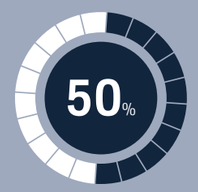
At a German cement plant, ThyssenKrupp Industrial Solutions successfully completed the performance and availability test for the first ever PREPOL® SC combustion chamber to be installed. The combustion chamber can be used with coarse alternative fuels (e.g. RDF and roofing felt) with edge lengths of 250 to 300 mm in the calciner area. This optimizes the CO_2 emissions and cost-effectiveness.

SERVICE
HAS MANY FACETS

At over 30 locations and seven service centers throughout the world, ThyssenKrupp Industrial Solutions is benchmarked by its customers against service solutions with added value.

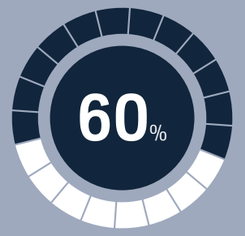
The 2013/2014 fiscal year was marked by demanding revamps and innovative solutions. Our modernization work, for example, resulted in an increase of over 60 % in the handling capacity of a coal blending bed in Kazakhstan. At an Italian plant for the production of nitric acid, we reduced CO_2 emissions by 150,000 metric tons per year by installing the progressive EnviNOx®. At the Hatschek cement plant in Austria, we replaced a kiln tire within the scope of a lump-sum contract – in half the delivery time with a cost saving of 40 %.

We supplied our biggest ever kiln tire – nearly eight meters across and weighing in total almost 250 metric tons – to the Allmendingen cement plant in Germany. In the MENA region, we are continuing to rigorously expand our O&M business with additional integrated asset management contracts, and our spare parts business, too, is investing in the future: an increasing number of cement customers in Asia and the Americas are using the mobile version of our online spare parts catalog, PSPN.



Reduction in delivery time

Cost saving



Higher handling capacity

General overhaul of a bucket-wheel excavator

RWE Power AG has commissioned ThyssenKrupp Industrial Solutions to completely overhaul one of the biggest bucket-wheel excavators at the Hambach opencast mine. Thanks to the wealth of experience that ThyssenKrupp Industrial Solutions has in revamping heavy machinery, the conversion can be carried out efficiently, guaranteeing the customer sustained added value through reduced maintenance costs.

Capacity increase in an ammonia plant

By installing a second OT converter at SAFCO's ammonia plant in Saudi Arabia,ThyssenKrupp Industrial Solutions has increased the plant's production capacity by 11%. The revamp was carried out during ongoing operation and within the agreed time and budget.

Strategic partnership

Morocco's biggest fertilizer producer OCP and ThyssenKrupp Industrial Solutions have agreed on a strategic partnership over a number of years. Through use of the new integrated asset management system, the availability of a plant in Jorf Lasfar is already being significantly improved.

100% full-service upgrade

ThyssenKrupp Industrial Solutions carried out the recoating and upgrade of an electrolysis cell at a chlor-alkali plant within the scope of a full-service package for the customer Bayer Material Science.

POLWELD welding for ball mills

Using innovative POLWELD welding, a total of six ball mills are being installed directly at a copper ore mine in South America. The mill shells are too big and heavy to be transported to the construction site as a single unit, so they are being delivered in sections. As the connecting flanges normally used for such mills are no longer needed, our POLWELD service represents an economically and technically extremely interesting alternative.

A one-stop SHOP

100 % PROCESS TECHNOLOGIES

Synchronously executed fertilizer complexes for booming US market

Task force demonstrates outstanding efficiency with parallel execution

Among the factors contributing to a brisk reindustrialization in the United States are the fall in energy prices as a result of shale gas reserve tapping and shale oil production. For example, the large-scale use of domestic energy reserves should lead to chemical plant investments of, in total, around two billion dollars over the coming two decades.

Against this background, ThyssenKrupp Industrial Solutions was awarded a major contract in late 2012 to engineer and supply fertilizer plants for sites in Port Neal, Iowa, and Donaldsonville, Louisiana. The plants, which use gas from domestic reserves as feedstock, will, with their additional capacities, significantly reduce the United States' dependency on fertilizer imports and at the same time leverage advantages in transport costs.

What is particularly striking about the project implementation: both plant complexes are being synchronously engineered and many work flows carried out in parallel. This results in maximum synergies, with time and costs being considerably reduced. Now in the construction phase of both large-scale plants, the globally orchestrated project implementation is regarded as an exemplary model for success for the new Business Unit ThyssenKrupp Industrial Solutions.

The complex in Port Neal, Iowa, will comprise an ammonia plant with a capacity of 2,200 metric tons per day as well as a urea plant and a urea granulation unit, each with a capacity of 3,500 metric tons per day. Port Neal is a strategically important location in the "bread basket" in the Midwest of the United States.

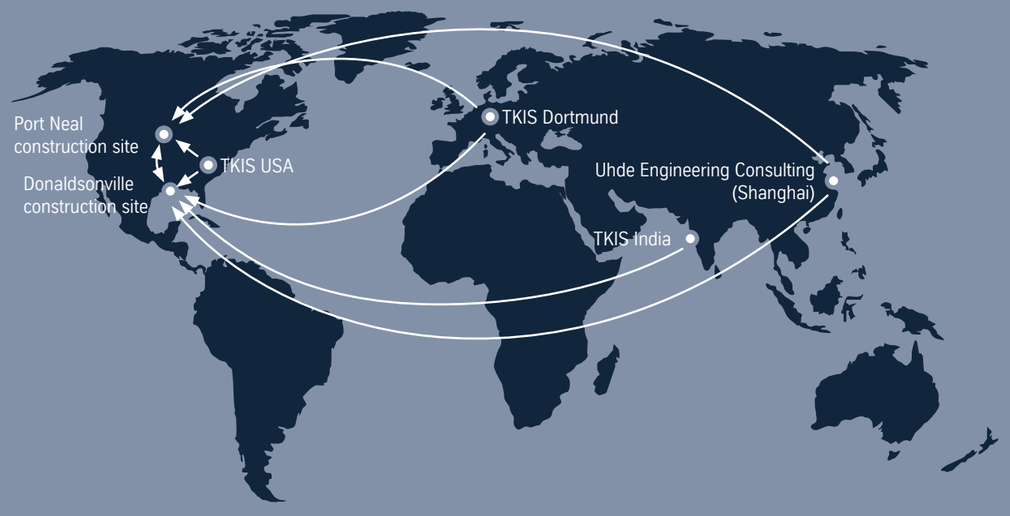
The complex in Donaldsonville, Louisiana, will comprise an ammonia plant with a capacity of 3,300 metric tons per day as well as a urea plant and a urea granulation unit of the same capacity as in Port Neal (3,500 metric tons per day each). For the Donaldsonville site, ThyssenKrupp Industrial Solutions is also engineering and supplying a nitric acid plant and an ammonium nitrate/urea plant with a capacity of 4,300 metric tons per day.

The customer for the two projects is CF Industries Holdings (CFI) – a company with which ThyssenKrupp has had ties for 40 years. In total, the contracts are worth around one billion euros to ThyssenKrupp Industrial Solutions.

1+1=3

“The focus is on our customer“

Global project implementation with added value – the composition of ThyssenKrupp Industrial Solutions’ (TKIS) global project teams:



The CFI project manager, Dirk Bodenheim, explains how the global team lineup for the extraordinary synchronous project was like fertilizer for its efficiency right from the start:

Mr. Bodenheim, what is behind the good news regarding your two parallel projects in the United States?

We can take advantage of the spadework already done by our global engineering. Our global organization has moved even closer together and is even more professional. Many more tools and standards have been homogenized. As a result, the project has been able to draw on a global infrastructure.

What does that mean exactly?

It means that, through an intelligent project organization, we have succeeded in simultaneously getting both the contract in Louisiana and the one in Iowa off to a quick, efficient, and cost-effective start as is expected of us. Our well-coordinated team in Germany, the United States, and Asia has brought maximum synergies for both major contracts. Even though they remain de facto two separate contracts with two different customers.

Was it clear from the start then that the two projects would be synchronized?

No, it was all up in the air. We may also have decided to execute the two contracts entirely independently of each other. But that is exactly what we didn’t do. Carrying out the engineering and procurement in parallel enabled us to synchronize many things. For example, conducting procurement negotiations only once – even if we then placed two separate orders. Overall, this considerably reduced the time and cost involved.

How do you achieve such international teamwork without causing any friction?

We are driven by the same guiding principles, on all continents. How we create this cohesion within our global organization is best illustrated by our project symbol.

Your project symbol? Could you elaborate on that?

We developed its form and the core concepts together democratically within a team-building workshop. There were suggestions and at the end a vote. What it shows is:

The focus is on our customer. Delivering professionalism, teamwork, and quality are the common goals of our team. The fabric is our guiding principle “make it grow” and our basic philosophy of “forward thinking”. And it works! Now when you visit our task force in India, this symbol not only hangs in every corner, but everyone believes in it – and so do we.

And now, around two years after contract award, we can report that what we have achieved with our teams in Germany, the United States, India, and China – both at our offices and on the construction sites – is not only a project success in itself: it is an outstanding success for the company.

The interview was conducted by Petra Lenz.

CHEMICAL INDUSTRY

ThyssenKrupp Industrial Solutions is one the few big players in the global market that are able to design and implement highly complex chemical plants on a mega scale. In the 2013/2014 fiscal year, we again benefited from growing demand, in particular in emerging countries, for a greater use of raw materials and an increase in food production.

HYDROGEN

Successful completion in the United States

In St. Charles, Louisiana (USA) the second of two hydrogen plants was put into operation for our partner Praxair. Praxair will use the new plant in the same way as its other plant in Port Arthur, Texas, to supply its refinery customer Valero with hydrogen and steam. The two plants are of the same design and each has a capacity of 150,000 Nm^3/h of pure hydrogen.

NITRATES

Demand for greater and improved fertilizer production met

The Belarusian customer Grodno Azot commissioned the Hydrogen & Nitrates Product Division to engineer and supply a fertilizer complex at Grodno on the Polish border. The complex will comprise a 1,200-metric-ton-per-day nitric acid plant as well as a 1,522-metric-ton-per-day ammonium nitrate (AN) neutralizer and a 3,325-metric-ton-per-day urea-ammonium nitrate liquid fertilizer plant. Furthermore, we were commissioned by Nitrogenmüvek of Hungary to engineer and supply an additional AN neutralizer with a capacity of 1,515 metric tons per day and an AN/calcium ammonium nitrate (CAN) granulation unit. This granulation unit is suitable for the production of both of these fertilizers, with a capacity of 1,550 metric tons of AN per day or 1,960 metric tons of CAN per day. Furthermore, our engineers and technicians were, and still are, in action on other major construction sites, among others in Egypt, Vietnam, Turkey, and the United States.

AMMONIA & UREA

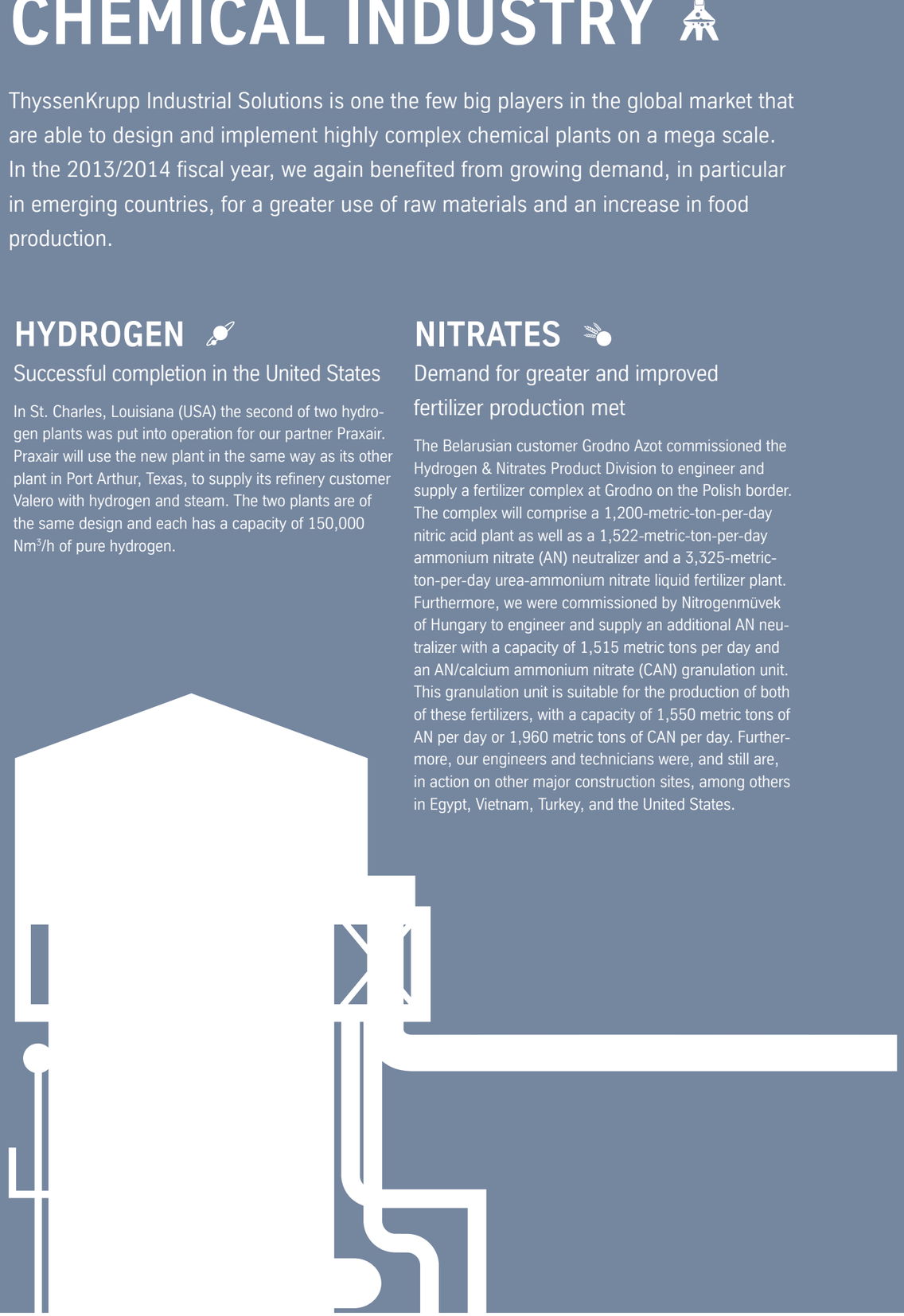
Activities in the Americas and the MENA region

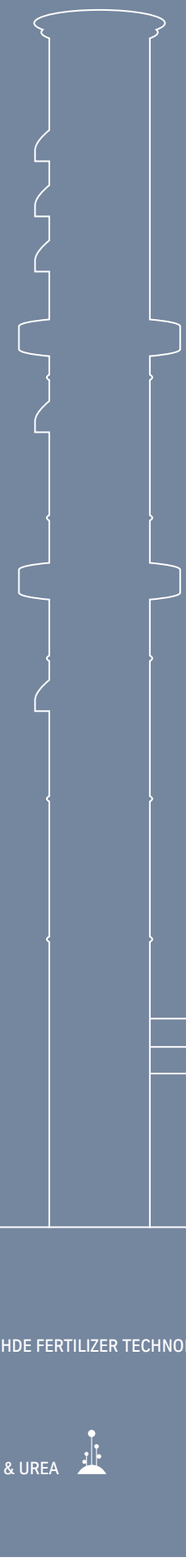
Work on construction of the liquid fertilizer complexes in the United States for CF Industries in Louisiana and the Orascom subsidiary, Iowa Fertilizer Company, in Iowa is coming along well, as is that on another ammonia/urea complex for CF Industries in Iowa. The plants will come on stream in 2015 and 2016, as will an ammonia plant in Saudi Arabia that the Korean contractor Daelim is building for Ma'aden Phosphate Company using technology and key equipment from ThyssenKrupp Industrial Solutions. ThyssenKrupp Industrial Solutions received a contract commitment from the Swiss–German project developer and plant operator Proman for the construction of an ammonia plant in Topolobampo in the Mexican province Sinaloa. It will be the first ammonia plant between Alaska and Tierra del Fuego on the Pacific coast of America.

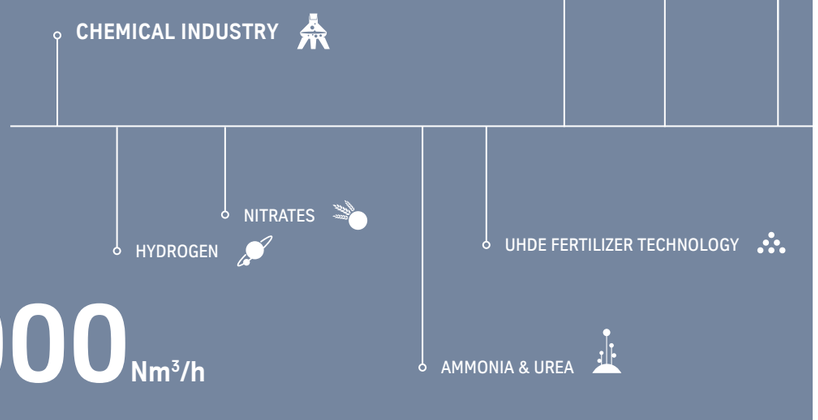
UHDE FERTILIZER TECHNOLOGY

Licensing at a high level

Uhde Fertilizer Technology (UFT), a subsidiary of ThyssenKrupp Industrial Solutions AG, received its biggest ever single contract with a capacity of 2× 3,850 megatons per day from the customer Dangote in Nigeria to supply the license, engineering services, and equipment. Owing to its proprietary technology for ammonia recovery from off-gases (ACT), Borealis Chimie awarded UFT a special contract. For Agrium Borger (USA), the granulator, with both the lower and modularly designed upper casing, was successfully delivered on schedule from a single source. The same applies for deliveries to the customers IFCo and CF Industries in the United States. For CF Industries, two granulators of the same design were success-fully delivered simultaneously to two different sites. Based on joint development work with Kimre (USA) regarding the reduction of dust emissions, UFT won a contract from CF Industries to revamp the existing plants at its Donaldsonville site.







150,000 Nm^3/h

Pure hydrogen

ELECTROLYSIS

China opts for oxygen-depolarized cathodes

In November 2013, the Electrolysis Product Division was carved out to form an independent company, ThyssenKrupp Electrolysis. The implementation and certification to DIN ISO 9001 were an important step in marketing ThyssenKrupp Electrolysis as an independent and globally active EPC player. The customers also welcomed the developments, as the successful fiscal year shows. Contracts for the HCl oxygen-depolarized cathode (ODC) technology surpassed all expectations. Key electrolysis orders were received, in particular from China, Saudi Arabia, Indonesia, France, and Switzerland. The carve out of ThyssenKrupp Electrolysis was the first step towards concluding the joint venture between ThyssenKrupp Industrial Solutions and Industrie DeNora, based in Milan (Italy). The new company, ThyssenKrupp Uhde Chlorine Engineers, will pool the electrolysis business of the two companies under the entrepreneurial leadership of ThyssenKrupp Industrial Solutions as the majority shareholder from April 2015.

BIOTECHNOLOGIES

Lactic acid optimization on an industrial scale

ThyssenKrupp Industrial Solutions has developed two processes for the production of bio-based monomers: the succinic acid and the lactic acid process. Succinic acid serves as an intermediate for products with a high market value, such as butanediol, polyurethanes, and coatings. Lactic acid is used in the food and cosmetics industries and it is also a feedstock for acrylic acid or polylactic acid (PLA). Both products offer considerable potential for growth. In Leuna, the new processes are being optimized on an industrial scale – a first in Europe. The lactic acid produced here has been successfully converted to polylactic acid on a pilot scale. Our process thus meets the high requirements placed on a polymerizable product. In January 2014, the Biotechnologies team was awarded ThyssenKrupp AG's Special Innovation Prize.

GAS TECHNOLOGIES

Support for shale gas boom in the United States

Formosa Plastics Corporation (Texas) awarded ThyssenKrupp Industrial Solutions a technology contract for application of the steam-active reforming process (STAR process®) in a propane dehydrogenation plant with a capacity of 545,000 t/year in Point Comfort (Texas). As a result, ThyssenKrupp Industrial Solutions is now also a successful player in the shale gas boom in the petrochemical sector in North America. In September 2014, Bionext placed an order to build a turnkey demonstration plant in Dunkirk. At the heart of the BioTfuel project being implemented in conjunction with Total, IFP Energies Nouvelles, Axens, Sofiproteol, and CEA is a demonstration plant for an integrated B-XtL process chain based on the PRENFLO® Direct Quench (PDQ) process by ThyssenKrupp Industrial Solutions.

In 2014, a propylene oxide plant with a capacity of 300,000 t/year was successfully commissioned in Jilin (China).

ORGANIC CHEMICALS & POLYMERS

Propylene oxide for China

On July 8, 2014, the new HPPO (hydrogen peroxide propylene oxide) plant for the chemical company JiShen in Jilin (China) was inaugurated with a grand opening ceremony. It has a production capacity of 300,000 t/year of propylene oxide (PO) and took around three years to build. The process was developed by ThyssenKrupp Industrial Solutions in collaboration with Evonik Industries AG, and a key feature is its outstanding environmentally friendly production. The scope of services provided by ThyssenKrupp Industrial Solutions included the design, a significant part of the engineering of the PO plant, and the supply of various equipment items. PO is chiefly used in the production of polyurethane precursors. These polyurethanes then go into making things like upholstery for car seats or furniture or insulation materials for the construction and cooling systems industry. In 2013/2014, the Organic Chemicals & Polymers Product Division also worked on the competitive execution of current contracts for our customers in China, the United States, Saudi Arabia, Qatar, Thailand, and Turkey.

ORGANIC CHEMICALS & POLYMERS

GAS TECHNOLOGIES

BIOTECHNOLOGIES

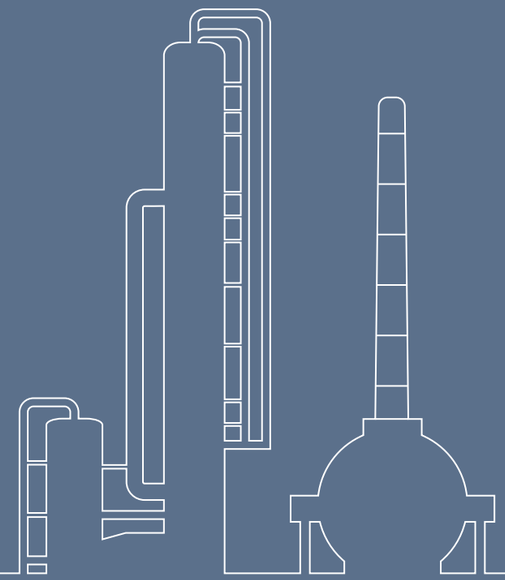
ELECTROLYSIS

140,000 t/year
of biochemicals is our target

300,000 t/year
Polypropylene

COKE PLANT TECHNOLOGIES

OIL & GAS INDUSTRY



Successful in Asia, the Americas and Europe

The highlights of the 2013/2014 fiscal year were the order completions for Dragon Steel in Taiwan, a wholly owned subsidiary of China Steel Corporation, and Hyundai Steel in South Korea. We are currently implementing ongoing contracts for Hüttenwerken Krupp Mannesmann in Duisburg and US Steel Clairton Works in the United States. New orders were generated for ILVA in Taranto (Italy), SSAB Lulea (Sweden), CSN Volta Redonda (Brazil), and JFE (Japan) for the plants in Kurashiki and Chiba. On the whole, the coke oven plant business is slack due to the continuing steel crisis. Nevertheless, new orders can still be expected as, in particular, old capacities need to be revamped – which is particularly true for the market in Japan.

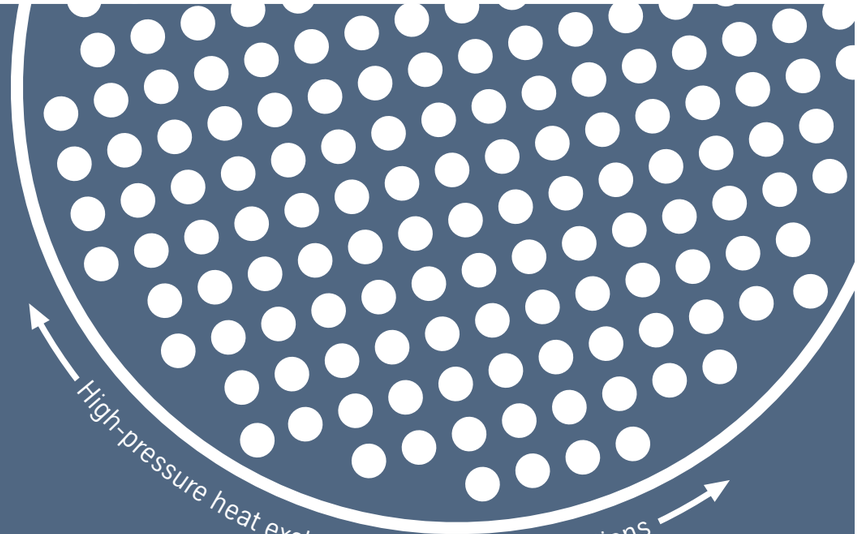
Business strengthened

ThyssenKrupp Industrial Solutions has strengthened its activities in the oil & gas sector. On October 1, 2014, a new company was founded: ThyssenKrupp Industrial Solutions Oil & Gas, based in London. The company will pursue an ambitious goal: over and above its existing consulting business, it aims to establish itself as an EPC contractor in the oil and gas upstream sector. The business idea is not new. It is a logical follow-on from the acquisition of the consulting company Energy & Power in 2012, which has since operated under the name of ThyssenKrupp Uhde Energy & Power as part of the ThyssenKrupp Industrial Solutions group of companies.

The new company will create a center of excellence for the execution of oil and gas processing plants in the immediate vicinity of globally active oil and gas producers. Many are already customers of ThyssenKrupp Uhde Energy & Power and value the competence and services of our experts. ThyssenKrupp Industrial Solutions Oil & Gas will engineer and execute plants within the network of existing regional Industrial Solutions offices, contributing its specialist process and project execution expertise to this collaboration.

PLASTICS INDUSTRY

The plastics industry is one of the most innovative and successful branches in the world. Of this there can be no doubt, for they keep finding new applications for established plastics and developing new materials. At the same time, rapid growth in the global population and increasing prosperity have created a positive market trend. Moreover, the plant contracting sector is strongly affected by two factors that are contributing to lower production costs. Firstly, fracking in the United States is facilitating low raw-materials prices and thus competitive advantages in accessing ethylene, a precursor of polyethylene. Secondly, producers are increasingly investing in extending their process chains in order to enhance their competitiveness. This has led to new projects, for example in polyethylene production and in the global use of downstream technologies.



PLASTICS INDUSTRY

HIGH-PRESSURE TECHNOLOGIES

Uhde High Pressure Technologies in Hagen is becoming a technology center for LDPE autoclaves

What at first began as re-engineering of obsolete plant systems is now coveted specialist expertise. The construction of turnkey reaction systems for the polymerization of LDPE and EVA in agitated autoclaves with motors installed in the pressure chamber, operated a pressure of up to 2,500 bar. Alongside Versalis and Exxon Mobil, LyondellBasell is now also relying on the technological know-how offered by Hagen in this field to deliver a fully functional system comprising a pressure vessel, motor, stirrer, and instrumentation. Added to these are the current contracts for autoclaves with a capacity of 100 KTA from China: Lenovo, Sinopec, and Sailboat. But there is also still a demand for large-capacity tubular reactors: Uhde High Pressure Technologies, a subsidiary of ThyssenKrupp Industrial Solutions AG based in Hagen (Germany), is supplying not one but two reactors with a capacity of 270 KTA based on the LyondellBasell process to the Shenhua Group, and a 250 KTA reactor based on the Exxon process has also been ordered by Sinopec. What makes these projects so special: the feedstock is obtained from coal and not crude oil. As well as projects for new plants, we are also pushing ahead with the service initiative. Together with the ThyssenKrupp Industrial Solutions locations of Thailand and Bad Soden, the resources for engineering and high-pressure production are being pooled for the first time in this form for a high-performance service project. For the customer, this means perfect local support, global know-how, and state-of-the-art high-pressure equipment ”made in Hagen“.

POLYESTER, POLYAMIDES & BIOPLASTICS

New services business successfully established

Uhde Inventa-Fischer, a subsidiary of ThyssenKrupp Industrial Solutions AG located in Berlin (Germany) and Domat-Ems (Switzerland), has reorganized its services division. The range of products and services on offer comprises tailored solutions and services that improve the efficiency of production processes and the performance of polyester and polyamide plants. For the world’s biggest polyester producer, Indorama Ventures in Poland, for example, the company carried out a polyester plant capacity increase from 160,000 to 216,000 metric tons per year. At the same time, the production costs were significantly reduced due to economies of scale and an improvement in energy and feedstock efficiency. Uhde Inventa-Fischer also successfully commissioned a polyamide 6 plant for Hangzhou Hangding Nylon Tech in Hangzhou City (China).

35 %
increase in polyester output

POLYESTER, POLYAMIDES & BIOPLASTICS

HIGH-PRESSURE TECHNOLOGIES

100% RESOURCE TECHNOLOGIES

Cement for Indonesia

Indonesia's cement demand is booming. More and more people long to live in modern houses and apartments. At the same time, infrastructure programs worth billions are driving up consumption. Pent-up demand in the country is huge, as the extremely low per capita consumption to date shows.

For both cement lines, ThyssenKrupp Industrial Solutions supplied key state-of-the-art equipment for raw material preparation, clinker production, cement loading, and fuel preparation. A POLAB® laboratory automation system is being installed for quality monitoring and control.

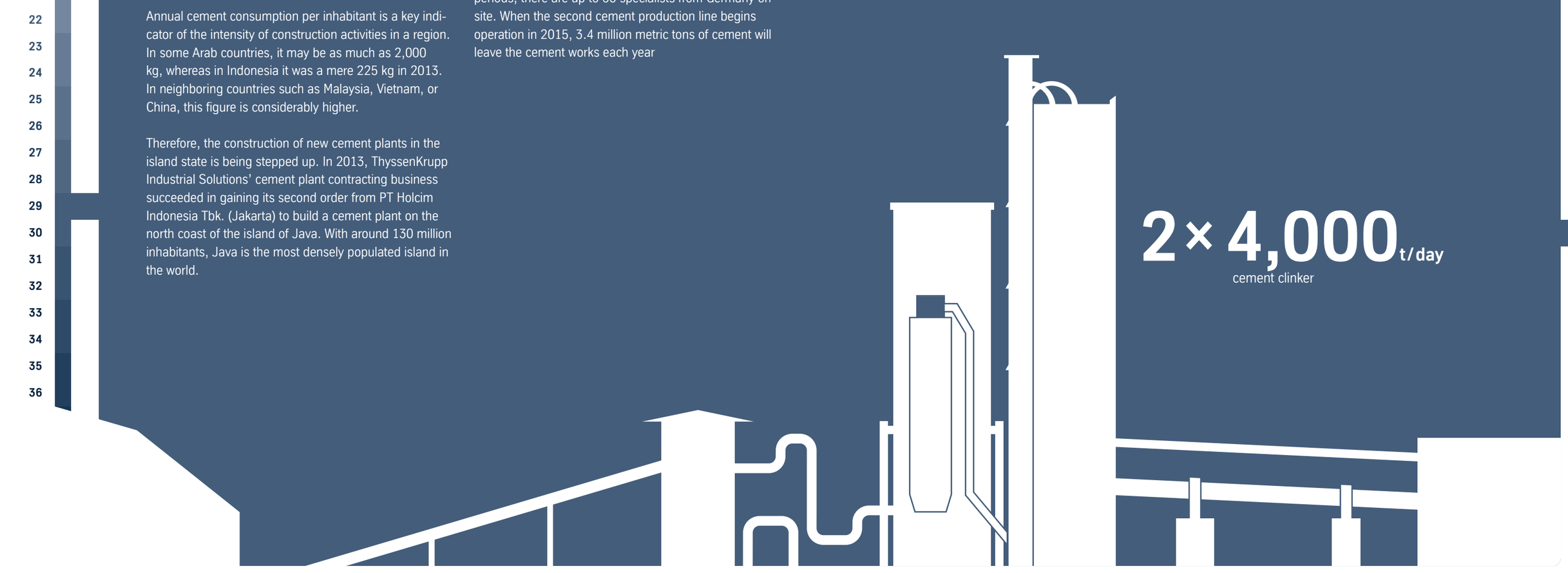
Annual cement consumption per inhabitant is a key indicator of the intensity of construction activities in a region. In some Arab countries, it may be as much as 2,000 kg, whereas in Indonesia it was a mere 225 kg in 2013. In neighboring countries such as Malaysia, Vietnam, or China, this figure is considerably higher.

Therefore, the construction of new cement plants in the island state is being stepped up. In 2013, ThyssenKrupp Industrial Solutions' cement plant contracting business succeeded in gaining its second order from PT Holcim Indonesia Tbk. (Jakarta) to build a cement plant on the north coast of the island of Java. With around 130 million inhabitants, Java is the most densely populated island in the world.

The first order from Holcim was placed in 2011. This first cement production line near Tuban in East Java came on stream this year.

The lines profited from the outstanding cooperation between two former ThyssenKrupp sister companies even before the merger that formed ThyssenKrupp Industrial Solutions, in that these lines were equipped with a full range of crushing technology from the former ThyssenKrupp Fördertechnik.

Work on the construction site is well under way. At peak periods, there are up to 50 specialists from Germany on-site. When the second cement production line begins operation in 2015, 3.4 million metric tons of cement will leave the cement works each year



2 × 4,000 t/day
cement clinker

ONE COMPANY ONE OBJECTIVE ZERO ACCIDENTS

For Jürgen Dietrich, senior project manager of the Business Unit Resource Technologies, it is very easy to compare how cooperation with the sister companies has changed: a contract for a cement plant on Java in 2011 was followed by a second from the same customer in 2013. This follow-up contract is being executed by the newly formed merger, ThyssenKrupp Industrial Solutions.

Mr. Dietrich, what has changed since the sister companies merged?

Our cooperation with Fördertechnik has always been very good. After all, they are based just around the corner and that is still an advantage. However, in the past we had a contractor-subcontractor relationship. Now we are all one company under the umbrella of the operating unit Cement.

And what does the unified company do better?

Not having a subcontracting relationship does make a big difference. We no longer need to conduct negotiations, and responsibilities within the operating unit are clearly defined. It is now like the work between two departments at the same company. We are both governed by the same supply contract concluded with the customer. This saves a lot of time and effort.

Could you give us an example with regard to the current project in Indonesia?

We use the same resources when it comes to erection supervision. In the past, I had to ask the subcontractor Fördertechnik who their supervisor was, but now it is our own man from the Cement operating unit. This makes it easier to coordinate dates and we can react more flexibly.

Another significant factor is that we have a local organization in Indonesia that independently carries out work for the purpose of rendering the services to be performed locally under the contract. From now on, we will increasingly see our local organizations abroad taking over a large part of the work locally – especially all that is country specific.

You have up to 50 specialists on-site at the same time – why is this necessary?

There is a wide range of tasks: alongside supervision of the erection works and managing the local subcontractors with regard to quality and on-schedule completion, commissioning is a key task that is carried out under the lead of our specialists. And here again we avail ourselves of the global resources available in the business area. Another example: of the 50 experts, 12 alone were exclusively responsible for health & safety. And this proved a clear success: from September 2013 to September 2014, we completed 12 million man-hours without losing a single day due to accident. We were completely accident free for a year.

That is quite remarkable when you think of the size of the construction site. How did you manage to achieve this excellent result?

Well, the merger to form ThyssenKrupp Industrial Solutions provided a perfect opportunity to improve construction site safety. The oil & gas industry procedures are the vanguard for the cement industry. Uhde is at home in this area and thus much more familiar with the requirements and how to implement them. The HSE department at ThyssenKrupp Industrial Solutions was a great help in introducing the relevant procedures and now we are on an even par. Of course, our target is always zero accidents.

The interview was conducted by Petra Lenz.

MINING & MATERIALS HANDLING INDUSTRY

ThyssenKrupp Industrial Solutions is one of the world's leading suppliers of machinery, plants, and systems for mining, processing, and handling raw materials. We offer our customers innovative concepts that enable them to produce and process their products with a high degree of cost-effectiveness, efficiency, and resource friendliness.

First mobile crushing plant in a Brazilian iron ore mine

In 2013, ThyssenKrupp Industrial Solutions commissioned a complete waste handling system in the northern Brazilian region of Carajás, the first of its kind, both in South America and in an open-pit iron ore mine. The system, with a design capacity of 7,800 mt/hour, consists of two fully mobile crushing plants, two belt wagons, several belt conveyors, totaling more than 5 km in length, and a spreader.

Gearless drive for overland conveyors

We are designing a long-distance conveyor for a Peruvian copper mine. With three horizontal and several vertical curves, it is one of the most challenging conveyors in the world. Its drive system is also unique: two gearless 6,000 kW motors – the largest ever to power a conveyor. Mining companies have come to appreciate this technology for its efficiency and low operating costs.

Bucket-wheel excavator technology still of interest

A further milestone in the business relations between the state-owned Serbian power utility company EPS and ThyssenKrupp Industrial Solutions was the order for another bucket-wheel excavator system in 2013. The crawler-mounted system, consisting of bucket-wheel excavator, connecting bridge, and loading unit, is capable of handling 6,600 m^3 of overburden per hour and is to be deployed at a lignite mine in the Kolubara Coal Basin.

Comprehensive mineral-grinding solutions

One customer again chose grinding equipment from ThyssenKrupp to expand its copper ore treatment plant in Peru. A total of twelve Polycom® high-pressure grinding rolls and ten ball mills are to treat 360,000 mt of copper ore per day. As a leading manufacturer of high-pressure grinding rolls, we have succeeded in winning an order for four large Polycom® high-pressure grinding rolls and the downstream ball mills with ring motor drives in the somewhat conservative Chilean market.

Semimobile crushing plants for Zambia

In 2014, we supplied three semimobile primary crushing plants with gyratory crushers to the new Sentinel copper mine in Zambia. Each of these plants can handle up to 3,600 mt of copper ore per hour. The crushing plants will be repositioned by a specially designed transport crawler with a carrying capacity of 1,200 mt as mining progresses.

Our success story in China continues

In late 2013, ThyssenKrupp Industrial Solutions signed a contract to design, supply, and install four ship loaders and two quadruple car dumpers for the new coal terminal in Caofeidian (China). The car dumpers and ship loaders are the biggest in China. Each car dumper can simultaneously unload four freight wagons, each weighing a maximum of 100 metric tons, at a rate of 28 cycles/hour. The maximum capacity of each unit is 8,600 mt/hour. The four ship loaders have a rated capacity of 6,000 mt/hour. Due to rising energy demands in the Guangzhou region, Zhujiang power plant is building an additional 1,000 MW block. To unload the extra coal required, ThyssenKrupp Industrial Solutions supplied two continuous ship unloaders with an unloading rate of 1,500 mt/hour. The customer decided in favor of ThyssenKrupp due to the excellent performance of the continuous ship unloaders already built, the reliable technical service offered, and the good relationship between ThyssenKrupp and the local manufacturing and erection partners.

Materials handling systems for a mine and port in Liberia

ArcelorMittal is expanding its iron ore production in Liberia. The ore will be excavated at the Yekapa mine, processed to a concentrate, transported by rail to the port of Buchanan, and shipped to the steel mills. ThyssenKrupp Industrial Solutions received an order to engineer, supply, and assist in the construction of the main materials handling equipment at the mine and port. All components for the railcar dumper, the stacker and reclaimer for the stockyard, and the high-capacity ship loader with a capacity of 10,000 mt/hour have already been shipped to the final destination, but due to the outbreak of Ebola, all construction works have been postponed to a later date.

360,000 t/day
copper ore

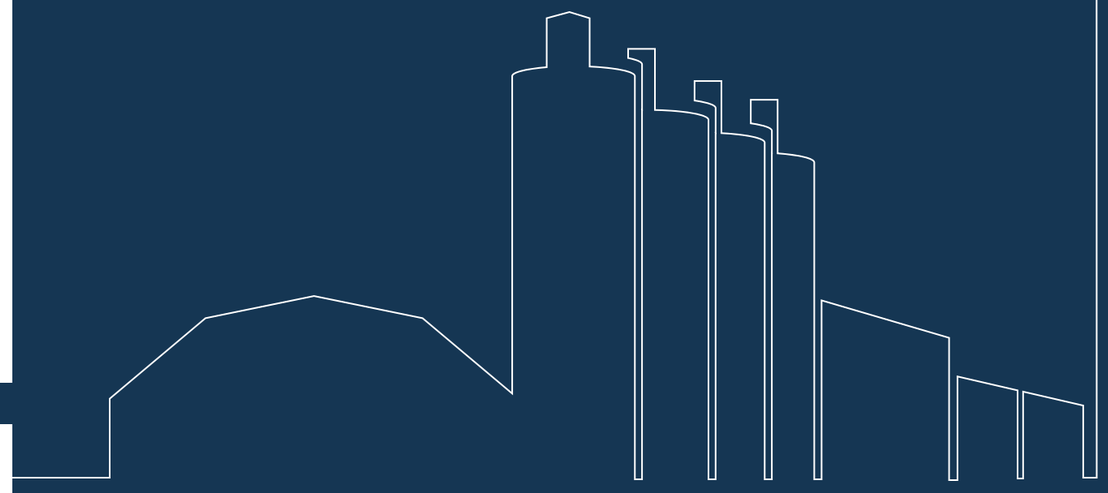
MINERAL PROCESSING

MATERIALS HANDLING

CEMENT INDUSTRY

Huge demand in emerging markets

Momentum in the cement plant contracting industry mainly stems from emerging markets. The increase in demand in these countries is due to population growth and its concentration in so-called megacities, rapid economic growth, and infrastructure development. Key markets for Polysius cement plants were Africa, the MENA region, India, and some South American countries. For example, we were able to secure follow-up contracts in both Saudi Arabia and India, in each case for a second large-scale cement production line. In Algeria, we are building a complete turnkey cement plant that will come on stream as early as 2016. In La Rochelle, on the Atlantic coast in France, a QUADROPOL® RD roller mill with separately driven roller units started production. This newly developed roller mill is designed for grinding both cement and blast furnace slag. In the single-machine business, too, we received contracts for a large number of crushing plants worldwide, as well as from China for the innovative POLYTRACK® clinker cooler. POLAB® Shuttle laboratory automation systems to monitor product quality came on line at two Thai cement works right at the start of the year, in January 2014, as did another at a German works during the course of the year.



8,000 t / day
Kiln line with two cement grinding plants for Wonder Cement Ltd. (India)

6,000 t / day
Cement clinker plant for Société des Ciments de Ain El Kebira (S.C.A.E.K.) in Ain El Kebira (Algeria)

5,300 t / day
Cement clinker plant for Al Sawfa Cement Company in Jabal Farasan (Saudi Arabia)

3,000 t / day
Cement production line for Empresa Publica Productiva Cementos de Bolivia ECEBOL (Bolivia)

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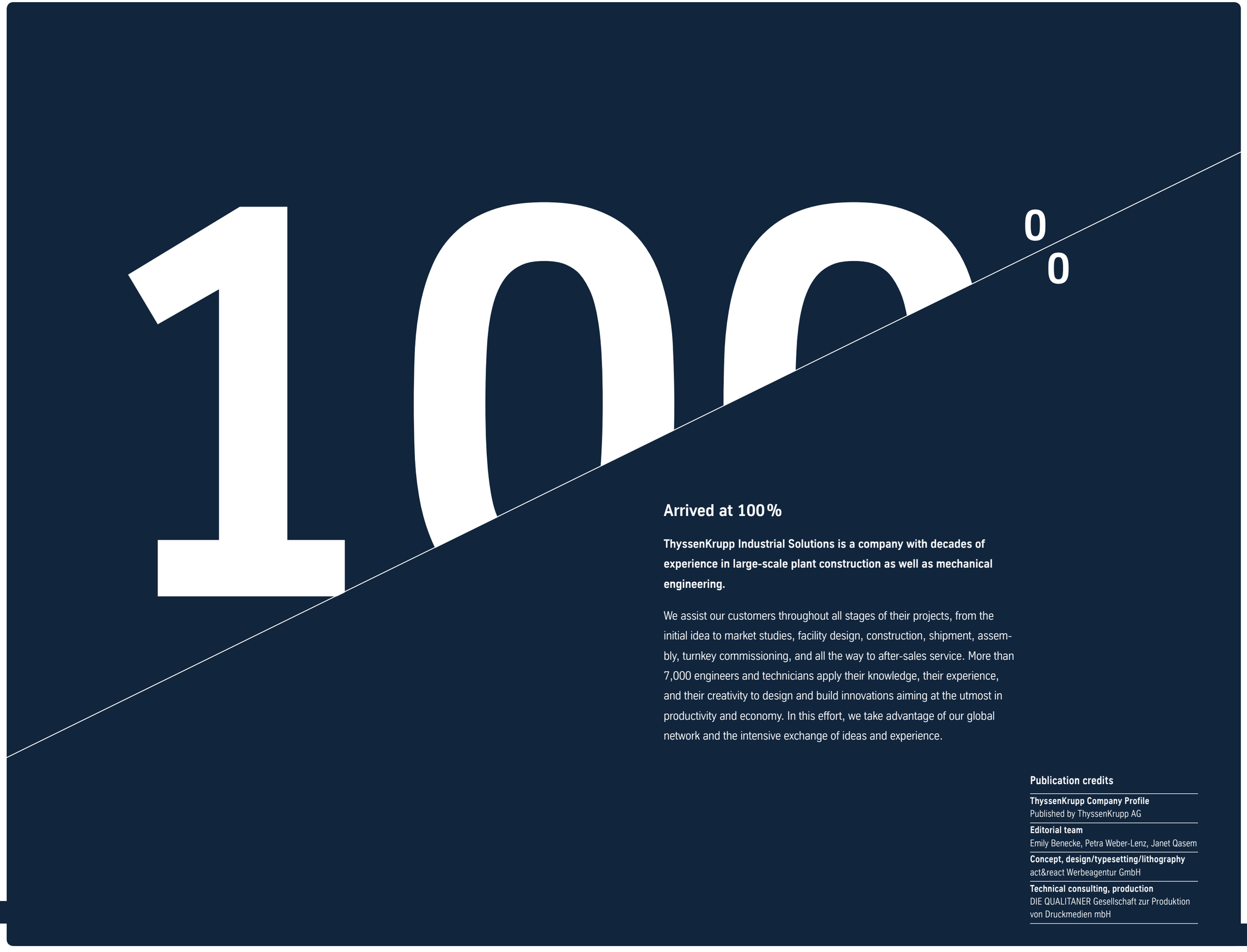

Arrived at 100 %

ThyssenKrupp Industrial Solutions is a company with decades of experience in large-scale plant construction as well as mechanical engineering.

We assist our customers throughout all stages of their projects, from the initial idea to market studies, facility design, construction, shipment, assembly, turnkey commissioning, and all the way to after-sales service. More than 7,000 engineers and technicians apply their knowledge, their experience, and their creativity to design and build innovations aiming at the utmost in productivity and economy. In this effort, we take advantage of our global network and the intensive exchange of ideas and experience.

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