

LINE PIPE GLOBAL

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MANNESMANN
LINE PIPE

A Member of the Salzgitter Group

Issue 13 · August 2020

A wide product range

Multi-talented HFI-welded steel pipe

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Dear Reader:

The focus of this issue is on the diversity of our products and their wide range of possible applications. Highly advanced technically and qualitatively and competitively priced, HFI-welded steel pipes can be put, after all, to a wide variety of uses in many different industries. We are constantly refining our products and, in cooperation with our colleagues from sales and support from the Business & Development Department, are constantly on the lookout for new markets and applications.

With sustainable and innovative products, we are therefore already involved in one of the most promising areas of research and application, that of the

transport and storage of hydrogen on an industrial scale. This is a new market for many of our customers, with whom we are collaborating on products for the challenges of the future and the success of the energy transition.

The extension of our range of wall thicknesses for offshore installations using the Zap-Lok™ process is a good example of how we are never happy to rest on our laurels. The report on the Tembikai gas pipeline project in Malaysia shows how we were able to qualify our steel pipes and ourselves as suppliers in the Far East within a very short time and which partners were instrumental in this process.

Alongside new applications, however,

there are always new product-related activities and services. This is the subject of the report on the successful new marketing strategy for our MSH sections. They have already been used in numerous industries and construction projects all over the world – as currently on SC Freiburg's new football stadium and in Copenhagen in what is certainly the world's most innovative waste-to-energy plant with a ski slope on its roof.

The projects in the Netherlands and southern France presented in this issue also provide fascinating insights into the many other possible applications of our versatile HFI-welded steel pipe bearing the Mannesmann label.

**I wish you an inspiring
and enjoyable read.**

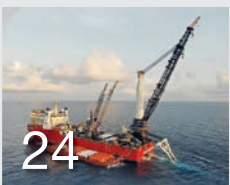
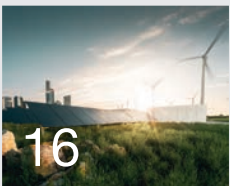
A handwritten signature in blue ink that reads "Betzler".

Andreas Betzler

Managing Director



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On the go

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Multi-talented HFI-welded steel pipe



Strong, durable, versatile and sustainable – just a few of the many attributes that our HFI-welded steel pipe comes with. Over time, a wide range of products has evolved with innovative applications in numerous sectors and application areas. In this issue, we take selected examples to show you how our customers use multi-talented HFI-welded steel pipe as a technically and economically optimal solution.

Flowlines – secondary oil production



Stadium buildings

With the new Wolfswinkel Stadium, Freiburg football it is finally getting a new home. "Big reception for a special club." Go to **Page 10**.



Tunnels, e.g. fire-fighting water pipes



Industrial gases, e.g. oxygen transport



Hydrogen

If you are interested in how we lay the foundations for tomorrow today with our H2ready products, go to **Page 16**.



MSH sections ...

... are used in the most varied sectors around the globe. To read about how our customers and partners benefit from our new sales approach, go to **Page 14**.



District heat pipes



Fuchs pipe system



Oilfield pipes – OCTG



Oil-/gas pipelines – offshore



Airports – kerosene pipelines



Wind farms – jackets and cable conduits



Ports – petroleum/LNG



Bridge structures



Zap-Lok™

Economic efficiency in a new dimension: In the South China Sea, pipes with a wall thickness of 17.5 mm were used for the first time. **Page 24.**



Waste management / waste disposal



Water pipes

In our article about the Eemshaven drinking and service water pipeline you can read, why Google depends not only on electricity, but on water as well. **Page 20.**



Oil/gas pipelines – onshore

In Southern France, our HFI-welded steel pipes are helping to protect a highly sensitive natural landscape. **Page 28.**



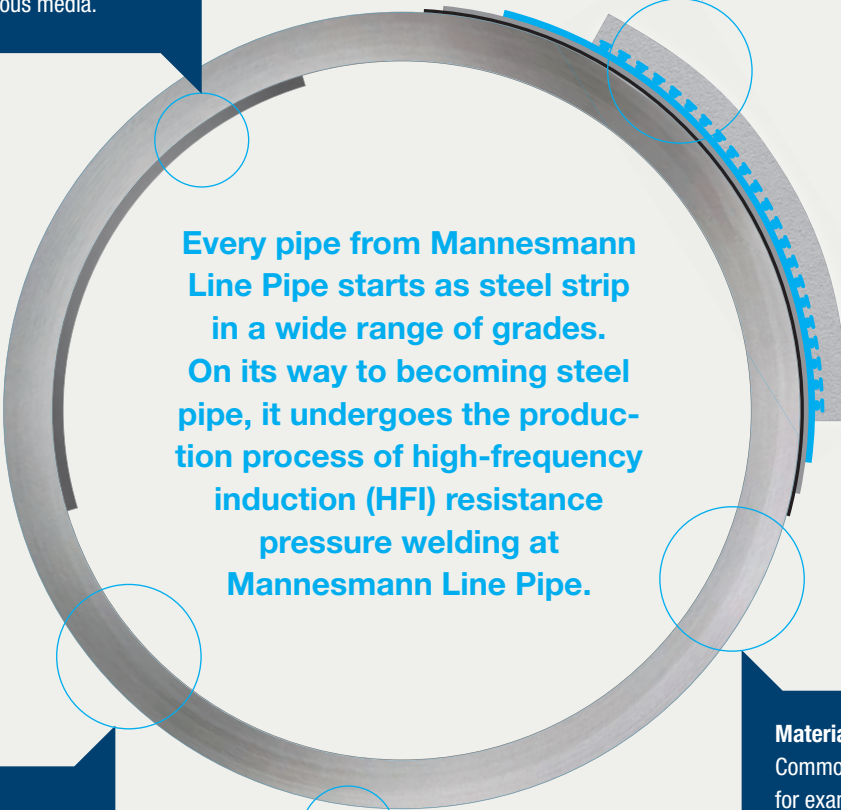
Multi-talented HFI-welded steel pipe

Linings

A variety of cement mortar linings are available for safe and lasting corrosion protection against aqueous media.

Coatings

Plastic coatings of polyethylene or polypropylene in three layers. A fiber cement mortar coating (FCM) is also available.



Every pipe from Mannesmann Line Pipe starts as steel strip in a wide range of grades. On its way to becoming steel pipe, it undergoes the production process of high-frequency induction (HFI) resistance pressure welding at Mannesmann Line Pipe.

Wall thicknesses

From 3.2 mm (for outside diameters up to 229 mm) to 25.4 mm (outside diameters ≥ 355.6 mm)

Outside diameters

114.3 mm to 610.0 mm

Material and grades

Common standard grades as well as, for example, high-collapse grades or fully annealed offshore hollow sections. Certificates to DIN EN ISO and API. For special grades, customized steel compositions are also possible.

From rectangle to circle

The strip material is formed on rolling stands into an endless open pipe. The strip edges are then pressed together by pressure rollers in a high-frequency induction welding process and homogeneously welded to form a longitudinal seam. The weld upset is then immediately removed down to the pipe level internally and externally. This is followed by a multi-step inductive heat treatment of the HFI weld to adapt it as closely as possible to the base material.

Mannesmann quality

During the next process steps, the pipe string is straightened, calibrated and finally cut by a flying saw into single pipe lengths of 18 m. "That sounds simple in theory, but in practice it means an enormous amount of work," says Jochen Berkemeier, plant manager at the Hamm site for the last 15 years. "There is a tremendous amount of experience and technical expertise involved, which all customers ultimately benefit from. Depending on the composition and quality of the strip material, standard or individual high-end tubes are produced to customer specifications. Particularly when the technical speci-

fications require further Q&T full-body annealing, the pipes are individually coated or lined, or the pipe ends are machined to customer specifications.

"Premium Line Pipe" sets new standard

Standard production does not automatically mean basic quality. "The opposite is sometimes the case," says Konrad Thannbichler. Since there used to be a wide variety of customer requirements in the production of pipes for gas pipelines, for example, the company decided to establish its own in-house production standard. "So we packed all the specific and sometimes exotic requirements of the largest European gas customers into a single pipe." In concrete terms, this now means that production is carried out with a high-quality material that complies equally well with the requirements and test certificates of all customers in the European gas pipeline sector." In doing so, Mannesmann Line Pipe has set a new – albeit very high – premium standard," the sales manager continues.

Products with an inbuilt future

In cooperation with customers, and research and network partners, nu-

merous new application possibilities have evolved in recent years – in the field of renewable energies, secondary oil production, in the liquefied natural gas (LNG) sector and in structural tubes with the new MHQ grades, for example. The most recent developments are those in the hydrogen sector and for wall thicknesses of 20 mm for the Zap-Lok™ pipe-laying process.

From product to system

"Although we have an enormous spectrum of products and versions for a huge diversity of industries and users, we always think in terms of system solutions for our customers," says Thannbichler, extending his vision from the product range to the "overall package" that Mannesmann Line Pipe offers its customers. Starting with customer advice, choosing the technically and economically most sensible product, through to the coating or lining, the most suitable jointing system and the ideal laying method. "This is rounded off by our global logistics and on-site services. In this way, we continuously support our customers from the initial inquiry through to installation or commissioning and start-up."





Interview

Opening up new markets and applications for customers

Mannesmann Line Pipe and its customers have to react to the dynamic changes in the markets for the steel and energy industries. In Siegen we talked to Managing Director Andreas Betzler about products, trends and prospects.

What is it that makes Mannesmann Line Pipe's product portfolio special?

We serve the most diverse industries with a very broad array of products. From drinking water pipes to special oil field pipes for aggressive oil-gas mixtures, from structural tubes for stadium construction to high-performance components in mechanical engineering. We see ourselves not purely as a tube and pipe manufacturer, but go further in the value chain and provide our products with up to three additional layers of coating, a lining and individual end machining, which can also be different on each side.

Where have product requirements changed most in recent years?

Climate change and the energy transition are the central issues that call for new

products for many of our customers. At the heart of Mannesmann Line Pipe's innovation strategy is reducing carbon emissions. We believe that the use of hydrogen as an energy carrier and storage medium will play a key role in a zero-emissions strategy in the industrial sector.

In addition, there is a growing need in industrial processes to extract and transport CO₂ and to store it in depleted gas fields, for example.

Then there is the expansion of renewable energies. This now involves the transport and distribution of large quantities of power at voltages of up to 550 kV.

Very topical issues. Do you already have market-ready products in this area?

Hydrogen has meanwhile become a prominent topic in the debate in politics

and society. Numerous companies in the energy sector are involved in transport and storage, and we receive queries specifically about this. Our MANNESMANN H2ready pipes are products that are already available for use today.

At the same time, we are collaborating with reputable partners and in numerous networks in order to stay on the ball for our customers and ready for future development steps.

In the field of CO₂ extraction, we have been involved in publicly funded projects and tested steels for their suitability for transporting gas mixtures containing CO₂. Working with our colleagues at the Salzgitter AG research institute, we are now in a position to provide customers with expert advice

“Our links with our research partners enable us to constantly develop new and improved products and open up new applications and markets for our customers.”

Andreas Betzler

and support for successful projects. In the development of a system solution for high-voltage and extra-high-voltage cable conduits, we are currently in the process of developing a technological approach with new, application-ready products in cooperation with partners in the fields of project planning, pipe laying, network operation and cable manufacture.

What do customers benefit most from in product development?

From quality, expertise, close contact and communication. Our links with our research partners enable us to constantly develop new and improved products and open up new applications and markets for our customers.

How does product development proceed at Mannesmann Line Pipe?

New product ideas are first evaluated in our Business & Development department and, if positively assessed, are transferred to a so-called MRI process. This involves the elaboration of a detailed concept. One person each from Sales and Technology then ensures that the idea is developed to market maturity with selected specialists from our company.

The position of product manager has not been in existence very long. What exactly is their task?

Our product managers have evolved out of the technical customer service department. They are now actively concerned with sales and are closer to the customer. Their job is to ensure that all technical customer requirements are identified at an

early stage and are precisely implemented in production planning and execution.

A glance at the trade tells us that a lot has changed here as well in the last few years. What does this mean for Mannesmann Line Pipe?

It is becoming obvious that online business will pick up speed enormously in the future. In addition, this will of course also bring changes not only to pure ordering processes, but also in the fields of sales and customer advice. However, the specifics of these changes vary greatly from one industry to another. Online trading is certainly easier to handle if "standard" is demanded than if decidedly customized solutions are required. For Mannesmann Line Pipe, however, it is crucial to be able to respond to each customer's wishes according to sector and client. This is one



Andreas Betzler,
Managing Director, Mannesmann Line Pipe GmbH

After training as a bank clerk, Andreas Betzler initially spent four years in the corporate lending business at HSBC Trinkaus & Burkhardt, an internationally oriented commercial bank based in Düsseldorf. After successfully obtaining a part-time degree in business administration, he worked for almost 13 years at Hüttenwerke Krupp Mannesmann, or "HKM" for short, in Duisburg, where he was in charge of Strategic Energy Management and at the same time head of Finance and Energy Trading. In February 2016 he was appointed Managing Director of Mannesmann Line Pipe. Initially, he was responsible for Purchasing, Controlling, IT, Human Resources and Accounting. Since May 2019, his duties have been extended to include Sales and Marketing as well.

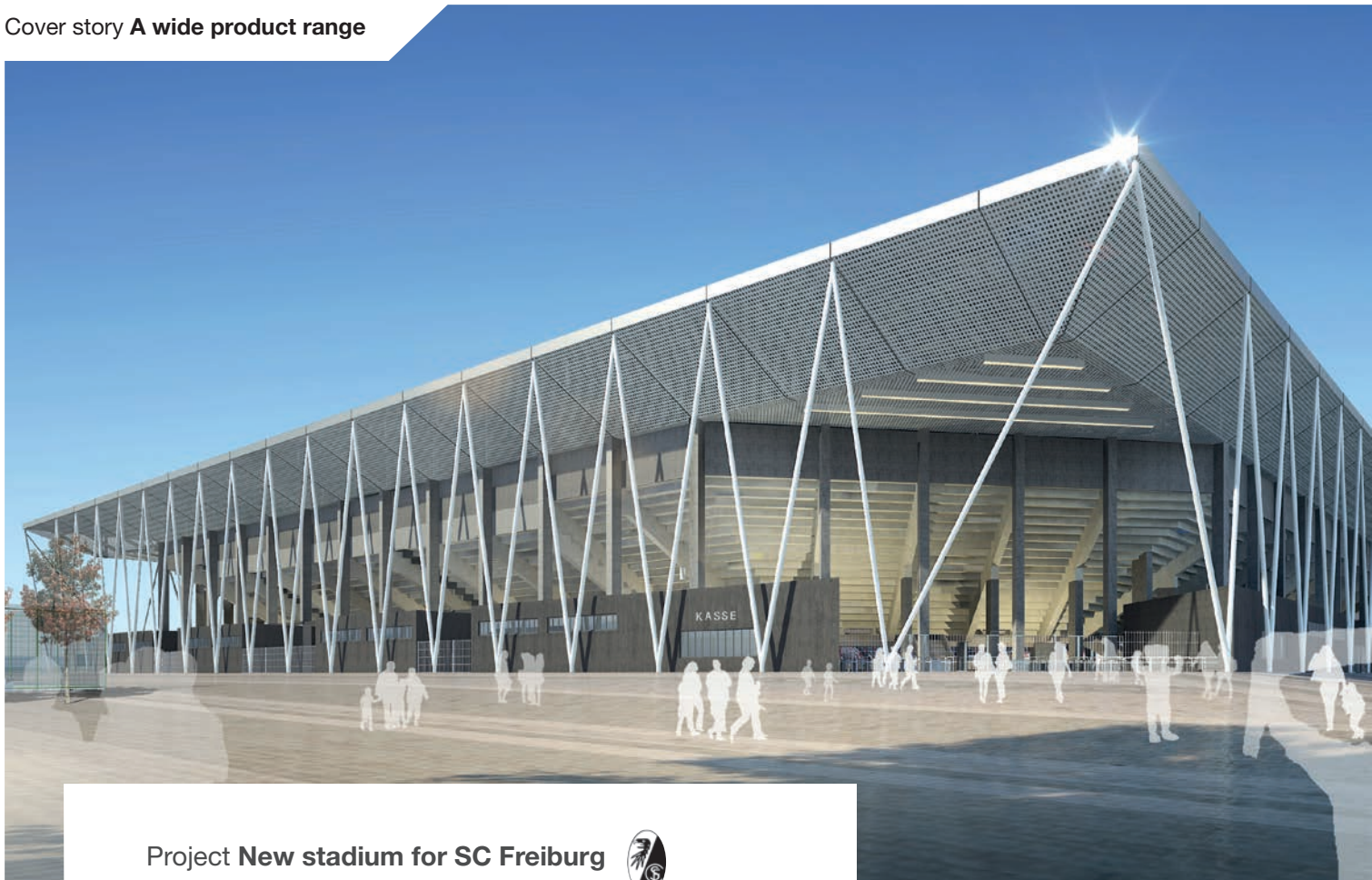
of our strengths that we can also count on in the future, regardless of whether selling is carried out digitally or in the conventional way.

How will the product range develop in the future?

The current trend is towards increasingly customized components. A batch size of 1 is desired, and short lengths could become a sustainable market trend. In the cost-effective laying of line pipe, on the other hand, we continue to score with our pipes up to 18 meters in length. At the same time, we are qualifying higher grades as substitutes for seamless pipes, for example, and expanding the wall thickness range for the Zap-Lok™ onshore and offshore processes.

Where do you see the biggest challenges for the future?

We will continue to work with our customers in implementing product developments for them. The challenge for us is to identify where long-term recurring demand with corresponding added value will arise for our company and our employees. To have the skilled manpower for this and to do this at production sites in the heart of Germany – with all its advantages and disadvantages – is a major challenge. Experience, manufacturing capability and the powerful MANNESMANN brand will certainly benefit us.



Project **New stadium for SC Freiburg**



Big reception for a special club

In terms of its setting, club and following, football has always been something special in Freiburg. With the building of the new Wolfswinkel Stadium, it is finally gaining a new home.

Anyone who has ever experienced the atmosphere in the Schwarzwald Stadium on the Dreisam River knows that the bar for the new stadium currently under construction is already high: close to the match action, family-minded, emotional and primal football at its best and finest.

Long-planned

Since the Dreisam Stadium barely meets the needs of a modern stadium, whether to modify the existing stadium or build a new one has long been under discussion. In December 2012, Freiburg City Council paved the way for a new development in

Wolfswinkel next to the airfield and the exhibition center, which the people of Freiburg then approved in a public vote in 2015. At the same time, on the website "Stadion-in-Freiburg.de", a detailed catalog of requirements from the fans' point of view was drawn up with the active participation of the fan scene and SC Freiburg backers. It became apparent early on that any anonymous drawing board stadium would be unwanted here.

New stadium with a sense of proportion

Fortunately, this was clear to all those officially involved in this project from the



Left: Alongside their load-bearing role, the columns also dominate the façade's design. Below: The new stadium blends gently and harmoniously into the landscape at Wolfswinkel. Visualisations: © HPP, SC Freiburg



"The decisive factor was our unbeatable lengths of 18 meters, which eliminate the need to chop up the visually dominant façade columns."

Thomas Reinhardt, Regional Sales Manager

very beginning. After a judicious review of the situation, it was obvious that what was wanted was not oversizing or economic megalomania that would commit the club to (international) success, but a design that would accommodate all the interests of the fans, the club and all the backers on a single site, or more precisely, under a single stadium roof. And this taking long-term account of possible stints in the second division.

Competition for the new stadium

For the building project, a competition was held to obtain a suitable architectural design. The result was to be an out-and-out football stadium with direct proximity

to the action and a capacity of around 35,000 spectators. At the top of the wish list was a large standing-area terrace, as in the existing Dreisam Stadium, which continues to make football an affordable and close-up experience.

Unanimous jury verdict

From the submissions, the jury unanimously chose the design by HPP Architekten GmbH in Düsseldorf. In August 2017, Stadion Freiburg Objektträger GmbH & Co. KG, a joint venture of the city of Freiburg and SC Freiburg, commissioned Köster GmbH in Osnabrück to serve as general contractor for the realization of the new construction project.



Foto: © Klaus Polkowski

Image gallery on the web

An extensive image gallery of construction work and a webcam can be found on the web at magazin.mannesmann-linepipe.com





Architecture of the essential

The winning design of the Düsseldorf architects envisages a building corpus with a clear and timeless elegance that blends gently into the landscape. The architecture focuses on the essential: a clear structure, short distances, openness and transparency.

The entrances at the corners open onto the forecourts with ground-level admission on all sides, forming a seamless transition to the stadium's surroundings. The stands are arranged to offer spectators an ideal view of the pitch and generate a powerful atmosphere by creating a cauldron effect. "After all, the emphasis is on a shared experience for all fans," says Antonino Vultaggio, partner at HPP. "The decisive factor was to meet the requirements of equal treatment of all spectators and to make football experienceable in the stadium from any place at any time."

Tubes play crucial structural and design role

Mannesmann Line Pipe supplied around 530 metric tons of HFI-welded steel tubes for the façade structure that dominates the design. These tubes play an important structural and certainly the decisive design role in the new stadium's outward appearance. "The crucial factor was our unbeatable lengths of 18 meters, which eliminate the need to

chop up the visually dominant façade columns," says Thomas Reinhardt, who, in cooperation with Bernd Hollaender from tube dealer ProPipe in Willich, supervised the project on behalf of Mannesmann Line Pipe.

The tubes produced in steel grade S355J2H were fabricated in the dimensions 406.4 x 20.0 mm in 18-meter lengths and 406.4 x 25.0 mm in 10.7-meter lengths in accordance with production standard EN 10210. From Hamm, they were supplied as required to Stahl- und Anlagenbau Schädlich GmbH in Stützengrün.

One-stop shopping for further processing and assembly

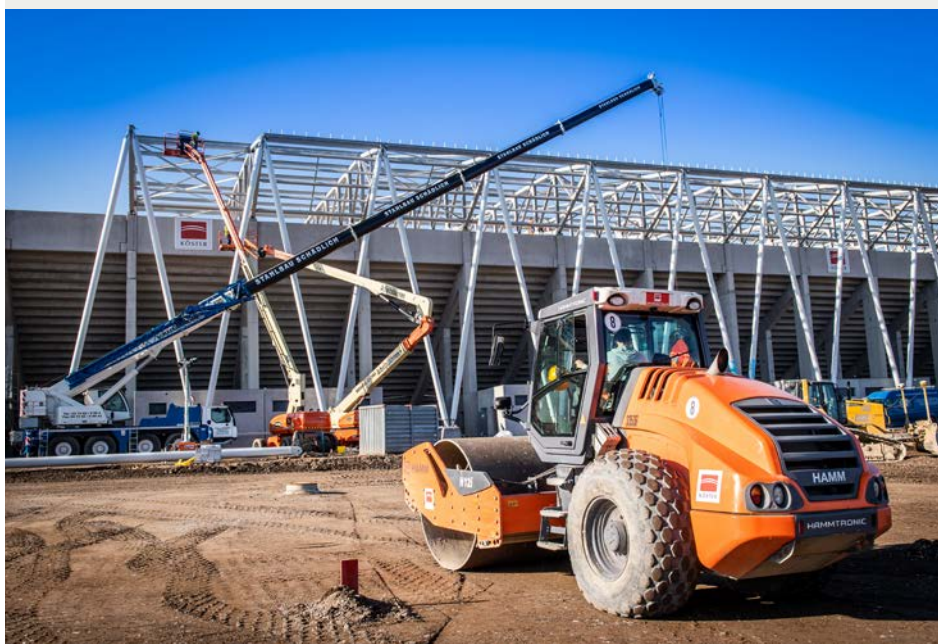
Here the tubes were cut exactly to

"After successful stadium projects, such as recently in St. Pauli and for Ajax Amsterdam, I am delighted that we were also able to serve the new stadium in Freiburg."

Bernd Hollaender, ProPipe Managing Director

length and fitted with fork heads before being blasted and painted. The tubes were then transported just-in-time by truck to the construction site in Freiburg. There the tube structures were brought into position with mobile cranes and the fork heads attached to the roof and ground with suitably fabricated bolt connectors.

Hollaender was very impressed immediately after erection of the first façade columns: "In recent years we have supplied many well-known stadiums with tubes. The new arena at Wolfswinkel, however, is a special project for a very likeable club. I'm already looking forward to meeting up with Messrs. Reinhardt and Schädlich to watch the first game there."



Above: At Stahl- und Anlagenbau Schädlich GmbH, the tubes were fitted with fork heads before being shot blasted and painted.

Photo: © Stahl- und Anlagenbau Schädlich GmbH

Left: Schädlich also handled the erection of the tube structures on site.

Photo: © Klaus Polkowski

New home for the friendliest Bundesliga football club

Sport-Club Freiburg e. V. was founded on May 30, 1904. The club has always been known for its continuity and solidity. Since 1991, for example, the club has only employed four coaches. One of them was Volker Finke, the coach with the longest term of office in German professional football (1991 to 2007). By comparison, Hamburger Sportverein (HSV) can “boast” 25 changes of coach over the same period.

Bundesliga champion of hearts

It is unlikely that Freiburg will win the championship in the foreseeable future – but the champion of hearts it has long become.

TU Braunschweig conducted a representative survey in 2019, carrying out over 4,000 interviews of individual football fans. On the strength of such factors as tradition, authenticity and regional loyalty, the “small” club from the Breisgau region won the “title” with ease.

From the Dreisam to Wolfswinkel

Since 1954, the home ground of SC Freiburg has been the Dreisam or Schwarzwald Stadium, which can accommodate around 24,000 spectators. In many respects, it barely meets either modern requirements or the stadium regulations of the German Football League. In December 2012, Freiburg City Council voted in favor of a new stadium.

New stadium and much more besides

The overall design also envisages new offices and training and functional rooms for the professional and U23 teams as well as a fan shop. In addition, a training ground with two full-size pitches and goalkeeper training areas will be built in the stadium's immediate vicinity along with circulation and parking areas for cycles, cars and buses.

The business, conference and event areas within the stadium are

designed to be used independently during and outside football matches. The VIP areas on the upper floors are located in a projecting structure that forms a covered entrance area, thus identifying the main building.

A total of around EUR 80 million will be invested in the stadium, training grounds and parking spaces required under building law. Added to this are infrastructure costs of around EUR 55 million. In addition to the cost of roads and pathways, these include expenditure on expert opinions, ecological compensation measures and further extra parking spaces.

Opening for the 2020/2021 season

The new home venue at Wolfswinkel for a 34,700 capacity is scheduled to open in the coming season. More than a third of this is standing space, which makes football, as in the Dreisam Stadium, a still affordable touchline experience.



MSH sections

New sales strategy for shorter delivery times

To boost sales of MSH sections, Mannesmann Line Pipe has been teaming up with Salzgitter Mannesmann Handel since 2019. Customers are the main beneficiaries of the new sales approach.



Left: For Amager Bakke in Copenhagen, probably the world's most innovative waste incineration plant, Salzgitter Mannesmann Line Pipe has supplied almost 800 metric tons of HFI-welded steel tubes and MSH sections for the load-bearing ski slope structure of the approximately 31,000 m² roof.



"We shall be marketing this top-class German-made branded product more aggressively and more broadly than up until now – also, of course, via our digital trading platform, the e-SHOP."

Mathias Berger, Product Manager Tubes
Salzgitter Mannesmann Stahlhandel

Recent sales figures for the MSH sections product area were no longer in line with expectations. Thorsten Bösch, the responsible business area manager: "We felt that this stood in stark contrast to our top-flight products using grades that are second to none. With available lengths of up to 16 m and wall thicknesses of up to 25.4 mm, they are in use worldwide because of their outstanding quality."

Sales and distribution now within the Group

However, the search for new distribution channels was not particularly difficult. In Salzgitter Mannesmann Handel, Mannesmann Line Pipe quickly found a Group-owned partner with a broad international base, which is further strengthening its own position as a full-range supplier by marketing MSH sections.

MSH sections are hot-rolled, square or rectangular structural steel hollow sections that are used in steel construction, machine and plant manufacture and for foundation structures in the offshore wind industry and in many other fields.

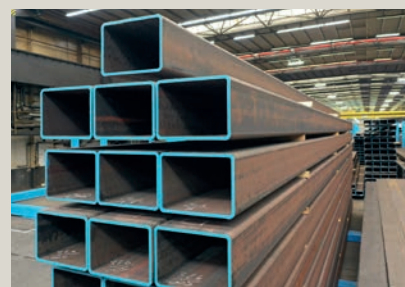
New warehousing capacity

To be able to supply customers more directly and faster and to replenish stocks at its own warehouses, Salzgitter Mannesmann Stahlhandel has established its own warehouse at the Mannesmann Line Pipe production location in Hamm. "From a logistical point of view," says Bösch, "the Hamm location with its optimal road and rail links is an outstanding national and international hub. This means that we can now work together in satisfying even larger-scale requirements and framework agreements from stocks."

Marketing also goes digital

At the same time, traders aim to spotlight the products more strongly. Mathias Berger, Product Manager Tubes at Salzgitter Mannesmann Stahlhandel: "We shall be marketing this top-class German-made branded product more aggressively and more broadly than up until now – also, of course, via our digital trading platform, the e-SHOP."

This also includes, incidentally, the



New MSH section warehouse Hamm

To supply customers faster with MSH sections, Salzgitter Mannesmann Stahlhandel has established a warehouse at the Mannesmann Line Pipe production location in Hamm.

MSH section product portfolio

All key information on sizes and grades can be found on our website.



new MHQ product generation. These high-strength and specially heat-treated tubes and profiles can withstand higher loads while achieving significant weight savings.

Exceeded expectations

The new sales partnership kicked off with a workshop in Hamm in January 2019. To ensure smooth cooperation in day-to-day business right from the outset, employees from trading, production, logistics and customer advice came together to meet face-to-face and discuss all technical and logistical processes. In the meantime, over 70 sales staff and product managers from Salzgitter Mannesmann Stahlhandel and Salzgitter Mannesmann International have undergone training in all aspects of MSH section product expertise.

The success of the measures taken is already reflected in sales figures: "The tonnage planned for 2019 has already been exceeded by a wide margin. In our view, customers have fully endorsed our new strategy," Bösch concludes.

Hydrogen applications

Hydrogen technologies – laying foundations today for tomorrow

If the energy turnaround is to succeed, so-called sector coupling, i.e. the interlinking of electricity, heat and mobility, is crucially important. H2ready products from Mannesmann Line Pipe could play an important part in this.

"As in all other areas, we are very well networked in research and applications development in the hydrogen field," says Managing Director Andreas Betzler. Mannesmann Line Pipe is actively involved, for example, in the Energy Agency.NRW network, cooperates with TÜV and the Fraunhofer Institute, and is strongly integrated in Salzgitter AG's group-wide activities.

Transition to series maturity

The excellently attended customer symposium in Siegen in December 2019 with its top-flight specialist lectures also ensured a lively exchange of ideas. The Mannesmann Line Pipe product

portfolio for the transport and storage of hydrogen was also presented on this occasion. Numerous products developed to market maturity are available for the energy sector, industry, mobility and buildings. "We are not a silent market observer here, but see ourselves as an active partner who contributes constructively to our customers' energy turnaround," Betzler continues. "We are already transitioning from research and testing to series production implementation on an industrial scale." There are already plenty of examples of this.

Hydrogen finally comes into play

The rail network in Germany is around



Excellent network

With its H2-ready program, Mannesmann Line Pipe offers a broad range of products for hydrogen applications.

To promote developments within the framework of the energy turnaround, we have established an efficient network from research to trial right up to implementation. This includes renowned companies from the following areas:

- Chemical industry
- Gas network operators and suppliers
- Automotive industry
- Plant operators
- Research institutes
- Engineering offices

In addition, we have holdings in the networks of Hypos, the DVGW (German Gas and Water Association), the DWV (German Business Association), the EnergieAgentur.NRW (EnergyAgency NRW), the Salcos® project of Salzgitter AG and the IRO (Institute for pipeline construction at Oldenburg Technical College), and we cooperate with inspection societies.



Manuel Simm, Konrad Thannbichler and Dominik Eichbaum, business development department of Siegen municipality, trying out the new hydrogen filling station in Siegen

Photo: © Mannesmann Line Pipe GmbH



The Coradia iLint marks Alstom's launch of series production of hydrogen-powered trains.

Photo: © Alstom/Rene Frampe

“With our H2ready products we see ourselves as an important link in the coupling of sectors.”

**Andreas Betzler, Managing Director
Mannesmann Line Pipe**



34,000 kilometers long. 40 percent of this is not electrified and is operated with diesel engines. The rail vehicle manufacturer Alstom has been operating the world's first two hydrogen trains since 2017. The regional trains powered by fuel cells connect Bremervörde, Cuxhaven, Bremerhaven and Buxtehude. By the end of 2021, the line's entire diesel train fleet is to be replaced by 14 hydrogen trains. Track sections in Hesse and NRW will soon follow, and Alstom is on the verge of series production of the Coradia iLint.

Carbon-free public transport from waste

The public utility company Stadtwerke Wuppertal (WSW) and the waste management company Abfallwirtschaftsgesellschaft (AWG) are soon to put ten regular buses powered by fuel cells on the road. The vehicles will receive their hydrogen emission-free from the

ultra-modern waste-to-energy plant in the south of Wuppertal. The daily hydrogen requirement is around 400 kilograms, which the waste-to-energy plant can reliably supply 365 days a year. In this way sustainable energy for public transport is generated from regional waste. After Wuppertal, for example, the waste-to-energy plant in Frankfurt – integrated in a project with the energy supplier Mainova – is also set to start producing hydrogen. The Allgäu also aims to become a hydrogen region. An analysis of potential shows that up to 1,000 metric tons of green hydrogen could be produced per year in a waste-to-energy plant and a hydro-power plant.

Hydrogen filling stations

However, so that buses, garbage collection vehicles and private cars can refuel with hydrogen, filling stations are needed. One such station has been in

existence in Siegen since June 2019, the first of its kind in southern Westphalia and one of currently 16 in North Rhine-Westphalia. Over 100 filling stations are planned for Germany by the end of 2020. Given a total of 1,000, about one in 15 filling stations would supply hydrogen. Then one could speak of a nationwide supply – provided there is enough hydrogen available.

The future of intralogistics

In-plant transport plays an increasingly important role in manufacturing companies and the trade sector. The intralogistics industry is therefore more advanced than many others when it comes to hydrogen/fuel cells. With its annual fruit and vegetable turnover of around 270,000 tons, the Paris Prelodis logistics center, for example, is Europe's first 100-percent hydrogen location. "We were motivated by potential cost savings, ease of use, lack of battery

charge room and also the enthusiasm to open a new site with innovative technology", says Philippe Giroux, CEO Preloadis, Prelocentre Group. The Mercedes Benz plant in Düsseldorf, the BMW plant in Leipzig and DB Schenker in Linz are also setting new standards in hydrogen-based intralogistics. In the meantime, all well-known manufacturers of industrial trucks now have hydrogen-based pallet trucks, tractors and forklifts ready for series production.

Excess electricity in the grid

The production of hydrogen is energy-intensive. In the case of "gray" hydrogen (see glossary p. 19), the production of a single metric ton generates around 10 tons of carbon. With carbon-neutral energy from the wind and sun, however, previously undreamt-of possibilities are now opening up for the production of "green", i.e. carbon-neutral, hydrogen. Peaks in solar and wind power are already producing surplus electricity today. Using these periods for "dynamic electrolysis" offers enormous opportunities. So the industrial-scale pilot plant of the electricity grid operator Amprion with the gas pipeline operator Open Grid Europe (OGE) has come at just the right time. A hydrogen electrolysis plant with an output of 100 megawatts is to be built in Lower Saxony. Electricity producers can then use this to convert surplus wind power into hydrogen that can be stored and transported.



Photo: © Laurence Chaperon

"The future belongs solely to green hydrogen. In the National Hydrogen Strategy we should think green, global and big."

Anja Karliczek, Federal Research Minister

Pioneer Salzgitter AG

Steel production is also energy-intensive. In terms of process engineering, there is basically nothing that can be changed. Salzgitter AG has therefore decided – as the world's very first steel producer – to decarbonize its steel production using green hydrogen. Hydrogen is to replace coke and coal in the extraction of iron, while the hydrogen itself is to be produced in a climate-neutral process using electricity from renewable energies. To this end, seven wind turbines are to be commissioned on the Salzgitter AG Group premises in 2020, generating around 400 standard cubic meters of hydrogen per hour (scm³/h). In the first stage of the project, carbon emissions have been reduced by as much as 26 percent. If steel production were converted in its entirety to the new process route

with direct reduction plants, electrolyzers and electric arc furnaces, a reduction of up to 95 percent would be possible.

National hydrogen strategy

The issue has also been addressed on the political level, as is demonstrated by the "National Hydrogen Strategy" planned by the Federal Government. This strategy is intended to dovetail climate, energy, industrial and innovation policy.

"The future belongs solely to green hydrogen", said Federal Research Minister Anja Karliczek recently in an interview with the Handelsblatt. "In the National Hydrogen Strategy we should think green, global and big," she insisted.

This was echoed by her fellow cabinet member Peter Altmaier at the Hydrogen and Energy Transition Conference in Berlin on 11/5/2019: "Gaseous energy carriers, and especially hydrogen, will be a key resource for a successful energy transition in the long term. At the same time, the generation of carbon-free and carbon-neutral hydrogen offers great opportunities for industrial policy. It is up to us to seize these opportunities and lay the foundations today for Germany to become the world's No. 1 in hydrogen technologies."



The BMW Group plant in Leipzig has been operating a large fleet of hydrogen-powered indoor factory trains since the end of 2018. These are used in production to supply the assembly lines with vendor parts.

Photo © BMW Group

Salzgitter AG is the first steel producer in the world to have decided to decarbonize its production process by using green hydrogen.

Photo: © Salzgitter AG



It therefore comes as no surprise that there are now numerous research and funding programs from the ministries. In the field of hydrogen technology, the Federal Ministry of Education and Research (BMBWF) is funding highly innovative approaches to production, transport and use to the tune of 180 million euros until 2021. In addition, over 300 million euros is available from the climate fund until 2023.

Research for the future

Mannesmann Line Pipe will also continue its research and development efforts. Current projects include

- Material behavior with a high hydrogen content in natural gas
- Material behavior with extreme load fluctuations
- Interaction of linings in a hydrogen atmosphere

"We do not want to rest on our laurels, because with our H2ready products we see ourselves as an important link in the coupling of sectors. The transport, distribution and storage of hydrogen will be all-important in a future hydrogen economy across all sectors," Andreas Betzler concludes.

www.mannesmann-innovations.com



Further information on our Mannesmann pipes for hydrogen transport and storage can be found on our website www.mannesmann-innovations.com

Hydrogen glossary

Hydrogen – green, gray, blue, turquoise

Green hydrogen is produced from water by electrolysis, using only carbon-free electricity from renewable energy sources. Production is therefore carbon-free.

Gray hydrogen is derived from fossil fuels. As a rule, natural gas is converted into hydrogen and CO₂ on exposure to heat (steam reforming). The CO₂ is released unused into the atmosphere, thereby intensifying the global greenhouse effect: the production of one ton of hydrogen generates around 10 tons of CO₂.

Blue hydrogen is gray hydrogen, but its CO₂ is captured at source and stored. The CO₂ produced during hydrogen production does not enter the atmosphere.

Turquoise hydrogen is produced by

thermally splitting methane (methane pyrolysis). Instead of CO₂, solid carbon is produced. Essential for carbon neutrality is the use of renewable energy sources and long-term carbon capture and sequestration.

Hydrogen economy

is an energy economy that uses mainly or exclusively hydrogen as its energy carrier. Although hydrogen is a primary energy carrier in chemical terms, its production requires the use of other energy sources. Thus, a hydrogen economy is only as sustainable as the primary energy from which the hydrogen is obtained.

Mannesmann H2ready

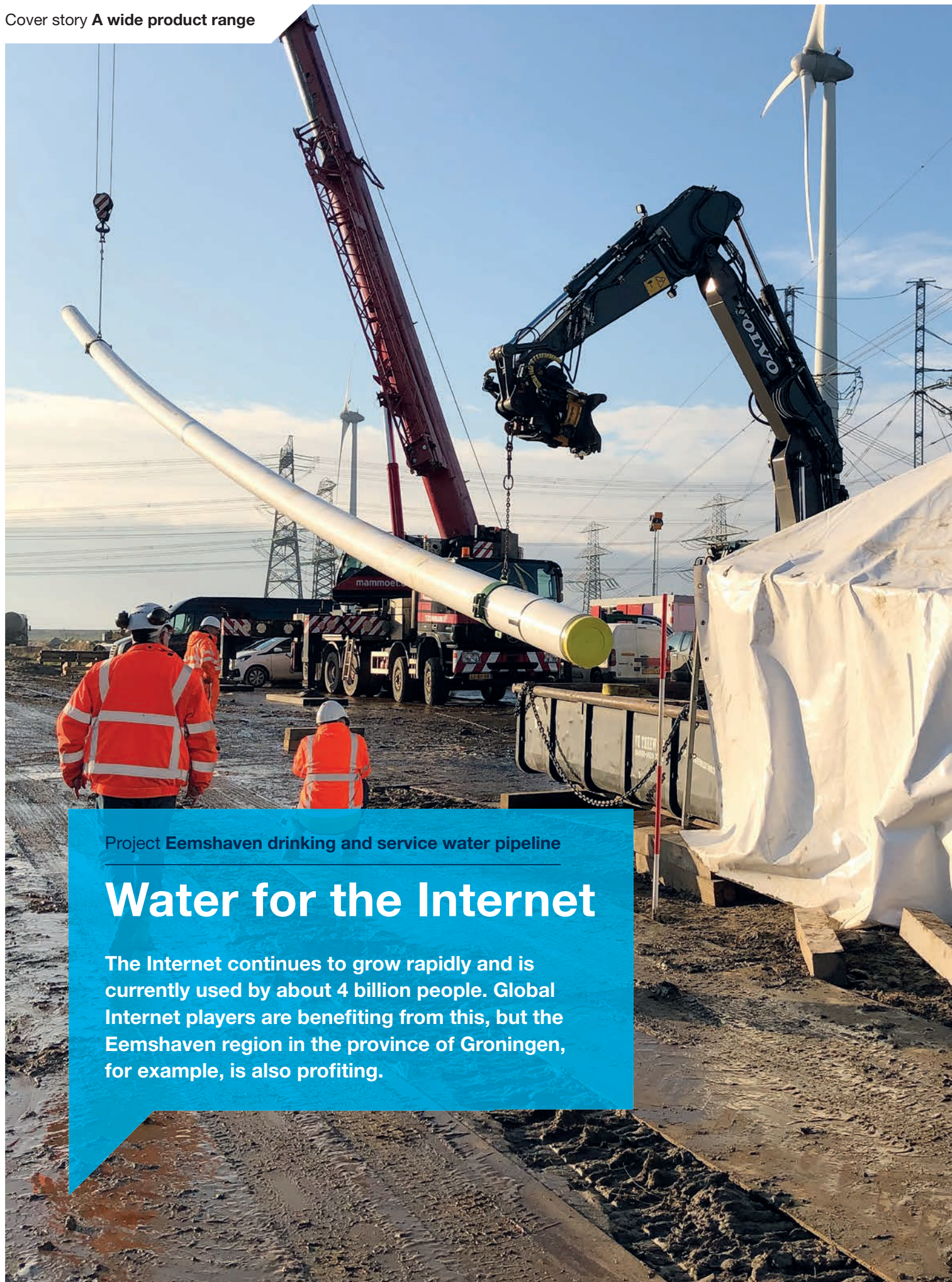
Specially developed and qualified for the

transport of hydrogen, our steel pipes feature mechanical and technological properties that exceed the requirements of the EIGA directive and ensure optimum safety and service life. Further information is available at www.mannesmann-innovations.com.

Fuel cell

Fuel cells do not store energy, but convert it. A fuel cell is a galvanic cell that converts the chemical reaction energy of a continuously supplied fuel and an oxidant into electrical energy.

Although the term fuel cell often refers to a hydrogen-oxygen fuel cell, methanol, butane or natural gas can also be used, depending on the type.



Project **Eemshaven drinking and service water pipeline**

Water for the Internet

The Internet continues to grow rapidly and is currently used by about 4 billion people. Global Internet players are benefiting from this, but the Eemshaven region in the province of Groningen, for example, is also profiting.



"The perfectly sequenced workflow soon made it clear why frictionless logistical services are so important for our client."

Monika Langenbach, Regional Sales Manager

The company Green Box Computing operates a data center in the north-easternmost tip of the Netherlands. The name is not immediately familiar, but if you enter it in the largest Internet search engine – and here we come full circle – the search result takes you to the official website of the Google data centers.

Plenty of electricity. And water.

The huge data centers are rightly associated first and foremost with high power consumption.

Your own PC or smartphone may still be cooled by air, but this is not possible on an industrial scale. Modern data centers and server farms therefore not only have a healthy appetite for electricity, but also an immense thirst for water.

Drinking and service water supply for the Northeast Groningen region

Following the economic development of the region around Eemshaven due to the arrival of several large international companies, the construction of a service water network was started in 2011.

To bring supply security into line with current needs, it is now being expanded further. The aim is to meet the demand for cooling and process water for industry located there while at the same time safeguarding the drinking water supply for the entire Northeast Groningen region.

Customized industrial water treatment

The high demand for service water is met with surface water so as to conserve water sources for drinking water supply.

For this reason, an industrial water treatment plant is being built around 40 km southwest of Eemshaven, which will provide sufficient purified and treated wastewater from an existing purification plant. From there, the water will be fed into the separate service water network and distributed up to 40 km northwards.

In addition to the construction of the water treatment plant, the pipe network also has to be adapted to changing needs. The new drinking and service water pipes are currently being laid in sections.





The PP-coated pipes are guided into the prepared trench.



Testing of the field coating and welded joint.



Power-packed: Eemshaven

Eemshaven plays an important part in the Dutch energy supply. For this is where the converter station for the 80 km long submarine cable linking the Norwegian and Dutch power grids is located.

Eemshaven also functions as a base port for the storage and pre-assembly of components for offshore wind turbines. To date, 16 offshore wind farms have already been built from Eemshaven. For the 316 turbines of the Gemini, Veja Mate, Merkur and Deutsche Bucht wind farms, the port also serves as a maintenance and service base.

Large companies have settled in the region. These include the shipping company Wijnne & Barends Logistics, the waste disposal company Bek & Verburg, the malt producer HollandMalt and RWE.

Frictionless logistical services

Monika Langenbach, the project manager responsible at Mannesmann Line Pipe, inspected the construction work in Eemshaven in the immediate vicinity of the Google data center in December 2019, where she was able to see for herself how the pipes were being welded, field-coated, ultrasonically inspected and trenchlessly laid. "The perfectly sequenced workflow soon made it clear why frictionless logistical services are so important for our client," explains the Regional Sales Manager. "In total, we are talking about more than 200 truckloads." It is principally the large tonnage in conjunction with the just-in-time delivery of the required pipe packages that makes the project highly demanding logistically for all those involved.

Mannesmann Line Pipe was awarded the contract to supply the HFI-welded steel pipes through a Dutch dealer, who in turn commissioned a processor in the Netherlands to apply the cement lining. The entire transport logistics are handled in close consultation with Mannesmann Line Pipe.

The final deliveries are still pending. "Thanks to the efficient coordination of the various parties, however, everything has gone smoothly so far," Langenbach reports.

HFI-welded steel pipes with PP and HDPE coatings

The contract comprises a total of almost 40 km of HFI-welded DN 500 and 600 steel pipes in grade L245N PSL2 to ISO 3183:2012, with a PP coating for trenchless sections and an HDPE coating for open-trench laying. Laying work began in September 2019 and will continue until fall 2020.

Commissioning of the new part of the network is planned for the spring of 2021. The Eemshaven data center will then continue to be reliably supplied with sufficient cooling water so that Google can continue to "keep a cool head".

magazine.mannesmann-linepipe.com/nw



Take a look here at the video on the background, planning and construction.





The Google data center in Eemshaven resembles an industrial complex from the outside.

The Google Eemshaven data center

The Internet is growing rapidly and with it the demand for Google services, with 3.5 billion search queries answered per day, email, Maps and Streetview plus YouTube – a Google subsidiary since October 2006. No wonder, then, that the Internet giant is constantly increasing the number of its data centers. At the beginning of 2020, there were 19 locations spread across North and South America, Europe and Asia. One of them has been located in Eemshaven since 2016. Eemshaven was

in fact the first Google data center worldwide to be powered 100 % by renewable energy sources from day one. The required power comes from the wind farms in Delfzijl and Zeeland (Krammer and Bouwdokken) and from the Sunport Delfzijl solar park.

Google is now regarded as the world's largest purchaser of electricity from renewable sources.

Massive investment

Approximately 250 people are employed at the Eemshaven site,

including IT experts, engineers, security personnel, kitchen staff and facility managers.

EUR 600 million was invested until 2016, and in 2018 an expansion of the campus was announced for EUR 500 million, which was topped up again in June 2019.

In addition, Google is planning another data center in Agriport, a good 200 kilometers away on the IJsselmeer. This will increase Google's total investment in the Netherlands to EUR 2.5 billion.



The Google data center in Eemshaven is powered 100 % by electricity from renewable energy sources.

Photo: © Google



Heat exchangers play an important role in cooling the data center.

Photo: © Google



Project **Tembikai offshore gas pipeline in Malaysia**

Zap-Lok™, a new dimension in offshore pipe-laying

The Zap-Lok™ offshore method promises considerable savings of time and money over pipe-laying using the conventional welding method. In Malaysia, the method has now been used with a pipe wall thickness of 17.5 mm for the first time worldwide. The quality of HFI-welded steel pipes and the results speak volumes.



Employees monitoring pipeline installation work in the control room on the "Timas 1201"



The pipes pressed together to form the pipeline using the Zap-Lok™-method are being laid over a distance of 60 km in the South China Sea.

"After internal consultations we were sure that we would be able to achieve certification for this new dimension as well."

Nils Schmidt, Regional Sales Manager



The Tembokai oil and gas field is located about 150 km off the east coast of the Malaysian peninsula. Located under 70 m deep waters, it is a so-called marginal oil and gas field and is being developed by the state-owned Malaysian energy company Petronas Carigali. Oil production started in October 2015, and the gas development project was launched in 2018. Vestigo Petroleum, a subsidiary of Petronas Carigali, plans to start gas production in the course of 2020.

Connection via a 60 km long offshore pipeline

To develop the field, it was to be connected via a 60 km pipeline to a drilling platform already installed in 2018/2019. To plan and implement the extensive

measures, the Malaysian company Alam Maritim Resources Berhad was awarded the contract, in a consortium agreement with Cortez Subsea, for the engineering, procurement, construction, installation and pre-commissioning of the new pipeline in April 2019.

Activation of the best connections

The Scottish subsea services and technology company Cortez Subsea had already been championing the Zap-Lok™ process in Malaysia for several years. Alam Maritim Resources Berhad had long-standing contacts in the region and was very interested in constructing the pipeline using the economically attractive Zap-Lok™ process.

For this project, however, a challenge arose in the calculation of the pipeline

dimensions: An outside diameter of 323.9 mm required a wall thickness of 17.5 mm – a size that had never previously been realized using the Zap-Lok™ process.

Top priority was therefore initially accorded to a lively and direct exchange of information between customers, end users and the experts at Cortez Subsea, NOV Tuboscope and Mannesmann Line Pipe.

Nils Schmidt, the responsible Regional Sales Manager at Mannesmann Line Pipe: "We were able to test and verify the suitability of the Zap-Lok™ connection for offshore use to high safety standards several years ago. After internal consultations we were sure that we would be able to achieve certification for this new dimension as well."

"All in all, we managed to cut laying costs by about 30% over the method using conventional welding."

Alasdair Cowie,
CEO Cortez Subsea Ltd.



The pipes produced at Mannesmann Line Pipe's Hamm site were given a special groove and chamfer.

Complete faith in our own skills

With the envisaged pipe wall thickness of 17.5 mm, this was "new Zap-Lok™ territory" for everyone involved. First of all, the new wall thickness required a brand-new unit, which NOV Tuboscope supplied at short notice from the USA to the Mannesmann Line Pipe site in Hamm.

But that was not all: Because of the highly ambitious schedule, it was clear from the outset that both the pipes for testing and qualification on the end user's site and the pipes for the actual customer order had to be produced in a single batch.

Nils Schmidt: "We took the full risk. However, we were absolutely certain that the predicted material behavior of the new wall thickness would be confirmed in practice."

Production of the new Zap-Lok™ connections

Within a few days, the pipe connections destined for qualification were first produced on the new unit. For this purpose, the pipes were widened to produce a socket at one end, and a matching groove and chamfer were machined at the other end.

"The load results immediately spoke for themselves," says Abdulla Kocatürk of NOV Tuboscope, still very enthusiastic in retrospect. "Now we only had to have the internal results verified."

Extensive quality tests

As soon as possible, the finished test joints were therefore subjected to extensive tests to determine their pressure resistance at the Salzgitter

Mannesmann Research Center in Duisburg and at the RWTH in Aachen. A 15-strong delegation of customers and end users eagerly awaited the results. The resultant burst pressures significantly exceeded the requirements of customer specifications, so there were no more technical reservations.

Further processing shared between Siegen and Hamm sites

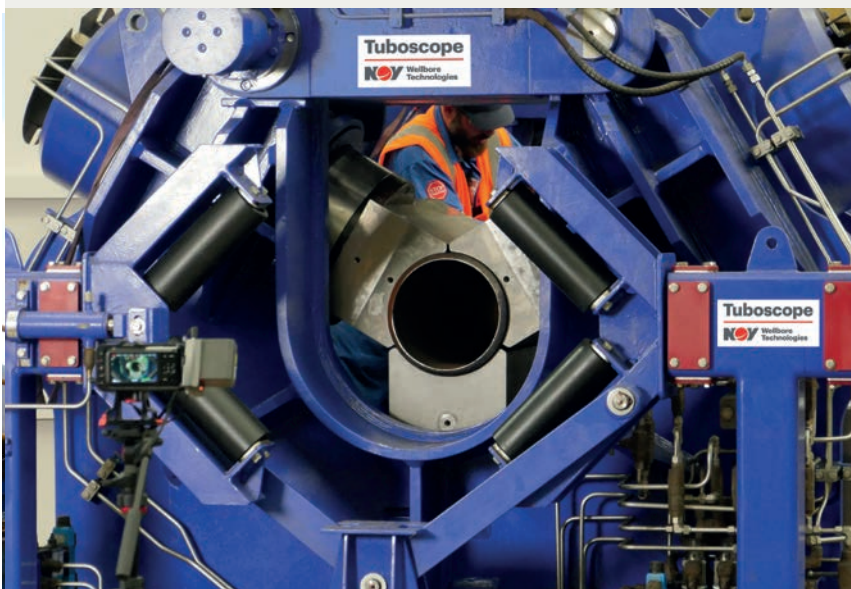
So as to meet the tight time window for delivery to the Far East, the subsequent application of the HDPP plastic coating in a three-layer process was shared between the Siegen and Hamm sites. Between August and November 2019, the consignment first went by train and truck from Hamm and Siegen to Brake and from there by ship to Malaysia.

Pipe-laying from the Timas 1201

To lay the pipeline, the Timas 1201 was used, an optimally suited multi-purpose heavy-duty pipe-laying vessel. Before the pipe-laying operations could be started, the equipment necessary for producing the weld-free Zap-Lok™ connections was installed on board.

High-tech assignment even underwater

The use of state-of-the-art underwater cameras meant that no divers were needed for installation. The application



NOV Tuboscope supplied the brand-new unit for the production of Zap-Lok™ joints from the USA to Mannesmann Line Pipe's Hamm site at short notice.



The Zap-Lok™ project team in Hamm jointly reviewing the initial results of the 3-layer plastic coating

enabled high-precision measurements underwater with an accuracy of +/- 1 mm. This ensured maximum precision and speed for pipeline crossings, connections and surveying work. The data generated in this way were additionally used to create a 3D visualisation of the finished pipeline. Among other things, this will serve as a basis for future inspections.

Huge cost savings

The installation of the pipeline with a total of 5,100 Zap-Lok connections was completed within 20 days at an average laying rate of 4.7 km per 24 hours.

Alasdair Cowie from Cortez Sub-sea sums it up: "The mutual trust of all those involved made the project a complete success. All in all, we managed to cut laying costs by about 30% over the method using conventional welding."



Image gallery on the Web

An extensive image gallery on the project can be found on the Web at magazine.mannesmann-linepipe.com/zi



The Zap-Lok™ laying process

The pipeline was laid using the patented Zap-Lok™ connection developed and patented by NOV-Tuboscope. The system enables a weld-free, semi-autonomous laying process and offers several advantages:

Tested safety

Zap-Lok™ technology is proven and safe with over 7,000 km of pipelines laid and more than 70,000 flawless connections. The mechanical alternative results in higher occupational safety and requires neither welds nor X-ray tests.

Speed

With the weld-free Zap-Lok™ method, approximately 3.5 to 5 km of pipeline can be laid in 24 hours. This is about three and a half times faster than the conventional method.

Lower cost

The method not only reduces the number of ship charters, but also lowers manpower costs enormously. With Zap-Lok™, cost savings of up to 40 % are possible.

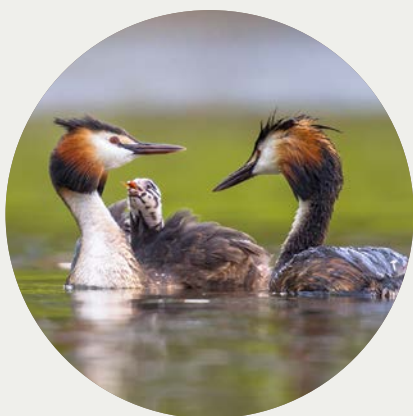
The method is particularly suitable for shallow waters and for water depths of up to 90 meters. The pipe diameters extend to 406.4 mm and wall thicknesses currently up to 17.5 mm. HFI-welded pipes from Mannesmann Line Pipe can be provided with various coatings and linings to suit customer requirements and specifications. Customized solutions are standard in this product segment as well.



Project **BerraVia**

Bypass for a highly sensitive natural landscape

It is not always easy to reconcile nature conservation and economic interests. A good example of how it can be done is the "BerraVia" project in southern France. HFI-welded pipes from Mannesmann Line Pipe have a big hand in this.



At the beginning of 2000, the French company Géosel-Manosque started to rehabilitate its pipeline network from the 1960s and 1970s. In the meantime, almost 70 kilometers of pipes between Lavéra and Manosque have already been replaced.

The "BerraVia" project is a section of the GSM 1 and GSM 2 Géosel-Manosque hydrocarbon and salt-

water pipelines laid more than 50 years ago, when the parallel pipelines in this section were laid for economic reasons through the lagoon "Étang de Berre" as the shortest direct route.

Salt marshes and bird protection

The Étang de Berre area is a unique natural landscape of lagoons, wetlands and limestone hills. Covering

Work in the highly sensitive areas only took place outside the nesting season. In the salt marsh area, the trench for the new sections of GSM 1 and GSM 2 was temporarily secured with sheet piling.



some 3,000 hectares, it is the habitat of over 350 bird and 50 mammal species, 135 butterfly species and numerous plant species, several of which are endemic, i.e. not found anywhere else in the world.

New pipeline route due to EIA

Following a comprehensive environmental impact assessment, a new route was therefore plotted. The new route no longer bisects the lagoon, but passes overland to the west and north of the small town of Berre l'Etang. Around 60 % of the new route uses existing pipeline corridors.

1,480 pipes with HDPE coating

The DN 500 steel pipes produced by Mannesmann Line Pipe in wall thicknesses of 8.0 mm, 10.0 mm and 12.5 mm were made from L415ME and coated with HDPE. The roughly 2,200 metric tons were distributed among 1,480 pipes, which were delivered in batches to a central stockyard in Rognac in southern France. For their intended use, they are approved for operating pressures of up to 80, 103 and 120 bar, depending on wall thickness.

Start of work in November 2018

The pipe-laying work was contracted to Eiffage Infrastructures and the laying of the pipeline to Denys France. The new pipelines were laid one meter below the surface level, and 1.5 m deep at intersections with railways or roads.

There will be no restrictions on future agricultural activities such as wine-growing, and olive and almond tree plantations. The laying was carried out here at a depth of 1.2 meters.

Close cooperation with nature conservationists

Ecologists and ornithologists were involved in the planning and assessment of the pipe-laying process from the very beginning. In order to allow for bird nesting periods, no work was therefore carried out in the sensitive

landscape areas between spring and autumn 2019. The final pipe-laying work is scheduled for completion in the course of 2020.

In most pipeline sections, it already looks as if nothing had happened. And thanks to the break, the birds should have noticed almost nothing of the elaborate laying work. Operation accomplished, bypass successfully laid.



Géosel – one of the largest companies for the transport and storage of fossil energy in Europe

Géosel has a total of 26 caverns for fuels such as heating oil, diesel, naphtha, "super" gasoline and kerosene with a storage capacity of approximately 9 million m³. Another seven caverns are connected to the methane gas terminal in Fos sur Mer and are used for the storage of natural gas with a volume of 2.5 million m³. In addition, there are two brine caverns and around 400 km of pipelines linking the local refineries and petrochemical complexes with each other and with the national and international pipeline grids. The fuels to be stored are piped from Fos/Lavéra to the pump station in Rognac at 70 bar operating pressure before being fed into Géosel's storage facilities located at a depth of up to 1,000 m.



1. Ireland

Dr. Juri Rosen, Kevin Kroh and Thorsten Bösch visiting Liebherr Container Cranes Ltd. in November 2019. Also in the picture (from the left): Dan O'Connor and Garvin Cronin



2. Germany

Dr. Holger Brauer attended the 5th HY-POS Forum on the energy transition and hydrogen in Dresden on November 5 and 6, 2019.



The roughly 200 attendees received news on the topics of the energy transition and hydrogen.



2. Germany

Booth personnel at the Oldenburger Rohrleitungsforum on February 13/14, 2020



9. USA

Participation in OTC, Houston, in May 2019, with Olesja Krüger and Michael Kosfeld accompanied by Bob Moore, Kurt Swendson and Phillip Meiser, Salzgitter Mannesmann International (USA)



2. Germany

"H2ready and Gas/Oil Line Pipe" conference, on December 5 and 6, 2019 in Siegen



2. Germany

Kevin W. Howard, C.P.M. Plains All American Pipeline, in Siegen on October 17 during project acceptance with Olesja Krüger and Michael Bick



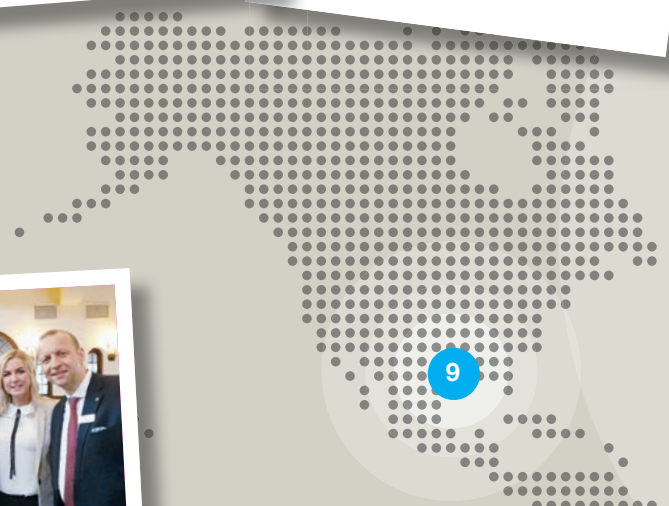
8. Spain

Michael Kosfeld and Henning Zitterich, Mannesmann Grossrohr, on a visit to Grupo Cunado in Madrid



2. Germany

The "Netbeheerders Gasunie", members of the network monitoring team, on October 11, 2019 in Siegen



On the go –
from global to local



3. Netherlands

Site visit in connection with the Air Liquide "NODBOZ" project in Bergen Op Zoom on May 22, 2019



2. Germany

Marion Pulverich and Thomas Reinhardt paid a visit to MDM Schweisstechnik GmbH in Marl on May 23, 2019 to send off Hermann Kotziers who went into well-earned retirement after 54 years of service.



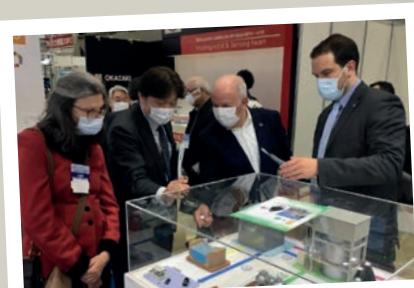
2. Germany

Customer visit by BE Group employees in Siegen on November 18/19, 2019. From the left: Thorsten Bösch, Dr. Juri Rosen, Kevin Kroh, Jarkko Mantila, Olof Berghell and Tom Lönnröth



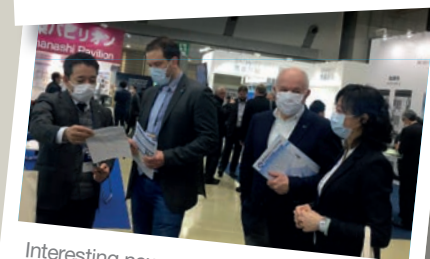
4. Austria

Celebration of the 25th anniversary of ALPE Kommunal- u. Umwelttechnik GmbH & Co KG in Stams, Tyrol in September 2019

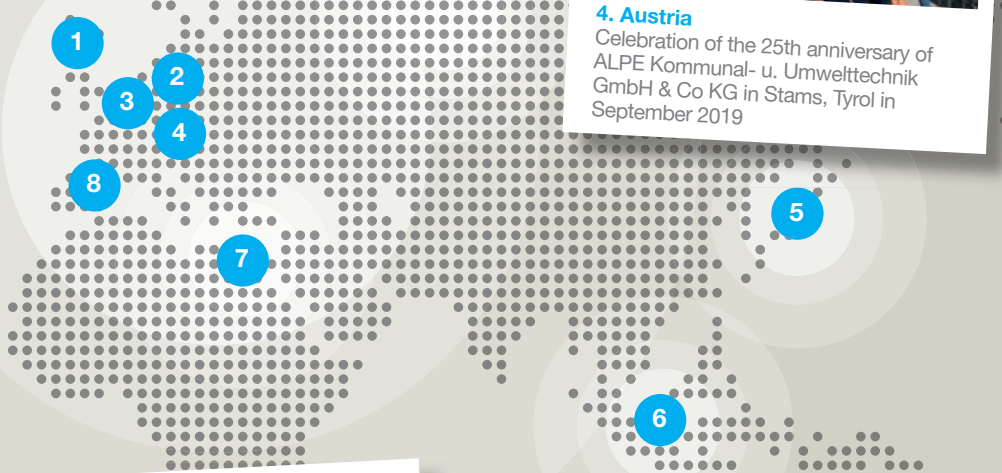


5. Japan

Manuel Simm in Tokyo for the 16th Int'l Hydrogen & Fuel Cell Expo – FC EXPO 2020 from February 26 to 28, 2020



Interesting new contacts despite the difficult conditions



7. Egypt

Andreas Betzler, Roger Menneking and Konrad Thannbichler handling an order in Cairo in December 2019



Appraisal of the construction work on the Grand Egyptian Museum in Giza. Mannesmann Line Pipe supplied round and square MSH sections for the 800 m long façade.



6. Malaysia

At Vestigo Petroleum in Kuala Lumpur in August 2019. Outside: Nils Schmidt and Michael Bick. From the left: Erik Larsson and Dr. Benjamin Chapman, NOV, Ir Muammar Gadafi Othman, Mas Nazli Aziah Mohd Adnan, Vestigo Petroleum, and Charlie Hughes of Cortez Subsea Ltd.

Legal notes

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