HFI GLOBAL

The magazine of Salzgitter Mannesmann Line Pipe for customers and partners

SALZGITTER MANNESMANN LINE PIPE
A Member of the Salzgitter Group

Issue 05 · March 2012

Cover story: Innovations

MLP INNOVATIONS

New dimensions, higher-strength grades, new applications, more opportunities

Dear Readers

This new issue of our magazine for customers, partners and other interested readers is again devoted to a central theme. After "renewable energies" in our last issue, we're now spotlighting "MLP innovations" in this one.

Innovations are not just ideas or inventions. Innovations in the true sense can only be termed such when new products, services or processes also make their mark on the market. Innovations therefore always need a certain degree of lead time. In this issue you can read all about what has recently been going on at Salzgitter Mannesmann Line Pipe in the fields of products and possible applications.

The cover story merges seamlessly into our projects. Again we wish to keep you abreast in this area.

The term "innovative" is applicable not only to our new polyamide coating, but certainly also to the successful trenchless technique used in a pipe-laying project in the Bavarian Forest.

Staying in Germany, we now switch from the mainland to the breezy North Sea. For the North Sea East wind park, we have teamed up with our sister Salzgitter Mannesmann Grobblech in supplying specially developed S-bends that make the installation of the wind park not only simpler but also more cost-effective.

From the high seas, we make an excursion literally into the Alps. For the northern approach of the Brenner Base Tunnel, a project of the century, we and our Austrian distributor, ALPE Kommunal- und Umwelttechnik, have supplied the extinguishing water pipes for the tunnel of the new Lower Inn Valley Railway of ÖBB (Austrian Railway).

Then back to and into the water, this time in the Netherlands. The district heat pipeline through the IJmeer demonstrates unconventionally but successfully that the shortest route may not always be the simplest but may nevertheless be the best route.

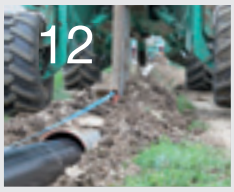
Staying on the water, we then accompany our HFI-welded steel pipes on their voyage from Brake in Lower Saxony to the port of Tuxpan in Mexico, over 8,000 km away. In extreme topographical and climatic conditions, a 320 km long gas pipeline is currently being laid there to improve central Mexico's energy supply.

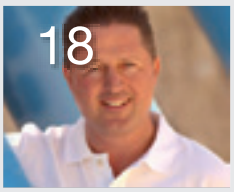
Finally, we're introducing you to an interesting information platform that has struck a chord with customers and partners. These are our customer conventions that have enjoyed great popularity since 1995 and regularly focus on the topic of innovation.

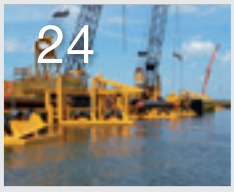
My best wishes for an interesting and enjoyable read!

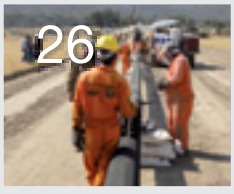
Jörn Winkels
Managing Director Technology and Sales

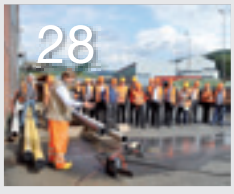
Content









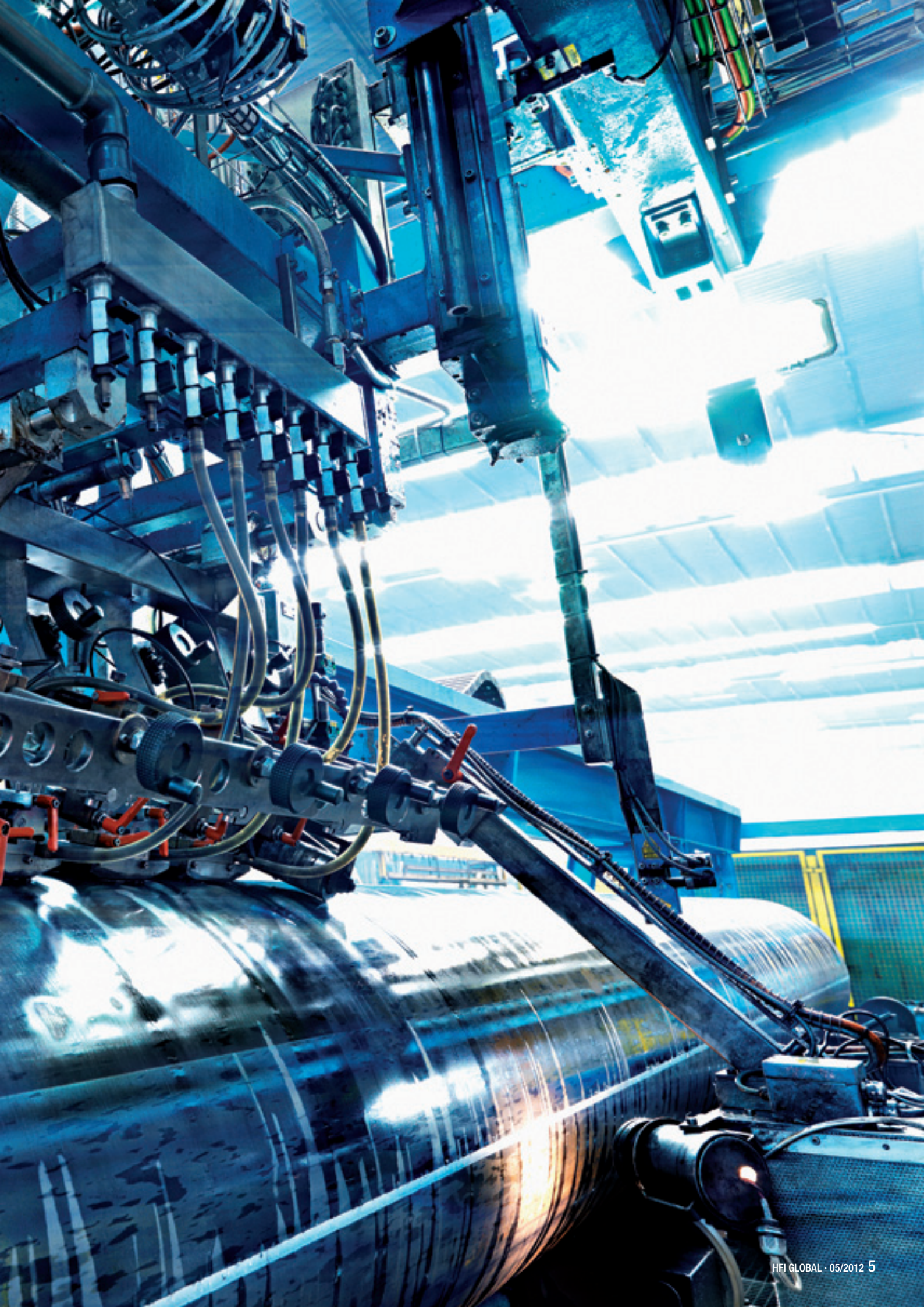


Better, more efficient and more innovative

MLP INNOVATIONS

Under its long-term product and technology strategy, Salzgitter Mannesmann Line Pipe is investing consistently in plant, technology and products. Making things "better, more efficient and more innovative" is the overriding aim of the technological leader in the production of HFI-welded steel pipe. In this issue of HFI Global, we're presenting the most important innovations of recent years.

Fully automatic ultrasonic testing of welds in a HFI-welded steel pipe



More efficient solutions

For a good two years now, Salzgitter Mannesmann Line Pipe has been producing HFI-welded steel pipe and tube with wall thicknesses of up to 25.4 mm. Customers from a variety of industries are benefiting from more efficient production and tighter fabrication tolerances compared to seamless and (D)SAW pipes.

Wall thickness measurement on a 25.4 mm thick HFI-welded steel tube

The economic benefits can be found not only in the more efficient production process. The pipe/tube lengths of up to 18 m and tighter wall thickness tolerances also make new technical solutions possible. "Rapid availability due to targeted thick-wall production and the skilled stocking of the raw material can also be decisive for the realization of customer projects," says Division Manager Konrad Thannbichler. "The proportion of thick-walled pipe and tube in 2011 was over 10 % of total tonnage," he continues, drawing attention to the numerous consignments for a huge range of projects and applications.

Steel construction

For example, Salzgitter Mannesmann Line Pipe supplied some 2,500 t of thick-walled tube measuring 610 x 20 mm to the spectacular Formula One race circuit in Dubai. Some 5,000 t of tube was supplied to the Polish Euro 2012 Football Championship venues in Breslau, Posen and Gdańsk.

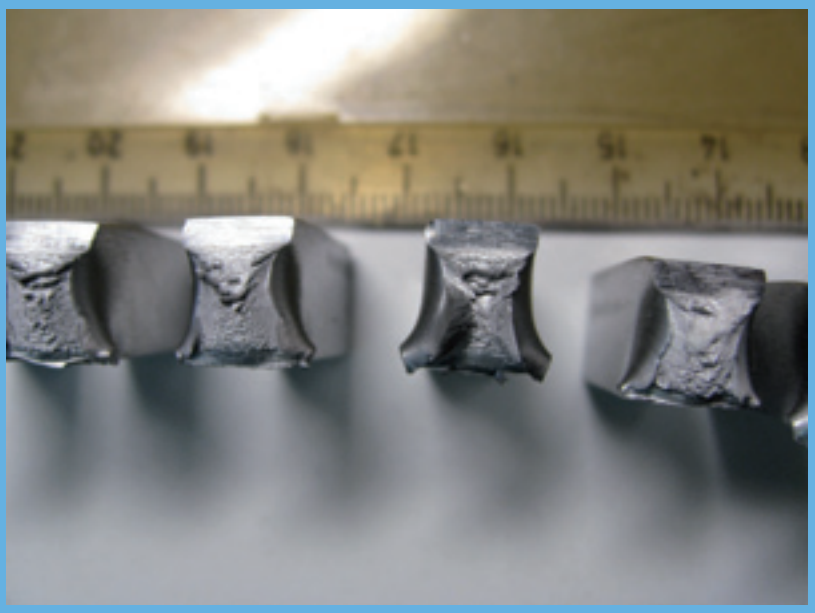
Offshore wind turbines and oil platforms

Round and square MSH sections are being used here for the jacket structures of wind turbines, converter and transformer platforms as well as in such peripheral structures as cable conduits, boat landings and supply platforms. Salzgitter Mannesmann Line Pipe has already supplied thick-walled tube in several sizes for the North Sea East, Thornton Bank and Gwynt Y Mor wind parks.

Power plant construction and technical applications

An additional technical advantage can be found in the narrow production tolerances of HFI-welded steel pipe and tube. As a result, they can often be employed with a

Project	Country	Year	OD mm	Wall thickness mm	Pipe/tube length m	Grade
Offshore line pipe	Netherlands	2010	355	20.6	11.9 – 12.5	X52N
Ayacuho oil	Colombia	2010	457	20.6	15.5	X65M
Offshore wind, Kvaerner	Germany	2010	406	21.4	12.0 – 18.0	S355
Offshore wind	UK	2011	406	25.4	10.0 – 13.0	S355
Stuttgart 21	Germany	2011	508	25.0	15.0	S235JRH
Offshore wind	Germany	2011	355	20.0	15.5	S355
Pipeline across road, Barcelona	Spain	2011	508	25.0	12.0	X52N
Offshore wind	Belgium	2011	406	20.0	8.5 – 11.0	S355
Taneko oil	Russia	2011	508	20.6	12.0	GRADE 6
Gas storage	Germany	2011	508	22.0	15.5	L450MB
Kavernen pressure pipe	Germany	2011	323	20.6	15.5	L360NB
Events hall	Azerbaijan	2012	508	20.0	8.0 – 18.0	S355
Offshore wind	UK	2012	355	25.0	11.0 – 12.0	S355



Cover story: Innovations HFI-welded steel pipe/tube for low temperatures

Resistant to sour gas at minus 60 °C

Extreme temperatures call for materials with extreme properties. Together with Salzgitter Flachstahl GmbH, Salzgitter Mannesmann Line Pipe has developed a material that is suitable for sour gas service at temperatures down to -60 °C.

After development of the material, HFI-welded steel pipe/tube has been produced at the Hamm site in a diameter of 406.4 with a wall thickness of 7.93 mm. In the course of an extensive testing programme, numerous tests were performed, including notched-bar impact tests to determine the brittle-to-tough transition temperature and a sour gas test (HIC test) both on the weld and base material. Having found the optimum balance between the pre-material and the welding and annealing processes, the testers achieved convincing product properties and positive test results across the board.

Qualification test passed in Russia

Scarcely had the first tests been performed than a specific matching customer request was received for the new development for the transport of media containing hydrogen sulfide at extremely low ambient temperatures. Further test specimens of the pipes underwent qualification testing at the Russian Engineering and Technical Centre in Samara. Both the customer and employees of the centre were highly impressed by the results. All the samples passed the challenging test programme with flying colours.

Extension to other grades planned

In the light of these positive test results, Salzgitter Mannesmann Line Pipe plans to extend this sour gas resistance to other grades in cooperation with Salzgitter Flachstahl GmbH. Parallel to this, low-temperature steels and HFI-welded tubes not resistant to sour gas are also being developed.

MLP INNOVATIONS

	16 mm	20 mm	25 mm
273.0 mm	101.4 kg/m		
323.9 mm	121.5 kg/m	149.9 kg/m	
355.6 mm	134.0 kg/m	165.5 kg/m	203.8 kg/m
406.4 mm	154.0 kg/m	190.6 kg/m	235.1 kg/m
508.0 mm	194.1 kg/m	240.7 kg/m	297.8 kg/m
610.0 mm	234.4 kg/m	291.0 kg/m	360.7 kg/m

Supply range of thick-walled HFI-welded steel pipe/tube

thinner wall than is possible with seamless material.

Gas storage

Gas is stored in underground vessels and pipes at what are usually very high pressures of 200 bar and higher. This calls for steel pipe with suitably dimensioned wall thicknesses.

"For the coming years, we're equipping ourselves with wall thicknesses of 25.4 mm in all standard steel grades to meet the needs of offshore wind turbines in particular. In machine manufacture and classical steel construction, this technical alternative will also establish itself in the long term," says a confident Konrad Thannbichler. To respond even faster in future to the needs of its customers, Salzgitter Mannesmann Line Pipe is setting up a warehouse for thick-walled tube tailored specifically to the requirements of the structural tube sector.

Higher-quality grades, new opportunities

So that it can supply its customers higher-quality grades for new fields of application, Salzgitter Mannesmann Line Pipe commissioned a Q&T plant at its Hamm site in 2008. A multitude of new-grade pipe/tube and MSH sections are meanwhile available.

Induction heating was chosen as the plant process, as this form of heating is quick and local but also continuous. All the Q&T steps take place in immediate succession in order to minimize production time and costs.

Higher-grade OCTG steels
Thanks to the broad range of what is now technically possible, oilfield tubes and casings (OCTG) can be produced in grades such as N80Q, L80 and P110 – also in weldable versions. The development of grade Q125 and of high-collapse grades (L80HC, P110HC) is coming along promisingly.

Line pipe with improved properties
This is where medium-strength grades can be produced with improved mechanical and technological properties. Furthermore, a Ni-alloyed steel with high toughness at sub-zero temperatures has been produced. From this, HFI-welded steel pipe can be produced for, for example, the transport of liquefied gas at temperatures of down to minus 196 °C in grades X70Q – X100Q to DIN EN 10028. Efforts are also being made to produce higher-quality grades as Q&T pipe up to X120Q according to API 5L.

Higher-grade pipe/tube and hollow sections for structural applications
Round pipe/tube for offshore applications can be produced in grades up to S355 conforming to EN 10225. The production range for rectangular/square sections is currently still limited to wall thicknesses of 20.6 mm – the extension of wall thickness to 25.4 mm, however, is merely a question of time. Currently, grades up to S460J2H

Higher-grade steels offer new scope for sophisticated structural applications in steel construction.

and S460MH and, by shaping immediately after tempering, even grades up to S690QLH can be produced on the basis of DIN EN 10210-1 as high-performance QT hollow sections (MHQ).

Further grades now being tested

Future developments in the field of higher-grade steels have the goal at Salzgitter Mannesmann Line Pipe of achieving even greater diversity in new fields of application and more cost-effective products. Further improvements in the interaction between material composition and process parameters will facilitate grades of higher strength, high-collapse grades and grades of higher toughness.

Cover story: Innovations New testing laboratory at the Hamm site

Breaking, cutting, dismantling and shattering

Innovative products that have to meet ever tougher specifications are setting new standards in quality assurance as well. So that it can perform more and technically more sophisticated tests on site, Salzgitter Mannesmann Line Pipe has invested in a totally new testing laboratory at its Hamm site.

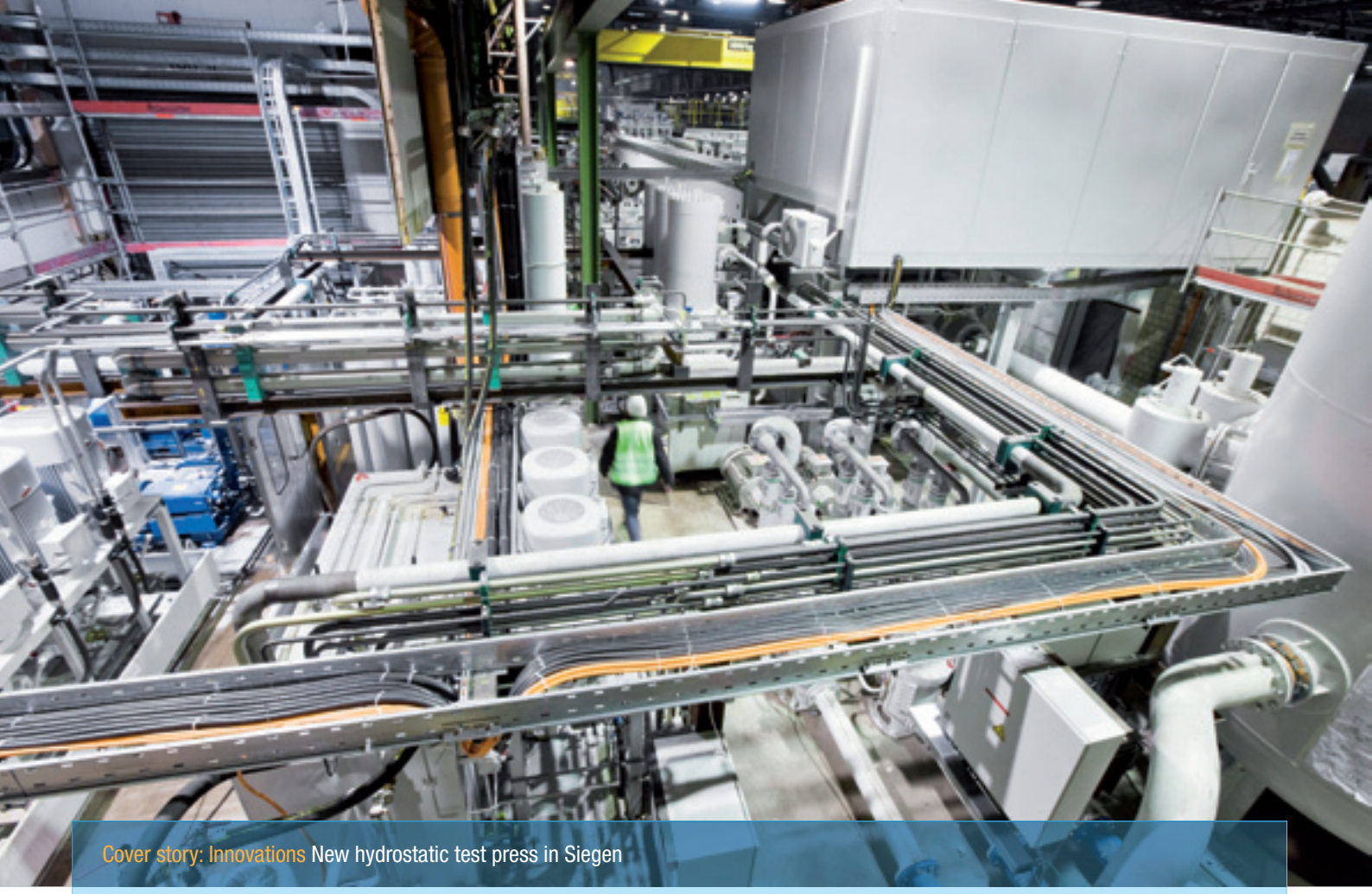
MLP INNOVATIONS

The centrepiece of the new testing laboratory is the new 1,000 kN 4-column tensile testing machine with hydraulic clamping for compliance with the new DIN EN ISO 6892-1 for 24-inch diameters and 1 inch wall thicknesses as well. The existing MFL 300-joule pendulum impact testing machine has been recalibrated to DIN EN ISO 168-1 and ASTM E370. Notch impact tests down to minus 75 °C are possible on this machine. For the production of micro- and macrosections in connection with metallographic investigations and hardness testing, a modular preparation system has been installed.

With the aid of the existing image-processing software, a new microscopy station permits the evaluation and documentation of metallographic grinding samples. Furthermore, the new lab has a spark emission spectrometer for obtaining product analyses and two hardness testing machines. The latter are a semiautomatic Vickers hardness testing machine with computer-aided evaluation and documentation for the HV1 – HV10 test range and an analogue Rockwell hardness testing machine with manual force application for checking the hardness values on the HRC, HRB, HRA and HRF scales.

Fabrication of test specimens

The number of test specimens fabricated in this department varies **from 3,000 to 6,000 per month**, depending on the order structure. These are specimens for analyses, bending and notch impact bending tests, tensile tests, HIC and SSC tests, microsections for hardness tests and other micro- and macrosections.



Globally unique test strategy

After 25 years of operation and over eight million pipe tests at the Siegen site, the time was ripe for a new hydrostatic test press.

Detailed planning for another million-euro investment as part of the Salzgitter Mannesmann Line Pipe technology strategy therefore got underway at the end of 2009. The standards expected of the machine and of the participating employees and outside firms were equally high. To meet the rising demand for tests, the press should permit a high throughput. At the same time, the new press was to be set up and commissioned in the immediate proximity of the existing machine without disrupting its regular operation.

Accommodating future developments

In addition to being safe, the new testing machine also had to be a match not only for the currently relevant product and performance spectrum, but also for future developments. These include higher wall thicknesses with higher test pressures and unit weights. The press was therefore designed for a pipe diameter of 406.4 mm with a wall thickness of 16.0 mm for X80 and N80 grades with a maximum test pressure of 500 bar. Since the product range at the Siegen site focuses on the lower pipe diameter range, the press also had to be amenable to higher throughput rates as well.

Globally unique design

The new press was therefore designed as a triple-line hydrostatic test press. This means that up to three pipes can be tested simultaneously at three test stations – a globally unique high-tech set-up.

The process in detail

At the turn of the year 2010/11, work got started on laying the foundations for the new emulsion baths, transformer station and press bed. Among other things, a seven metre deep pit first had to be dug for this. However, for work at this depth it is obligatory to have the ground searched for unexploded bombs by bomb disposal experts. Four weeks finally elapsed before it had been ascertained that there really weren't any bombs or ammunition in and around the construction site.

The valuable time that had been lost had to be made up for. By effectively coordinating the outside firms with internal planning, we finally managed to get more or less back on schedule. To disrupt the flow of production as little as possible,

1 Hydraulic and pump technology – the powerhouse of the overall press
2 Test equipment in detail
3 Final assembly of the press in action
4 Complete press in regular operation

MLP INNOVATIONS

work was carried out in weekend shifts and at the turn of the year, Easter and Whitsun. Meanwhile, the new press underwent pre-assembly on the manufacturer's site so that the basic functions could be tested.

At Salzgitter Mannesmann Line Pipe, preparations were made at the same time for delivery of the press and the transport routes for the heavy machine parts with weights of up to 110 t were checked and prepared. It was important here to take account of bridge loading capacities and clearances in the plant shops.

After successful assembly of the press components from mid-December 2010 until the end of January 2011, work continued with the final assembly of the mechanics, electrics, electronics, hydraulics and filter technology of the new press. Again, the commissioning of parts of the press took place mainly at the weekends.

Old press stays in operation

To prevent the loss of testing capacity due to the teething problems of the new press, the old press stayed initially in operation. This meant that holdups in production and testing could be effectively prevented and work on and the fine-tuning of the new press could go ahead undisturbed.

Perfectly equipped for the future

The new test press has been in regular operation for several months now and marks another milestone in the long-term implementation of the technology strategy of Salzgitter Mannesmann Line Pipe. With this and numerous other measures, planned and already completed, the company considers itself perfectly equipped for future customer requests and product developments.

The new hydrostatic test press in Siegen

The electrical and electronic switch gear of the new test press has a total length of over 15 metres.

Four programmers worked for over six months on the press software and six firms were simultaneously engaged in the electrical commissioning of various parts of the press.

Safety functions such as the e-stop and protective doors were realized with a programmable safety control (safety PLC).

For the test process proper, an autonomous computer with dedicated software handles the standard electrical and hydraulic tasks.

The technical coordination, notes for the records, correspondence, designs and drawings fill several metres of shelves. The final documentation of the press alone comprises roughly 40 folders.

Technology Water pipeline project using the ploughing technique

Polyamide coating and ploughing technique for four-fold benefits

HFI welded pipes with a polyethylene-polyamide combination coating have been used in a modernization and expansion programme of the Bavarian Forest Water Supply Association. The outcome of the pilot project: faultless pipe-laying, less spoil, shorter construction time and reduced construction costs.

MLP INNOVATIONS

Wasserversorgung Bayerischer Wald is a special-purpose association that supplies some 100 communities and 225,000 people with drinking water. The objective of a modernization and expansion programme planned for the coming years is to secure drinking water supplies in Eastern Bavaria in the long term.

In connection with this project, the ploughing technique was used for the first time in Germany for laying a cement-mortar-lined steel pipeline (DN 300). The HFI-welded steel pipes for the drinking water pipeline between the high-level tank at the village of Reissing and an existing supply pipe at Wallersdorf have a diameter of 323.9 mm and a wall thickness of 4.5 mm. Ordered in lengths of 16 m, the pipes can withstand a maximum service pressure of 60 bar.

The rocket plough technique

Largely straight pipeline sections and fine soil free from stones offered the best prerequisites for the ploughing technique. About half of the planned pipeline route was subdivided into 23 subsections with a maximum length of 750 m. In coordination with the customer and the pipe-laying company, some of the polyethylene-coated pipes were provided with an additional 2 mm polyamide coating for added wear protection and also to verify the combined coating's efficiency in practice.

Water pipeline project in Eastern Bavaria using the rocket plough technique

1 Pipe-laying plough towed by a 480-hp winch
2 Expansion head
3 Special pipe end design with the polyethylene-polyamide coating combination
4 In all, MLP supplied 9,400 m of polyethylene coated pipe, of which 1,200 m was given an additional polyamide coating.

The ploughing technique suited the farmers down to the ground because it did not interfere with their work in the fields.

Special pipe end design

The ends of the pipes provided with this combined coating of polyethylene and polyamide were redesigned to suit to the pulling operation involved and the planned polyurethane field coating (see Figure 3).

Pipe-laying details

The pipes were laid out in the pipeline route and welded together into strings, which were placed on bogies until they were ready to be pulled in. The joint areas were shot-blasted before field coating with polyurethane.

For pipe-laying, a 480-hp winch was used with a maximum tensile force of 120 t, in combination with a plough for pulling the pipe strings to a laying depth of up to 2.5 m. For this purpose, the strings were fixed at one end to an expansion head – a so-called torpedo – and the position of the string was continuously measured by a device. In this way, technically perfect pipe-laying along the planned route and at the planned height was ensured, taking into account the bending radii of 150 m and the maximum permissible tensile forces of 110 t. The highest tensile force measured during the pulling operations was a mere 60 t. Final polarization current measurements showed that the pipes with the combined polyethylene-polyamide coating were also in perfect condition.

Four-fold customer benefits

In-situ polarization current measurements showed that the pipes laid in this way had suffered no damage at all in the process. The advantages of the ploughing technique were fully exploited in terms of reduced noise and dust development, less spoil, and zero impact on the soil structure. The construction time was cut by a third, and the spoil volume was reduced by 20,000 m³ in the ploughed sections.

The MLP system approach

The success of non-conventional pipe-laying methods such as the ploughing technique depends essentially on trouble-free progress and hence on the pipe coating's resistance to local stresses during the pulling operation. This inevitably applies not only to the mill-applied coating but also to the field coating in the joint areas. Without the associated system approach, the development of the wear-protection coating applied at the mill would be practically useless. However, this project proved the effectiveness of the combined polyamide-polyurethane mill coating.

Project Offshore wind park North Sea East

Safety in wind and weather

The North Sea East offshore wind park situated some 30 kilometres north of Helgoland is scheduled for start-up in 2013. A total of 48 wind turbines and a transformer station are being erected at water depths of up to 25 metres. To ensure that the systems will resist the extreme wind and wave loads, Salzgitter Mannesmann Line Pipe supplied HFI-welded steel pipes for the jacket foundations.

With an installed annual capacity of six megawatt, each of the turbines covers the energy consumption of 6,000 households. The wind park as a whole will supply just under 290,000 households with electricity.

Extreme loads on the material

The North Sea East wind park will feature the currently largest and top-performing wind turbines anywhere. With a height of about 160 metres from sea level to the rotor tips, each of the 48 wind turbines will be higher than Cologne Cathedral. With dimensions like these, all the plant components are exposed to extremely high wind and wave loads. Besides the high stresses on the rotor blades and the tower, secure stability of each of the units is of key importance. Extensive investigations have revealed that so-called jacket foundations anchored to the sea floor are best suited for the North Sea East wind park project.

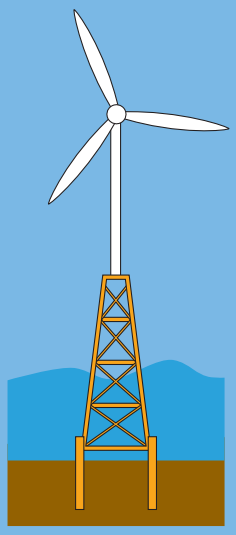
How the electricity comes ashore

To enable the electricity to reach consumers on the mainland, the wind turbines have to be interconnected via cables. Along these cables, the electrical energy generated by the turbines is transmitted to a transformer station at

Visualisierung: kuempellorenz.de

MLP INNOVATIONS

In jacket foundations, the steel tubes form a three-dimensional lattice. The foundations for North Sea East are anchored at depths of up to 25 metres and have a total weight of about 550 tonnes.



For the foundation structures, specially developed S-bends were manufactured by the sister company Salzgitter Mannesmann Grobblech from HFI-welded pipes supplied by Salzgitter Mannesmann Line Pipe.

the wind park. There it is aggregated and converted to a high voltage and then transmitted to a further transformer station, the HelWin Alpha. From there, it is transmitted to the shore via a high-voltage cable on the sea floor. In future, other wind parks will also feed their output to the HelWin Alpha transformer station.

Development of suitable cable conduits

To reduce installation work and the risk of cable damage at the foundations, an optimally suited S-bend was developed jointly with the customer RWE, the Norwegian steel fabricator Kvaerner and the bending plant of Salzgitter Mannesmann

MLP INNOVATIONS

Grobblech in Mülheim. The fact that the maximum available pipe length of over 18 m was used for making the 96 special bends and another 96 standard bends substantially cut down on the number of girth welds required which, in turn, had a positive effect on production time and cost.

Large consignments

Salzgitter Mannesmann Line Pipe also supplied 450 tonnes of straight pipe with a diameter of 406.4 mm and wall thicknesses of 15.9 mm and 21.4 mm. In addition to the bends for the foundation structures, 20 bends and straight pipes were supplied for the transformer station. This delivery amounted to 350 tonnes. Another 600 tonnes of steel pipe with a wall thickness of 25.4 mm were supplied for the 96 boat landings. Here too, assembly and installation work was significantly reduced through the use of the maximum pipe length.

Start-up in 2013

Commissioning and start-up of the wind park is scheduled for 2013, when it will turn out about 1 billion kWh of regenerative electrical energy a year while reducing CO_2 emissions into the atmosphere by some 850,000 tonnes.

The North Sea East wind park
Location: 30 km north of Helgoland
Number of turbines: 48 (REpower 6M)
Foundations: steel jacket foundations
Installed capacity: 295 Megawatt
Power generation: approx. 1 billion kWh/a
CO_2 emissions avoided: approx. 850,000 t/a
Start-up: 2013

For further information about the North Sea East wind park visit www.rwenordseeost.com

The network link of the North Sea East offshore wind park

1 Transformer platform North Sea East
2 Transformer platform HelWin alpha
3 Dike cut for the high-voltage power line
4 Büttel transformer substation

Sales partner ALPE Kommunal- und Umwelttechnik GmbH & Co. KG

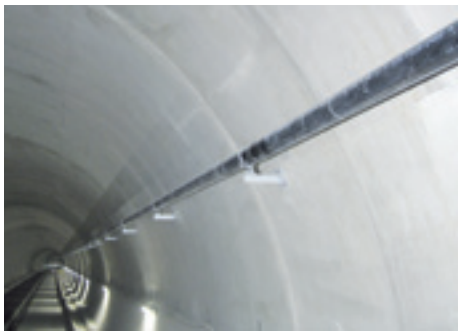
"High-quality products and competent technical advice"

Austria's ALPE Kommunal- und Umwelttechnik GmbH & Co. has been serving as a distributor for Salzgitter Mannesmann Line Pipe KG since 1994. In 2011 the company moved into its headquarters in Stams. This was reason enough for us to take a look at the new site and ask Alois Kluibenschädl about matters past and future.

The team of ALPE Kommunal- und Umwelttechnik GmbH & Co. KG: From left to right: Tanja, Alois and Gabriela Kluibenschädl, Christoph Happ, Christian Katzmayr and Stephan Juffinger

Building the new company complex in Stams and moving there in 2011 marked the dawn of a new era for ALPE. The new building with an adjoining warehouse for 650 pallet stations on a site of about 6,000 m² permits the spacious storage of pipes, fittings, valves and accessories.

The projects realized are often distinguished by challenging pipe-laying situations and tough product specifications. Top left: Pipe-laying operations for the waste water power plant in Seefeld. Top right: The Cistercian monastery Fiecht (line pipe replacement for the drinking water power station). Bottom right: Installation of the extinguishing water pipe for the Perschling chain of tunnels. Bottom right: Pipe-laying operations for the snow-making systems on the Hintertux glacier.



Mr Kluibenschädl, how would you describe your company?
ALPE works as a dealer in the local authority, industrial and environmental technology sectors. In Austria and throughout Europe, we serve and support customer projects in which the emphasis is always on technical and commercial advice.

What are your particular focuses?
We specialize in water supplies, waste water disposal, the construction of fire extinguishing lines, snow-making guns and hydroelectric power generation.

What does cooperation with Salzgitter Mannesmann Line Pipe involve?
As a systems supplier, we serve as a full supplier in our capacity as distributor for Salzgitter Mannesmann Line Pipe while also being the direct contact for our customers. With our suppliers, we aim for long-term relations and expect nothing but top-quality products and services, as we ourselves are committed to providing competent expert advice and high-grade products. Customers have come to rely on this over the last 25 years.

What have been the project highlights of the last few years?
Thanks to Salzgitter Mannesmann Line Pipe's broad product array, we can look back on a multitude of joint projects. Certainly worth mentioning is the supply of the world's first waste water power plant to the community of Seefeld, the snow-making systems on the Hintertux glacier and, most recently, the order for 37 km of PE-coated and cement-mortar-lined DN 200 pipes for the extinguishing water pipeline for the Lower Inn Valley Railway/ Brenner Base Tunnel approach project. And, finally, there's the roughly 70 km of DN 125 extinguishing water pipeline for the Austrian Railway's Wienerwald and Lainz Tunnel.

All of them challenging projects.
Absolutely. There's pipe installation in mountainous surroundings, genuine feats of logistics due to the confined space and the customer's in some cases demanding specifications. However, thanks to Salzgitter Mannesmann Line Pipe, we're perfectly equipped.

What are your wishes for future business?
Our relocation marks the dawn of a new era. For a family business, this is a huge leap. We hope of course for many more exciting and successful projects and look forward to continuing good business relations with Salzgitter Mannesmann Line Pipe.

Photo: ©Gerhard Berger/ÖBB

Project Extinguishing water pipe, Lower Inn Valley Railway, Austria

Tunnel vision

The century-old dream of building a tunnel under the Brenner massif in the Alps is gradually becoming reality. The construction and commissioning of the four-track section of the Lower Inn Valley Railway between Kundl and Baumkirchen at the end of 2012 are another milestone on the way to a trans-European link through the Alps. Involved in the project are HFI-welded steel pipes from Salzgitter Mannesmann Line Pipe.

The future high-speed line will allow trains to travel at speeds of up to 250 km/h.

The Lower Inn Valley Railway is part of the overall Brenner Base Tunnel strategy. On completion, the link will shorten the Munich-Verona trip by 3 hours.

Passenger and freight transport over the Alps has been increasing steadily over the last few decades. In the freight sector, some 40 % of the transit volume on the central trans-Alpine routes goes via the Brenner corridor. Work on definite plans for a mammoth project therefore got underway at the end of the Nineties: a project to build a rail route under the Alps through the so-called Brenner Base Tunnel.

From vision to reality

So that this over-a-century-old vision can become reality, extensive planning and preparations are necessary. The Lower Inn Valley Railway, for example, forms the northern approach to the future Brenner Base Tunnel. The existing double-track railway line, which is working almost to full capacity with up to 240 trains per day, is currently being widened to accommodate four tracks.

Route of the Lower Inn Valley Railway

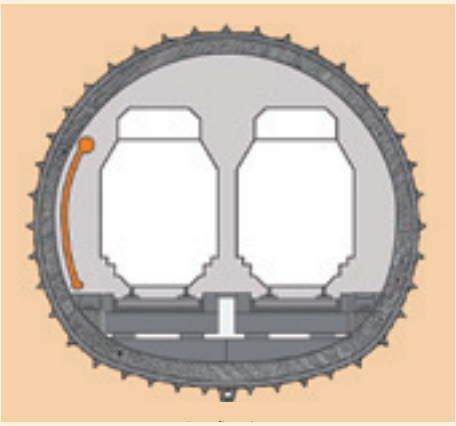
The roughly 40 km long new line between Kundl and Baumkirchen will go into operation by the end of 2012. Almost 32 km of the route is located in tunnels, troughs and galleries and on subsurface tracks. The A12 motorway, the existing railway line and the Inn have had to be traversed several times. In the Stans-Terfens tunnel, there's even a third line to permit overtaking. In addition to increasing capacity, the

40 km new Kundl-Baumkirchen line

On leaving Kundl station, the existing line will initially be supplemented by an acceleration track and then expanded to four tracks. The line then descends and enters the 11.5 km Radfeld-Wiesing tunnel. After passing under the Inn, it continues in the 4.5 km Wiesing-Jenbach tunnel. Having underpassed Jenbach station, the line resurfaces briefly before descending again into the 10.5 km Stans-Terfens tunnel in which there is a third track for overtaking. After this, the line continues in the Terfens gallery and runs alongside the existing line. After about 1.3 km, the line continues on subsurface tracks and then forks towards Brenner/Verona and Innsbruck/Arlberg.

The tunnel during track-laying work

Lower Inn Valley tunnel cross section



Among other things, 300,000 m³ of concrete, 841,000 bolts for track assembly and 1,130 km of cables were placed and installed in only 20 months. The tunnel sections were fitted with an extinguishing water line from Salzgitter Mannesmann Line Pipe.

new high-speed line also makes it possible to streamline the various regional and international passenger and freight traffic movements.

Highest safety standards

Rail ranks among the safest present-day means of transport. Modern control equipment makes rapid train sequences possible at maximum speeds of up to 250 km/h. This in turn ensures high transport capacity for freight and passengers.

In addition to the safety measures ensuring smooth operations, the new rail link will have numerous additional safety features.

Smoke-free escape corridors

Over 80 per cent of the line is situated in tunnels and troughs. Even at the early stages of planning for the new line, it became obvious that tunnel safety would be a highly important issue. In emergencies, it is possible to flee into the open via emergency exits every 500 metres in the tunnel. All of the exits are equipped with safety locks that are kept at slight overpressure by special ventilation systems. In the event of a fire, all the passages therefore stay smoke-free. In the rail tunnel itself, illuminated handrails along the escape routes lead to the exits.

Large rescue zones

At the safety exits, rescue zones have been planned that provide sufficient space for emergency vehicles and landing pads for rescue helicopters. In the shafthead buildings, emergency staff have goods lifts, rooms and infrastructure for the coordination of rescue missions at their disposal.

Extinguishing water system

The entire line is equipped with an extinguishing water system. Three wells are

available for the water supply to ensure an independent supply. Three pump stations pump the water at an appropriate pressure straight into the extinguishing water pipelines. Overall, there are over 250 water hydrants in the tunnelled sections of the line.

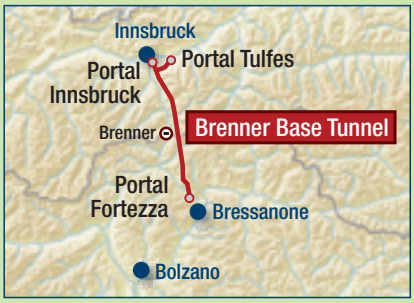
Salzgitter Mannesmann Line Pipe has supplied 38,000 metres of HFI-welded DN 200 high-pressure steel pipes with slip-welding joints. The over two thousand 16 metre long pipes with cement mortar lining and PE coating were fabricated and supplied to Alpe Kommunal- und Umwelttechnik GmbH & Co. KG in Stans between the beginning of 2010 and mid-2011. The limited storage capacity at the tunnel entrances was of course a big problem. However, thanks to intelligently organized logistics, it was possible to supply all the required quantities to the site just in time. Overall, all the work on the line was completed on time.

Commissioning scheduled for the end of 2012

Trial operation is currently underway on the new line. Commissioning for regular traffic is expected in December 2012. The innovative safety strategy will ensure safe line operation. In emergencies, which hopefully will never arise, the high safety standard will ensure swift and efficient tunnel evacuation.

Pipe and moulding storage area at Terfens gravel pit. The limited storage capacity made the project exceptional from a logistical point of view as well.

Below: Fabrication of one of the numerous slip-welding joints on the supported pipeline



Brenner Base Tunnel, project of the century

The Brenner Base Tunnel is a joint Austrian-Italian project for the construction of a railway tunnel for combined passenger and freight transport under the Brenner Pass. The tunnel will be built through the Alps along the Munich-Verona route. As a key element in the 2,200 km long Berlin-Palermo high-speed rail route, it is part of the EU's Trans-European Networks programme. Its construction is intended to cut travel time from Munich to Verona from 5:50 h to about 2:50 h.

History

The Italian engineer Giovanni Qualizza hit upon the idea of tunnelling under the Brenner Pass back in 1847. The first feasibility studies were only conducted about 150 years later, in 1989. The symbolic ground-breaking ceremony took place in June 2006 and the first blasting operation for an exploratory gallery went ahead in Aica on 3 December 2007.

Completion in 2025

When all the numerous preparatory tasks have been completed, work on the main Ahrental-Trens section is due to start in 2016. The project is currently scheduled for completion in 2025.

The world's longest railway tunnel

The tunnel between Innsbruck in Austria and Fortezza in Italy will be 55 km long. Counting the existing Innsbruck rail bypass, the Brenner Base Tunnel measures a total of 64 km and is thus the world's longest railway tunnel.

Project Diemen-Almere district heat pipeline

Heat from across the water

An unconventional approach has been chosen in Almere to expand the Dutch heat grid and supply 25,000 households with eco-friendly district heat.

The Diemen power plant location south-east of Amsterdam supplies electricity to just under 290,000 households and generates some 400 GWh of heat a year, which is channelled into the service mains of Utrecht, Amsterdam Zuidoost and IJ-burg. Now that the "Diemen 34" combined-cycle power plant has been built, the location will also have new district heat capacities as of 2012. These were to be connected up to the Almere district heat grid as efficiently and cost-effectively as possible. An 8.5 km connecting pipe doesn't normally pose a great challenge – but between the power plant and the point of delivery in Almere Poort lies the IJmeer, the southern-most bay of the Netherlands' largest lake region comprising the IJsselmeer and the Markermeer.

The pipe route was designed by Tebodin, the Dutch consultancy commissioned with the planning work. Instead of conventional onshore pipe-laying along the A1 and A6 motorways, the decision went in favour of a direct route through the approximately 8 km wide IJmeer bay. This meant giving due consideration to dike protection – always a highly sensitive issue in the Netherlands – as well as to shipping traffic and bird nesting and resting places. In the tendering procedure, the Dutch company A. Hak based in Geldermalsen/Tricht was awarded the demanding pipe-laying project.

Salzgitter Mannesmann Line Pipe supplied some 17,000 m of HFI-welded steel pipes with an outside diameter of 508.0 mm and a wall thickness of 6.3 mm to FW-FERNWÄRME-TECHNIK GmbH in Celle. The inner pipes were provided

The special pontoon on which the 500 to 700 m long string sections were welded together and prestressed mechanically

Photo: FW-FERNWÄRME-TECHNIK GmbH Celle

Onshore, the pipe-in-pipe units were welded into 500 to 700 m long pipe strings, tested and then floated into the water

Photo: FW-FERNWÄRME-TECHNIK GmbH Celle

with a 70 mm thermal insulation layer and roller bearings to ensure their concentric positioning inside the jacket pipes. These were ordered from Salzgitter Mannesmann Grossrohr with an outside diameter of 711.0 mm, a wall thickness of 10 mm and with a polyethylene corrosion protection coating. Single inner pipes and jacket pipes were then combined to form 16 m pipe-in-pipe units.

On the construction site, these 4.5 t units were welded together into 500 to 700 m long string sections, which were then tested and floated into the IJmeer. A special pontoon with hydraulic jack from A. Hak then lifted the end of the pipeline and that of the new string section out of the water so that they could be girth-welded together and prestressed mechanically.

In all, the pipe-laying operations took from January to September 2011 and proceeded without a hitch at a water depth of 2 m on the floor of the IJmeer. A special dredger excavated an approximately 2.3 m deep trench in which the pipe-in-pipe system was laid.

Since it is forbidden in the Netherlands to make open crossings through dikes, 350 m and 500 m long sections were welded to the pipeline end and laid underneath the dikes using a trenchless HDD (horizontal directional drilling) technique. The 700 m section underneath the 19 m deep navigation channel in the IJmeer was also laid with the aid of horizontal directional drilling, so the shipping traffic was in no way affected by the pipe-laying work.

The pipeline is expected to give about 50 years' service and will contribute its share towards CO_2 reduction through the use of eco-friendly district heat.

The district heat pipe runs from the Diemen power plant location south-east of Amsterdam through the mouth of the river IJ. The entrance to Muiden harbour was not affected by the pipe-laying operations and was available for trouble-free use throughout the project.

Project Gas pipeline through Mexico

More energy for central Mexico

To improve the gas supply in central Mexico, the Mexican gas company Gasoductos Mexicanos is currently building a 320 km gas pipeline from Tuxpan to Santiago de Querétaro. The extreme topography of the pipeline route and the climatic conditions are severe challenges for everyone involved in the project.

To transport the LPG (liquefied petroleum gas) over the distance of 320 km at a service pressure of 100 bar, inclusive of a roughly 60 km branch line, a total of five pump stations are also required along with infrastructure engineering in the port of Tuxpan for the further transport of the liquefied gas into the country's interior.

Special challenges due to the extreme topography

As a result of the topography of the pipeline route, the project is a major challenge for the participating logistics, civil engineering and pipe-laying companies, as huge differences in altitude have to be mastered. Pipe-laying thus started off in Tuxpan at sea level and the route will subsequently have to cross a mountain pass at an altitude

1 The topography places severe demands on the participating logistics, civil engineering and pipe-laying companies. **2** A pipe store has been set up in the destination port of Tuxpan over 8,000 km away. **3** From Tuxpan the pipeline will transport LPG (liquefied petroleum gas) to Santiago de Querétaro to improve the gas supply in central Mexico. **4** Loading work in Brake was supervised in each case by an external expert and an employee of Salzgitter Mannesmann Line Pipe.

of 2,700 m. The extreme inclines and steep drops in areas that are in some areas poorly accessible will undoubtedly hamper pipeline construction. Heavy rainfall in this region can also cause landslides and hence harbours additional hazard potential.

Production in three lots

After the successful supply of an initial 21 km section in 2009, Salzgitter Mannesmann Line Pipe succeeded in impressing the customer in all respects and was awarded the follow-up order for a further 320.5 km of HFI-welded steel pipe with a diameter of 273.1 mm in 2010. The overall order comprises some 16,500 t of grade X52M in three different wall thicknesses ranging from 6.35 to 9.27 mm. For pipe-laying on extremely steep slopes, the pipe was given a 6 mm extra-thick polyethylene coating for added protection.

From Siegen to Mexico

In February 2011, the first 130 rail cars left the Siegen mill on their way to Bremen. The loading of the MV ALEXIA with some 6,750 t of pipe at the port of Brake (Bremen) took three days. From here, the ship set sail on its three-week voyage to Tuxpan over 8,000 km away. The shipping of the second lot took place at the end of June and the final third was sent on its way in September.

The monitoring of loading work was entrusted in each case to an external expert, who was supported by Salzgitter Mannesmann Line Pipe to ensure that the pipe was stowed undamaged and securely. A pipe store was set up at the port of Tuxpan itself where the supplied pipe could be checked before continuing its journey by truck to further intermediate stores close to the construction site.

Progress delayed by rain

Pipe-laying is now advancing, although work on the steep slopes has had to be temporarily interrupted and postponed because of heavy rainfall and the associated safety risks. The new LPG terminal in the port of Tuxpan for gas supplies arriving by sea has now been completed.

The pipeline is due for handover in October and for commissioning in December 2012.

Customer conventions Positive feedback since 1995

Exciting topics in theory and practice

Salzgitter Mannesmann Line Pipe has been organizing customer conventionss since 1995. What started as an internal training course for the water pipe sector is now a permanent fixture on the MLP calendar. Besides water and gas line pipe, trenchless pipe-laying has been a topic well-received by our customers and other interested parties, and the first convention on this technology took place in 2010.

Customer conventions are always well attended.

When the first convention on water pipe was held, no one could have known how successful this newly initiated information event would become. But soon it became clear that it had struck a chord. Before long, the number of participants had to be limited, as the conventions had developed into a successful information platform for interested employees of public utility companies, pipe-laying companies and engineering offices.

New topics followed

In 2005, the water pipe convention was succeeded by a series of conventions on gas and oil line pipe, which are also always fully booked up well in advance. In 2010, the customer convention on trenchless pipe-laying was implemented as a platform for the exchange of ideas and experience in this technically demanding application field. Here too, the interest is greater than the number of participants that can be accommodated.

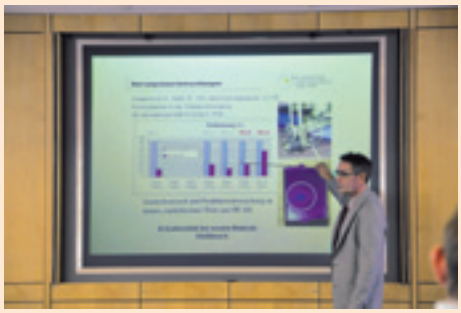
Success through expertise and quality
In all the conventions, the expertise of the speakers and the quality and relevance of their topics are the decisive criteria. We have invariably resorted to the services of highly skilled and specialized partners from the respective sectors of industry. The talks are devoted to planning, project development, approval procedures, the construction phase, commissioning and start-up, quality monitoring and ongoing pipeline protection and monitoring. In addition, there are practical presentations such as the cutting-to-length of pipes, field coating and the introduction of product developments.

In all the conventions, participants are invited to take part in a guided tour of the works.

A network of added value
The programme of the conventions extends over one and a half days. This gives participants sufficient time for an intensive exchange of experience. Meantime, given that the conventions are not only attended by customers but also by employees from pipe-laying companies, engineering offices and the TÜV, a network of true added value has been created for participants.

Positive feedback throughout
To ensure that the events maintain their high quality level, questionnaires are regularly distributed for evaluation. The findings gained from them are then incorporated in subsequent events.

Customer conventions thrive on interesting technical talks as well as practice-oriented presentations.



Comments from participants

André Grassmann
Open Grid Europe, Essen

"Interesting talks, a comprehensive tour of the works, and a rich exchange of experience. I can fully recommend the "Trenchless" customer convention both as a participant and as a speaker."

Maik Kopsch
Beratende Ing. Kopsch Biko, Bad Liebenwerda

"The contents of the talks were very well combined. From practice-oriented topics to innovations right up to realizable visions – all of these topics were addressed and looked into in subsequent discussions."

Christoph Senoner
ILF, Innsbruck

"A very informative, high-calibre convention. The polyamide material presented at the conventions might be an interesting alternative for trenchless thrust crossings in product pipelines and horizontal directional drilling projects."

Trade fairs and customer conventions

This year, too, Salzgitter Mannesmann Line Pipe will be present at numerous trade fairs throughout the world. We will also organise two customer conventions of our own. Further information and details of these events can be found on the Internet at www.smlp.eu under "News".

March 2012

26.–30.03.2012
Tube
Düsseldorf/Germany

May 2012

07.–11.05.2012
IFAT ENTSORGA
Munich/Germany

May 2012

23.–25.05.2012
H_2O
Ferrara/Italy
Stand: Sintertec

May 2012

25./26.05.2012
ÖVGW-Jahrestagung
Innsbruck/Österreich
Jointly with Alpe Umwelt-technik GmbH & Co. KG

May/June 2012

29.05.–01.06.2012
ITM Polska
Posen/Poland
Joint stand with Salzgitter AG

June 2012

05.–08.06.2012
Ecwatech
Moscow/Russia

August 2012

28.–31.08.2012
ONS
Stavanger/ Norway

September 2012

18.–22.09.2012
HUSUM WindEnergy
Husum/Germany

September 2012

25./26.09.2012
gat 2012
Dresden/Germany

September 2012

26.09.2012
7th German Symposium on Trenchless Pipeline Replacement
Siegen/Germany

October 2012

18.–19.10.2012
Customer convention, water
Salzgitter Mannesmann Line Pipe Siegen

November 2012

08./09.11.2012
Customer convention, Gas
Salzgitter Mannesmann Line Pipe Siegen

November 2012

11.–14.11.2012
ADIPEC
Abu Dhabi/UAE
Jointly with Salzgitter Mannesmann International

November 2012

14.–16.11.2012
OGT
Ashgabat/Turkmenistan






Flashlights

1 Trade fair Offshore Europe in Aberdeen, 06-08. September 2011
2 Gas Conference at Salzgitter Mannesmann Line Pipe in Siegen, 15-16 September 2011
3 Water Conference at Salzgitter Mannesmann Line Pipe in Siegen, 13-14 October 2011
4 OGT in Ashgabat/Turkmenistan, 15-17 November 2011
5 Convention on Trenchless Technology at Salzgitter Mannesmann Line Pipe in Siegen, 26-27 January 2012
6 Trade fair stand at the Oldenburg Pipeline Forum, 09-10 February 2012

Credits

Publisher
Salzgitter Mannesmann Line Pipe GmbH
In der Steinwiese 31
57074 Siegen
Germany
Phone: + 49 271 691-0
Fax: + 49 271 691-299

info@smlp.eu
www.smlp.eu

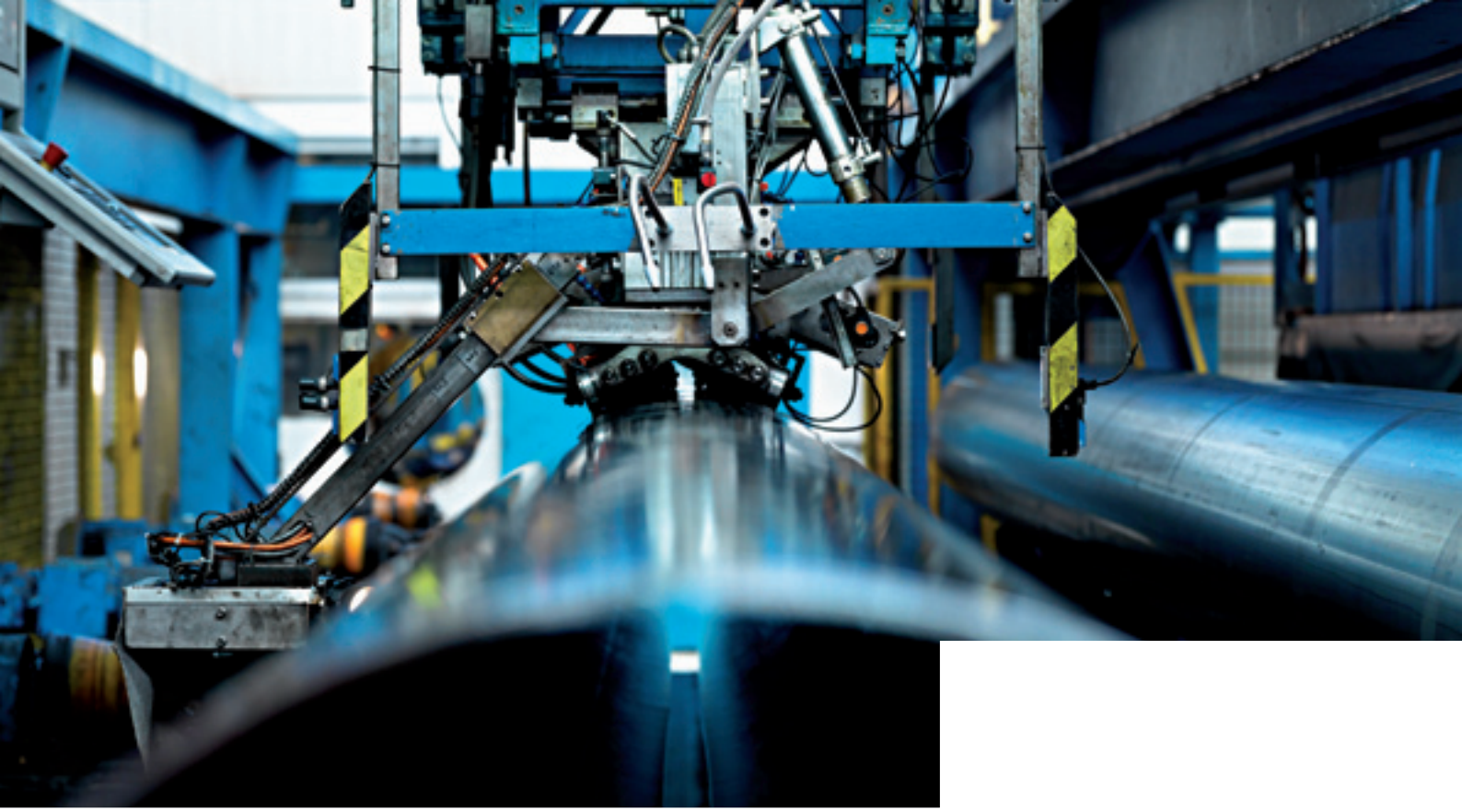
Responsible editor
Birgit Quast
Tel.: + 49 271 691-201
birgit.quast@smlp.eu

Concept, editing and design
Kümpel Lorenz GbR, Büro für Gestaltung
www.kuempellorenz.de

English translation
Ruth Baldwin, Mönchengladbach

Authors and co-workers
Jörn Winkels, Michael Kosfeld, Konrad Thannbichler, Michael Bick, Dr. Holger Brauer, Thomas Elzenbaumer, Roland Friedla, Dr. Hendrik Löbbe, Dr. Hans-Jürgen Kocks, Stephan Maier, Frank Meyer, Heinz-Jürgen Meyer, Birgit Quast, Udo Saßmannshausen, Thorsten Schmidt, Manfred Veit, Christoph Weil

Photo credits
Front cover: © Dominik Obertreis
Page3: © Freezingtime - istockphoto.de/ www.kuempellorenz.de/
Pages 4/6: © Wolfram Schroll
Page 8: © www.optima-video.com
Pages 10/11: © Dominik Obertreis
Pages 14/15: © © Freezingtime - istock-photo.de/ www.kuempellorenz.de/
Pages 15/16: © Andreas Köhring
Page 16: © kvaerner.com



Salzgitter Mannesmann Line Pipe GmbH
In der Steinwiese 31
57074 Siegen
Germany
Phone: + 49 271 691-0
Fax: + 49 271 691-299

Postal address:
Postfach 12 01 52
57022 Siegen
Germany

info@smlp.eu
www.smlp.eu

SALZGITTER
MANNESMANN
LINE PIPE
A Member of the Salzgitter Group