HFI GLOBAL

The magazine of Salzgitter Mannesmann Line Pipe for customers and partners

SALZGITTER MANNESMANN LINE PIPE
A Member of the Salzgitter Group

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Cover topic Extension of wall thickness range

HFI welded pipe: now also with 1 inch/25.4 mm wall

Dear Reader

In 2007, Salzgitter Mannesmann Line Pipe expanded its manufacturing programme of HFI welded steel pipe from 20 to 24 inch outside diameters. A similar spectacular event is on the books for 2010: the maximum pipe wall thicknesses will be increased to 1 inch = 25.4 mm. Both developments of our manufacturing programme were preceded by numerous talks with customers and partners so as to identify the actual needs in the various application areas. You can read some interesting facts about the cost-efficient manufacture of the new pipe wall thicknesses and their application potential in the various industries on pages 4 to 9.

As usual we have reports on projects that have been completed all over the world.

Our journey starts at one of the world's most important air traffic hubs, Frankfurt Airport. Here you will learn about the important role played by HFI welded steel pipes from Salzgitter Mannesmann Line Pipe in every take-off.

From high up in the air we go underground – to Copenhagen, quasi directly beneath the Danish Royal Family's city residence. We have news of an unusual district heating project which called for outstanding technological expertise and competence at several levels, quite literally, at the same time.

Competence and creativity were also at a premium with an express order for steel pipes for a gas pipeline in Vancouver. Inspired by the spirit of the Olympics, our logistics specialists beat all their own records and managed to ship the pipes safely halfway around the world in just 22 days.

From Canada we take a detour to Central America to show you the branch office of our sales partner Salzgitter Mannesmann International in Mexico. One of the team members is Jürgen Ziebe, who left Germany in 1958 and has lived and worked in Mexico for 52 years now. Employees and customers alike profit from his vast knowledge and experience.

Back in Frankfurt we provide you with an insight into the practical application of our innovative system for trenchless pipe-laying projects. Here too, as is so often the case, the exchange of knowledge and experience with the users of our products plays a major role.

Another article focuses on what could be described as a major roller: working together with international suppliers to the textile industry, Salzgitter Mannesmann Line Pipe contributed to improving the economics of warp beam production. Another good example showing how efficient communication between manufacturers, customers and users can lead to technically superior, cost-efficient products and solutions.

Enjoy your read!

Marc Rasquin
Chairman of the Board of Management

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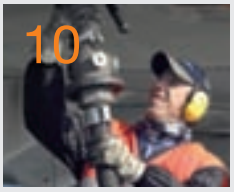
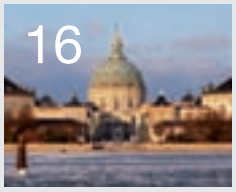




The new pipe wall thickness on a 1:1 scale, here with a pipe diameter of 16 inches/406.4 mm (available up to 24 inches/610.0 mm)

Cover story Extension of wall thickness range

HFI welded pipe: now also with 1 inch/25.4 mm wall

Following the increase in diameters from 20 to 24 inches in 2007, Salzgitter Mannesmann Line Pipe is now taking the next logical step: raising the maximum wall thickness from 20.6 to 25.4 mm. Customers from many different sectors stand to benefit from the advantages over seamless and (D)SAW welded pipe, both in cost-effectiveness and closer dimensional tolerances.

Salzgitter Mannesmann Line Pipe is once again responding to numerous customer enquiries: this time for greater thicknesses in technically mature and competitive HFI welded steel pipe and MSH sections.

The reason for this upgrade is the wide application potential in machinery and steel construction, offshore wind farms and oil platforms, in gas storage facilities, in power station engineering and many other industrial uses.

Here is one more example of where Salzgitter Mannesmann Line Pipe customers can profit from the expansion of the Hamm mill in 2007. »The way was paved four years ago, when the extension of the welding mill to produce outside diameters up to 24 inches was initiated,« explains the responsible plant manager Jochen Berkemeier. By early 2010, the first steel pipes with wall thicknesses of 23.0 and 25.4 mm were successfully produced. ▶▶▶

The starting material is a decisive factor in achieving the desired material grade

Bending the new wall thicknesses takes about 30 % more force

»We have already successfully produced initial orders for pipes with a wall thickness of 25.4 mm.«

Jochen Berkemeier, plant manager at Hamm

Increased demands on the equipment

A decisive step in the manufacture of HFI welded steel pipes is the shaping of the wide strip, which is mainly done through bending. However, the force needed for shaping the strip increases with the square of the wall thickness. So to shape strip with a wall thickness of 25.4 mm, the bending force needs to be about 30 % higher than for a wall thickness of 20.6 mm.

Adjusting the frequency and weld annealing parameters

After shaping the strip to an open pipe, the edges are welded together. To allow a wall thickness of 25.4 mm to be welded by the HFI process, the energy input into the edges must be optimized. Here, frequency plays a key role. As it decreases, the penetration depth of the heat-affected zone in the strip centre increases and the correct welding temperature is achieved. The subsequent normalizing of the weld also calls for special plant configuration with targeted parameter adjustments.

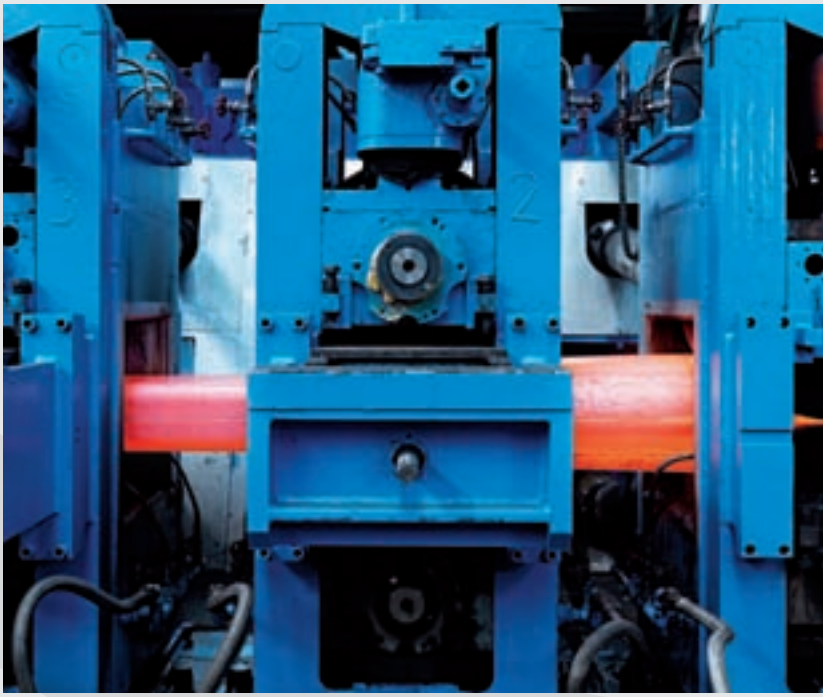
Selecting the right starting material

Selecting suitable starting material is another challenge. Simply changing the thickness of the starting material for any specific pipe diameter will result in thicker walls, but not in the same grade of the end product. For equal strip grades the finished pipe with raising wall thickness will end up with different mechanical properties in terms of strength, hardness, elasticity and toughness.

Establishing reliable process parameters

Since Salzgitter Mannesmann Line Pipe was breaking new ground for wall thicknesses above 20.6 mm, several test series had to be run. Meantime, reliable process parameters have been established for shaping, welding and post weld annealing. Plant manager Jochen Berkemeier is more than satisfied with the results: »We have already successfully produced initial orders for pipes with a wall thickness of 25.4 mm.

Pipe inspection in the finishing line



Shaping the thick-walled pipes to MSH sections

This shows that we are indeed on our customers‘ wavelength with the extension of our manufacturing programme.«

Diameters		Wall thicknesses in mm/inches		
mm	inch	22.2/0.875	23.8/0.938	25.4/1
406.4	16	210 kg/m	225 kg/m	239 kg/m
457.2	18	238 kg/m	254 kg/m	270 kg/m
473.1	18 5/8	247 kg/m	264 kg/m	280 kg/m
508.0	20	266 kg/m	284 kg/m	302 kg/m
530.0	20 7/8	278 kg/m	297 kg/m	316 kg/m
610.0	24	322 kg/m	344 kg/m	366 kg/m

The preliminary manufacturing programme for the new wall thicknesses 22.2 mm/0.875 inch to 25.4 mm/1 inch. Other diameters and wall thicknesses on request.

Strength determination by means of the tensile test in accordance with ASTM A 370

The application possibilities in detail

The new thick-walled HFI welded steel pipes can replace seamless and (D)SAW welded steel pipes in all their typical applications.

Steel construction
Thanks to the greater wall thicknesses, the pipes have higher static carrying capacities. This opens up new possibilities for utilization as structural tubes and square and rectangular hollow sections.

Offshore wind farms and oil platforms
Here too, pipes in the new wall thicknesses are a practical, price-conscious alternative as cable conduits or in the complex structures of foundations.

Power station engineering
An additional technical advantage lies in the close manufacturing tolerances of HFI welded steel pipes. This can allow the use of thinner walls than would be required with seamless pipes. Besides applications in power station engineering, the tubes can be used for roller bearings and hydraulic cylinders.

Gas storage facilities
In underground facilities (caverns, aquifers) and pipe arrays, gas is usually stored at very high pressures of 200 bar and above. This calls for steel pipes with suitably dimensioned wall thicknesses.

Cover story Interview with Michael Kosfeld

»Offering better and more cost-conscious product solutions«

We spoke with Michael Kosfeld in Siegen about the technical and cost advantages and the market potential for the new products with greater wall thicknesses.

Mr Kosfeld, increasing pipe wall thicknesses to up to 25.4 mm involved considerable development efforts and expense. What were the underlying reasons for this step?
We know from our customers that there is a particularly important demand for these sizes. In 2007 we extended our range to include diameters up to 24 inches. The increase in wall thicknesses is the logical next step in broadening our manufacturing programme. As a technological leader on the global market for HFI welded steel pipe, we are of course always eager to improve the quality and cost-effectiveness of the solutions we offer our customers.

That means you are responding to concrete customer requirements?
Exactly. Working closely with our

customers as we do, we talk with them frequently and have learned that there is a high demand for greater wall thicknesses.

Where do you see the main applications for the new wall thicknesses?
The new sizes will find numerous uses in the oil and gas industry, as structural tubes or MSH sections. They are also suitable for gas storage facilities, in power station engineering, steel construction, hydraulic engineering, and as blooms for further processing. Another application is deep sea pipe-laying projects using the reeling technique. As you see, the spectrum of applications is tremendous.

Talking about gas storage facilities, could you give us a brief outline of this application?
Underground caverns, aquifers and pipe arrays store gas at very high pressures of 200 bar and higher. This calls for appropriately thick walls, greater than the 20.6 mm which was our limit in the past.

Pipe arrays are made up of a large number of interconnected pipes. Such storage possibilities help power station operators and small utilities to optimize their gas procurement and sales. But given the high operating pressures, they too need pipes with great wall thicknesses.

Where precisely do you see the advantages of HFI welded pipes in these applications?
Until now, the demand from this market has mainly been served by seamless and (D)SAW welded pipes. However, HFI welded pipes which are just as suitable can be manufactured with higher precision and significantly closer tolerances. So the pipes in our new size range offer our customers a novel, high-grade and cost-conscious product solution.

Apropos cost. What prospects do you see here?
HFI welded pipes can be manufactured much more cost-effectively than seamless or (D)SAW welded pipes. This is particularly evident with the many current projects requiring large quantities of pipes.

»HFI welded pipes can be manufactured much more cost-effectively than seamless or (D)SAW welded pipes.«

When will the first pipes and sections be ready for shipment?
The first pipes with an outside diameter of 406.4 mm in grades up to X 56 are already available with wall thicknesses of 23.0 and 25.4 mm. Diameters of 508.0 and 610.0 mm will follow successively. As for MSH sections, we are at present coordinating the precise parameters for our manufacturing programme.

Talking about steel grades – where will the focus be here?
We are currently still in the launch phase, but we have set a high benchmark with grade X 56. In the long term, we will offer the entire range of steel grades.

How about coatings, linings and custom machining?
In principle, the new thicker-walled pipes are available in the same designs as the pipes in our established manufacturing programme. The substantially higher weight might mean marginal restrictions in some special lengths e.g. with 18-meter pipes. The standard 12-meter pipes will, however, be available across our range.

To sum up, how do you assess the market potential?
As already said, HFI welded steel pipes with their significantly closer tolerances are a competitive alternative to seamless and (D)SAW welded pipes. Combining our technical strength and our customers' expressed interest, we estimate the market potential to be high.

Michael Kosfeld
Born in Mönchengladbach in 1966, Michael Kosfeld grew up and was educated in Brazil. He then completed a traineeship at Mannesmann AG in Düsseldorf.

Career
Since 2007 Michael Kosfeld is heading the oil and gas line pipe and OCTG division at Salzgitter Mannesmann Line Pipe.

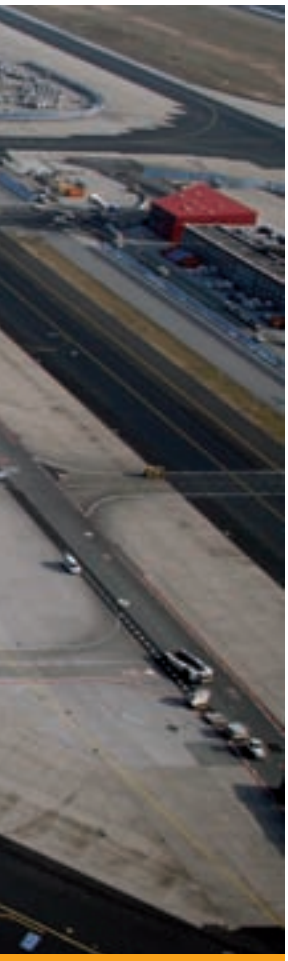
In the course of his 25 years career in the Group he has held sales positions at various Mannesmann companies in Germany and abroad. Most recently, he worked for almost four years for Salzgitter Mannesmann International and Stupp & Mannesmann Line Pipe in Houston, USA.

Hobbies
Michael Kosfeld loves travelling and is a keen golfer.

Project Kerosene pipeline at Frankfurt Airport

Frankfurt Airport‘s main artery

With over 460,000 aircraft movements and almost 51 million passengers per year, Frankfurt Airport ranks among the world‘s most important air traffic hubs. Although hardly noticeable at first sight, high-pressure steel pipes from Salzgitter Mannesmann Line Pipe play a vital role in every aircraft take-off.



Left: Frankfurt Airport is one of the world's most important air traffic hubs
Top: Refuelling an aircraft tank with a dispenser vehicle

The logistics involved in keeping airport operations running smoothly and efficiently 24/7/365 are enormous. Passengers need to check in, their luggage must arrive at the right place at the right time, the airspace must be monitored, take-offs and landings must be coordinated, and aircraft must be serviced and maintained. However, even when all this has been done, something very basic is still missing: fuel for the aircraft.

Underground refuelling system

The mega-giant volumes of kerosene used at Frankfurt Airport are distributed to more than 200 aircraft parking positions, so-called pits. This is done via an underground pipeline system, which has been expanded over recent years to a length of 60 kilometers using HFI welded steel pipes from Salzgitter Mannesmann Line Pipe in a variety of grades and diameters.

Computer-controlled leak monitoring

Frankfurt Airport has one of the most advanced underground refuelling systems anywhere in the world, with computer controlled leak monitoring. Leaks as small as 1 liter per hour are reliably detected and would cause the relevant valves to close automatically. Built and operated to the most stringent safety standards, the underground kerosene pipeline receives its fuel supplies from Hydranten-Betriebs-Gesellschaft (HBG), a joint venture of several oil companies and a Lufthansa subsidiary.

New pipeline linked to Europe

HBG operates a large fuel farm on the airport premises at Frankfurt with a capacity of 186 million liters of kerosene. To ensure supplies to the fuel farm independently of weather conditions and inland navigation, plans were made starting in 2007 for the construction of a pipeline over a distance of some 20 kilometers to Gustavsburg, which is linked via the RMR Pipeline (Rhein-Main-Rohrleitungsgesellschaft) and the European pipeline network right up to the oil terminals at the Port of Rotterdam.

The new pipeline route runs from the Gustavsburg fuel farm at the Rhine harbour around the southern edge of the Ticona works, parallel to the Frankfurt-Cologne ICE route and then beneath existing paths in the Kelsterbach Forest. It is scheduled to go onstream in the course of 2010.

Pipe-laying operations by the Nacap company at Frankfurt Airport

Steel pipes with a special lining
Salzgitter Mannesmann Line Pipe supplied HFI welded steel pipes in the nominal diameters DN 250, DN 300 and DN 500 for this demanding project. A two-layer COPON lining was applied to the shot blasted inside surface for internal corrosion protection. The pipes for the open-trench sections were provided with an HDPE-coating and a top coat of fiber cement mortar (FCM-N).

Some 30 percent of the pipeline was completed by horizontal directional drilling (HDD), a trenchless pipe-laying technique which called for a total of 16 launch pits along the route. The pipes for these between 70.0 m and 650.0 m long sections were given an FCM-S special coating with T-profile, to protect them against the high mechanical loads involved. Underground crossings were built beneath the bed of the Main River and under a railway track, the A3/A67 motorway, and the high-speed Frankfurt-Cologne rail line. Given that not a single tree had to be felled along the route, conservationists raised no objections to the new pipeline. On the contrary: the new link has made transporting kerosene much safer than via inland shipping on the Main River.

Dispenser vehicles enhance safety
But back to Frankfurt Airport and the question of how the kerosene gets into the aircraft tanks: the refuelling attendants at the 200 and more pits have 318 kerosene hydrants at their disposal. But the kerosene is not filled directly into the tanks from them. It is pumped into the wing tanks of the jets via dispenser vehicles at a speed of some 7,000 liters per minute*.

Since this has to be done at several pits simultaneously, the refuelling system provides a constant flow of kerosene at a rate of about 45,000 liters per minute. The dispenser vehicles are equipped with a wide range of measuring instruments for checking the quality and temperature of the kerosene. Even a slight deviation could have fatal consequences, that is why each tank filling process is recorded and the kerosene is visually inspected at the start and at the end of it.

Up to 18 million liters of kerosene a day
A Boeing 747-400 holds about 225,000 liters of kerosene, an Airbus A380 as much as 310,000 liters, so refuelling procedures can take up to one hour. Of course, each aircraft is filled with only as much fuel as it needs to reach its destination. Even so, at peak periods up to 18 million liters of kerosene a day can be required. All safely and reliably transported via pipeline from Rotterdam right into the aircraft tanks.

Just for comparison: transporting this volume by road would require approx. 480 tank trucks per day.

* In addition, 12 tank trucks are available for conventional refuelling of the aircraft.

An Airbus A380 holds up to 310,000 liters of kerosene

As the owner and operator of Frankfurt Airport, one of the world's most important air traffic hubs, Fraport AG ranks among the leading groups in the international airport business.

Frankfurt Airport in figures	
Operational area:	21 square kilometers
Workshops and facilities:	approx. 500
Employees:	approx. 71,000
Passengers in 2009:	50.9 million
Peak day:	1 August 2009 – 174,840 passengers
Aircraft movements in 2009:	463,111
Peak day:	5 June 2009 – 1,392 take-offs/landings
Airlines:	130
Destinations:	317
Countries:	105
Fuel farm capacity:	186 million liters of kerosene
Underground high-pressure pipeline network:	60 km

Other airport projects

Besides Frankfurt Airport, Salzgitter Mannesmann Line Pipe has supplied numerous other international airports with pipes for kerosene pipelines.

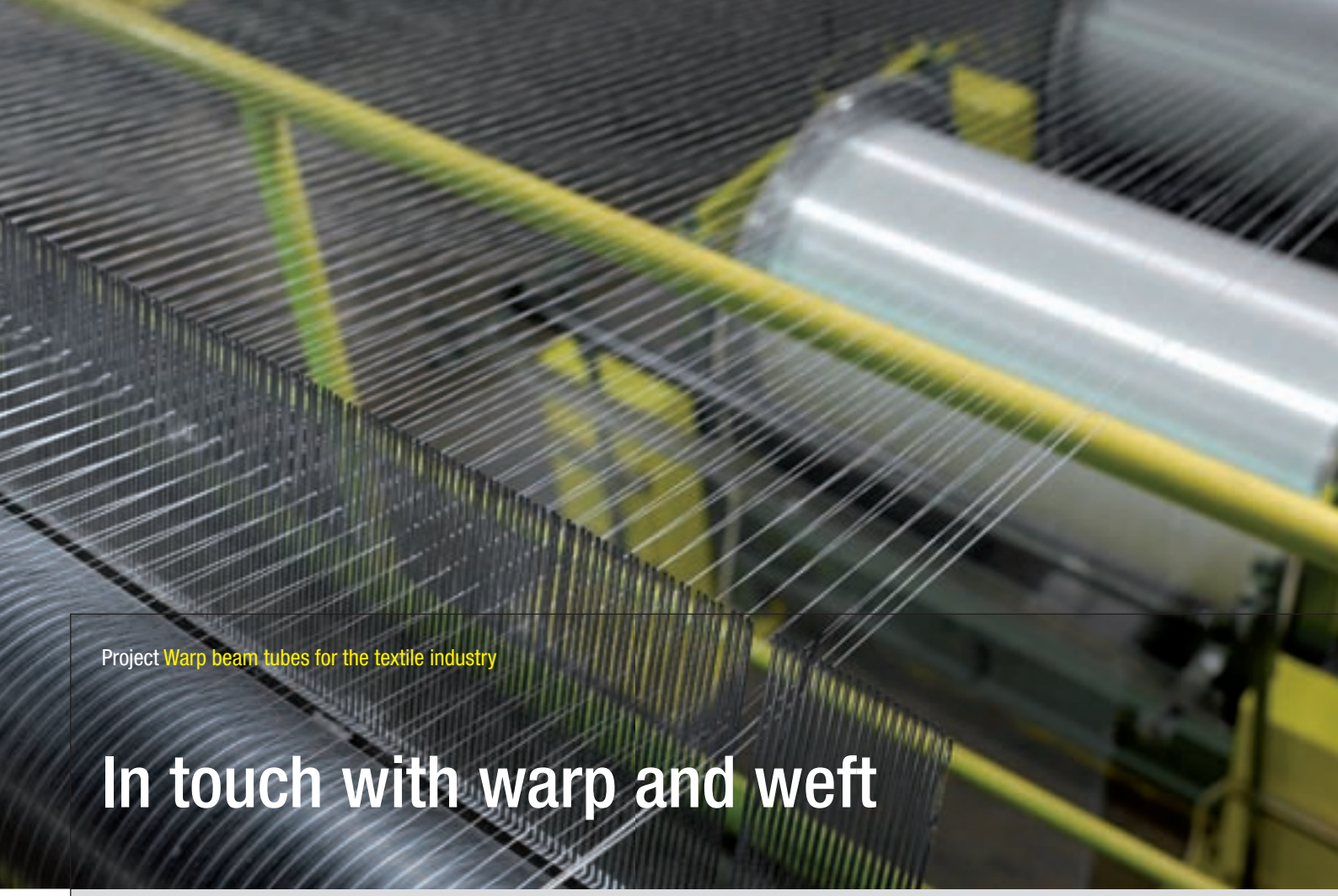
Sheremetyevo-3 Airport (Moscow) – total fuel line length: 3,600 m
Pipe diameter: 508.0 mm; wall thickness: 8.0 mm
Coating: MAPEC® polyethylene LDPE coating to DIN 30670
Lining: COPON EA4 2217 suitable for carrying Jet Fuel A1

Vnukovo Airport (Moscow) – total fuel line length: 6,750 m
Pipe diameter: 406.4 mm; wall thickness: 8.0 mm
Coating: MAPEC® polyethylene MDPE coating to DIN 30670
Lining: COPON EA4 2217 suitable for carrying Jet Fuel A1

A380 Airbus fuel line (Toulouse) – total length: 1,560 m
Pipe diameter: 323.9 mm; wall thickness 10.0 mm
Coating: MAPEC® coating, black to NFA 49-710 S

Berlin Brandenburg International Airport – total fuel line length: 12,600 m
Pipe diameters: 508.0 mm; 406.4 mm; 219.1 mm; 168.3 mm; 273.0 mm
Wall thicknesses: 12.5 mm; 8.0 mm; 10.0 mm; 6.3 mm; 7.1 mm
Coating: MAPEC® polyethylene MDPE coating to DIN 30670, with longitudinal colour strips
Lining: COPON EA4 2217 suitable for carrying Jet Fuel A1

Liège Airport – total fuel line length: 8,019 m
Pipe diameters: 406.4 mm; 508.0 mm; wall thickness: 9.5 mm
Coating: MAPEC® coating to DIN 30670 S
Lining: COPON EA4 2217 suitable for carrying Jet Fuel A1



Project Warp beam tubes for the textile industry

In touch with warp and weft

Modern weaving mills are high-tech enterprises where precision, speed and reliability are what counts for survival on a globalized market. Salzgitter Mannesmann Line Pipe supplies HFI welded steel tubes with a special diameter of 216.8 mm to a renowned internationally operating manufacturer of precision accessories for the textile industry.

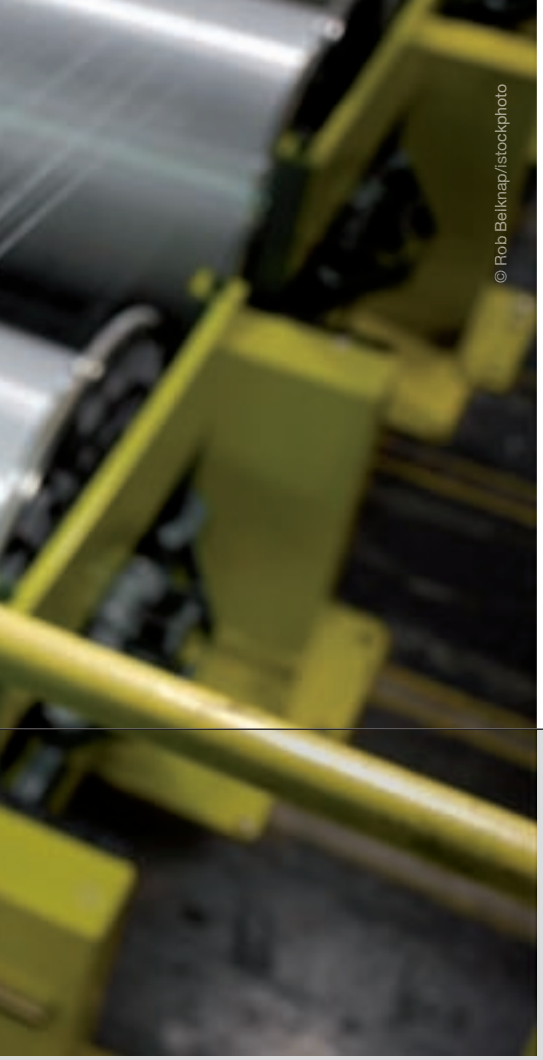
Up until now, the company had used standard tubes with a diameter of 219 mm which were then machined down to 216.8 mm, the dimension typically used in the textile industry. Two factors tilted the customer‘s decision in favour of HFI welded steel tubes: Firstly, the high precision with closest tolerances on the diameter, ovality and wall thickness and, secondly, the manufacturing of special sizes. This makes the manufacture of the end products easier, quicker and, above all, more economic. Meantime, steel tubes from Salzgitter Mannesmann Line Pipe are being used in a variety of wall thicknesses and material grades.

Application as warp beam tubes

To make a warp beam of the tube, it has a circular aluminium flange fitted to either end. First, square threads are cut into the tube ends on which the aluminium flanges can be adjusted to the width of the cloth to be produced. Then square or specially designed inserts are introduced into the tube ends, depending on the specifications of the loom manufacturer. Finally the tubes are spray zinc coated. This not only provides excellent corrosion protection but the rough surface also ensures yarn entrainment, so that tying holes or adhesive tapes for the warp yarns can be largely avoided.

Up to 10,000 yarns

Warp beams hold all the warp yarns in a parallel wind. This can be up to 10,000 individual yarns per beam, depending on the type of cloth being woven. A jumbo warp beam has a flange diameter of 1,600 mm and can take up to 3 tonnes of yarn. Depending on the tensile force exerted by the yarns (up to several tonnes), the HFI welded tubes are made in four different material grades with wall thicknesses ranging from 6.1 mm for cotton cloths to 12.5 mm for synthetic fabrics.



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Background information on weaving

On modern power looms, up to 10,000 warp yarns are fed to the machine from the rear. To produce a fabric, some of the warp yarns are raised, while the others are lowered. Through the resultant opening, called the shed, the weft or pick yarn is either blown from the side by a fine air or water jet, carried through in a shuttle, or passed through by two grippers. To ensure that the fabric isn't too loose, a weaver's comb or reed battens each new pick, forcing it against the just formed cloth beside the previous pick.

For more complex fabrics, jacquard machines are used; these can raise or lower each warp yarn individually. Modern weaving machines have several sheds which increases their productivity because several weft yarns can be processed simultaneously.

Left: Extreme close-up of warp ends
Bottom left: Cutting the square threads
Bottom centre: Finished warp beam tubes, coated and fitted with special inserts for mounting on the loom
Bottom right: Jumbo warp beam with a flange diameter of 1,600 mm

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Modern weaving mills are high-tech enterprises where precision, speed and reliability are at a premium

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Project Copenhagen District Heating Pipeline Project

290 °C under Amalienborg Palace

District heating meets more than 98 % of the heat demand of Copenhagen and its 500,000 inhabitants, a worldwide unique supply quota. In 2009, another step was taken towards resource conservation by connecting a power station on the Amager Peninsula off Copenhagen with the district heating network.

Amalienborg Palace is the Danish Royal Family's city residence in Copenhagen. The water between the Palace and the opera house opposite freezes over in low winter temperatures.

Looking down to one of the three tunnel shafts. The district heating pipes were lowered into them and then welded together.

The project was prompted by Denmark's endeavours to further extend combined heat and power generation in order to bring down primary energy consumption and thereby CO_2 emissions.

The realisation of the power station connection in Copenhagen called for the concentrated harmonisation of technical expertise in several different areas. For the geographical proximity of Copenhagen's city centre to the waste incineration plant with its CHP generating plant – a straight-line distance of only about 3.0 km – was offset by the extremely difficult route planning. Open-trench laying was ruled out from the start, since the new pipeline had to pass under the harbour basin, Sortedam Lake and, most crucially, through the extremely cramped conditions of Copenhagen's Old Town.

Enormous civil engineering challenges

After intensive consultations, the planning engineers at the Københavens Energi utility company decided on a tunnel to link the power station with the »Fredensgade« transfer station in the city centre. However, if the entire line was to be laid in the homogeneous limestone strata under the groundwater level, it would have to be at depths of up to 40.0 m. So first a 25.0 x 15.0 m oval access shaft was built directly beside the power station at a depth of 35.0 m. From there, the route runs 2,400 meters with a 0.2 % gradient under the harbour basin and the Amalienborg Palace grounds to the »Adelgade« transition shaft. At this point, the tunnel bends towards the northwest and rises over a further 1,400 meters with a 1.1 % gradient to the »Fredensgade« target shaft.

While the shafts were being drilled, there were several cases of flooding with up to 240 m^3 per hour. This water had to be pumped off, filtered and gradually trickled back into the groundwater so as not to dry out and thus damage the very susceptible oak piles supporting Copenhagen's Old Town buildings. The tunnels were drilled to an outside diameter of 5.10 m; the inside diameter is 4.20 m. The entire shaft and tunnel construction works took about two years to complete.

Designing the high-temperature district heating pipeline

Besides the tremendous civil engineering exigencies, the pipelines themselves posed high technical challenges. Salzgitter Mannesmann Line Pipe supplied the carrier pipes for the two parallel steam pipelines. They were 508.0 mm in diameter with a wall thickness of 11.0 mm, insulated with 210 mm rock wool and encased in spirally welded steel pipes from Salzgitter Mannesmann Großrohr.

Since the operating temperature in the district heating pipeline is about 290 °C, the pipes used had to meet strictest insulation and thermal expansion criteria. The linear expansions of the HFI welded inner pipe in the high-temperature pipe-in-pipe system are up to 8.5 m in the 2,400-meter-long tunnel section and approximately 4.9 m in the shorter section.

This demanded the highest level of advanced engineering and the solution was provided by FW-FERNWÄRME-TECHNIK GmbH from Celle through a combination of thermally pre-stressing the carrier pipes and the use of articulated expansion compensators. The compensators were installed in the vertical parts of the pipeline in the three tunnel shafts.

Permanent vacuum with triple function

A permanent vacuum of 1 – 3 mbar was generated in the annular chamber between the carrier pipe and the outer jacket, producing a Thermos-flask effect which cut heat losses by up to 40 % and substantially restricted the jacket pipe temperatures. At the same time, this vacuum also allows ongoing monitoring of the leak-tightness of the pipe-in-pipe system. A further advantage is that, since there is no oxygen in the annular space between the pipes, outside corrosion of the inner pipe and inside corrosion of the jacket pipe are excluded.

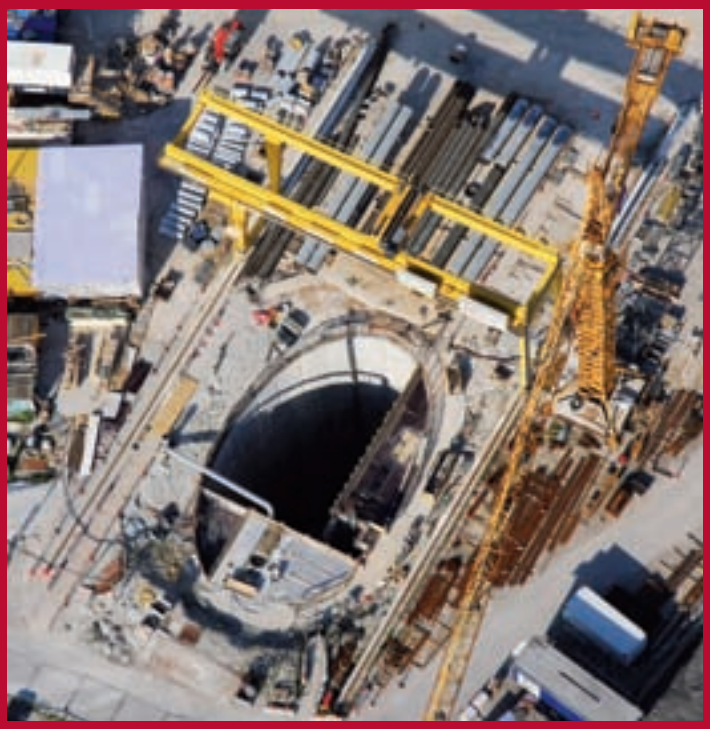
Just-in-time supplies to the construction sites

The project's logistics were likewise challenging and complicated. Since there was barely sufficient storage space at the shafts in the inner city, the shaft-head deliveries of the 16-meter-long double pipes, each weighing some 8.5 t in all, had to be timed practically to the hour.

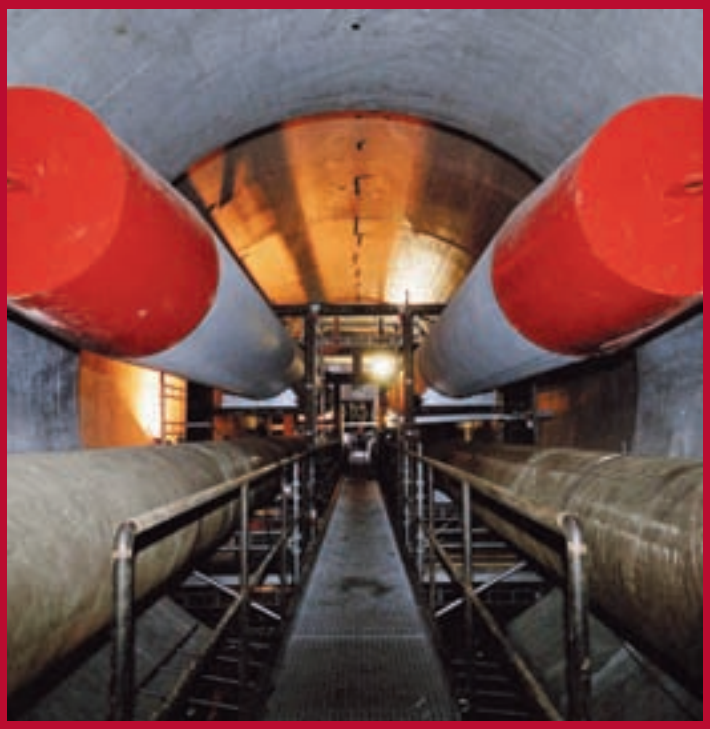
Well-organised advance planning ensured a just-in-time pipe delivery to the

Right: The welded pipe strings are inserted into the tunnel sections bit by bit on roller bearings

The oval access shaft, 35 m deep



The steam conduits are designed to withstand temperatures of up to 300 °C

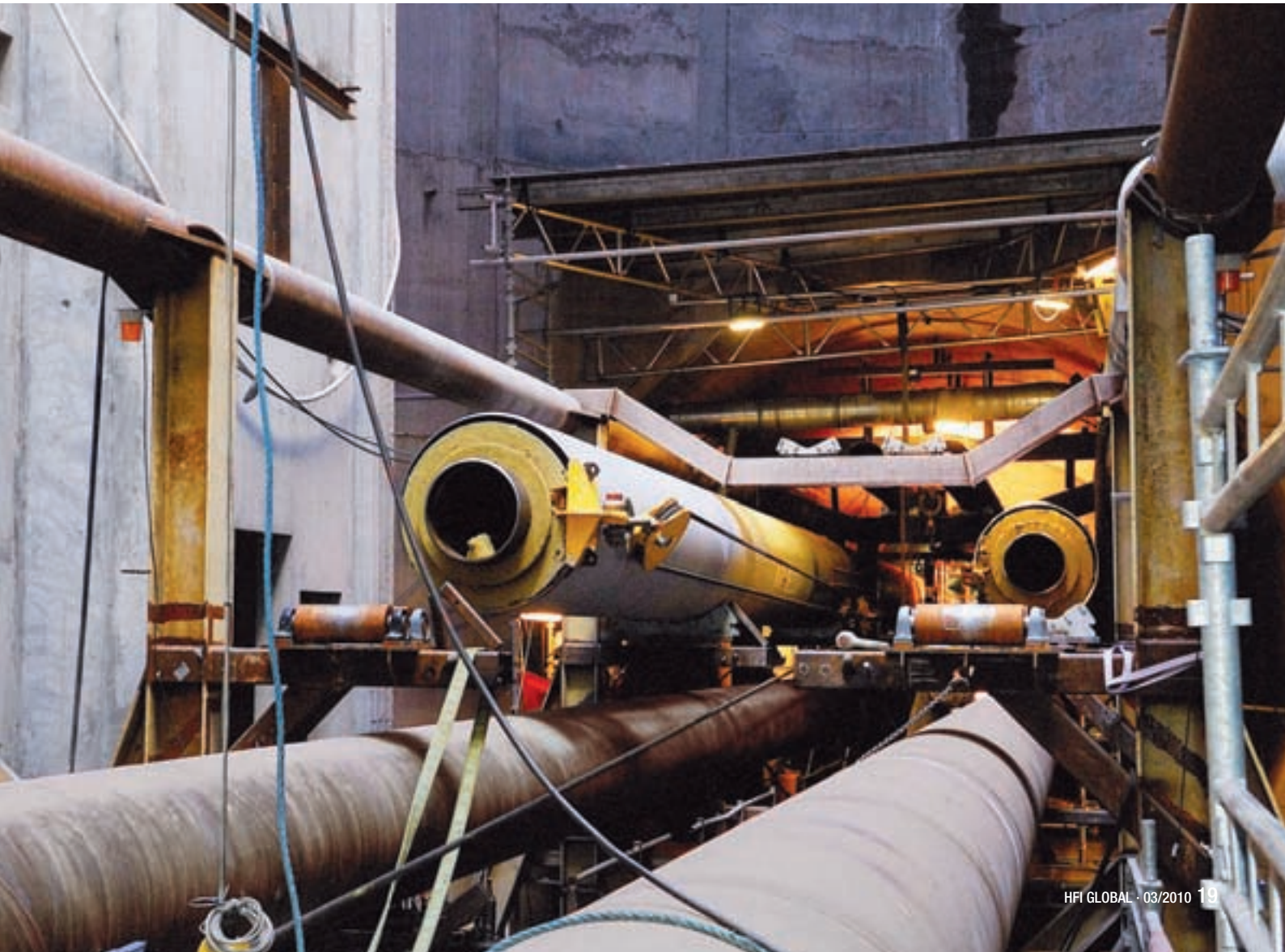


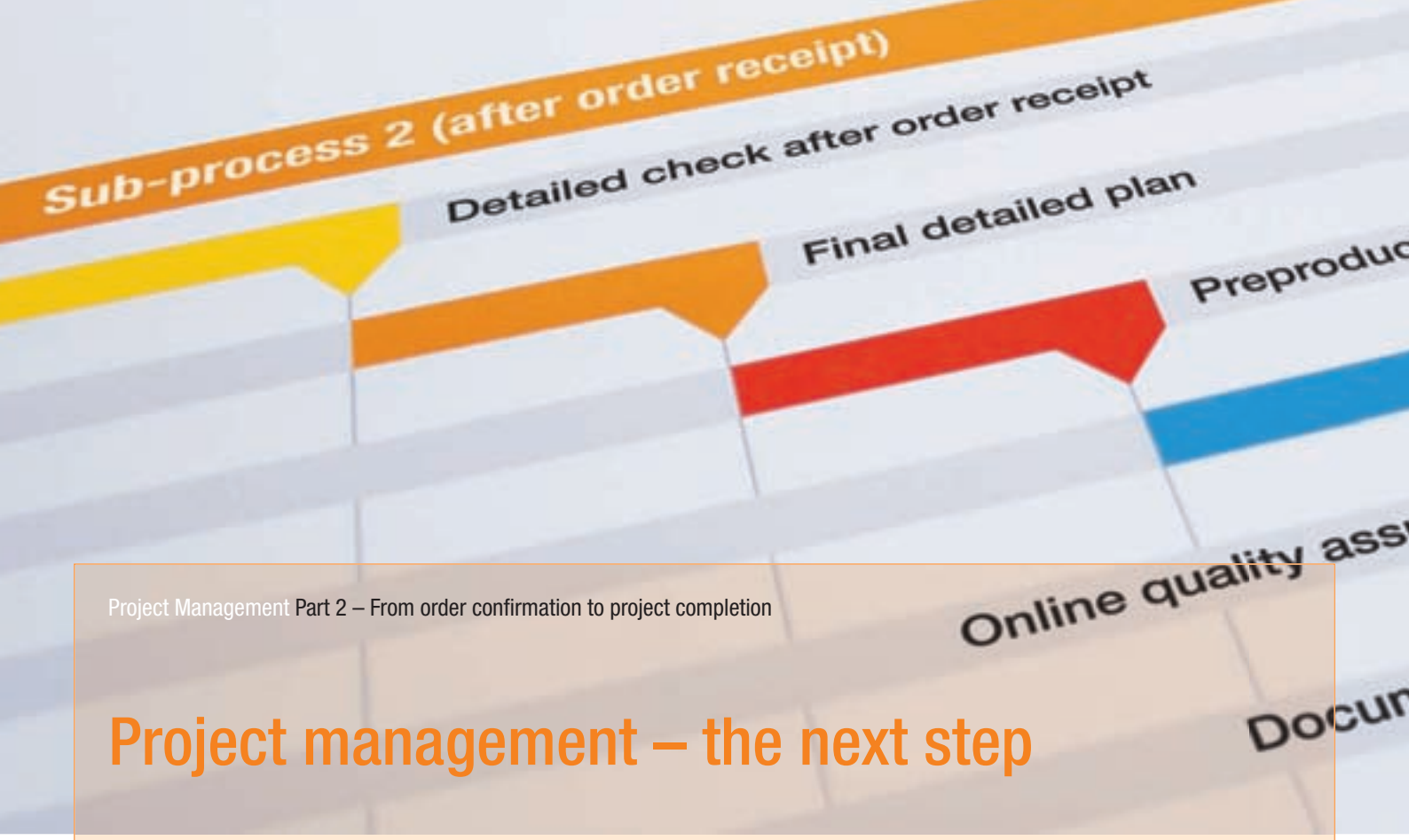
appropriate tunnel shafts. They were first lowered into the shafts by crane. Then the carrier and jacket pipe sections were welded together and inserted section by section into the tunnel on pre-installed roller bearings.

Successful teamwork unites the project partners

The well coordinated teamwork between client, planning office, Salzgitter Mannesmann Line Pipe and FW-FERNWÄRME-TECHNIK made a notable contribution to the further extension of the district heating network in Copenhagen. This successful project demonstrates clearly that technical and business expertise and experience can come together to cut emissions and improve the exploitation of primary energy, even under such demanding conditions.

The pipeline route, at depths of up to 40.0 m, leads from the Amager peninsula off the coast under Amalienborg Palace to the »Adelgade« tunnel shaft and from there to the »Fredensgade« target shaft





Project Management Part 2 – From order confirmation to project completion

Project management – the next step

In the last issue of HFI Global we looked into the project management at Salzgitter Mannesmann Line Pipe with a focus on the quotation phase. In the second part we will explain how the data from the planning phase are processed after the receipt of an order.

Detailed check after order receipt

After a customer has placed an order, the responsible project management again checks the order data and documents in detail. This is particularly important because several months may have passed between the offer and the order placement, and the requirements may have changed in the meantime.

In such a case, the enquiry phase, including the technical assessment as part of the project check – as described in the last issue of HFI Global – would need to be completely restarted. If necessary, the data in the SAP system would have to be updated.

Final detailed plan after check of order status

After this check, and when the quotation and the order match directly, the final phase of detailed project planning commences. Now the decision is taken which plant will produce the pipes. The factors which determine this decision include deadlines, the cost efficiency and the appropriateness of the process technology, and overall capacity utilization.

Based on the rolling planning and the agreed delivery date, the required prematerial is then ordered from approved and certified suppliers.

Preproduction meeting

Usually a detailed preproduction meeting is held at this stage in order to discuss and agree on all the technical and quality relevant topics. Such meetings are usually attended by customers at which, among other things, the MIP (Manufacturing and Inspection Plan) is released.

A further internal meeting serves the coordination of the order information. This ensures that all the important project data and milestones are understood and can be processed by the people who are responsible for implementing the order.

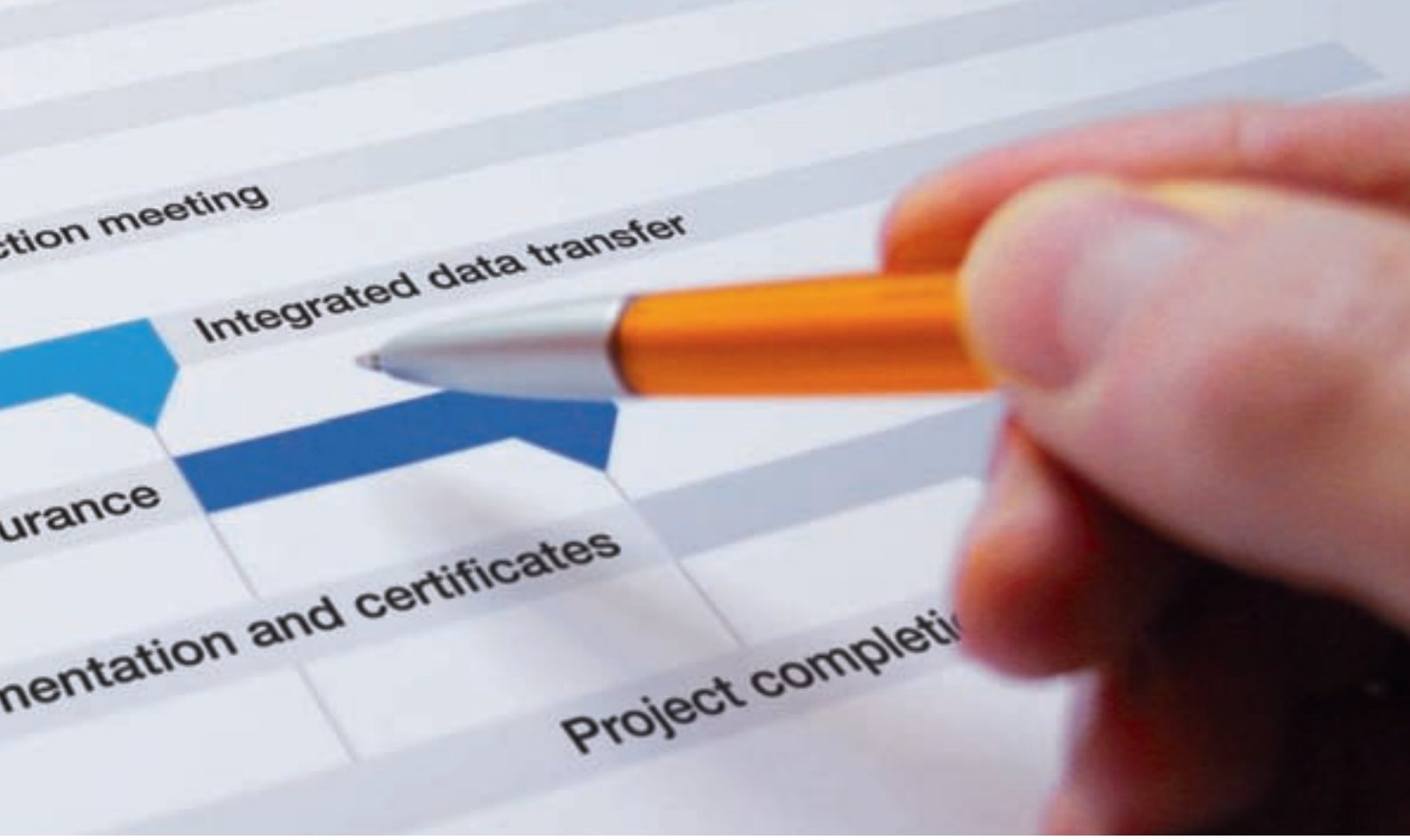
Integrated data transfer for maximum quality performance

All quality features relevant to the project and the products (e.g. tolerances, characteristics, test frequencies, etc.) are now processed into the SAP system. From there, they are transferred directly to the integrated MDA (mill data acquisition) systems of the production lines, the test laboratory and the predefined inspection stations.

This excludes data loss or errors which can easily occur in the case of manual transfer. The closed information chain at Salzgitter Mannesmann Line Pipe ensures an outstanding quality standard.

Online in-process quality assurance

In order to reduce the reaction time and avoid process deviation, all quality relevant tests are carried out online during production flow. The short response times and numerous visual inspections and mechanical tests during production and in the



test laboratories exclude the possibility of dispatching pipes with non-conformance quality. Only pipes in perfect 1A condition are released for further processing or shipment, based on automatic online recognition of the unique barcode applied to each pipe. Non-conforming pipes are immediately blocked online via a non-conformance report (NCR) and are removed from the normal process flow.

This new, fully automated NCR feature in the SAP/MDA system has been developed by the quality departments in the Salzgitter Mannesmann Line Pipe mills and has been implemented as part of the SAP introduction at both locations.

The integrated NCR approach enables quality deviations to be promptly and systematically analyzed and thus contributes to process optimization in the context of our continuous improvement philosophy.

Advantages for documentation and certification

Thanks to the new integrated SAP/MDA system, 3.1 or 3.2 certificates to EN 10204:2004 can be readily issued in any desired form and supplied promptly with the product delivery.

The scope of any special test or documentation requirement is identified in the context of project planning (enquiry processing) with the aid of defined standards and clarified with the customer before the start of production (e.g. at the preproduction meeting).

Here too, the objective is to make all the relevant documents available to the customer as close as possible to the time of pipe delivery.

Project completion

After shipment of the goods and submittal of all order-related documents a close-out meeting is held, preferably including customers' participation.

The fully automated NCR system assigns a unique production number and barcode to each pipe, which also contains all quality-relevant data. This ensures that only pipes in perfect 1A condition are released for shipment.

Technology FCM-S line pipe and MAPUR® casting resin

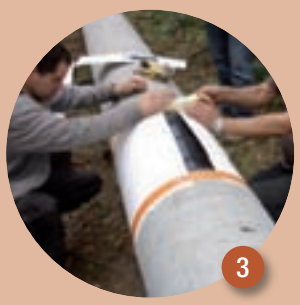
An innovative system for trenchless pipe-laying projects

We presented this system, with its innovative pipe design and the newly developed two-component casting resin MAPUR®, in the last issue of HFI Global in detail. Meantime, we have witnessed it in practice at a project in Frankfurt, where a high-pressure gas pipeline had to cross beneath the Riedgraben, an old arm of the River Main.

For Salzgitter Mannesmann Line Pipe, the development evolved from viewing the concept of a welded pipe string as a single system made up of multiple components. This holistic approach is particularly important in the context of trenchless pipe-laying projects, where the »mere« supply of top quality pipes which comply with all the specified requirements no longer suffices. Research into improving the design of fiber cement mortar coated steel pipes produced the novel FCM-S design, which is optimally adapted to the newly developed coating material, MAPUR®. The perfect interaction of the two components has generated a practice-oriented and user-friendly system.

Use of standard casting mortar

The standard field coating material for steel pipes with a cement mortar coating is casting mortar, which is applied with the aid of a cardboard mould to complete the coating around the girth weld joining



MAPUR®: pipe joint protection against corrosion and mechanical damage

1 Heating the protruding PE coating and the entire weld area

2 Applying the heat shrinking tube

3 Installing the cardboard mould

4 Stabilizing the mould

5 Preparing the two-component MAPUR® casting resin

6 Pouring MAPUR® into the mould

7 MAPUR® only requires one day to cure to its maximum strength

8 The prepared pipe string can be pulled in

9 The pipe head after the installation of the trenchless crossing

two pipe sections. This material not only takes a long time to cure, the field coated area can also be vulnerable to mechanical damage, for example by falling stones jamming in the joint area.

Advantages of MAPUR®

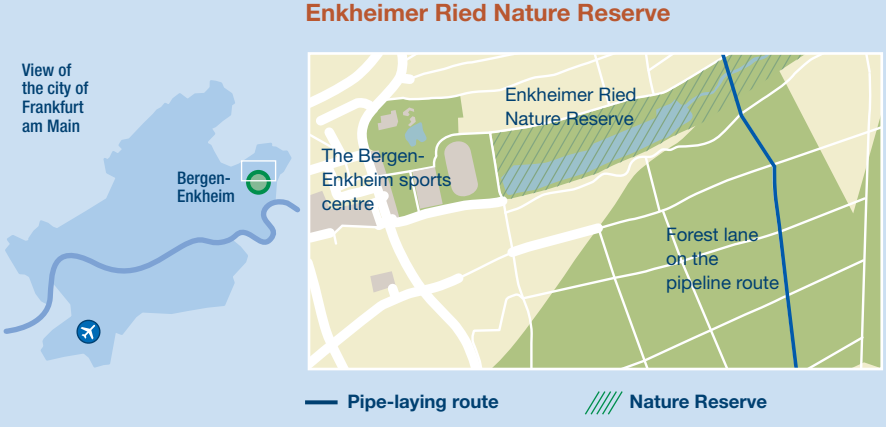
Salzgitter Mannesmann Line Pipe and its pre-material supplier have jointly developed MAPUR®, a sand-filled two-component casting system based on polyurethane. The advantages of this material, which is also used with cardboard moulds, include its significantly shorter curing time: it reaches its maximum strength in just a single day, whereas conventional casting mortar takes up to seven days. It also offers much higher resistance to mechanical point loads.

Skilled and professional processing onsite

To ensure correct processing on site, the Frankfurt-based SKI company was contracted for the field coating operations.

Innovative system proves itself in the field

The contract for NRM Netzdienste Rhein Main GmbH proved to be an excellent pilot project. A high-pressure gas pipeline in DN 400 with a fiber cement mortar top coat had to be laid using the horizontal directional drilling technique. The route of the pipeline in the north-east of Frankfurt passes under the Riedgraben in the Enkheimer Ried Nature Reserve.



View into the hold of the »Toronto Express« with the pipes for a new gas pipeline in Vancouver

Logistics Flat rack shipment to Vancouver

Halfway around the world in 22 days

A mere four weeks was the time frame available to Salzgitter Mannesmann Line Pipe for shipping 200 HFI welded steel pipes for a pipeline in Vancouver. The enormous pressure of time challenged the creativity of the responsible logistics specialists, who even beat the specified delivery deadline.

Wanted: a perfectly coordinated logistics concept to cut 35 days off the journey time.

Loading a flat rack – much faster than single pipe loading

The 21st Winter Olympics have just ended and life is back to normal in Vancouver. This sports event and the investments that came with it have certainly contributed to the continued upswing in this stunningly beautiful part of British Columbia. But the attractiveness of the metropolitan area on the Pacific coast and hence its population has been growing continuously for years. While only some 1.8 million people lived here in 1994, the population is expected to hit the 3 million mark by 2030. So it's time to prepare and get fit for this growth.

New pipeline for Terasen Gas

Like many conurbations around the globe, Vancouver is having to cope with increasing private and public transport, including goods transport volumes. So a long-term plan for improving the transport infrastructure, the Gateway Program, got underway in 2003. As part of the programme, a new 40-kilometre four-lane highway, the South Fraser Perimeter Road, is being built along the Fraser River to speed up traffic flows in the future. In one section of the road works, an existing natural gas pipeline had to be replaced at short notice with a new pipeline by the Terasen Gas utility company.

The pipes for the replacement were required ASAP, and the order for their delivery was placed via the Canadian pipe distribution specialist CE-Franklin with Salzgitter Mannesmann International (Canada) Inc. in Vancouver, which immediately ordered 2,400 metres of HFI welded steel pipes with a diameter of 610.0 mm from Salzgitter Mannesmann Line Pipe in Hamm. Provided with an epoxy flowcoat lining and a 3-layer polyethylene coating, the pipes were to arrive in Vancouver no later than early September 2009.

A race against time

The receipt of the order marked the start of a race against time. As the shipping department saw it, it would be impossible to keep the delivery deadline with conventional loading methods, so a fervent search for alternatives was instigated.

The pipes covered a distance of 11,285 km via road, sea and rail in just 22 days.

What was needed was a perfectly dovetailed, coordinated logistics concept which would shave about 35 days off the time that would be required for a standard shipment and still include a small time buffer.

The flat rack solution

The solution that would do the trick had to function safely and quickly on trucks, ships and railway wagons alike. In addition, time-intensive single pipe loading and unloading had to be avoided at all of the three transhipment locations. Various scenarios were played through and dismissed. After intensive talks with the forwarding agency, the logistics and purchasing specialists at Salzgitter Mannesmann Line Pipe finally decided to use flat racks for the shipment. The advantage of this shipping method is that instead of handling each pipe individually, only the complete flat rack has to be moved. This saves time during transhipment and minimizes the risk of pipe damage during reloading operations. A suitable load-securing concept for eight pipes per flat rack was developed together with the Cordstrap company based in Toenisvorst, North Rhine-Westphalia.

A convincing loading and transportation concept

What still worried the logisticians, however, were the loading guidelines of the Canadian Railway Company, CP Rail. For the specified methods not only turned out to be difficult to use with coated and lined pipes but they might even have damaged them. The forwarder therefore provided a flat rack loaded

The pipes reached the container yard in Vancouver in record time and in perfect condition

The loading concept eventually also convinced the representatives of the Canadian Rail Company

with comparable pipes and secured in line with the applicable German regulations. The representatives of the forwarder, the Salzgitter Mannesmann International office in Vancouver and the logistics specialists from Salzgitter Mannesmann Line Pipe all worked together, and in the end the loading and transportation concept also convinced the representatives of CP Rail.

Shipment starts on the road

The pipes with a wall thickness of 14.2 mm were manufactured in line with the production and delivery schedule. On 4 and 5 August 2009, 25 flat racks with a length of 12.19 m and carrying a total of 200 pipes left the Hamm works on trucks bound for Antwerp. There they were loaded aboard the Toronto Express and started their 6,100 kilometre journey across the ocean to Montreal on 6 August. To ensure that nothing went wrong with this express order, specialists from the logistics department of Salzgitter Mannesmann Line Pipe and the forwarder supervised and accompanied the loading operations.

Deadline beaten

Without any incidents, the flat racks arrived in Montreal on 17 August. A cargo surveyor who had come to inspect the pipes after the 11-day journey found and certified them to be in perfect condition. Two days later, after an inspector from the Technical Services of the Railway Association of Canada had checked and released the express freight, the transportation could be continued via a Canadian Rail train over a 4,905 km long stretch from the East Coast across Canada to the container yard in Vancouver. At 3:45 am on 26 August, even before the customer's deadline, all the pipes reached their Vancouver destination in perfect condition.

11,285 km in just 22 days

In all, the pipes took a record time of 22 days to cover a distance of 11,285 km via road, sea and rail. With conventional single pipe loading, it would have been 5 October at the earliest, a full 40 days later, before the delivery could have arrived in Vancouver.

The 200 HFI welded pipes made in Hamm for a gas pipeline were to arrive at Vancouver within four weeks. Salzgitter Mannesmann Line Pipe even beat this deadline and delivered the pipes over 11,000 km to Vancouver via road, sea, and rail in only 22 days.

The logistics schedule in detail
Departure ex Hamm: 4/5 August 2009
Transport to Antwerp: 278 km by road
Transhipment in Antwerp: 6 August 2009
Shipment to Montreal: 6,102 km by sea
Arrival in Montreal: 17 August 2009
Transhipment to Montreal: 19 August 2009
Transportation to Vancouver: 4,905 km by rail
Arrival in Vancouver: 26 August 2009

Sales Office Salzgitter Mannesmann International (Mexico) S.A. de C.V.

Quality and reliability »made in Germany«

Salzgitter Mannesmann International based in Düsseldorf has had a sales office in Mexico since 1981. In 2009, HFI welded pipes were sold there for the first time on a large scale. A fitting occasion for HFI Global to introduce the office to its readers.

»In 1958 I arrived at the port of Veracruz in Mexico. Of course everything looked very different from what it is today,« recalls Jürgen Ziebe, who left Germany for Mexico as a young engineer. Some 50 years later, the first pipes from Salzgitter Mannesmann Line Pipe followed him on their long journey across the sea from the port of Bremen to the other end of the earth.

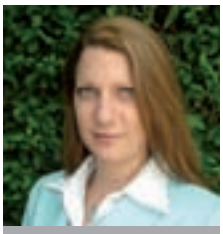
»Somehow I have always had to do with steel pipes. Indeed, my very first customer here for my then employer, Krupp-Widia, was a pipe mill: Tubos de Acero de México. So a large part of my professional life has revolved around pipes.«

Perhaps this is what induced Jürgen Ziebe, meantime 76 years old, to remain active in his retirement by working for Salzgitter Mannesmann International in Mexico. The young sales team led by the branch manager Rafael Esteban (37), the mechanical engineer Fermín Beltrán (27) and the legal expert Kathrin Jochum from Nürnberg can still call on him for advice day-in, day-out.

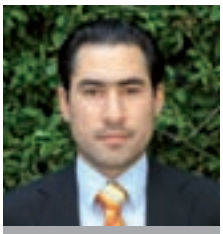
The company was established in 1981

Rafael Esteban
General Manager

Jürgen Ziebe
Consultant



Kathrin Jochum
Sales Representative



Fermín Beltrán
Sales Manager

»The name Salzgitter Mannesmann stands for steel products of outstanding quality – in Mexico as well.«

and it focused for a long time on selling flat steel and steel sections. Since 2007, however, efforts to up sales in steel pipe from the Group's portfolio have increasingly gained importance. Thanks to good and long-standing relationships and experience as well as Jürgen Ziebe's proactive support, Salzgitter Mannesmann Line Pipe and SMID in Düsseldorf and Mexico have meantime booked and successfully completed four orders for the oil and gas pipeline sector. In each case, the end customer was the state-owned oil and gas company Pemex. »Obtaining the Pemex approval was anything but easy. It took quite some effort to convince the decision makers of the high quality of HFI welded steel pipes made in Germany and secure a first order,« recalls Jürgen Ziebe. »What certainly helped was the good name of Salzgitter Mannesmann, which has long been a synonym for excellent steel products here in Mexico as well.«

The hard work has paid off. The first successful delivery of 21 km of HFI welded gas line pipe with a diameter of 273.1 mm was soon followed by three further orders. Meantime 86 km of line pipe has been supplied in all. This includes 15 km of pipe with a diameter of 24 inches and three-layer coating, which was subjected to the exacting inspection requirements of the Mexican customer specifications at the Hamm location, witnessed by the customer's representatives.

»I must say we are particularly proud of our high logistics performance. The perfect interaction with Salzgitter Mannesmann Line Pipe in Hamm and Siegen enabled us for the first time to organize the transportation here in Mexico.« Dealing with complex customs procedures and ensuring that the pipes arrive on site punctually and undamaged is a matter of course for Salzgitter Mannesmann Line Pipe. And customers appreciate this, because it takes the hassle out of their administrative processes, as well as reducing their own man hours and minimizing the failure risk. After all, the sales office staff keep a sharp eye on the careful handling of the pipes as well as the deadlines for unloading and further transport.

For Jürgen Ziebe, reliable and punctual logistics services and the outstanding quality of the products combine to create a major opportunity for Salzgitter Mannesmann Line Pipe to go on expanding its market position in Mexico. Further negotiations for new deliveries are currently underway. So Jürgen Ziebe has no time at the moment to retire completely. Especially since, as he concludes, »I can't really imagine a life without steel and steel pipes.«

Fermín Beltrán supervises the safe unloading of HFI welded pipes in the Port of Tuxpan, Veracruz

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«.

April 2010

12. – 16.04.2010
Tube 2010
Düsseldorf/Germany

May 2010

19./20.05.2010
ÖVGW Annual Convention
Wels/Austria

May 2010

19. – 21.05.2010
H_2O
Ferrara/Italy

May 2010

27./28.05.2010
DVGW/DELIWA
Bezirksgruppen-Fachtagung
NRW 2010
Congresszentrum Essen

June 2010

08. – 11.06.2010
ITM
Poznan/Poland

September 2010

13. – 17.09.2010
IFAT ENTSORGA
Munich/Germany

September 2010

17. – 19.09.2010
NRW-Tag
Siegen

September 2010

30.09. – 01.10.2010
Water Conference
Salzgitter Mannesmann
Line Pipe Siegen

October 2010

05. – 08.10.2010
KIOGE
Almaty/Kazakhstan

October 2010

14./15.10.2010
Gas Conference
Salzgitter Mannesmann
Line Pipe Siegen

November 2010

01. – 04.11.2010
ADIPEC
Abu Dhabi/UAE

November 2010

16. – 18.11.2010
OGT
Ashgabat/Turkmenistan

November 2010

30.11. – 01.12.2010
Gat 2010
Stuttgart/Germany






Flashlights

1 Water Conference at Salzgitter Mannesmann Line Pipe in Siegen, 1-2 October 2009
2 Trade fair stand at KIOGE in Almaty, Kazakhstan, 6-9 October 2009
3 Gas Conference at Salzgitter Mannesmann Line Pipe in Siegen, 15-16 October 2009
4 10° Congreso y Exposición Internacional de Ductos 2009, Monterray/Mexico vom 11-13 November 2009
5 Symposium on Trenchless Technology at Salzgitter Mannesmann Line Pipe in Siegen, 21-22 January 2010
6 Trade fair stand at the Oldenburg Pipeline Forum, 11-12 February 2010

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