HFI GLOBAL

The magazine of Salzgitter Mannesmann Line Pipe for customers and partners

SALZGITTER MANNESMANN LINE PIPE
A Member of the Salzgitter Group

Issue 04 · July 2011

HFI-welded steel pipe and the production of regenerative energy

Renewable energies 2.0

Dear Readers

Previous numbers of our magazine for customers, business partners and other interested parties have always focused on reports of projects under implementation in various parts of the world.

This time is different. Instead of projects the present edition concentrates on one single, globally significant theme. We are going to talk about renewable energy generation, one of the key issues for all our futures.

We aim to provide you with a comprehensive overview of the current status of developments in and around the generation of energy from wind, hydro-, geothermal and solar power sources. Our cover-story title, »Renewable Energies 2.0«, points to the irrefutable fact that what were once utopic dreams have since become serious technologies and processes which in future will contribute significantly to global energy production.

As one of the technologically most advanced producers of HFI-welded steel pipe we are proud to have already participated in off-shore wind-park projects and in the Scottish Oyster wave-power station, and also that we shall be making our contribution to further innovative projects in future.

Alongside our cover story we would like once again to acquaint you with some exciting projects and products. The new football stadium in Danzig has already kicked off. In the run-up to the 2012 European Championships UEFA has already awarded its unique architecture and urban planning concept the status of »show-piece project«.

Leaving Poland‘s Baltic coast we move on to the Allgäu where a treetop path, called the Skywalk gives us a truly unique vista over the alpine foothills and Lake Constance all the way to the Austrian and Swiss Alps.

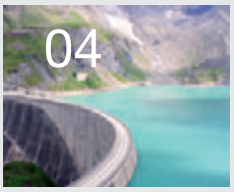
Back in Salzgitter and Peine we have a piece on a very special pipeline which delivers the vital oxygen supply to produce steel in Peiner Träger GmbH‘s new electric furnaces. In our article you will learn how this too constitutes an environmentally friendly solution which enables up to 18,000 tonnes of CO_2 to be saved annually.

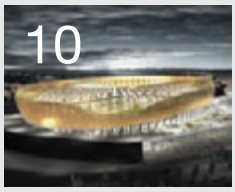
Finally we introduce yet another home-grown product innovation. Pioneering the use of polyamides in pipe coating has enabled us to develop a new high-quality coating variant which has already proved itself in field tests as a comprehensive system solution.

My best wishes for an interesting and enjoyable read!

Marc Rasquin
Chairman of the Executive Board

Content





Wind energy

Geothermal energy

Cover story: HFI-welded steel pipe and the production of regenerative energy

Renewable energies 2.0

The technologies for the utilization of renewable energy sources have long overcome their teething troubles. Research approaches have yielded industrially mature high-tech products, equipment and processes, which in some countries are already contributing on a large scale to the energy mix. The next phase now focuses on raising efficiencies and testing concepts which only a few years ago would have been considered utopic

Water power

Solar energy

»The German share in the world market for environmental technologies and services today amounts to 224 billion euros or 16 percent.«

Federal Environment Minister Dr Norbert Röttgen quoting from the 2010 Environmental Statement of the German Federal Government

Germany takes a leading role in Europe in the use of renewable energy sources. In 2010, the share of regenerative energy in German electricity consumption increased once again to reach 16.8 %. At 11 %, the share in primary energy supplies has almost tripled within just ten years. This has been made possible by mature high-tech products and processes for the production of wind, solar, water and geothermal energy.

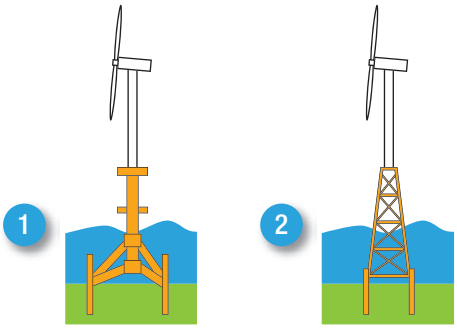
Regenerative energies as an economic factor

In 2010, according to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, investments in plants for the utilization of renewable energy sources amounted to some 26 billion euros, almost a quarter more than in the year before (20.6 billion euros). Investment in renewable energies is significantly higher than investment in conventional electricity and gas utilities, which in 2009 reached some 12.4 billion euros according to the German Association of Energy and Water Industries (BDEW). Renewable energies are even set to overtake other key industries such as the chemical sector in terms of employment, with some 500,000 jobs forecast for Germany by 2020.

International strategies called for

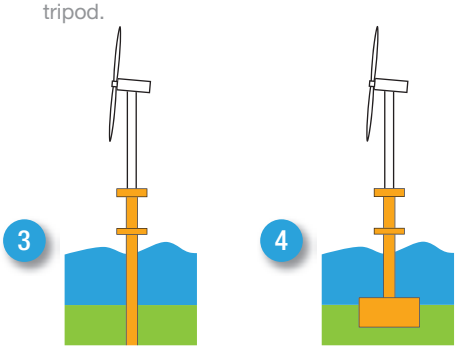
If the use of renewable energies is to be expanded successfully and, above all, quickly, energy production in Europe must no longer be considered as a national but an international and even – with the inclusion of North Africa – an intercontinental concern. Overcapacities from the hot and sunny South could, for example, be »parked« in Scandinavian hydroelectric power plants and called off at times where wind and solar energy outputs are insufficient in Central Europe. This is why the development of intelligent supply networks must take top priority.

DOTI 2009/alpha ventus



1 A tripod foundation consists of legs made of steel piles which are rammed into the sea floor.

2 In material-saving jacket designs, steel tubes form a three-dimensional lattice structure, whose legs are anchored on the sea floor with the aid of piles, similar to the tripod.



3 A monopile is a cylindrical hollow pile which is driven into the sea floor with the aid of a pile driver.

4 Gravity foundations are successfully used in bridge construction but would be extremely costly in offshore regions.

Wind energy

Offshore plants offer an enormous potential for energy production from wind. The UK is currently leading here with an installed capacity of 1 GW. But offshore wind energy is also increasingly gaining importance in other European countries.

On 12 August 2009, the Alpha Ventus test field started supplying offshore electricity to the German power grid from Germany's first wind farm, which is miles from the coast and in water depths of over 25 metres. Meantime, the commercial project »Baltic I« is also connected. In mid-2010 the installed capacity for producing offshore wind energy in Europe amounted to 2.2 GW, with about the same capacity again under construction, and more than 18 GW approved. It is expected that about 3,000 MW of new offshore wind energy output will be installed each year from 2015 onwards.

Different options for foundations

One of the big technical challenges with offshore wind farms is building safe foundations for the wind turbines, for they have to resist tremendous forces. Besides the sea currents, waves and wind, the wind turbines themselves, which weigh in at between 750 and 850 tonnes, add their own constant dynamic loading to the steel and concrete structures. In shallow waters, monopiles can be used. However, at greater water depths and with turbine capacities of over 3 MW, this type is usually technically and economically unfeasible because of the enormous tube lengths and diameters that would then be required. In the Alpha Ventus test field, therefore, tripod foundations and the significantly lighter jacket structures were installed. Jackets are square or polygonal lattice structures of steel tubes; they have been tried and tested over decades in the offshore oil and gas industry and are by now firmly established.

Application possibilities for HFI-welded steel pipe

Offshore wind farms hold a variety of applications for circular, square and rectangular MSH sections from Salzgitter Mannesmann Line Pipe. Besides jacket structures for the foundations of wind turbines and transformer platforms, HFI-welded steel pipes in grade S355 with diameters up to 610 mm and wall thicknesses up to 25.4 mm are used in peripheral applications such as cable conduits, boat landings and supply platforms.

The use of geothermal energy for baseload power generation is increasing in importance around the globe. In early 2010 the 500 geothermal power plants worldwide totalled an installed capacity of over 10 GW.

Geothermal energy

Geothermal power plants use the heat stored in the upper strata of the earth's crust for the generation of thermal energy or electricity. Geothermal energy is permanently available and there are no direct costs for raw materials. The capacities of geothermal plants are high enough to meet base load requirements, i.e. ensure permanent supply of electricity. In terms of per capita utilization of geothermal energy, Iceland is number one, while the USA leads the world in terms of installed capacities with over 3 GW, followed by the Philippines and Indonesia.

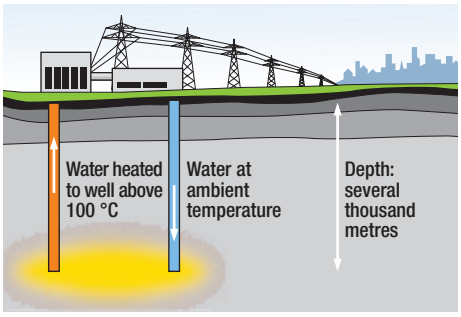
A distinction is made between deep and subsurface geothermal wells. Energy from the latter is extracted via heat pumps and stored in collectors predominantly for district heating purposes.

Geothermal power plants

In areas of volcanic activity above all, such as Iceland, geothermal reservoirs of several hundred degrees centigrade are located at depths of as much as 2,000 metres. A geothermal power plant uses the steam turbine principle to convert heat into electricity. Here, steam from water which is either fed in pipes through high-enthalpy reservoirs or alternatively extracted hot from the depths is used to drive the turbines of electricity generators.

Application possibilities for HFI-welded steel pipe

Technology for drilling deep geothermal exploratory and production wells can rely on the HFI-welded line pipe and oilfield tubulars (OCTG) which have already proved themselves for decades in the oil and gas industry. The ongoing product improvements and innovations in these application areas are now feeding through to the geothermal industry. Salzgitter Mannesmann Line Pipe offers a well-balanced spectrum of products with outside diameters up to 610 mm and wall thicknesses up to 25.4 mm in a wide range of grades.



In geothermal power plants, water is fed in pipes through a heat reservoir or extracted directly from a deep well. The resultant steam is then used to drive a turbine which generates electricity.

Some 16 % of the electricity generated worldwide stems from hydroelectric power plants. The potentials of conventional river and reservoir power plants are, however, limited. Marine current and wave power plants offer new possibilities. Salzgitter Mannesmann Line Pipe has already supplied HFI-welded pipe for a high-pressure water pipe in the Oyster pilot project.

Conventional hydroelectric power plants

River and reservoir power plants are used with great success for efficient energy production, especially in the Alps and in the Scandinavian countries. In the scenarios of future international power grid structures, this technology plays an important role as a buffer solution for periods where there is insufficient sunshine or wind.

Marine current power plants

The first plants for the generation of electricity from marine currents have been built in the UK, Norway, Northern Ireland and the USA. Transferring the function principle of wind turbines to the sea floor appears very promising in terms of efficiency, for calms never hit tidal currents and water has a significantly higher density than air. This means substantially more electricity can be produced with much smaller rotors. According to estimates, there is enough potential in Western Europe to meet the power demand of about 20 million households with clean energy.

Wave power plants

The British company Aquamarine Power together with Scottish and Southern Energy plc (SSE) has secured for itself a 200-MW field for wave power plants in Scottish waters. The development of the field is scheduled to start in 2013. At present Aquamarine Power is testing its Oyster wave energy device. On a platform anchored to the seabed at a depth of 15 m, a buoyant hinged flap is pushed back and forth with the movement of the waves. This powers a hydraulic system that feeds high-pressure water to an onshore hydro-electric turbine, where it drives a generator to make electricity. The successor, Oyster 2, will produce as much as 2.4 MW with the aid of three underwater units. The 650-metre polypropylene-coated high-pressure pipe used here, which has to meet the most punishing offshore requirements, was supplied by Salzgitter Mannesmann Line Pipe. In the summer of 2011, Oyster 2 will undergo a performance test and if it is successful, the unit will then go into series production.

Application possibilities for HFI-welded steel pipe

HFI-welded steel pipe has long been used in various applications in hydroelectric power plants. Whether sweet or salt water, line pipe or high-pressure piping systems - Salzgitter Mannesmann Line Pipe offers its customers just the right solution for every application, complete with a comprehensive range of coatings and linings. Moreover, Salzgitter Mannesmann Line Pipe can now turn its decades of experience in oil and gas line pipe for offshore pipelines to good use in the promising sector of aquamarine power stations.

Water power

The Oyster wave energy converter pumps seawater to an onshore turbine for the production of electricity.

The solar energy reaching the surface of the Earth is enough to cover the current worldwide energy demand ten-thousand times over. A giant potential, which is just waiting to be exploited and distributed in an intelligent manner - and all our future energy problems are solved.

Solar energy

Besides wind energy, solar technology will also play a key role in the energy mix of the future. Through international projects such as the Desertec Initiative or the Mediterranean Solar Plan, even the desert regions in North Africa could play an important part in the production of clean energy for Central Europe.

Parabolic trough power plants

Parabolic trough power plants have been in successful commercial operation since 1985. As with conventional power stations, electricity is generated using a steam turbine and an upstream generator. A long row of parabolic trough-shaped mirrors concentrate the incident solar radiation 80-fold onto an absorber tube. In Spain and Portugal, two pilot projects are currently running to exploit new ways of increasing the performance and efficiency of such plants. For test purposes, the oil previously used in the absorber tubes will be replaced with water or salts that melt at approximately 300 °C, thus enabling operating temperatures to be raised to 500 °C. At the same time, this would allow direct evaporation in the absorber tubes as well as more efficient high-temperature latent heat storage.

Solar tower power plants

Solar tower or heliostat power plants are usually steam power plants in which steam is generated by solar energy. Hundreds to thousands of automatically positioning mirrors (heliostats) focus the solar radiation so that it is reflected by the central absorber (receiver). This highly concentrated radiation at the top of the tower generates temperatures of several thousand degrees centigrade. The first commercial solar tower power plant in Europe was erected near Seville in Spain in 2006. In the long term, the total capacity at this location will be increased to 300 MW.

Application possibilities for HFI-welded steel pipe

HFI-welded steel pipe from Salzgitter Mannesmann Line Pipe is used for a variety of purposes in the field of solar energy. The broad spectrum of product requirements means the entire range of outside diameters - from 114.3 mm to 610.0 mm - and wall thicknesses of 3.2 mm to 25.4 mm are used in the steel grades S235 and S355. To reduce the number of pipe joints, Salzgitter Mannesmann Line Pipe offers its customers pipe lengths of up to 18.30 m. In future, it may be possible to produce even longer tubes.

Parabolic trough power plants are among the most efficient and cost-effective concepts in solar energy power stations.

Solar thermal power stations with capacities >10 MW

Name	Location	Output in MW	Annual capacity in GWh	Commissioned
Parabolic trough power plants				
SEGS I-9	USA	353.8	n.s.	1984–1990
Andasol 1-3	Spain	150	474	2008–2011
Solnova 1, 3, 4	Spain	150	340	2009
Nevada Solar One	USA	75	134	2007
Alvarado 1	Spain	50	105	2009
Extresol 1	Spain	50	158	2009
Ibersol	Spain	50	103	2009
Central Solar Termoelectrica La Florida	Spain	49.9	175	2010
Solar tower power plants				
Planta Solar 20 (PS20)	Spain	20	48	2009
Planta Solar 10 (PS10)	Spain	11	23.4	2007

Currently a large number of plants are under construction or in planning. Several plants are being erected in the USA in particular with a capacity of over 200 MW and dry cooling. Source: NREL, Status: December 2010, www.nrel.gov

Project The Gdansk PGE Arena

Like amber on the beach

With its new PGE Arena Gdansk is getting itself ready to stage the 2012 European Football Championship. With its translucent lightness and the amber-coloured radiance of its architectural lines a landmark is in the making which will become an emblem of the city as it writes the next chapter of its tradition-filled history on into the 21st century.

Source: RKW Architektur + Städtebau

The new football area will bring new life to the district of Letnica.
Source: Artur Rys - ARDUKT

»Gdansk's PGE Arena is a creative challenge which stands as a symbol for modern Poland's emergence on the European scene.«

Wojtek Grabianowski,
Managing Partner,
RKW Rchitektur + Städtebau

Source: RKW Architektur + Städtebau

The new football arena is slated to be the starting point for the future urban and economic development of a whole city district. On a thirty hectare site next to the stadium new offices and a hotel have been coming up since May 2009. The urban planning concept of the architects, RKW Architektur + Städtebau, follows the image of a piece of amber as often found in nature on the beaches of the Baltic Sea. Filled in equal measure with tension and with harmony, the individual gemstones slot in one by one and promise to give new life to the district of Letnica.

Tinged with the hue of "Baltic Gold"
Originally the stadium was given the provisional working title of "Arena Baltycka". Then, in December 2009, the Polish energy company PGE acquired naming rights over the sports venue. Round pebbles worn smooth by water, sand and sea breezes were the inspiration for the shape of the new stadium. Amber, the gold of the Baltic, showed the design team how it should be coloured. Six modular variants make up the stadium's gleaming sheath, each with differing coloration, which blend to yield a seamless gradation of colour. Going up it becomes increasingly transparent to ensure no shadows fall on the pitches. The stated construction costs amount to 480 million zlotys (around 120 million euros) and the new stadium can accommodate 42,000 spectators. In the 2012 European Championships on current planning three preliminary round matches and one quarter-final will be played in the Gdansk PGE Arena. The Polish First Division team Lechia Gdánsk are proprietors of the stadium.

Photo: Michal Kruszynski – BIEG2012

The crescent-shaped four-chord lattices were erected in two stages. First the façade was joined with the steel section frame, thereafter the overhanging roof was put in place.

The new PGE stadium was deemed by UEFA to be the best project of all the preparations for the European Championships.

Photo: Michal Kruszynski – BIEG2012

A load-bearing structure like a ship's hull

The filigree load-bearing structure is redolent, like the history of the city itself, of old shipbuilding traditions. Salzgitter Mannesmann Line Pipe in cooperation with Salzgitter Mannesmann Steel Trading Sp.z o.o. in Poland, delivered some 2500 tonnes of HFI-welded tubes of varying diameters and wall thicknesses in lengths between 6.7 and 12.0 metres to the Polish steel construction company Energomonta Południe S.A. in Katowice. There the tubes were cold bent to the required radii and profiled at the end with plasma cutters as a preparation for welding the trusses. The roof is formed of a total of 82 concentrically aligned crescent-shaped four-chord lattice trusses. The vertical distance from base to roof is 38 metres and the overhanging part of the roof that covers the grandstand seats measures up to 45 metres. A frame of hollow steel sections unites the individual truss elements in a three-dimensional structure that supports both the façade and the roof. A

Photo: Michal Kruszynski – BIEG2012

Photo: Michal Kruszynski – BIEG2012

Photo: Jerzy Pinkas – www.gdansk.pl

cladding made up of polycarbonate plastic panels strongly tinted in varying hues brings the colour gradient of the façade and the translucence of the roofing to full effect.

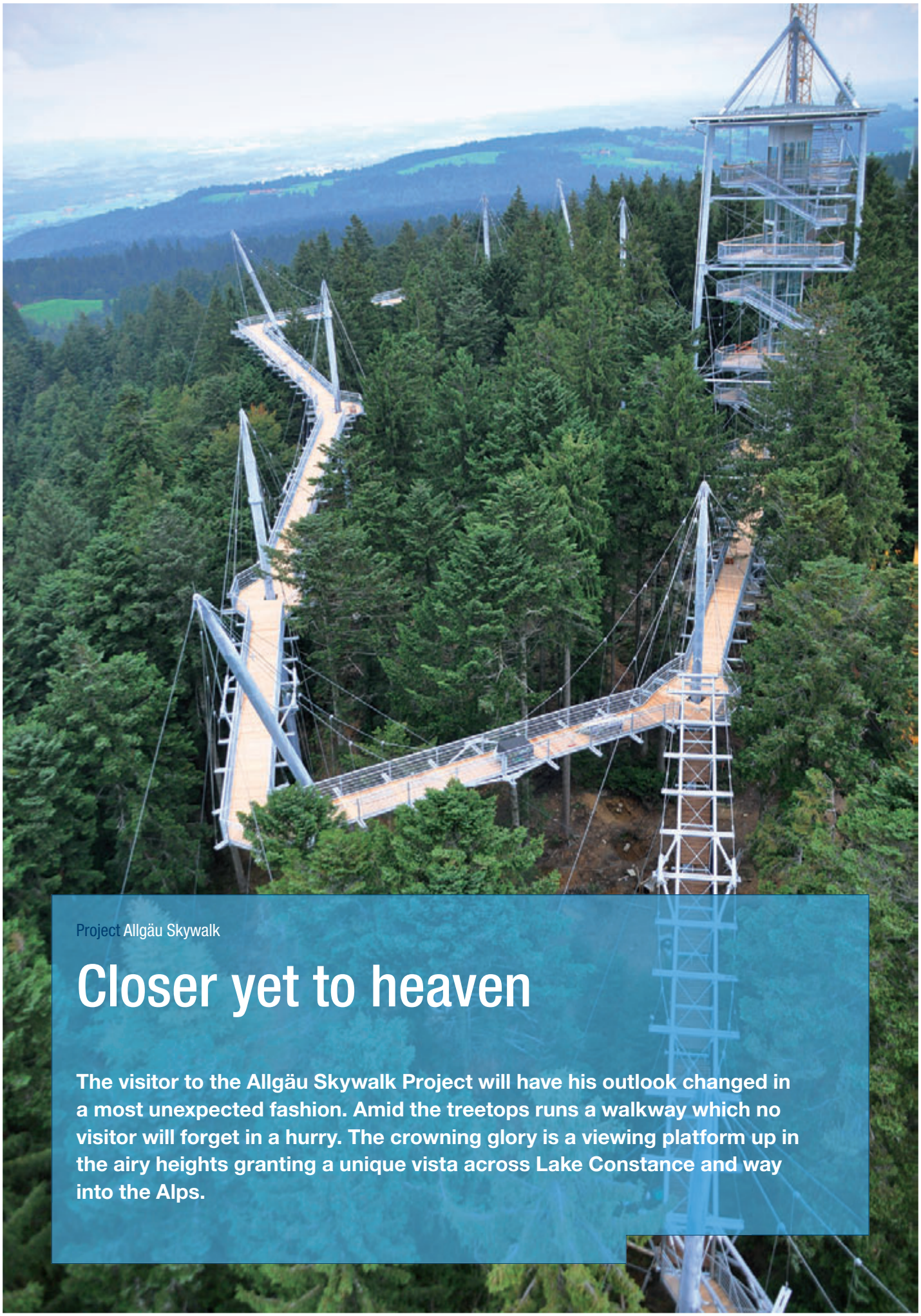
Gdansk and Euro 2012

The 14th European Football Championships will take place in Poland and the Ukraine from 8 June to 1 July 2012. With a population of 445,000 Gdansk is the sixth biggest city in Poland and will be one of eight locations hosting the European Championships. The city stands on Poland's Baltic coast and is the capital of the province (voivod) of Pomerania. Ever since the days of the Hanseatic League it has been a major trading centre and still today its port and shipbuilding facilities are of major significance in the Polish economy. The new stadium was deemed by UEFA to be the best project of all the preparations for the European Championships. The German national team will be taking up residence in Gdansk for the duration of the championship.

Source: RKW Architektur + Städtebau

Gdansk was selected as one of the Polish venues for the 2012 European Championships in Poland and the Ukraine. Three preliminary round matches and one quarter final are scheduled to be played in the new football arena. The project cost amounted to 645 million zlotys (around 120 million euros).

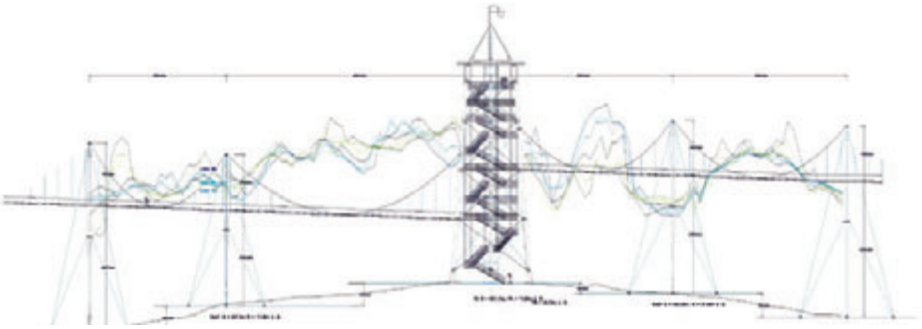
The PGE Arena, Gdansk
Project completion: 2011
Total spectator capacity: 42.000
VIP boxes: 52
Site area: 393.000 m²
Built-up area: 15.891 m²
Outside floor area: 237.939 m²
Home Team: Lechia Gdansk



Project Allgäu Skywalk

Closer yet to heaven

The visitor to the Allgäu Skywalk Project will have his outlook changed in a most unexpected fashion. Amid the treetops runs a walkway which no visitor will forget in a hurry. The crowning glory is a viewing platform up in the airy heights granting a unique vista across Lake Constance and way into the Alps.



Incomparable. Unique. Breathtaking – these are just some of the most frequently-heard comments made by visitors who have completed the Skywalk. 540 metres long and ever-changing, just like the forest and the weather around it. At times in misty gloom, at times in dazzling light it is always an experience, even in the rain. What really grabs one though is the constant change of view: along a gently climbing path with stairways and landings it rises the first few metres from ground up into the treetops until you reach the sky and your view stretches out over the forest into the far yonder. A moment ago you were earthbound, now you have an unhindered view in all directions. A panorama you have only dreamed of reaches out over the Allgäu and Lake Constance to the Alps beyond.

From vision to reality

The idea of constructing a treetop path as a tourist attraction first saw the light of day in Scheidegg in 2007. The Experience Trail is designed as a free-hanging suspension bridge structure. Engineering services were provided by the Allgäu company Biedenkapp Stahlbau GmbH. Salzgitter Mannesmann Line Pipe delivered in all around 93 tonnes of high frequency induction welded steel pipe in diameters between 406.4 mm and 610.0 mm and in lengths of 2.40 m to 17.90 m. The pipes, with wall thicknesses between 12.5 mm and 17.5 mm were chamfered and profiled to order and provided with assembly slots at the plant of Interfer Rohrunion. The pipes were ordered from Salzgitter Mannesmann Line Pipe in April 2010 and delivered on the dot in the middle of that year. Thus it was that the treetop walk was ready for opening in October 2010.

An attraction for tourists

Already it is hard to imagine tourism in the region without this new highlight. So that young families with pushchairs and wheelchair users can also experience nature in this inimitable way the viewing tower even has a built-in lift. In the meantime, around the Skywalk have since clustered a visitor centre, an adventure playground plus two nature trails and one barefoot trail.

For more information go to www.skywalk-allgaeu.de

Project: Oxygen pipeline

Oxygen – elixir of life

The start-up in March of the second electric steel-making furnace at the Peine-based Peiner Träger GmbH, a subsidiary of Salzgitter AG, will double the company's annual crude steel output to 2 million tonnes. The oxygen required here reaches the steelworks safely and cost-effectively via a 27-km pipeline from Salzgitter to Peine.

Before the crude steel capacity could be expanded, a new solution had to be found for the oxygen supply. For oxygen is an important element in crude steel production; it is top-blown over the molten metal surface or fed into the bath to bond undesirable tramp elements such as sulfur, phosphorus and carbon in the flue gas or the slag and thus separate them from the hot metal. The oxygen used in Peine comes from a new air separation plant operated by the Messer company in Salzgitter at Salzgitter Flachstahl GmbH. With this new plant, up to 28,000 cubic metres of gaseous oxygen can be fed per hour into Salzgitter Flachstahl GmbH's distribution system and its 27-km-long pipeline to Peine.

The new electric furnace at Peiner Träger GmbH is supplied with industrial-grade oxygen from Salzgitter over a distance of 27 kilometres.

The central supply concept via the oxygen pipeline cuts CO_2 emissions by up to 18,000 tonnes a year

Top: View of Salzgitter Flachstahl GmbH
Centre: The quality of the weld assumed special importance given that the pipeline is operated at a pressure of 30 bar.
Bottom: Special valves control the operation of the oxygen pipeline.

However, to make this possible, several hurdles first had to be taken in this technically demanding project. Originally, two smaller separation plants had been planned for different locations. But after complex cost calculations the decision fell in favour of one central plant and the construction of the 27-km oxygen pipeline.
Along the route, 54 crossings were required in all, underneath roads, railway lines, the A39 motorway and the Midland Canal. Here the customers benefited from Salzgitter Mannesmann Line Pipe's experience in trenchless pipe-laying: crossing the Midland Canal with a 420-metre trenchless pipeline section posed no problems at all.

Production chain across the Group
Salzgitter Flachstahl GmbH supplied approximately 1,800 tonnes of hot wide strip from precisely the location at which the new pipeline starts. It was manufactured at the Siegen and Hamm works and returned to Salzgitter as HFI-welded pipe with an outside diameter of 323.9 mm and wall thicknesses of 7.1 to 10 mm. In all, some 1,700 high-quality welds had to be made, all of them able to resist the pipeline service pressure of 30 bar. While the root passes were all welded using the TIG process, the filler and cap passes were carried out using the vertical-down technique.
The pipeline medium – oxygen – required special care regarding cleanness from all those involved in the project. The pipe inside surfaces were shot-blasted with ferrite-free grit to ensure absolute freedom from oil and grease. After the treatment, the metal surface complied with SA 2.5 requirements, which is mandatory for pipes used for oxygen pipelines. The pipes were also sealed with air-tight end protectors in order to keep them clean during transportation and intermediate storage.

Enormous cuts in CO_2 emissions
Meantime both the pipeline and the electric furnace are giving excellent service in regular operation. The decision to supply oxygen from only one central air separation plant and not decentrally, as originally planned, saves enough electricity to reduce CO_2 emissions by up to 18,000 tonnes per year.

VESTAMID® from Evonik: strong and flexible

NEW COATING · VESTAMID® · VESTAMID® An Evonik product.

Salzgitter Mannesmann Line Pipe is expanding its manufacturing programme of coatings for steel line pipe with a new extruded thick-layer polyamide coating, offering customers a further high-strength coating variant for demanding applications at service temperatures of -25 to +80 °C.

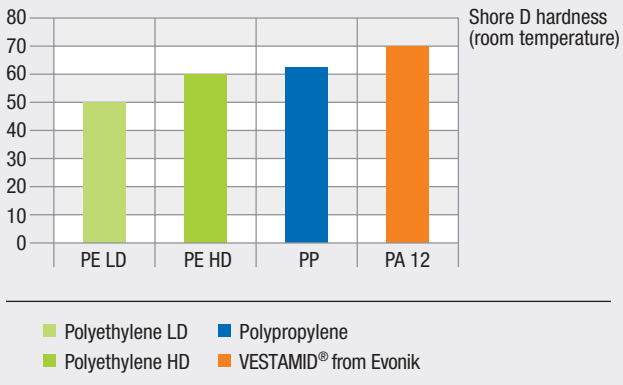
Product benefits and properties

Why VESTAMID®?
The essential advantages of VESTAMID® as a coating material are:

- extraordinary impact resistance and toughness, even at low temperatures
- excellent resistance to stress cracking
- outstanding abrasion resistance
- low coefficient of sliding friction

Product properties compared with other coating materials
VESTAMID® has a greater Shore hardness than polyethylene or polypropylene. In contrast to polyethylene and polypropylene, a polyamide coating offers mechanical protection for steel pipe in addition to acting as an efficient barrier against corrosion.

Shore D hardness to DIN EN ISO 868



The Shore hardness of VESTAMID® is higher than that of polyethylene or polypropylene.

Sintered polyamide
– a tried and proven material

Polyamide has been used as a coating material in compliance with DIN EN 10310 for many years. The powdery material is, for example, sintered onto steel pipes for overhead pipeline crossings or for isolating valve installations. This polymer has also been used for many years now in the cable industry, medical engineering, machine building and process equipment construction.

A material for demanding applications

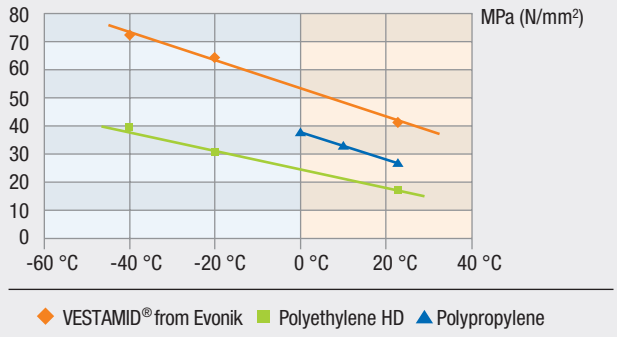
A flexible, mechanically strong coating system, polyamide combines the advantages of polyethylene and those of cement mortar. The new coating type can be used at service temperatures of -25 to +80 °C for advanced trenchless pipe-laying techniques such as

- pipe pulling
- ploughing
- horizontal directional flush drilling

An excellent field coating system

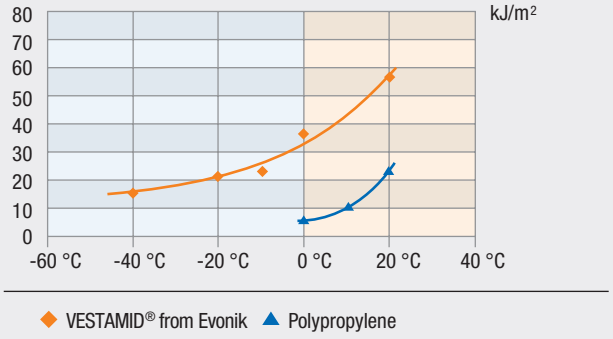
Polyamide coated steel line pipe can be field coated with a polyurethane system. With this standardized system (see DIN EN 10290), polyurethane is sprayed or cast onto the cleaned and roughened steel surface. Since the mechanical properties of polyurethane and polyamide coatings are very similar, especially in terms of strength, this ensures an optimum combination of corrosion protection and mechanical protection. Here too, Salzgitter Mannesmann Line Pipe follows a system approach: to achieve the best possible results, the individual components are all optimally adjusted and coordinated to each other.

Tensile test to ISO 527-3 – Yield stress



The material's greater hardness is also reflected in its tensile properties, e.g. the yield stress. In terms of strength it is superior to both polypropylene and polyethylene and it is more flexible in use than polypropylene, which can only be used at service temperatures down to 0 °C.

Charpy impact strength to DIN EN ISO 179-1/1eA



A comparison of the impact strengths shows the superior properties of polyamide compared to polypropylene, especially at low temperatures.

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«.

June 2011

14. – 17.06.2011
ITM
Posen/Poland

June 2011

21. – 24.06.2011
Suisse Public
Bern/Switzerland

June 2011

21. – 23.06.2011
MIOGE
Moscow/Russia

September 2011

06. – 08.09.2011
Offshore Europe 2011
Aberdeen/UK

September 2011

15.09. – 16.09.2011
Gas Conference
Salzgitter Mannesmann
Line Pipe Siegen

September 2011

20. – 22.09.2011
Rio Pipeline conf. & expo
Rio de Janeiro/Brazil

October 2011

07.10.2011
5th German Symposium
on Trenchless Pipeline
Replacement
Siegen/Germany

October 2011

13.10. – 14.10.2011
Water Conference
Salzgitter Mannesmann
Line Pipe Siegen

October 2011

25.10. – 26.10.2011
Gat 2011
Hamburg/Germany

November 2011

15.– 17.11.2011
OGT
Ashgabat/Turkmenistan

Flashlights

1 Trade fair stand at Tube Düsseldorf in Düsseldorf, 12–16 April 2010
2 Trade fair stand at ITM Poland in Posen/Poland, 08–11 June 2010
3 Trade fair stand at KIOGE in Almaty/Kazakstan, 06–09 October 2010
4 Trade fair stand at ADIPEC in Abu Dhabi, 01–04 November 2010
5 Symposium on Trenchless Technology at Salzgitter Mannesmann Line Pipe in Siegen, 27–28 January 2011
6 Trade fair stand at the Oldenburg Pipeline Forum, 10–11 February 2011

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