New cross rolling mill
for the pilger mill Rath

R&D activities
for complex tube applications

Hoberg & Driesch
Portrait of a leading wholesaler in seamless tubes

Renewable Energies:
Green tubes
for a blue planet

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Dear Customers,

Dear Readers,

In the last edition of iTube, we spoke about turbulent conditions in the markets and the resulting necessity for the Vallourec group to adapt to the current business challenges through the Vallourec Transformation Plan. We wish to embrace these challenges with creativity and seize every opportunity to reinforce our strengths. We are now in a good way and confident in our future through all concrete measures that have already been completed.

The change of our business context has two main consequences for the Industry Division. On the one hand, we enjoy increasingly complex tube applications which give us the opportunity to offer integrated solutions. The basis for this capability is provided by powerful production facilities, continuous product improvements, and technical support that is becoming increasingly more important. Vallourec’s efforts in these sectors are described in several articles in this edition – whether the comprehensive renewal of the pilger mill in Düsseldorf-Rath, R&D activities across the corporate group, e-Business projects such as the iTube® Portal, or customer-oriented reorganization.

The second main area of focus is on opening up new applications. Here it is the turn to renewable energies which offers a broad field of activity in which Vallourec is already intensively represented with products and integrated solutions. The spectrum ranges from innovative forms of wind and solar energy through geothermal and ocean thermal energy conversion up to technically demanding storage media. The article on “Renewables” will give you a first impression of this sustainable application sector.

“Making the impossible possible” – turning this motto into a reality will only succeed by working closely together with our customers and all of our market partners. For that reason I am pleased to invite you to be part of our “Vallourec Transformation Plan”.

I wish you an enjoyable read,

Philippe Carlier
Senior Vice President Europe
Vallourec Industry and Powergen Divisions
and European production facilities
Vallourec activities in renewable energies

Green tubes for a blue planet

An intense search is going on worldwide for economically-feasible solutions to integrate renewable forms of energy generation into a more varied and independent “power mix of the future”. On the basis of decades of experience in developing tube-based products, system solutions and services that make power generation safer, more efficient and less energy consuming, Vallourec is able to make valuable contributions also to the green forms of energy. Several selected projects and concepts reveal this application-specific expertise of the company substantially to support the development of power generation technologies based on wind, water, sun and underground heat.

Solar trackers are movable solar units that follow the course of the sun.

In a concentrated solar power plant (CSP), process water is heated by the reflected, concentrated solar energy and then drives a steam turbine.
Decreasing natural resources, national economic necessities and a general concern for the environment have brought renewable energy technologies constantly into focus. For the coming decades and beyond, “green energies” open up chances partly to cover the worldwide energy demand without adding further loads to the environment. What is currently being promoted is an “energy mix,” by which we understand a dynamic co-existence of latest technology fossil and nuclear power generation with forms of energy that can be sustainably tolerated by the environment.

This enhanced energy concept is to be accompanied by initiatives to save energy in the three main consumption sectors of industry and commerce, private homes and households, and mobility. While progressive industrial companies like Vallourec have already committed themselves comprehensively to redesign and adjust their processes towards lower energy consumption and sustainability, signs of a new awareness and acceptance of energy-saving technologies are most obvious in everyday private life. Whether in the form of low-consumption light bulbs and household appliances, insulated building shells, and new heating concepts with solar and ground heating, or in private and public initiatives to support e-mobility.

Local potentials determine choice

Wind energy, solar, hydroelectric, geothermal or marine thermal – the decision for the preferred form of green energy does not simply mean a choice of either or. Instead, it is necessary to provide a weighting on the basis of reliable local sources of potential energy as well as existing energy grids and distribution structures. It is hardly surprising that the intensity of solar radiation and the many hours of sunshine a year in countries such as Spain and Italy and in a number of states in the USA have led to an early expansion of photovoltaic systems, that marine thermal power plants are best suited for use in tropical waters, and that large wind turbine farms should ideally be set up in areas well away from the coasts that provide reliably strong wind.

Worldwide trend

The potential for regenerative forms of energy is not only being recognized but is also being made use of more intensively. With results that are sometimes surprising; Denmark already covers 40 % of its needs for electricity with wind energy as of 2015, although the country still had to import 99 % of its energy up until the 1970s. Currently Norway covers more than 95 % of its needs for electricity through hydroelectric plants. There the proportion of fossil forms of energy that are used is truly insignificant at less than 0.5 %, even though the country is one of the leading oil and natural gas producers worldwide. Mainland China satisfies its ever increasing demands for energy primarily through electricity generated from coal-fired and nuclear power stations, in which Vallourec’s highly developed steel tubes help to increase efficiency and decrease CO2 emissions. At the same time China commands the greatest number of installations to generate renewable forms of energy. In view of the high amount of natural potential for hydroelectric power, it will probably soon be able to cover half of its requirements for electricity in this way and thus make itself more independent of energy imports. In the case of the Arab countries, a dispassionate look at the situation from a purely business point of view leaves them open to the idea of exporting their profit-making oil as much as possible and of covering their domestic requirements for energy through cost-effective ecological forms of energy.*
These examples show one thing above all: Whether protection of the climate, economic and political factors, or a mixture of the two determine these actions, the wide range of potential in regenerative forms of energy has been recognized, even if with differing degrees of intensity and weighting, and also while still struggling against political, economic, structural, and technical obstacles.

**Vallourec’s participation in renewable energies**

The iTube editors have picked out a number of interesting concepts from the large number of promising technologies and ideas concerning the regenerative gaining of energy in which Vallourec is involved to some extent with products, system solutions and services. The spectrum ranges from wind turbines to deep geothermal energy and hydrogen storage containers through to CSP (Concentrated Solar Power) and OTEC (Ocean Thermal Energy Conversion) power stations. Undoubtedly you have already heard of at least some of these. But what exactly is “Agro-Photovoltaic?”

**Reliable and plannable: offshore wind energy**

Since its energy yield is quite reliably predictable and the necessary backup level by conventional energy sources low, offshore wind energy has already been firmly integrated worldwide into the energy mix of the coming decades. The expansion of wind farms off the coasts of Europe is to continue up to ten times the current figure by 2050.

Wind energy is in no way as peaceful in its generation as you might think from the pictures of wind farms that are usually taken in good weather. Aggressively corrosive seawater, strong currents and high waves together with extreme temperature conditions are pitted against rotors with gigantic diameters of 160 m and units with turbine heights of 200 m. These circumstances place extremely high requirements on the technology and all the constructional and functional parts of wind turbines. The foundations play a special role here, since they must be anchored in ever increasing depths of water in a way that is secure and also environmentally friendly. These high demands call for the use of materials and system solutions that can provide service over many years with little maintenance and without fatigue, while at the same time they can also be processed economically. Tubes from Vallourec are right at home in the offshore environment. The special static structural requirements and the safety and maintenance aspects make...
a clear case here for the use of seamless hot-rolled tubes used in a wide range of applications such as boat landings, J-tubes, maintenance platforms or anode cages. Vallourec is promoting in addition the development of its own innovative foundation system for wind turbines in the form of PREON® marine. This patented system represents an economical method for anchoring. At the same time it fulfills the strictest environmental regulations, as it uses small diameter “micropiles” for grounding which have a lower impact on the seabed and may be installed at sealife-friendly low noise levels.

Energy from down below:
dee geothermal power

In deep geothermal power it is possible by means of drilling deep holes to a depth of up to 5,000 m to bring to the surface the thermal energy that is stored in underground water-bearing strata. Electricity and heat are generated by means of steam generators, heat exchangers and turbines from the hot water that still has a temperature of around 140 °C at the surface. The technology is regarded as efficient and environmentally friendly, because among other things the water that has been taken out can be put back again via a second borehole in parallel with the extraction of the process water. Geothermal power plants have been in operation for quite a while in Germany. Currently a number of federal states and local communities, in which the geological preconditions for the use of deep geothermal energy are fulfilled, are looking hard at this clean form of energy for the future. For example, the city of Munich has announced that it intends to cover its entire requirement for electricity with geothermal power by 2025.

The deep geothermal power sector benefits from a direct transfer of know-how from oil and gas drilling, since the engineering knowledge, drilling technology and materials that are used are similar. In this environment Vallourec can provide its broad range of products from the Oil & Gas sector, and above all here, for the casings for the cladding of the boreholes. Among other things, they must withstand temperatures of over 180 °C and pressures of up to 743 bar and also offer protection against corrosion due to contact with salt- and acid-containing media, depending on the local geological circumstances. Vallourec is involved by providing casings and VAM® premium connections for a current project in the town of Holzkirchen in southern Germany. The geothermal power station there will go onto the grid in 2017.

Power that keeps shining:
Solar trackers and CSP plants

Solar trackers and CSP (concentrated solar power) represent two different technologies aiming at a higher power yield in the conversion of sunlight into electrical
energy. Some modern directly working solar power plants use “solar trackers,” these being systems where the solar modules are mounted onto the frame that can be rotated to follow the position of the sun and so can be adjusted precisely to the ideal solar irradiation angle.

CSP is a technology applied in an indirectly working solar power plant that basically operates on the same principle as fossil-fuel power plants. However, here the heat source is the sun, whose rays are concentrated onto an absorber with the aid of large-scale lenses and mirrors to heat up a heat carrier medium. Hot steam is produced and is then used to drive a steam turbine coupled to a generator to produce electricity – an application for which Vallourec is well-known for its special tubes for steam piping systems. In view of their torsional stiffness, seamless structural hollow sections are the optimal construction material for torsionally stiff framework systems for the variable sub-structures of the solar trackers, for the framework structures of CSP mirror systems, or also the supporting structures of solar towers. Vallourec products have already been supplied for various CSP power stations in the USA, where large solar power stations are being operated in the Californian Mojave desert and also in Nevada and Arizona. In Europe it is primarily Spain that has many years of experience with solar power stations. In the highly demanding tube application field for special corrosion resistant alloys, Vallourec is involved in the EU-sponsored RAISELIFE project. It focuses on increasing the lifetime of five key functional materials for CSP technologies, among them corrosion resistant high-temperature metals and coatings for molten salts, which in modern power plants are used as heat-transport media.

**Land use with a double benefit: agro-photovoltaic (APV)**

The idea is just as simple as it is ingenious, and goes back to a concept of the founder of the renowned Fraunhofer Institut für Solare Energiesysteme ISE in Freiburg: In order to avoid competition between solar systems and agricultural areas in view of the limited space available, the agro-photovoltaic system envisages a double utilization of the area available. In the current “APV-Resola” pilot project at the Derreiter-Hofgemeinschaft Heggelbach on Lake Constance the PV modules that are active on both sides (“bifacial”) are set up so high that conventional agriculture with machines can be carried out underneath them. The increased distances between the PV modules and a south-western instead of a southern orientation of the photovoltaic system is intended to ensure that sufficient light to promote growth still falls upon the planted areas. Four cultures are being tested simultaneously as part of a two-year pilot phase: wheat, trefoil, potatoes and root celery. Around 95% of the area underneath the photovoltaic system can still be used for agriculture. The installed test area, including the APV system (power rating 194 kWp) and the reference area, cover around 2.5 hectares.

Wide-span support structures for PV systems represent an ideal application for PREON® box. This support system that was developed by Vallourec permits the economic planning and erection of filigree, column-free support structures for spans of up to 100 m, based on a unique iterative planning software.

**Liquid power cycle: ocean thermal energy conversion (OTEC)**

Ocean thermal energy conversion (OTEC) is a process that produces electricity by using the temperature difference between deep, cold ocean water and warm surface waters. This works best in the tropics. OTEC plants pump up large quantities of deep cold seawater (e.g., 6 °C) and warm surface seawater (26 °C) to run a power cycle and produce electricity. The greater the difference in water temperature, the higher the resulting power yield. Current plants follow three different functional principles, differing mainly by being either open, closed or hybrid circulation systems. The advantages of OTEC are that it is a constant and reliable form of power (24/7), a clean energy source, environmentally sustainable, and capable of providing substantial levels of energy. Several pilot plants have successfully been in operation since the 1970s,
although the final technological breakthrough has still to be achieved. In the past years, Vallourec has made its own contribution to plant design by providing special titanium welded tubes for the seawater condensers and evaporators used in the OTEC technology. They directly contribute to the higher power yield of the plants on which their final technological breakthrough is dependent.

**Mobile energy supply:** batteries of hydrogen cylinders

Industrially produced hydrogen needs to be transported as a rule from the hydrogen factory directly to the individual consumption points. This is increasingly done in the form of compact, transportable hydrogen accumulators, where the individual “cells” are made up of compressed gas storage bottles, so-called accumulators. These special containers must withstand high pressures and are therefore designed to have walls of up to 100 mm in thickness. A special point to consider in the storage of hydrogen is the danger that it diffuses into the material and results in the formation of cracks, a corrosion process that is similar to material weakness.

Vallourec has many years of experience in the production of thick-walled large tubes for the production of bottles for the storage of compressed and liquid gas. The development of suitable special alloyed steels and the ability to carry out destructive and non-destructive testing on the basis of all the regulations that apply to pressure vessels also allow the production of tubes for hydrogen accumulator systems on the basis of customer specifications.

**Involved in future applications**

In numerous application fields of energy generation technologies, innovative Vallourec products over decades have contributed to a safer, more efficient and less energy-consuming design of processes. The growth market of regenerative energy technologies adds a new field of focus to tube application. Various corporate sectors are actively involved in research projects, new developments, pilot units and mature technologies in which tubes and complete system solutions with tubes are used. Concerning the tube applications, an intensive transfer of know-how is taking place from the sectors of machine construction, oil and gas conveyance, power station technology, and structural steelwork into these new technologies for the future.

* In this review article the descriptions of the specific technologies have been simplified and represent only the general idea behind them. Please check the Internet or specific technical sources for further details.

The facts and figures on the country-specific use of renewable energies were taken from recently updated and reliable sources such as www.umweltbundesamt.de (Fed. Environmental Agency), www.bpb.de (Fed. Agency for Civic Education) and www.wirtschaftslexikon.gabler.de (online encyclopaedia).
Hoberg & Driesch GmbH & Co. KG, Düsseldorf

Success through continuity and sustainability

How are tube wholesalers reacting to the current developments in the steel tube sector? The iTube editorial team visited Hoberg & Driesch, one of the leading European wholesalers for seamless steel tube and for many decades a market partner of Vallourec, and previously of Mannesmann. We spoke to CEO Hanns-Jörg Westendorf, CFO Dr. Marcus Schubbe and the Head of Central Procurement Ömer Horasan.

iTube: How has the business model of Hoberg & Driesch developed recently?
Westendorf: In the past few years we have developed Hoberg & Driesch into a corporate group that has experienced an increased degree of value creation through consolidation and specialization. The acquisitions of the companies Gelsenkirchen Rohrhandel in 1983 and Schumacher Stahlrohre in 1997 were classical additions to and extensions of our core business. The company acquisitions since 2011 have been following the strategic goal of moving into specialized areas so as to markedly increase the level of value creation. The company Jung & Co. expands our range in the field of premium tube products in a sector that is not so intensively fought over. Our majority holdings in Mut Tube Solutions and Mut Automotive Solutions position us in important eastern European markets and strengthen our range of offerings in the field of prefab-
For decades now we have maintained a close business relationship based on trust with Vallourec and before that, with Mannesmann.

The company that was founded in 1948 by Peter Hoberg and Toni Driesch in Düsseldorf offers its customers a complete range of high quality steel tubes. Today Hoberg & Driesch is one of the leading European wholesalers for steel tubes with a focus on a wide range of seamless steel tubes from German and western European manufacturers. The areas of application cover the fields of machine construction, general construction, automotive and energy.

Always available from stock in a wide variety of sizes:
- Thick-walled tubes
- Normal and threaded tubes
- Boiler tubes
- Hollows
- Precision steel tubes
- HFL and HFZ tubes
- Piston rods and tubes
- Cylinder tubes
- Steel tubes to API specifications
- Roller bearing tubes
- Tube made of fine grain construction steels
- Steel tubes for machine construction

Additional services:
- Expert technical consulting
- Prefabrication
- Individual stockpiling
- Logistics solutions
- Customer-specific packaging
- Additional product inspections

www.hoberg-driesch.de

The Vallourec Industry Magazine N°03 / November 2016 / p.11
in quantities of well under a ton for all our customers taken together. In the case of precision tubes the average quantity supplied is only between 100 and 200 kg. The reliable logistical handling of these numerous small orders is one of our great strengths: We guarantee to our customers that they can get their desired tubes on their workbenches, including prefabrication, within 48 hours at the latest, and as a rule, within 24 hours of our receiving the order.

**iTube:** Is the digitization of the ordering and tracking processes in connection with your diversified customer structure an important topic for you?

**Westendorf:** In principle we are entirely open when it comes to the topic of digitization. Due to our procurement and customer structures, we primarily regard bilateral solutions (EDI) as being of interest for us. The most important thing is an integrated process that avoids information being input twice.

**iTube:** How would you describe Hoberg & Driesch’s formula for success?

**Dr. Schubbe:** The niches that we already occupy and which we plan to occupy are based on the existing momentum of Hoberg & Driesch. In other words, based on successful product groups, our know-how in the seamless area, and the services that make Hoberg & Driesch strong. And, as a matter of course, based on our direct and good connections with the producers of high quality seamless tubes – and first and foremost, our long-term market partner Vallourec.

**Westendorf:** Important “soft” factors for success are also calmness, composure and sustainability. In the past Hoberg & Driesch never reacted as erratically and abruptly to changes in the market as did many of its competitors. The profits that had been made in good times have been reinvested in various ways to ensure more efficiency and capacity. An example of that is our administration with the central warehouse in Düsseldorf, which we set up in 2008 in the immediate vicinity of the Vallourec production facilities with ample provision for future expansion. Our new warehouse building for precision steel tubes will soon be set up on these premises and it will be equipped with a fully automatic high bay warehouse system. This indicates one thing above all: when we act and react, we do so in a considered way that is related to our core business and, above all, sustainably.
MSH Sections for Anode Cages and Topsides

Strong Winds – Sturdy Structures

Wherever new offshore wind energy farms are set up, you can be reasonably sure that MSH sections are also being used in numerous functional constructions. Current examples are provided by the offshore wind farms “Walney Extension” in the Irish Sea and the “Galloper Offshore Wind Farm” in the North Sea off the south-eastern coast of England. There hollow sections from Vallourec can not only be found above the wind-lashed surface of the sea as topsides, but they also provide reliable offshore service as supporting structures for anode cages and are thus part of the systems for protection against corrosion that are located under the sea.

In the offshore wind farm Walney Extension 400 tons of MSH sections were required for the base structures of the anode cages in the system to protect against corrosion. Walney Extension is a project of DONG Energy UK in the Irish Sea and was designed with up to 90 wind turbines to produce a total capacity of 660 megawatts. Before installation, the sections were curved at Kersten Europe to the requirements of Bladt Industries. Bladt Industries, which is responsible for the installation of the anode cages, is a specialist for large, complex steel structures such as the foundations for wind turbines.

Anode Cages, Topsides and Boat Landings

A second current project and an example of the use of MSH sections is the Galloper Offshore Wind Farm. It is located in the North Sea, approximately 27 kilometers off the coast of the English county of Suffolk. Up to 56 wind turbines there are intended to generate a maximum of 336 megawatts starting from March 2018. The project partners under the umbrella company of Galloper Wind Farm Limited are RWE Innogy UK, UK Green Investment Bank, Siemens Financial Services, and Macquarie Capital Group Ltd, with equal shares. To date Vallourec has produced a total of 1,530 tons of MSH sections in several batches for this project, and these are to be used as the construction materials for anode cages, topsides, and boat landings. The MSH sections went via Salzgitter Mannesmann Stahthandel to the EPC supplier for processing and assembly, this being the Belgian steel construction company lemants NV, and to its Polish affiliate Spornasz.

Wide variety of offshore wind farm applications

Vallourec has found yet another special application in the offshore wind energy sector for this product group through the use of MSH sections for anode cages. The applications in this sector in which MSH sections have already proven their worth include boat landings, platforms, topside components, cable protective tubes (J-tubes), and bridging pieces. PREON® marine, a new system for the foundation structures of wind turbines that is based on MSH sections, is currently in an advanced state of development.
MSH sections for the Mall of Qatar

Mega-mall as development booster

The gigantic Mall of Qatar is a prominent project within “Qatar's National Vision 2030” and regarded as the jewel in the middle of a multifunction area that also includes the award winning Al-Rayyan FIFA World Cup 2022 stadium. Cremer Steel, which is responsible for the steel deliveries to general contractor Eversendai, selected Vallourec as its “trusted partner” from among several competitors.

In addition to their own hot-finished MSH sections Vallourec's service package also included cold-finished hollow sections from a third-party vendor.

To make a highly appropriate comparison: the new mega-mall covers an area that is equivalent to more than 50 football fields, an area of 500,000 m², into which are integrated on several levels around 500 shops, 100 restaurants and 26 areas with moving water. The 19-screen Cineplex inclusive of IMAX's revolutionary laser projection and 12 channel immersive sound system on a huge 28 x 15 m screen will also feature the latest 4D projection technology screen, 7 VIP screens, an 8-lane bowling center and gourmet food services. A luxury hotel and 7,000 parking spaces complete the concept in the outside area. About 20 million visitors are expected annually in this country with only 2.3 million inhabitants, that is situated on the Persian Gulf, bordered to the south by Saudi Arabia and to the northwest by Bahrain.

Economic diversification

Behind the government-sponsored “National Vision 2030” lies a wide-ranging economic and infrastructural development strategy. It aims at moving away from the one-sided dependence of the country on the production and export of oil by developing a diversified economy for the future. Here it is self-evident that the expansion of the tourism sector, which is already well developed, and the notable growth rates in recent years indicate why this was chosen: between 2009 and 2014 there was an annual increase of 14 % in the number of visitors, around 3 million tourists visited the country in 2015, and more than 3.5 million are expected for 2016.

The geographically and strategically favorable location of Qatar at the intersection of the markets of Europe, Asia and America favors this broad economic development. Furthermore, those who are in charge are bringing the country into the focus of visitors and investors worldwide through global events. There was the UN climate conference COP18 in Doha, Qatar that attracted attention in 2012, the IAAF World Championships in Athletics will take place there in 2019, and the staging of the FIFA World Cup in 2022 will ensure that Qatar appears on the radar in the context of popular sporting mega-events.

Substantial infrastructure investments

Promoting adventure shopping in combination with attractive leisure events makes good sense in Qatar.
The shopping center is part of a multifunction area that also includes a luxurious residential complex and a leisure park.

In several respects, the international premium brands not only attract the turnover generated by tourists, Qatar itself comes ahead of Singapore with the highest per capita income worldwide, at 140,000 US dollars, and is regarded by experts as extremely attractive for investments in infrastructure projects. By 2022 a total of 200 billion dollars will flow into the construction sector, while investments amounting to 140 billion dollars are planned for transport and traffic-related schemes. The shopping center can look ahead to a very high number of visitors and the best possible forecasts for growth even before it opens, thanks to its favorable location – 75% of the population of Qatar can reach the new mall within 20 minutes by car. The interest of the tenants reflects these excellent overall conditions. No less than 97% of the rental areas had already been taken by the end of June 2016.

MSH sections via Cremer Steel
The involvement of Vallourec in the project as a premium supplier of structural steelwork hollow sections succeeded above all due to the order-related bundling of tube products of varying provenance and a high level of service competence. Thus a total of 475 tons of hot-finished hollow sections was wrapped up into a complete economic package and delivered on schedule via Cremer Steel Hamburg to the executive main contractor Eversendai in the United Arab Emirates. Cremer Steel explicitly selected Vallourec as a “trustworthy partner” among the various vendors.

* As of the time that iTube Magazine went to print the official opening date for the Mall of Qatar had been set for December 10, 2016. For the very latest news see www.mallofqatar.com.qa

Mall of Qatar (MoQ)

Principal and project developer:
Mall of Qatar W.L.L. in cooperation with Urbacon Trading & Contracting (UCC), Doha

Steel supplier:
Peter Cremer GmbH, Hamburg

Structural steelwork/General contractor:
Eversendai, Dubai

Products:
475 tons hot-rolled hollow sections (MSH)

Special points:
delivery of a complete package as a service included outsourced tubular products
Faster, more reliable, better quality: In February 2017 a new production era will begin at the pilger mill in Düsseldorf-Rath. Then a brand new and high performance cross rolling mill will be put into operation – the biggest and most modern of its type anywhere in the world. Working together with the leading industrial plant manufacturer, Danieli, the “Mohican project team” from Vallourec has developed a unit for the rapid, economic and high-quality production of seamless hot rolled steel tubes in the segment of higher quality and high strength premium grades that is in ever increasing demand.

The investment in the new three roll cross rolling mill in Düsseldorf-Rath alone shows the willingness to perform and the degree of confidence in the future. But there is much more behind this investment than merely the renewal of an important production facility. It reflects the goal of Vallourec to establish itself even more strongly as the leading producer of tubes in high-strength grades for special applications. This is supported by the production technology at the heart of the pilger mill: a cross rolling mill with the latest three roll technology, which reliably offers high rolling forces and precision forming to the extremely tight tolerances that are required for the production of high quality tubes in high-alloy grades as well.

Ongoing trend towards premium grades
Today there is increasingly a requirement for steel tubes made of alloys that exhibit an optimal strength-weight ratio when it comes to plant engineering, latest
power generation technologies and construction. This trend will certainly continue. Considering the development of materials for steel tubes in recent years, Vallourec has supported the implementation of new technologies through numerous application-specific developments. For example, the premium grade series Forterior®, Oceanfit® and FineXcell® with impressive yield strengths of up to 900 MPa and extreme notch toughness values down to -60 °C permit the design of filigree, lightweight and nonetheless extremely strong jack up rigs, cranes, agricultural machinery or hydraulic components. The increase in performance with the new cross rolling mill is in a sense the answer to the ever more demanding requirements and the technical production preconditions that apply for the production of steel tubes in high-strength grades of steel. Thus plant manager Christoph Bem also spoke of an important step that points the way to the future: “This action represents an advantage for the medium and long term future of the mill, it ensures that we can provide a wide range of sizes and meet the increasingly higher quality requirement of the market” he confirmed, and said more concretely: “The high rolling forces that are required for the production of tubes of high strength grades often bring our current cross roll equipment to its limits, which increases the need for repairs and the risk for downtime. Operating at the limits of the equipment no longer meets our demand to guarantee our customers with short delivery times.”

**Co-operation with leading industrial plant manufacturer**

The plant engineering answer to changing market requirements was devised in collaboration between the Italian specialist for tube production facilities, Danieli and a project team from Vallourec. Numerous individual detail solutions (see also the interview box with Danieli Executive Vice President Massimo Totis) have contributed to significant performance improvements at all levels: The innovative three roll technology, in which each roll is driven individually by its own high performance motor, provides better shaping precision and symmetry of the tubes even at maximum rolling forces. At the same time, higher rolling forces permit a reduction in the temperature of the material to be rolled, which greatly improves the surface quality in addition to reducing the amount of energy required. In addition, it was possible fully to automate the process from the press up to the pilgering process. For Christoph Bem the result is a viable solution with numerous internal optimizations, improve-

**Latest technologies for a classical process**

**History and application:** The cross rolling process was first combined in 1890 with the pilger rolling process. This technology, also known as the “Mannesmann process,” made it possible from then onwards to produce seamless tubes in one rolling operation. Constantly improved in detail in the meantime, in its basic principles this process is still the state of the art of the technology today for the production of hot rolled seamless steel tubes. The combination of cross rolls and pilgers is characterized by a high degree of flexibility concerning the outside diameters, wall thicknesses and tube lengths that can be produced in all kinds of grades.

**Production sequence:** The solid block of steel that has been heated up to a rolling temperature of around 1300 degrees Celsius is first pierced in the vertical press, then the hollow block is elongated in the cross rolling process. Finally the hollow wall is expanded further in the pilger process. The term “pilger process” is due to the fact that the rolling out of the steel blank is not done continuously but instead “in pilgrim steps.” The movement reminds you of the Echternach Procession – three steps forward, two steps back.

The complete process chain at the pilger mill in Düsseldorf consists of a rotary hearth furnace, a 2000 t piercing press, a perforating press, the cross roller mill, the pilger mill, the reheating furnace, a hot saw unit, the sizing mill and cooling beds for the cooling down of the tubes.

**Schematic depiction of the cross rolling process in the new “three-roll technology”.**
ments in quality and benefits for the customer: “The combination of the latest technology and automation leads to a faster production process that is able to sustain higher quality standards. Guaranteed deliveries, optimized surface quality and the fulfillment of additional market demands strengthen our commitment for excellence with our customers,” so goes his summary.

Safety and environmental management at the very latest level

When it came to the planning and implementation of the new cross rolling mill, environmental performance and safety-related optimization were just as important as the technical improvements. As has been defined in its basic corporate principles concerning ethics and protection of the environment, Vallourec has committed itself to a process of continuous improvement in accordance with the internationally recognized environmental management standard ISO 14001. The latest standards concerning the conservation of resources and environmentally-compatible production with the use of less energy were therefore implemented along with the strictest possible requirements concerning operational safety and health and safety at work. This means that Vallourec is also qualified for partnership arrangements with the most demanding customer groups in which the seamless verification of compliance with the most stringent safety and environmental standards is a basic requirement also for suppliers.

Start of production in February 2017

The investment project running under the internal project name “Mohican” started in May 2014. It will be concluded between December 2016 and January 2017 with the setting up of the new cross rolling frame. The final project step that is still outstanding is associated with an eight week long shutdown of the pilger mill, which all Vallourec customers had been informed of back in July 2016 so that they could modify their requirements planning accordingly well ahead of time.
Four questions for

... Massimo Totis, Executive Vice President Danieli & C. Officine Meccaniche SpA

What are Danieli’s capabilities and references in engineering and building cross rolling mills for the tube industry?

Danieli Centro Tube (DCT) is the department of the Danieli Group which is in charge of the design, manufacturing, commissioning of and operating assistance for seamless tube plants and equipment. We have acquired 18 references worldwide since the establishment of DCT in 2004, which represent a clear recognition of Danieli’s capabilities to provide “state of the art” plant and equipment for the tube manufacturing industry. Our portfolio covers not only hot rolling mills but also the complete set of finishing lines required for the processing of seamless tubes.

Talking about cross rolling mills, cross rolling is one of the key technological aspects in tube manufacturing. The proper rolling parameters in the cross rolling mill are the basis for obtaining hollows with suitable tolerances for further steps in rolling to produce the final tube. Our know-how and feedback from the operating plants allowed us to offer to Vallourec an innovative design for this cross rolling mill combined with the solidity and reliability necessary for years of smooth and trouble-free production cycles. And, as a result of our expertise in cross rolling, Danieli Centro Tube is also able to provide the expander mill which permits the widening of the size range of existing plants.

What were the special challenges in the Mohican project?

Considering the project from the beginning, it represented a challenge in various aspects such as:

- the time and logistical constraints due to the necessity to install and start up the equipment in an existing facility and within a plant shutdown time of two months, which also included dismantling work.

Are there any special technological features and Danieli developments which define the performance of the new cross rolling mill?

This mill is an extraordinary example of co-operation between buyer and seller. The mill configuration starts from Vallourec’s technical assignment of a three-roll type cross rolling mill to elongate hollows, characterized by the wide range of required features, and in particular by:

- a wide range of outside diameters
- a wide range of wall thicknesses
- very short hollow extraction ability
- the ability to perform outside diameter reduction or outside diameter expansion on the same machine using only one type of roll
- axial roll changeover with the aim of maintaining a rigid closed structure of the frame

How would you describe the co-operation between Danieli and Vallourec?

Vallourec and Danieli have a long history of co-operation arrangements. If we look at the last fifteen years alone, these include numerous machinery and plant engineering projects for heating furnaces, tube mills and heat treatment facilities for Vallourec plants in Brazil, France, the USA and now also in Germany. In every single project we were able to form, on both sides, working teams with a view to considering the challenges in terms of quality, timing and performance as “mutual targets”. Together we succeeded in breaking through the traditionally separate roles of buyer and seller and generated the concept of “being in the same boat”. Furthermore, we should add that this co-operation between our companies is not taking place only during the execution of the project but also that we have in force a general co-operation agreement which gives to both parties the outstanding opportunity to share ideas and viewpoints about technical and technological developments, tube markets trends and new R&D activities.
New Vallourec Branding Campaign

Making the impossible possible

A tube is a tube? Those days are long past – the Vallourec Branding Campaign that was started in May 2016 provides ample proof of this. At the centre of this there are technically demanding examples from actual practice taken from the broad application spectrum of innovative Vallourec tube solutions. Core statements from the campaign are the customer promise “We make [your specific solution] possible” that is being put forward as a slogan with the claim “Smart Tubular Solutions,” which will be part of the company signature from now on.

The campaign reflects on the one hand the reality that is experienced in the increasingly demanding application environment of tubes and tubular solutions. On the other hand, it is also accompanying a restructuring process that has been going on within the company. This is oriented towards an even greater degree of commitment in the global markets regarding these new requirements (see the report on page 26 concerning the new organization of the Industry Division).

The advertising campaign that is being launched worldwide will communicate for the first time in a targeted way and across all applications something that the company has already implemented on a day to day basis. “Tubular solutions” developed especially for individual customers and for demanding applications have been a reality in all the fields of business of Vallourec for many years now. Whether special grades for crane construction or modern power station construction, offshore applications above and below sea level. Or complete system solutions for the construction of commercial and industrial buildings, such as PREON® box, and foundations for offshore wind turbines, such as PREON® marine. These highly specialized product packages, the “smart tubular solutions,” are backed up by extensive know-how concerning materials and production, comprehensive R&D activities and customer-, project- and sector-specific added value services.

Claim supplements company signature

Part of the new Branding Campaign is a modified Vallourec company signature that expands the existing logo and the logotype with the “Smart Tubular Solutions” claim. The claim summarizes the image of Vallourec as being an integrated solution provider and communicates the claim that it is able to develop innovative and cost-effective tubular solutions for and together with its customers.

The new advertising campaign from Vallourec firmly places customer- and application-specific tube solutions (“smart tubular solutions”) in the foreground: Everything from the construction of buildings and stadiums through plant engineering and construction and offshore applications to power station construction and complex infrastructure solutions. The general tenor: “We make your projects possible.”
The Vallourec Industry Division at Tube 2016

Successful start for the new iTube® Portal

The Industry Division of Vallourec was once again represented at the international trade show Tube 2016 in Düsseldorf. The stand aroused a great deal of attention and attracted a large number of visitors, not least due to the launching of the “iTube®” e-Business Portal – the first portal with an online shop for steel tubes directly from the producer.

Vallourec officially opened the new iTube® e-Business Portal with an integrated online shop on 6th April. As part of the kickoff, the first 1,000 tons of seamless steel tubes were sold to steel dealer Klöckner & Co Deutschland GmbH with no more than a few mouse-clicks. The premiere was accompanied for the entire duration of the trade show by regular presentations on special Vallourec products, components, system solutions and on the iTube® Portal itself.

A signal for traditional industry

The current mayor of Düsseldorf, Thomas Geisel, assessed this project in the presence of the Vallourec management and numerous visitors as a positive signal for the transformation of traditional sectors of industry in the Ruhr area: “With this project Vallourec has shown that it is a pioneer for digital transformation in Düsseldorf. It indicates that digitization is not only something for startups, but also that it changes the entire economy,” stated Mr. Geisel. For Andreas Denker, Managing Director of the Industry Division of Vallourec, the iTube® Portal is “a very important step on Vallourec’s road towards Industry 4.0, where digitalization is used to make processes between sales, production and logistics faster and more direct – in short: more intelligent.”

Kick-off with MECAPLUS® hollow bars

As Vallourec’s customers increasingly plan on a short-term basis and have highly individual requirements for their seamless steel tubes, they want to be able to purchase quickly and conveniently. “It is precisely these very needs that we are meeting with the iTube® Portal,” added Andreas Denker in his opening speech. The new iTube® Portal can be reached under www.itube-portal.de. It includes, among other things, information, calculation programs and an online shop for steel tubes under www.itube-shop.de. As a first product line, the MECAPLUS® range of seamless steel tubes for machining can be purchased via the shop.

Sven Koepchen, Chairman of the Board of Management of Klöckner & Co Deutschland GmbH and Andreas Denker, Managing Director of the Industry Division of Vallourec after the sale of the first 1,000 tons of seamless steel tubes via the iTube® Portal.
Vallourec R&D Activities

Complex applications – integrated development

An important step towards maintaining closeness with our customers is application-specific research and development. Through this Vallourec can provide its customers with tubular solutions that are optimal for the relevant application with regard to the economic, material and processing-related aspects. Research centers with all kinds of test laboratories handle these tasks to develop, among other things, new material concepts and the matching joining technologies.

The R&D team at Vallourec has to be co-ordinated as closely as possible with the actual customer requirements so as to find the relevant customer- and application-specific tubular solution. This could be one that involves the further development of a material that is matched to the customer and the application. A check is made in parallel to determine whether the relevant solution-oriented project is feasible and viable with regard to production and economic considerations.

Deriving potential benefits from co-operation

Closeness to the customer and the application of this principle have always characterized the R&D activities at Vallourec, and they are considerably more important in view of the increasingly complex material requirements that will apply in the future. This can be seen when taking the example of highly developed agricultural machines, cranes or offshore rigs. New generations of agricultural machines will be able to cultivate even wider areas under difficult ground conditions, more quickly and at one go. Larger cranes are being constructed that have a lower intrinsic weight but can take even heavier loads. And offshore constructions can be made lighter and easier to install while requiring little maintenance and yet being resistant to corrosion on a long-term basis. Development goals such as these can only be attained if the new design makes use of the specific properties of materials of greater strength in connection with reliable joining technolo-
gies. The economic and technological potential of new generations of machines and constructions can only be achieved reliably in this co-ordinated way.

Finding the “Pain Point” of the customer
The starting point is the search for the individual “Pain Point” of the customer – the point at which his own product development is so severely affected that he actively looks for the solution to his problem. First of all, a number of basic questions need to be asked to make it possible to develop tailor-made solutions together with the customer: What properties are the most important ones for the application – the highest possible strength or a material that is easy to process and weld? What combination of yield strength and impact toughness is required? Are there special needs concerning resistance to corrosion? In what processing state would the customer ideally like to receive his tube?

The concrete need for optimization in the further development of the material and production configuration is derived from these questions and answers; this is a complex process that at the end leads to an individual solution package.

The very latest production facilities as a basis
Intensive customer-orientation pre-supposes reliable and flexible tube production plus a high level of R&D activities. Vallourec has comprehensively invested in both areas in recent years. For example, the modernization of the pilger mill in Düsseldorf-Rath (see the article on pages 16-19 in this edition) offers through the new diagonal roll a long-term basis for the production of a broad range of tubes with optimal quality, and especially also in the case of the more demanding grades. The radial forging plant in Aulnoye is in a position to produce contour-forged “Shaped Tubes”, these being tubes of varying diameters and wall thicknesses over the entire length of the tube. The Assel mill in Montbard covers the production of medium-thick-walled and thick-walled seamless tubes with stringent requirements for the tube quality and dimensional accuracy in the area of antifriction bearing tubes and hollow bars, for example, in 100Cr6. Above all, the three production facilities that we have listed here will make a significant contribution when it comes to providing tubes for special applications within an unmatched range of dimensions and shapes.

Customer-specific developments
The R&D work at Vallourec does not in any way simply end with the development of an alloy but also continues with customer-specific further development. Thus leaner chemistry concepts in which, for example, the composition of the alloy is changed without modifying the basic material properties are applied to certain applications. “Quality modifications” of this kind, in which it is possible under certain circumstances to do without expensive alloying elements and without compromising on quality, primarily have economic benefits for the customer in addition to processing and constructional advantages. The product is made more competitive and the Pain Point of the customer – the weldability – is improved.

Reliable results from research centers and test laboratories
Vallourec maintains six research institutes worldwide so as to be able to offer integrated solutions to its customers. For example, the Vallourec Research Institute Deutschland in Düsseldorf-Rath is provided with a series of test laboratories and facilities whose work is closely connected to the projects and developments in product development. At Vallourec, R&D activities and continuous product improvement go hand in hand.

“... At Vallourec, R&D activities and continuous product improvement go hand in hand...”

Microstructure investigation is carried out by EBSD analysis (electron back-scatter diffraction).

The long-term maintenance-free operation of complex agricultural machinery under heavy operating conditions mainly depends on the quality of the welded joints.

The Vallourec Industry Magazine N°03 / November 2016 / p.23
Vallorec’s testing facilities enable the controlled performance of manual MIG/MAG welding processes using customer-specific parameters and equipment (left).

Automated lab-based TIG welding with typical industrial robots and welding consumables (right).

Jack-up rig designs for ultra-rough conditions aim at structures with an optimal strength-to-weight ratio; welded connections have to be highly reliable and realized efficiently.

Our leaner chemistry concepts bring the customer economic, constructional and processing advantages.

Utilization of all available R&D resources

Depending on the type of the project and its aims, the manufacturers of welding consumables and experts from within and outside the group are also brought in. If required, then the competences of the Vallourec Research Center Germany in Riesa and the Vallourec production plants around the world are used as well. This holistic approach, in which the resources of the customers and all those from within the Vallourec group are integrated as required, results in an interactive optimization of the development of suitable materials, welding technology and tube production processes. For the customer this means that at the end he gets a tailor-made, tested and approved product.
Introducing Ralf Hojda

A pioneering spirit for new products

Ralf Hojda as Director of Research & Development and the Technical Customer Service, Region Europe, is responsible for the Industry and Powergen divisions at Vallourec. iTube spoke with him about customer orientation and a strategic realignment.

iTube: Mr. Hojda, you are an engineer with an affinity for sales and marketing. How do you combine these two “viewpoints” in your projects?

I am very well aware that a love of technology can lead to noteworthy new developments, but these are not necessarily accepted by the customers and the markets. For that reason, we will act in an even more holistic and application-oriented way concerning the development of systems and materials. The tasks in R&D and the technical customer service for the Industry and Powergen divisions are now intra-departmental. We are organizing cross-functional project groups that are put together for specific applications and tasks. The main starting point is always the customer and the market, with a deep understanding of the requirements from both the technical and commercial points of view and a look at the competition. These are basic prerequisites for the development and launching of a new product.

iTube: What benefits do Vallourec customers gain from this new form of product development?

When it comes to demanding applications in machine, vehicle, offshore, and general construction, plus power plant engineering, there is an increasing demand for steel tubes nowadays with an optimal strength/weight ratio. In recent years Vallourec has devised superlative products for these special requirements that are now being further developed in coordination with the needs of the customer. Leaner Chemistry concepts make existing special grades cheaper and more marketable without changing their specific material properties and we supply as added value our know-how regarding modified welding techniques, for example. The result is an integrated tubular solution, a product that fully meets its requirements, solves defined problems, and makes use of constructonal and economic potentials.

iTube: What role do the PREON® concepts play in integrated tubular solutions?

PREON® box and PREON® marine are the most advanced tube-based solutions that we have developed to date in the industrial sector. The first is a software-based concept that quickly and economically devises a suitable supporting structure for production halls, the second is a patented foundation system for offshore wind turbines that takes into consideration all the technical, economic and ecological aspects.

iTube: Do regenerative energies constitute a new market for such “integrated” products?

For example, in the regenerative energies sector a customized transfer of the PREON® concept to the supporting structures for solar trackers and the modules for Concentrated Solar Power (CSP) is conceivable. If the Agro-Photovoltaic concept succeeds, then PREON® box would be an ideal solution for this kind of solar support structures. But the individual tube already represents a complex solution package in many demanding application areas. This applies when it is produced in a specially developed grade, all the processing properties are taken into account, and when it is made available in the desired state of finish at a marketable price. An “intelligent tube” has the potential to help new technologies break through, which has always been an especially attractive task for me.

About Ralf Hojda

In the company...

After leaving school Ralf Hojda studied material science in Dortmund. His first job took him to Krupp, later Thyssen-Krupp, where he held responsible positions in the quality control, technical marketing, development and application engineering sections. At Diehl he built up the technical marketing and application engineering sections, and after gaining an economics qualification managed the development and sales department in the newly founded Diehl Metal Applications for automotive components. Since October 2012 Ralf Hojda has been promoting the development of semi-finished products into solutions at Vallourec.

... and in private life

Ralf Hojda is married and the father of a 16-year-old daughter and a 19-year-old son who shares the professional interests of his father and is studying automotive technology. Ralf Hojda lives with his family in the Sauerland and keeps himself fit there, as he does while traveling, with swimming and jogging. A few years ago he also developed a passion for golf.
New organization of the Vallourec Industry Division

Fast, reactive and close to the market

The goals set for the new strategy of Vallourec are close proximity to the markets and customers, an application-related solution orientation, and uncompromising quality of products and services. The changes made to the organization structure of the Vallourec Industry Division as of 1st July 2016 reflect this new orientation: a clear, product- and customer-related “three-pillar structure,” which splits up the Industry Division into three Business Units and shortens the path to the relevant capable and responsible contacts across all products and businesses.

Andreas Denker, Managing Director of the Vallourec Industry Division, is convinced of the increase in performance within his organization: “The ‘three-pillar structure’ makes the Industry Division product-related, customer-oriented and directly contactable for business-specific solutions and strategies.”
Vallourec offshore grades for three new jack-up rig generations

First AJ46 jack-up rig delivered

Vallourec facilities in Deville (F) and Mülheim a. d. Ruhr (D) have been producing an overall quantity of 600 tons of quality tubes in offshore grades SG 690 L and SG 360 L for DSOC’S latest jack-up rig generation AJ46. The Chinese Shipyard has been building the new generation over a three year period in close technical collaboration with the owner CBI-MMEER Accomodations Ltd. and charterer Maersk Oil.

J-tubes for “Beatrice”

A new order for secondary structures for offshore wind turbines: Around 1,000 tons of MSH sections for cable protection tubes, so-called J-tubes, was delivered to the Belgian steel construction company Iemants NV in the late summer of 2016. The circular MSH sections with an external diameter of 457 mm and wall thicknesses of 17.5 and 25 mm respectively are to be used in the “Beatrice” wind farm project, which is around 20 km off the coast of Scotland. “Beatrice” is made up of 84 units that will generate a total of 588 megawatts. The innovative aspect of the project: for the first time two of the new Siemens Offshore Transformer Modules (OTMs) will be used there, through which the current that has been generated will be sent to the coast by means of two large export cables.

Vallourec participates in pilot project

The Blyth Offshore Demonstration Project off the north-eastern coast of England may be small, but it is important. There the owner and operator EDF Energies Nouvelles Group (EDF SA) will test a new technology for foundation structures at a wind farm with five units under actual working conditions. The “Gravity Base Technology” involves a hybrid structure that consists of a steel-reinforced concrete foundation and a single foundation pile (a so-called monopile) made of steel. The structure has a height of 60 m and a diameter of 30 m and weighs 13,000 t. Vallourec supplied to Iemants NV the MSH sections that are being used for the secondary structures.

Offshore grades for Statoil’s new “Cat J” rigs

Two units of Statoil’s latest jack-up rig generation “Cat J” are currently under construction in the South Korean shipyard of Samsung Heavy Industries (SHI). Due to the demanding application profile they are using Vallourec’s seamless tubes in highly developed DNV certified grades NV D460 mod. and NV E690 mod. An overall quantity of 5,555 tons of tubes were produced and delivered to SHI. The rigs will operate on the Norwegian Continental Shelf.
MECAPLUS® hollow bars in Spirafort® grades – this product offered by Vallourec is all about short chips and short distances. While the short chips formation of the product makes it possible for you to increase cutting speeds and tool life, our new iTube® Portal gives you the opportunity to order online. We always keep 200 different dimensions from the gapless MECAPLUS® size range in stock – quality hollow bars with clean turned size guarantee, saving material, process time and storage costs. Order your mechanical tubing directly from the manufacturer – from Vallourec: Take the short link to iTube-Portal.de.

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