MSH sections: The “Crystal” of the Musée des Confluences, Lyon

New strategies
Vallourec goes “i”!

Tailor-made
Premium forged pipes from Aulnoye

Douce-Hydro
Custom hydraulic system solutions
PREON® box - intelligent hall construction thanks to innovative software

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With PREON® box you can plan and construct halls with spans of 30 to more than 100 metres using our specially developed design software – more quickly, more economically, and with greater flexibility. From multiple static systems this software determines the most sensible solution for your project. So you can construct efficiently, saving time and costs, and are always able to react fast and easily to changing requirements.

industry@vallourec.com
Dear Customers, Dear Readers,

Our industry is currently going through turbulent times. To overcome this challenging transition phase, adapt to the structural changes of our markets and meet our customers’ new expectations, Vallourec is deploying a comprehensive performance plan. Our objective is to improve the Group’s competitiveness and strive for excellence. Our ultimate ambition is to consolidate our customers’ trust and loyalty. This plan is based on six key programs. The first program is about safety, which is neither a priority nor an objective, but a pre-requisite and a core value for Vallourec. The second one is about premium quality, as part of Vallourec’s culture of excellence. Innovation is part of our DNA and remains a top priority to help you meet your present technical challenges and prepare for the future. Another key component of our performance plan is commercial excellence: we are working hard to constantly upgrade our sales force skills and organization, leverage the synergies between our various business units and demonstrate to you, our customers, the value that our products and services can bring to your projects. We also concentrate on operational efficiency to offer and deliver the best at your place. Finally, our program called “VALENS” is about cost reduction and cash generation with an aggressive objective to reduce our cost base by the end of 2016.

For now, all the Group’s forces are focused on the execution of this comprehensive and ambitious performance plan which has one ultimate goal: your satisfaction. It is the driving force behind all that we do. More than 600 actions are already engaged, and we are all determined to make them successful and to remain your partner of choice.

In this second issue of your iTube magazine, you will read about groundbreaking strategies, innovative solutions, impressive projects and remarkable customers.

I wish you an enjoyable read,

Philippe Crouzet
Chairman of the Management Board
In the early part of 2016 the Industry Division plans the launch of the comprehensive “iTube” online platform. Industry 4.0 has thus come to the tube industry as well. The digitalization of workflows and processes permits optimization along the entire supply chain. This will help to win new customers and offers established market partners a wide variety of benefits. Everything will be more rapid, more transparent and more efficient.

In the last edition of the iTube magazine the focus was on the premium products with the “tailor made steels” Spirafort®, Avadur®, Forterior®, Oceanfit® and FineXcell®, which were customized specifically for the relevant applications.

iTube – an innovative and pioneering approach with tailor made tube solutions

The “intelligent, innovative, internet tube” is custom-made for every application from the High End Premium Product to the Low Cost Commodity – implemented as a One Stop Shop solution. Old market structures are crumbling due to the dynamism of the markets and the breathtakingly fast development of internet business. The workflows between production and logistics to the construction site or the workbench of the customer must be rebalanced and optimized. This includes a switch from the largely passive producer role over to a proactive form of application and customer-specific action in the individual markets. Actively approaching the customer with intelligent products, offering application-specific grades and geometries, customized services and complex design solutions make up the strategy of the future. Simply waiting for the cyclical recovery of the crisis-stricken markets and hoping for a return to earlier volumes is no solution: “We have to radically reinvent our business model,” is the firm opinion of Andreas Denker, Managing Director of the Industry Division.

More added value to create benefits on both sides

To create more value for our customers we have to get much closer than before to the specific tube applications and the adjoining processing operations.
We need to simplify the daily life of our customers. VAM solutions from the Oil & Gas Division are a good example, in which customized services and parts are supplied right to the production site. Vallourec Bearing Tubes delivers specific ball-bearing cages ready for assembly made from cold rolled rings. Our PFP® forging technology will provide a new massive incentive to the expansion of such solutions. So-called “Shaped Tubes” could be designed online and subsequently manufactured – on demand – at the PFP forging unit in Aulnoye. Here it is possible to produce varying wall thicknesses for a uniform diameter – or the inverse constant ID and varying OD over the entire length of the tube. A tube that is thick-walled at the neck and thin-walled at the outlet could be used in the booms of cranes to improve lifting performance. A tube with varying OD could be used to make integral flanges on big hydraulic cylinder tubes without subsequently welding a ring. Thus we will make a seamless tube even more seamless.

On this new platform, customers will be able to design their own individual tube by means of a digital tube configurator.

Comprehensive entry into E-Commerce
Andreas Denker is convinced that entry into online business is necessary to open up new potentials and to simplify the work flows within the supply chain. Worldwide access to tube-specific technical know-how, the availability of all the relevant standards, specifications and application requirements via the internet, simple, fast and cost-effective online services – these are just some of the numerous advantages that the new online service and information portal for tubes and tube solutions will bring to the market. This applies equally for standard products as for special products such as MECAPLUS® hollow bars.
Five questions for

... Andreas Denker, Managing Director of the Vallourec Industry Division

Is the time right to go online in the steel tube sector?

There are many good reasons for getting into the E-Commerce sector right now: Worldwide hyper-competition, changed information and purchasing behavior of our customers and the technology boost of the internet are the main ones. Technology and the "Zeitgeist" (spirit of the age) have advanced so much that we can implement our holistic E-Commerce ideas, both conceptually and technically right now.

What qualifies Vallourec to make a rapid entry into the world of Industry 4.0?

When it comes to the production and use of seamless steel tubes, we have unmatched and comprehensive know-how. Our range of sizes has no gaps and we offer the widest range of steel grades. In the past few years we have successfully developed integrated hardware and software solutions in which the actual tube is just one part of what we offer - PREON® box and PREON® marine are prime examples of that. In the high-end sector we have made a strong commitment to moving in the direction of customer-specific, tailor made tubes and components production on the basis of our PFP forging technology. All these have been small steps on the way to "iTube", in which our customers will shortly be able to configure their demand on the Web.

What will the new Vallourec online portal look like?

We will start with a comprehensive "knowledge base" about tubes, including all the relevant standards and specifications. There will be a tube configurator in a second step, so that customers can design their very own individual tube. An online webshop for MECAPLUS® hollow bars for machining will be a nice addition for our turned parts customers who need tubes in tailored dimensions. These and further modules will be developed step by step - some of them will fly and others may die, but this is the name of the game in i-business.

In which partnerships will you engage in order to expand the iTube idea to the internet?

We have entered into a strategic cooperation arrangement with a dynamic E-Commerce startup. This company has successfully developed projects of comparable dimensions for B2B internet platforms. And of course we are in deep and detailed talks with selected trading partners, to share the potentials of E-Commerce in view of the changes in the market. With our "iTube" initiatives we will become a pioneer and a game changer in the tube sector.

What is your schedule for Industry 4.0 – when will Vallourec go "i"?

As I said, step by step... We are working focused on the individual modules and will go live at the "Tube" 2016. The first functionalities will be usable by then.
BUHLMANN GROUP expanding further

Merger with the DylanGroup strengthens its position in the market

For some time now the BUHLMANN GROUP has addressed the tense market situation in the steel sector by a commitment to expansion and further specialisation. Visible signs of this were most recently the setting up of a “Competence Centre Special Materials” for the company-wide processing of the segment of special materials, a new distribution centre in Burghausen, and the founding of the affiliate BUHLMANN North America in Houston in January 2015.

BUHLMANN added to its strength around 200 specialised employees with a deep knowledge of the market through the takeover in February 2015 of the internationally operating Dutch company, the DylanGroup, which had been a direct competitor for many years. The merger brings with it the benefits of optimised storage capacities, an enlarged international sales team and a common purchasing policy. The DylanGroup will continue to do business under its own name and will act as an independent affiliate of the BUHLMANN GROUP.

Three questions for Jörg Klüver

Chief Operating Officer of the BUHLMANN GROUP and member of the board of management of the DylanGroup.

What do you expect from the merger with the DylanGroup?

As is wellknown, for some years now the steel sector has been in a tense situation. Under these more difficult conditions, which a number of competitors have already been unable to cope with, this merger has been absolutely the right strategy for us. The exchange with one another of optimized storage capacities, the increase in the international sales team and a common purchasing policy are among the advantages.

What has brought the DylanGroup, which was previously a direct competitor in know-how, into the BUHLMANN GROUP?

Just like BUHLMANN, Dylan was also active in project business and management. The company is regarded in all the relevant sectors as a reliable provider of full service solutions. Therefore, we are first of all welcoming on board 200 new employees who have a great deal of experience of this sector. For BUHLMANN this is a further expansion step to enable us to build on our successful position in the market.

How will the merger be visible from the outside?

The DylanGroup will continue to do business under its own name and will act as an independent affiliate of the BUHLMANN GROUP. We initially identified the new potentials that have been created in the course of a joint management workshop last April. Currently we are in the process of investigating and integrating the synergies in important corporate areas such as purchasing, communication and IT.
Douce-Hydro SAS, Albert (F)

Design and management of hydraulic system solutions

Douce-Hydro, a French company that has specialised in hydraulic cylinders since 1950, developed within two decades into the leading vendor worldwide of hydraulic system solutions for all kinds of applications. The jump into the international market was done with full commitment after the company was taken over by Jean-Marc Vandenbulke in 1990. Today, more than 90% of all the production is exported, with the USA making up the biggest market by taking 25% of total production. And Douce-Hydro has had one thing on its side since 1957: high-quality seamless steel tubes from Vallourec.

When you are being guided by Jean-Marc Vandenbulke through the plant in Albert that is generously equipped with all kinds of machining and coating units, you notice at certain points a sparkle in the eyes of the charismatic chairman and CEO of Douce-Hydro. However, what you see there is also one of the biggest and most modern production facilities worldwide for hydraulic system solutions that you can find anywhere in this sector. And he has built it all up.

Specialising in all kinds of application areas

According to the statement of the company manager the special thing about Douce-Hydro is the wide variety of solutions that are offered: Where the heaviest...
units and components need to be moved reliably under adverse conditions, with forces of up to 1,000 tons and internal pressures of up to 3,000 bar, then in many cases you will find a hydraulic solution from Douce-Hydro. Jean-Marc Vandenbulke places special value on speaking of "hydraulic solutions", because in his hands the company made a commitment to growing out of the role of just being a cylinder manufacturer. Working on the basis of the know-how for a wide variety of shapes and types of hydraulic cylinders, there was a strong move towards the individual sectors so as to expand the range from the original product to the complete application-specific system solution.

Looking at the numerous application areas for which the company produces, currently the most important ones are dams, bridges, industrial presses and in the maritime environment. This policy of basing its business on several (hydraulic) pillars showed its worth in the crisis that hit suddenly in recent years, confirms Jean-Marc Vandenbulke. Douce-Hydro is therefore not so vulnerable and can, for example, cope considerably better with the current slump in projects for the offshore sector by compensating in other application fields than could a company that is a specialist in one or two sectors only.

**Depth of specialisation**
The wide range of applications at Douce-Hydro is supplemented by the depth of specialisation in the individual sectors. It is possible to offer custom solutions thanks to a 20-man design team of skilled engineers who co-operate closely with the development departments on the customer side and implement a special application in project work that not infrequently can take several years. Practically nothing of what you can see in varying stages of machining and completion in the halls is "off the peg", confirms the chairman and CEO, and adds with a wink that the relevant special factor is of course a closely guarded company secret. However, he was perfectly willing to give us a look into the course of a typical development process, which often starts as a "white paper discussion" with the customer. In other words, everything starts with the relevant requirement and the know-how is adapted very precisely to the application instead of simply modifying an existing system that had been developed. In the subsequent course of the project Douce-Hydro adheres firmly to the principle of keeping all the development and production steps in-house and under control. None of the technically relevant processes are outsourced – only in this way is it possible to assume the full liability for the systems functioning properly at once and also in some cases for decades thereafter. The principle at Douce-Hydro of having everything custom-made is rounded out by worldwide customer service, by establishing a presence on all five continents and by providing support on location.

"Our need for an uncompromising quality of all tubular material used in cylinder design and production binds us closely together with Vallourec – since 1957"
Two current developments show the degree of specialisation at Douce-Hydro. The first is a piston accumulator system weighing 45 tons, which required five years of development work. This involves an extremely complex mooring system for the fast and reliable docking and undocking of special ships at deep-sea drilling platforms. Fast is exactly the word here: The entire process is done within less than a second (0.7 s) despite exceedingly severe pressure loads due to currents and wave action. A further example is provided by stabilisation systems that were developed by Douce-Hydro for the 90 metre tower of a ship for offshore cable laying. The system ensures rapid folding down of the tower in the event of strong cross-winds, and thus protects the special ship against the danger of capsizing.

Protection against earthquakes through viscous fluid damper systems

The strategy of making the degree of specialisation as broad as possible while also making it as deep as possible led to the takeover of Jarret Structures Inc. in 2008. The US company is specialised in the design and manufacture of viscous fluid damper systems for bridges and buildings that are used for protection from shock and vibration in the seismic and civil engineering industries. Here, as with all Douce-Hydro hydraulic special systems, the range offered comprises the company’s own research and development tools, specific CAD systems and special software for tests and simulations.

Patented coatings

Among the in-house specialities within the overall scope of fully integrated production can be found the special forms of surface coating for piston rods and industrial piston accumulators. Graded on the basis of resistance to wear and corrosion, under the proprietary label KERADOUCE®, it is possible to choose from the three coatings Metaltek®, KERADOUCE® and LaserteK® and to be able to guarantee superlative sliding properties and excellent resistance to mechanical wear and chemical corrosion, even after periods of operation that can be as long as several tens of thousands of hours for the cylinder systems (see the illustrations).
Douce-Hydro – a modern family-run company

Even though its activities are on a global scale, at its heart Douce-Hydro has still remained a family-run business. Jean-Marc Vandenbulke justifies this management principle by pointing to the maximum amount of trust, continuity and identification. His son Franck is managing the business in the USA that is immensely important because it provides 25% of total sales from the production facilities that were set up in Detroit in 2000. Further key positions in the management of the company are occupied by members of the family, as is the case with Production Manager Jackie Vandenbulke, brother of the CEO, and since very recently also by daughter Marjorie, who is in charge of the Marketing & Communication area.

Tailor-made tubes from Vallourec

Trust and continuity also count a great deal for Jean-Marc Vandenbulke when it comes to relationships with the suppliers of his important semi-finished materials for cylinder production. Here the company almost exclusively uses tubes from Vallourec produced at the plants in Rath and Reisholz, Düsseldorf: "The business links go back to 1957", he explains, "and they are based as before on virtues and quality characteristics that are valid more than ever today." What he means by this, in addition to flexibility and meeting the delivery requirements, is in the first instance the constantly high production and metallurgical quality of the mechanicals from Vallourec. Among other things, this can be seen in trouble-free mechanical processing and optimal weldability.

Christian Gry, Commercial Director for the mechanical engineering sector at Vallourec and for many years in close business partnership with Douce-Hydro, names a crucial reason for this customer satisfaction without revealing the technical secret itself: "The custom-made philosophy of Douce-Hydro fits perfectly with our strategies. The individual Vallourec production facilities have technically adapted their production of tubes to meet the individual requirements of Douce-Hydro – for that reason they have excellent machining and welding properties. To put it in a nutshell: tailor-made tubes for custom hydraulic system solutions."

Full information: www.doucehydro.com

The Vallourec Industry Magazine N°02 / November 2015 / p.11
Its bizarre structure can hardly be believed at first glance, its materiality oscillates between opaque, reflecting and structured transparent: The Musée des Confluences in Lyon is beyond the slightest doubt a unique building whose architecture makes terms such as modernity and future visually perceptible. COOP HIMMELB(L)AU is responsible for this extraordinary design, in which the most spectacular element makes up the transparent entrance area – a giant crystal. It is something truly special in terms of its shape, design and steel structure, turned into reality by Josef Gartner, a company of the Permasteelisa group, and making use of MSH sections.
The side of the Musée des Confluences on the water: cloud and crystal or spaceship?
Photo: Sergio Pirrone

knowledge
The Musée des Confluences: Its name comes from the fact that it is at the confluence of the rivers Rhône and Saône – a location that is both central and symbolic. A “confluence of contemporary knowledge” is therefore the first association that is made, and no doubt intentionally, with this exhibition area. The museum is intended to showcase the latest developments in the field of the sciences, and wants to describe in time and space and make comprehensible the development, dreams and fundamental questions of human societies through its permanent and changing exhibits. It thus devotes itself to a very special extent to the scientific areas of anthropology and ethnology.

Crystal and cloud
Regarding the various forms of materiality of the building shell, the structure as a whole is visually and functionally divided into two parts. The “crystal” that opens out towards the city is the entrance and reception area, and at the same time wants to be a meeting point and an urban forum. And this explicitly not as a museum temple for the educated elite, but instead functioning as an interface for meeting, communication and education for the general public. On a symbolic level, the crystal represents the present, the world in which we move on a day to day basis. The opaque structure of the “cloud” is quite dif-

"Something truly special in terms of its shape, design and steel structure"
The spectacular crystal during the building work: The elements were pre-assembled at Gartner Steel and Glass and only needed to be bolted together on the construction site. Photo: Hubert Canet, Balloïde Photo

The Vallourec Industry Magazine N°02 / November 2015 / p.15

Different, this part of the building that hovers on pillars that consist of a spatial succession of black boxes in the interior, and daylight has intentionally been excluded in the exhibition rooms. The cloud represents the future, the unknown and the uncertain, all which still has to be discovered. Crystal and cloud – the known and the still to be discovered – the present and the future: these opposites that are embodied in the structure epitomise the idea behind the design of the two-part building, whose two elements are connected with one another by numerous connections such as bridges, corridors and catwalks that are interwoven with one another in looping pathways at all levels.

Network exhibition areas

The “cloud” looks like a gigantic spaceship – you associate it with the angular shapes of stealth planes and ships or the futuristic bodywork designs of Lamborghini. The building self-consciously rejects any assimilation with the surrounding area and the present. It houses ten exhibition rooms on three levels and one storey with administration rooms. Three galleries are reserved for permanent exhibitions, and a further seven hold changing exhibitions. All the areas are connected with one another via the “Connecting Space” as in a traffic network. The larger auditoria and auxiliary rooms are in the concrete plinth.

Tornado with a supporting role

The building self-consciously rejects any assimilation with the surrounding area and the access zone to the adjacent exhibition areas. The experience area become a spatial experience through the bizarre façade and roof construction that uses plain and functional materials such as glass, steel

Musée des Confluences, Lyon (F)

Principal:
Conseil Général du Rhône, Lyon

Architects:
COOP HIMMELB(L)AU Wolf D. Prix & Partner ZT GmbH

Structural steelwork facades and roof:
Josef Gartner GmbH, Würzburg

Pipe supply:
MSH sections via Benteler Distribution

Use of MSH sections:
rectangular and square in outer diameters 120 x 120 mm, 160 x 80 mm, 180 x 80 mm, 180 x 180 mm and 300 x 200 mm in wall thicknesses between 4.5 mm and 17.5 mm; size 450 x 250 mm in wall thicknesses 8.0/16.0/20.0 mm

Material/quantity supplied:
S355J2H / EN10210; 532 t
Main entrance area: The dimensions of the MSH sections were optimised to have as few different outer diameters as possible. 

Photo: Sergio Pirrone

and concrete in a completely baffling way in terms of the shapes. No one area looks like another, the levels are nested into one another, open areas become enclosed rooms, angular become round. The visual and design highlight in the interior of the crystal is the funnel in the centre, called the Gravity Cone or in French, Puits de gravité. It springs from the inwards-falling roof like a tornado whose funnel touches the floor of the entrance hall. The actual sensation of this central element is only revealed to the eye of a trained structural engineer: the funnel not only makes a dramatic effect visually and in terms of lighting, but it also fulfils the task of providing support for the primary structure (see interview on p. 17).

On the other hand, even a layman should be able to notice the special form of the structural steelwork in the crystal. Only very few different dimensions of MSH sections are used, the elements are connected without transitions, and the nodal points have no weld seams or visible bolts – the section lines flow and the whole structure appears smooth and slim and “all of a piece”. Ladislaus Balint, the head of the design team of the well-known facade builder Josef Gartner, explained to us in an interview how this “seamless” appearance was achieved and why only hot rolled structural hollow sections (MSH) were used.

“ The visual and design highlight in the interior centre is the funnel, called the Gravity Cone.”
Unusual shape – extraordinary construction

Four questions for Dip. Eng. Ladislaus Balint, Design Team Leader at Josef Gartner GmbH, Würzburg

How did you calculate and implement with your team this extraordinary crystal construction?
In the project we were responsible for the static structural calculations of the complete primary and secondary structures of the crystal. We precisely calculated the relevant deformations of the primary and secondary constructions in the course of numerous deformation analyses. When we made the roof flow downwards, the funnel was produced as the central element of the roof construction, the “Gravity Cone” or “Puits de gravité”. Originally, a solid pillar that had been designed for 350 tons was to have assumed the supporting function. But the design team succeeded in calculating and turning into reality a filigree, funnel-like construction made out of hollow profiles as an alternative to this solid pillar. Hence at this point the secondary structure takes over a part of the static structural function of the primary structure.

How is such an individual solution tested and approved?
In France special solutions or individual instances such as this are handled by the central construction authorities in Paris, the Centre Scientifique et Technique du Bâtiment (C.S.T.B.), and the procedure is called “Attex”. We were able to provide verification of the structural analysis on the basis of precise calculations. Another “special case” that was relevant for the approval was our concealed bolted connection of the profiles that are joined seamlessly by means of head plates.

The Gartner team was able to demonstrate in the course of a comprehensive expert assessment and through very complex FE (Finite Element) calculations that this special connection can definitely be seen as meeting the Eurocode requirements and hence could obtain the approval of the relevant authorities.

Why did you choose MSH sections as the construction material?
Gartner in its capacity as a company within the Permasteelisa group primarily serves the top segment of architects and builders worldwide, for example, in the field of special structures with unusual roof and façade constructions. When it became clear that the primary and secondary structures could be implemented in the calculated form by using hollow sections, we set out the specifications for the desired material profile largely without any tolerances in view of our requirements for tight edge radii and the dimensional stability and straightness of the profiles. The standard defines the hollow section radii too generously for our purposes. There are several reasons why our requirements are much stricter. A construction in which the geometrics and courses change almost every two metres must be produced from extremely accurately dimensioned material as a fundamental consideration, because this is the only way that makes it possible to produce technically and visually clean joints. Because it was important for us, both for structural reasons and to ensure proper sealing, that as much of the horizontal structure as possible was used to hold the glass.

The nodes are another problem, since up to six sections come together there. These complex nodal joints can only be produced cleanly, both technically and visually, by using the corresponding high-quality material. Here we are talking, of course, about special structures with aesthetic requirements ranging from high to extreme.

To what extent have you made use of the wide range of dimensions available for MSH sections?
We wanted to use as few different dimensions of MSH sections as possible and therefore optimised the choice of dimensions accordingly. The wide range of dimensions available made it possible for us to use the size 180 mm x 80 mm, which makes up around 60% of the sections used, with seven different wall thicknesses between 4.5 mm and 12 mm. In this way we could optimally adjust the sections virtually invisibly to suit the relevant structural requirements while using the same outer diameters.

It is an elaborate special solution that largely does without welded connections and has no visible bolted connections at all. We provided all the sections with head plates at the ends and provided access for installation from the inside to bolt them together by means of “hand holes”. Hence there are no bolts at the joins and there are also no visible protuberances due to the quality of the sections. We carried out the pre-assembly at our plants and on the construction site it was only necessary to bolt the elements together edge to edge on the facing side.
Offshore wind turbines

Where the wild winds blow

Miles away from the coast of the countries bordering the North Sea, slim white towers rise up to 200 m above the level of the sea. Gigantic rotors – each blade as long as a football field – constantly rotate to extract from the wind its valuable energy even under the most stormy weather conditions and in the midst of raging seas. Right in the middle of the storm and the wind: MSH sections, installed in boat landings, maintenance platforms and other secondary structures.

Arranged offset in formations of 100 and more units per park, distributed over an area as big as Manhattan, they look like a carefully composed armada of rotating wind harvesters: offshore wind turbines are visually fascinating natural power stations and the main hope for a changed energy policy from an ecological point of view. Offshore wind power generation is enjoying a following wind, so to speak, and with good reason: Compared to competing systems on land and also in comparison with photovoltaic units, offshore wind energy has some vital advantages. Weather-related fluctuations in the amount of power produced that make costly storage systems and backup power stations essential to ensure a constant mains frequency for a stable power grid are largely avoided due to the relatively constant wind conditions. The electricity generated by offshore wind is regarded as reliable and predictable.

Reduction in the cost of the generation of electricity

The supply of energy in the future will after a transition period of around 30 years consist of a mix of various sources of renewable energy and conventional power stations. The proportion of renewable energy is intended to increase continuously. Since also in Germany the amount of bioenergy and hydroelectric power can only be increased to a limited extent, offshore is going to play a key role here. While the total capacity at the moment is around 1 GW, (with a further 2.2 GW under construction), by 2050 this is intended to be around 50 GW, which still amounts to around 10% of the total amount of electricity consumed in Germany today.

Opportunities through research and development

However, the wind energy sector is under heavy pressure significantly to slash the costs of power generation over the next few years. Experts point out that on the one hand the ability to do without costly energy storage systems and backup power stations needs to be included even more clearly in the cost calculations. On the other hand they see further ways to make substantial savings in offshore wind energy through research and development. There are ecological problems to be solved through new
technologies, such as pollution affecting the seabed and endangered marine mammals and seabirds. At the same time, they have to reduce the production, installation and maintenance costs. Innovations that cut costs and are ecologically friendly at the same time, such as the PREON® marine foundation system (see also p. 31 in this issue) currently being developed by Vallourec could make a major contribution to making offshore wind energy generation systems even more economic and also gain them unrestricted ecological acceptance. A considerable expansion of wind energy out at sea could substantially reduce the costs of the change in the energy sector when looked at from a long-term point of view, according to experts considering the various expansion scenarios up to 2050.

**Tough conditions – tough competition**

There are not only high cost and development pressures for the units themselves but also for the secondary strictures such as boat landings and maintenance platforms on the engine housing. The orders are fought over fiercely – time pressure is everywhere. Generally, all the subsequent project steps are delayed once the design, which the relevant owners determine, has been adopted. However, all this comes without any adjustment to the completion deadline for the constructions. They are often subjected at short notice to modifications to the price and function, which make series prefabrication impossible. Two current North Sea offshore wind park projects, Veja Mate and Race Bank, are equipped with robust boat landings made from MSH sections – a total of 158 units with a supplied volume of 1,390 tons. Here the overall package of the product, price, service, logistics and speed of delivery was just as right as for two further projects, Rampion and Dudgeon, for which another 2,083 tons of MSH were ordered.

**A breath of fresh air**

Vallourec produced the sections for Veja Mate and Race Bank at great speed, with just six weeks between receipt of the order and delivery to the responsible general contractors, the Belgian company Iemants Staalconstructies nv and the Danish company Bladt Industries. A great challenge also for Vallourec’s sales team, in this case consisting of Beatrice Schmidt and Till Burgsmüller, who succeeded in managing even the tightest schedules. “Offshore wind energy is bringing a ‘breath of fresh air’ twice over into Vallourec’s application palette”, concludes General Manager Sales & Marketing, Rainer Bindewalt, “firstly, in its role as the engine that drives the development of our innovative foundation solution PREON® marine, and secondly, as generator of high-quality tube applications for offshore constructions.”
Introducing Philippe Carlier

Changes for the Best

Vallourec went through a comprehensive reorganisation in the course of the year 2015. The Group is now arranged by regions in order to be closer to the markets and customers, ensuring shorter processes and faster reaction times. Philippe Carlier is the new Senior Vice President Europe, responsible for the Industry and Powergen divisions at Vallourec as well as the European production facilities of the Group. He has set himself the target of “merging steel tube industry with business”.

In the past, teams of specialists had worked worldwide as contact points for individual product groups and applications. Now, with the new concentration on regions, they can devote themselves far more intensively to individual application- and product-specific customer wishes. Vallourec’s explicit aim is to offer best possible service in each region – that is the promise of Philippe Carlier, who is regarded as being very operation-oriented in view of his two decades within the company and his experience of several functions in production and management.

“ Our focus is quite clearly on high-end products and integrated solutions ”

Premium service close to the markets
Carlier combines a clear promise to the customer with the new structure: "Direct customer benefits will be generated from a more efficient organisation structure with bundled service and support functions. Fast reaction times and decision, direct paths, the same capable contact people at all times, and also, as a result of these factors, shorter throughput and delivery times are some of the advantages of this reorganisation.” The contacts in Sales will remain the same – the task areas that had formerly been handled worldwide will be bundled into regional responsibilities in future and expanded to include services that are precisely tailored to the increasingly complex technical and logistical requirements of regional customers and markets. Philippe Carlier promises customers “a whole new level of intimacy” (see the interview on the right) and views the increased intensity of contact “as the right answer to the strongly quality- and service-oriented needs of the European market and the technical complexity of the products of our customers”.

"
Six questions to...

... Philippe Carlier,
Senior Vice President Europe and responsible for the Industry and Powergen divisions at Vallourec as well as the Group’s European production facilities.

What are the strengths of the company and the challenges to overcome?
Ever since the Joint Venture between Vallourec and Mannesmann back in 1997, our basis has been our premium product strategy and our presence in all the markets as a full line provider. As before, we are the number 1 worldwide in the range of seamless tubes and tube related services. This position is being fought over with increasing ferocity at the global and regional levels, and the big challenge for us is to spot marketing developments as they emerge, to anticipate new trends and to be able to meet them in a proactive way. This remains the biggest challenge of all in view of constantly changing market dynamics.

Which effect does the tense market situation have on the future strategies of Vallourec?
There will be strategic shifts, of course. Still we want to remain strongly represented in all markets and for all applications – this applies equally to Oil & Gas, Powergen and Industry. And we will remain represented there with our usual wide range of sizes and products. In Europe, we will counter the decreasing capacities with increased flexibility within the plants. Here our strategy is “less volume – higher value”. But the key to future success in European and worldwide markets is definitely an excellent overall performance. To achieve this goal, we have implemented a comprehensive programme aimed at substantially improving Vallourec’s performance and competitiveness – the so-called “performance plan”. It is based on six extensive key programmes focusing on all the main performance related issues such as safety, quality, innovation, commercial excellence, operational efficiency and cost reduction. It is all aimed at the consolidation of our customers’ trust and loyalty. As the result of our performance plan all parties dealing with Vallourec should experience substantial benefits in the near future.

What products and solutions will be especially important in the coming years?
Basically, all the products and solutions that fit our high-tech and service philosophy. I would include here comprehensive E-Commerce solutions and holistic product and service concepts, such as PREON® box and PREON® marine. In terms of products this includes innovations in tube materials for weight savings and higher performance in vehicle construction. In high-temperature power plants, new products contribute to increase efficiency while reducing pollution of the environment. In the Oil & Gas sector, our tubes offer increased safety and reliability combined with higher performance. Fundamentally speaking, this covers everything “beyond standard” in our industry and all products which can be produced and marketed economically with a high level of customer benefit.

How would you describe your management style?
Some of my former positions within the Vallourec Group prove that in addition to the strategic management tasks, I also have a marked operation- and application-oriented background. I am a very practical person and prefer to be in close contact with our staff in Sales and Production, and also with our production facilities, trading partners and our customers. Here I always prefer the short and direct route.

Your concluding message to our iTube readers:
We are experiencing tough times at the moment. On the other hand, we have already weathered many major crises on the basis of our values and strengths, which are the foundations and the DNA of our company. We will master the present situation thanks to our strong will to take dynamic action and our permanent readiness to adapt the company and make changes happen.

About: Philippe Carlier

In the company ...
After graduating from the Centrale Paris School of Engineering, Philippe Carlier began his career at EADS in 1988 and moved to Vallourec as a management controller in 1995. He held various positions such as plant manager, deputy Chief Operating Officer, and industrial director, before being appointed Director of the Upstream activity (steel mills and rolling mills) in 2012. He has been in charge of the Upstream and Industry activities (tubular products for mechanical engineering, construction and the automotive industry) since 2014. In 2015 Philippe Carlier became a member of the top management of the group with his appointment as Senior Vice President Europe. He is also taking charge of the coordination of Vallourec’s industrial policy.

... and in private life
Philippe Carlier is married and has three children. When work allows it, then he can devote himself to his great passion - his interest in aircraft and aerospace - in the cockpit of a single-engine propeller-driven plane of his aeroclub. In addition, Philippe Carlier keeps himself physically and mentally fit by regular running, and he loves discovering new landscapes on his motorbike.
Premium Forged Pipes from Aulnoye

A plant fit for the future

The PFP®-forged “custom tube” is an important asset in the iTube products and solutions portfolio, with its optimal adaptation to customers’ specific requirements and its flexibility. The iTube editorial team took a trip to the Vallourec tube mill in Aulnoye, northern France, where the forged tube is produced, to see with its own eyes the unique production process of this facility and report on the many special features of premium forged pipes.

If you wish to grasp the idea behind custom tubes and their potential, then first we need to explain the manufacturing process that Vallourec developed and patented in Aulnoye. The abbreviation PFP®, marketed as “Premium Forged Pipes”, relates at the same time to the combination of “Piercing and Forging Processes” to produce a tube. After heating of the pre-material to forming temperature, the manufacturing sequence involves in a first step a cross-roll piercing mill to produce a hollow shell starting from solid bar pre-material. In a second step, the hollow shell is hot-formed in a four-hammer forging machine on a cylindrical mandrel and reduced both in diameter and wall thickness. The CNC-controlled setting of the forging hammers and the quick-change mandrel system allow in addition any desired variation of production parameters without disruption between individual tube sizes, while in a conventional rolling process set-up times for changing rolling tools are much more time consuming.

“Our custom mindset is developing fast. We are just about to trigger it in our customers’ minds. I really think we should be present at an early stage whenever a tube-related engineering process is involved.”
Custom shapes – gapless sizes – all grades

PFP® tubes are available in sizes between 209 and 381 mm outer diameter and between 25 and 90 mm wall thickness with piece weights up to 3,600 kg and lengths up to 13.4 m. Extensions of the outside diameter range up to 420 mm and of the maximum piece weight up to 4,000 kg are currently in development. A unique feature of the new process is to allow production of any size within this range as mandrels are available to cover all inner diameter values between 89 and 311 mm with 1 mm-steps. Any desired wall thickness value can be obtained by simply adjusting the reach of the forge hammers accordingly, so that tubes with variable OD or ID and WT can be produced.

The new process can provide tubes in all standard grades of the mechanical industry, ranging from ASTM A106 Grade B/C up to ASTM A519 Grades...
AISI 4130 and 4140. New proprietary material grades bridge or supplement the strength gap between these two material groups of mechanical grades, including high-end proprietary quenched and tempered high-strength fine-grained steels for high-performance applications requiring high impact toughness properties and outstanding weldability. Besides these material grades which have proven to cover most of the current needs of the mechanical industry, high-alloy grades used in the oil and gas (13%Cr) and power generation markets (9%Cr) are also available. “Almost all applications for custom sizes of tube for mechanical engineering are covered”, confirms plant manager Cédric Souillart to us, and adds: “You simply have to see and understand the PFP® process to get a concrete impression of the new possibilities. Due to its flexibility and efficiency, it puts us in a position fundamentally to change the entire way tubes are configured, produced and marketed. Custom tubes and shaped geometries with variable outer diameter and wall thickness along the tube length – we can offer these “specialities” to our customers in very small batches that can be as little as a single tube, and all with top quality. The tube production process is thus customer- and application-oriented to the full extent. And, in view of its high flexibility it is also the ideal “tool” to implement the e-business strategy of Vallourec”.

Flexibility as the key to economic production

Baptiste Wattiez, the R&D and Quality Manager of the plant in Aulnoye, details the advantages of the procedure with regard to the areas of application and costs. “Flexibility and economy go hand in hand with the PFP® process”, he explains. “We can offer our customers substantial technical and economical advantages. The process opens up new technical possibilities for optimised tubular solutions and at the same time allows the customer to save time and cut expensive process costs.” The average batch size produced in Aulnoye is seven tubes and 95% of all orders even involve batch sizes of less than five tubes of one dimension and specification. To reinforce this specificity, the work flow has been optimised and the total lead time has been cut significantly.

Of course the logistics for single tube delivery will have to be adapted to the new possibilities of single shaped tubes.
Continuous workflow
Capacity planning and work flow organisation are the keywords for Florent Holl, the production manager. He quotes the production mix as an example for the flexibility of the plant and the PFP® unit: “The ideal target of our specialised tube mill is made up of standard products, custom-made and shaped tubes. Small batch sizes are also covered as a fixed constituent part of the production. The crucial advantage of the specialised production facilities is that we can also react with an outstanding flexibility to special wishes of the customer at short notice.”

In Aulnoye, organisational flexibility is the result of a multi-year “Lean Manufacturing Programme”. The “RefleQ’s programme” was initiated in 2011 with the aim of bringing together two production lines into one continuous “in line” production work flow. Bottlenecks in the work flow were removed, and investments in the order of 10 million euro were made for optimising the quality and the work flow alone. Among other things, a modern three-point straightening press equipped for measuring and correcting the straightness deviation over the entire product length to max. 0.75 /1,000 was installed.

Covering high-tech pipe applications
Plant manager Cédric Soulliart brings to life the much-quoted cliché of “customer orientation”: “Our task is to develop a sense of fantasy in the customer for the possibilities that are provided by custom tubes. The PFP® forging unit in Aulnoye is set to become the most visited mill within the Vallourec Group. Customers are invited to experience the process live – in this way they can develop their own individual ideas. And we offer our specialists for active participation in development processes. In future we want to be brought into the planning at an early stage in all cases involving a product development process that is based on tubes.”

In some cases this has already become a reality. Working in close cooperation with the customer, it was possible to go from a thick tube to a near-net shape forged tube for cost-efficient machining. For instance crane manufacturers are much interested in the possibility to use custom-shaped tubes whose wall thickness is reduced over their length. The result would be lighter and longer crane booms with a greater range and a higher lifting capacity. These specific variation possibilities could allow savings in material to be made overall, so that the constructions would be lighter despite being able to handle heavier loads. The advantages of weight savings, lower costs and time savings through reduced processing requirements as well as less welding and testing may easily be transferred to numerous other industries and tube applications.

Interfaces to e-business and Industry 4.0
The technical “trumps” and the flexibility of the PFP® process in Aulnoye are key assets for the iTube and for the new e-business strategy of Vallourec. The idea of configuring one’s own application-specific tube with the help of online tools and handling the entire ordering process online is well within reach. Plant manager Cédric Soulliart is convinced of this as well: “I consider it to be absolutely realistic that a customer could configure his own individual tube with a touch screen and then send us the order data online. All that is required for this is a user-friendly app that handles the transfer of the design that is desired by the customer to the process data. And we will introduce just such an app for this at the next Tube fair.”

“Custom-made is a joint approach. Customers have to explore the possibilities in close cooperation with our engineers in order to develop new application ideas.”

Interfaces to e-business and Industry 4.0
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Variants of shaped tubes: Varying outside and inside diameters over the entire length of the tube, forged by the PFP® process.
ABS and DNV GL certification for Vallourec

Increased safety standards

Vallourec successfully established their brand Oceanfit® in 2014, committing to the market their expertise and strength of supplying round tubulars to the offshore construction segment. Comprehensive certification based on the offshore regulations of the internationally recognised classification societies Det Norske Veritas Germanischer Lloyd (DNV GL) and the American Bureau of Shipping (ABS) has since been carried out successfully.

It qualifies these high-strength steel grades for rig designs and other offshore applications in which DNV GL- or ABS-certified material is required throughout. Extensive mechanical testing on these materials was conducted to qualify them. Accreditation companies such as American Bureau of Shipping (ABS) or Det Norske Veritas Germanischer Lloyd (DNV GL) that are active worldwide in the shipping and offshore sector contribute to a continuous increase in safety standards. This also means that when issuing an overall acceptance, for example, for a jack-up rig, then ABS or DNV GL certification is required throughout for all the steel tubes that are installed in it. The big offshore design and engineering companies such as GustoMSC have reacted to this development and in the meantime stipulate that only ABS- or DNV GL-certified material may be used for certain types of constructions, for safety reasons. For a while now Vallourec has belonged to the exclusive group of producers of seamless tubes who hold this certification.

Vallourec now holds ABS and DNV GL certifications for Oceanfit® offshore grades. Certifications cover both the company’s steel mills and tube mills.

Offshore certification for tube works and steel plants

As part of these elaborate certification processes, not only the plants producing the tubes and the materials are subjected to checks and tests but also the starting materials coming from the steel plant. In this way the “DNV GL Approvals of Manufacturer Certificates” and “ABS Approvals” that were granted as a result of the Vallourec certification processes also included the steel plants in Bous and Hüttenerwerke Krupp Mannesmann in Duisburg as well as the Vallourec works in Aulnoye and Mülheim an der Ruhr. Another qualification process is under way at the pilger mill in Düsseldorf-Rath and will be concluded shortly.

These recently certified special grades have already been used on a large scale in two major jack-up rig projects at the Samsung Heavy and DSME shipyards in South Korea. Initially on the strength of an individual approval, and after the granting of the certification, then also on the basis of a general “Grade Approval”. These materials can now be used in DNV GL- or ABS-classified offshore construction projects without any further special tests and thus meet the highest offshore quality and safety standards.
PREON® marine

Destination: North Sea

PREON® marine has successfully completed the first test phase at the IWES Test Centre for Support Structures in Hanover. This means that the foundation system for offshore wind turbines that is being developed at Vallourec is coming much closer to being implemented. Furthermore, Vallourec will receive financial support from the German Federal Ministry for Economic Affairs and Energy (BMWi).

Vallourec’s patented new foundation system for the anchoring of wind turbines out on the high seas is moving forward with giant strides towards the “leap into the North Sea”. The first tests showed that the foundation piles could be installed without any problems in the sand of the North Sea. Further tests will determine the overall conditions for use in various types of ground. With PREON® marine four special adapter elements are used in conjunction with a jacket, which is usually a four-legged underwater supporting structure that looks like an electricity pylon. This foundation structure will be embedded around 25-35 m into the sea floor, depending on the structure of the ground, with four to six foundation piles made of seamless steel tubes with a diameter of 400-600 mm.

In the course of the investigations at the test pit of the IWES Test Centre for Support Structures, this installation of foundation piles was tested with success by so-called dry tests in a large-scale laboratory using a pool filled with water-saturated North Sea sand.

Covering all possible conditions of use

In addition to the various ground properties there are also further factors that influence the final design of the foundation structure. These include different depths of water, stresses from currents, wind and waves and the specific types of structures used in wind turbines. Discussions are held with wind generation system designers and project developers at an early stage with the aim of finding an optimal combination of flexible options for use, environmentally-friendly installation and assembly, and sustainable operation that is economically viable. Overall, this is a complex and time-consuming development process that is nonetheless necessary to create the broadest possible basis for the application of the system. This makes it all the more important that Vallourec has given approval to secure the financing of PREON® marine that is required for the next few years until the result is on the market.

From the sandpit to the test field

PREON® marine is going to enter this market with the construction of a prototype. This means that the foundation system is to be incorporated as part of a wind turbine in the North Sea test area in the near future. This “live test” will be done under conditions that are 100% genuine, including the generation of electricity and commercial use of the wind turbine. The product development of the innovative foundation system is being done with the assistance of the BMWi, which is supporting the setting up of a prototype foundation with a wind turbine of the latest design as part of the SEALENCE promotional project (SEALENCE is a portmanteau name derived from SEA / SEAL plus SILENCE). Discussions have already been held with plant operators within Germany and internationally. The transfer of this innovative technology from the sandpit to the rough and stormy North Sea will certainly be a highly exciting process.
Homage to the pharaohs

It is a construction project of superlatives and is currently the most elaborate construction of a new museum in the whole world: the Grand Egyptian Museum (GEM) that is in sight of the world-famous pyramids of the pharaohs Cheops, Chephren and Mykerinos in Gizeh. The entrance facade and roof of the main building of the museum are the most spectacular architectural elements – they are supported by structures made from MSH sections supplied by Vallourec.

The Egyptian Ministry of Culture as the client is hoping to gain from the new construction not only a suitable presentation and research area for more than 100,000 exhibits from the history of ancient Egypt, but at the same time the project is intended to be a lasting tourist magnet for millions of visitors all year round who want to explore the past high culture of Egypt. Every year more than 2.5 million tourists visit the Egyptian Museum in Cairo, which can only display a fraction of all the exhibits that it has due to a lack of space. The worldwide interest in the world of the pharaohs, and in the pyramids as the last surviving examples of the seven wonders of the ancient world, has increased considerably in recent years. This has been helped by the fact that in 1979 UNESCO declared Gizeh to be a world cultural heritage site and arranged exhibitions of replicas worldwide – most recently “Tutankhamun – his tomb and the treasures” – to keep alive the cultural heritage of the
The fact that cultural travel in the region has become increasingly affordable has fuelled this interest further.

**Architectural competition with 2,227 participants**

The international response to the call for entries for the architectural competition that was put out by the Egyptian Ministry of Culture in January 2002 was overwhelming: 2,227 architects from 103 countries registered to take part, and around 1,550 design offices sent in their illustrated drafts for the museum complex, plus explanations, between May and August 2002. In October of that year the jury deliberated for a week and picked out 20 drafts for the second round of the competition. At the beginning of May 2003 the concept of the Irish design office heneghan.peng.architects was declared to be the win-

“...The holistic design by heneghan.peng architects covers the whole area including landscaping and infrastructure.”

**MSH sections for the Grand Egyptian Museum**

The questions as to whether modern-day pharaohs would have built their palaces, tombs and cult edifices using seamless tubes can no longer be answered with any reliability. But what we can say for sure is that around 1,340 tons of MSH sections were used in the secondary structures for the facade and the area in the main museum building. However, there were no triangular sections.

- **Scope of supply:** 1,337 t MSH sections, circular and square
- **Material:** S355J2H / EN10210 with increased tensile strength of min. 510 N/MM²
- **Dimensions:** 114.3 mm to 406.4 mm outside diameter; 3.6 mm to 20 mm wall thicknesses
- **Customer/general contractor:** Supplied by ThyssenKrupp Mannex to National Steel Fabrication Co. (NSF), Egypt
- **Challenges in the course of the project:**
  - close supervision of project delays through anticipated deliveries
  - constant availability for the customer, also on public holidays and at Christmas
  - smooth handling of logistics

The museum building is divided into three main function areas: the museum, entrance hall and conference centre. The entrance façade and folded roof construction surround the building like a veil.

*Model Photo: Richard Davies*
The master plan for the Grand Egyptian Museum covers an area of 480,000 m² which is on a plateau located right next to the Nile. Large areas have been set up as theme parks and landscaped gardens with local flora.

Rendering: heneghan.peng. architects

The call for entries was carried out under the auspices of UNESCO and under the supervision of the International Union of Architects (UIA).

Master plan covers the entire museum premises
While the primary function of the New Grand Egyptian Museum is permanently to provide display space and research options for the numerous antique artefacts, the project has a second vital role at the infrastructural level. A master plan covers all the additional functions for the project site that extends over 50 hectares, in addition to the actual museum buildings. It is primarily the landscape architecture that plays a vital role here in addition to the auxiliary buildings, restaurants, cafés and parking areas. The Nile that is right next to the museum has played a key role for millennia as the origin and source of Egyptian civilization, with its function of bringing fertility to the regional cultural landscape and vegetation, and also serves as the model for numerous theme parks and gardens around the museum. The museum area that is located on a plateau right next to the Nile acts, so to speak, as a link with strong contrasts between the natural, cultural and desert landscapes.

The triangle as the measure of all things
The design approach of heneghan.peng.architects for the main museum building explicitly did not want to engage in a boastful battle of sizes with the pyramids of Gizeh that are easily visible from there. The draft of the building instead pays homage to the important cultural heritage by adapting the shapes and materials of these monumental structures and bringing them into our own era. In the first instance the triangle and the pyramids make up the basic geometrical shapes that run like a leitmotif through the draft at all kinds of levels. Thus you find the triangle as the determining grid that is overlaid onto the arrangement of the park and garden areas in the same way as in the folded shed roof structure that is based on triangles and which covers the entire museum building, hovering over it “like a veil”. The ground plan of the three usage zones of the museum

MSH sections, structure and support the giant facade of translucent stone elements
building – the entrance hall, exhibition area and conference centre – also use the triangle as the basic determining grid.

**Translucent stone facade supported by MSH sections**

The most spectacular element of the building shell is undoubtedly the entrance façade. It is a series of gigantic triangles along a stretched-out façade that opens up into the area of the forecourt by displaying triple elements to allow a view inside and light inside and entry for the visitors. This façade is a filigree construction of translucent sand-coloured stone panels that allow light into the interior by day and night and produce spectacular visual effects in the external view. The surface of the individual triangles has a fine structure with an oriental appearance, arranged according to the principle of the “Sierpinski triangle”. This has an interrupted geometrical pattern in which the big triangle is made up of several smaller copies of itself. A system that can be broken down into ever smaller grids over several levels.

The façade elements are supported by structures made from MSH sections, which had to be delivered in close coordination with a tight and frequently modified or delayed schedule. Till Burgsmüller, project leader for Vallourec, together with the whole sales division managed to meet all logistical requirements by constant availability to the customer - even on public holidays and at Christmas.

A further important part of the draft design is the structure of the main building with the use of six strips. It is visible both when looking at the roof and also the building section. The demarcation lines of five strips precisely delineate the extended visual axes to the edges of the three pyramids of Gizeh. The sixth strip has in the interior a large and continuously rising staircase that runs up to a viewing platform in the display area.

From there the visitors get a direct look at the Cheops pyramid for the first time – breath-taking and filling the entire view.

**“Tut” is handling the sales pitch**

The GEM megaproject, which its director Tarek Tawfik calls “the museum for the third millennium” and “the pyramid of the modern era”, is to have a “soft opening” in 2018, meaning a partial opening. But “soft” in no way means small in the context of this gigantic project, assures Tawfik. As it is, around two-thirds of the entire construction sum of almost a billion dollars are not available yet and are to be secured in tranches. And “Tut” has to go out and sell once again. King Tutankhamun is regarded as the really big attraction for cultural tourism to Egypt and the GEM.

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**Grand Egyptian Museum, Cairo/Gizeh**

**Selected facts:**
- **Design**
  - Architects: heneghan.peng.architects
  - Engineering/facades: Arup
  - Structural steelwork: NSF Egypt
- **Areas**
  - Main building (museum and conference centre): 133,282 m²
  - Auxiliary buildings: 34,014 m²
  - Gardens and parks: 303,678 m²
  - Exhibition areas (inside and outside): 93,000 m²
- **Construction costs**
  - Around 1 billion US dollars
- **Opening**
  - Expected to be 2018 (soft opening)
Quality and efficiency are the parameters by which your production is measured. Vallourec Seamless Hollow Bars for Mechanical Engineering don’t just meet the standard; they assure you have the competitive edge. A gapless size range for getting as close as possible to the clean-turned size. Higher cutting speed, longer tool life and professional support from the pioneer of seamless tubing speak for our co-operation. Now it’s your turn! Get in touch with us!

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