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Offshore oil and gas – Overview

The end of easy-access oil

Since the first drilling operations carried out in the 1950s in the Gulf of Mexico, production of offshore oil has increased continuously. Over the years, the water depths (between the surface of the ocean and the seabed) have continuously increased: from shallow offshore (less than 400 meters deep) which still represents most offshore oil and gas production, to deep-water offshore (between 400 and 1,500 meters), which appeared in the 1980s and only really began to develop in the early 2000’s.

Nowadays, the oil industry is planning to exceed the ultra-deep stage (between 1,500 and 3,000 meters deep) to work in depths of nearly 4,000 meters.

Today, offshore represents about a third of the world oil and gas production. The main production zones are in the Gulf of Mexico, off Brazil, the North Sea, off West Africa, the Mediterranean, the Arabian Gulf, the Caspian Sea and the South China Sea.

Offshore, and particularly deep-water and ultra-deep offshore, is one of the few oil and gas reserves that is largely unexplored. As most shallow offshore zones are already in operation, operators are focusing their efforts on deep-water areas with ever increasing discoveries. However, deep-water offshore operation requires state-of-the-art products and large investments.

Technological and environmental challenges are greater than ever

Beyond 200 meters water depth, human intervention is no longer possible; it is replaced by remotely operated vehicles (ROV’s). Beyond 300 meters, the installations are typically floating, anchored on the seabed and sensitive to weather conditions. From 1,000 to 1,500 meters, conditions for operation and intervention become much more difficult. At that depth, the temperature of the water is around 4°C, creating a risk of hydrate and paraffin formation, which can obstruct the pipe during production phases. Also, the pressure reaches 150 bars at a depth of 1,500 meters and increases by 1 bar every 10 meters.

In such an environment, the challenge consists of perfecting systems which prevent the oil from cooling and resist the pressure, to keep it fluid and ensure it can be raised to the surface.
The oil and gas industry had to resolve difficulties specific to certain fields, such as corrosion caused by acidic and sour environments or the crushing of tubes that cross pre-salt formations. This is evident in the large deposits offshore Brazil. Generally, operators are confronted with increasing complexity of offshore projects, located at ever greater depths and ever further from the coasts.

Operating in deep water also causes particular difficulties to drillpipe and casing strings as loads can be very high. The strength of conventional tubulars are not sufficient and a specific design must be used to prevent the tubes from crushing in the jaws or slips tongues which hold them on the rotary table during installation operations. Robust connections with high-performance sealing must also be used.

The drill pipes are subject to great tension stresses. In order to drill more complex wells in deeper water, the use of high torque connections is necessary to transmit the rotation of the drill string from the drill bit at the base of the well to the drill floor.

Also, after the 2010 Deepwater Horizon incident in the Gulf of Mexico, the regulations and requirements of oil companies and service and equipment suppliers have become even more stringent, demanding ever greater risk mitigation during the drilling and production process.

MAIN PLAYERS

The development of offshore oil and gas is an entire network, in which oil companies and businesses in the oil-related sector work side-by-side.

Oil companies

As the technological investments necessary for offshore operation are particularly high, the international oil companies (notably Total, Chevron, Shell, BP and Exxon Mobil) share most of the market amongst the international oil companies (IOC’s). However, the national oil companies (NOC’s) of producing countries, such as Petrobras or Statoil, represent a very large part of the investments in this field. Amongst the 10 main players in ultra-deep offshore, Petrobras is the world leader, with nearly 50% of investments made in 2014, far ahead of Total and Shell.
Companies in the oil-related sector

In the area of oil field services, the main players are Halliburton / Baker Hughes, Schlumberger and Weatherford.

The main players in offshore construction are Saipem, Subsea 7 and Technip. The worldwide market is quite concentrated, with 70% of worldwide consolidated revenue generated by 10 companies. In the field of drilling activity, the leaders are Transocean, Seadrill, Ensco and Noble.

The range of products (OCTG tubes, line pipes, drill pipes...) and services from Vallourec is aimed both at the oil companies and companies in the oil-related sector.
Vallourec, a major player in offshore oil and gas

Vallourec works as a supplier and privileged partner of oil companies and companies in the oil-related sector on all offshore projects, including the most critical.

Vallourec’s range of offshore products covers the entire hydrocarbon production chain, starting with OCTG (Oil Country Tubular Goods) tubes intended to equip wells during the exploration and production phases. Vallourec also has a complete range of products intended for drilling offshore wells. These threaded seamless tubes are fitted with VAM® connections (a family of premium threading invented and patented by Vallourec), which provides perfect sealing for the drill strings.

Downstream of the oil and gas wells, the Group markets tubes for offshore flowlines for transporting hydrocarbons to the surface, as well as welded tubes for umbilicals, flowlines, and structural tubes intended for offshore platforms. The Group also offers a range of on-site services dedicated to the offshore industry.

Main deep-water projects in which Vallourec participates
RESPONDING TO THE DEEPWATER OFFSHORE CHALLENGES

Vallourec's teams work in close collaboration with its customers to develop tailor-made solutions and adapt the pipe and connections to the ever-higher technological demands characteristic of deep-water and ultra-deep applications. The Group responds to these challenges by developing products that are capable of withstanding corrosive environments, extreme mechanical stresses and high pressure and temperature levels over the life of the well.

With "easy oil" drawing to an end, the development of innovative premium products is the Group's priority to meet the needs of its offshore oil and gas customers.

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THE STRATEGIC IMPORTANCE OF R&D

Innovating in profitable market segments

Vallourec's innovation strategy is based on a long-term strategy that considers the growth potential of the energy sector and the increasingly complex conditions of oil and gas development.

Anticipating technological challenges

In the oil and gas sector, the technical challenges faced by the Group's customers in deep waters ("high pressure and high temperature" deposits, salt domes, etc.) require the development of more resistant steel grades and higher performance threaded connections. For submarine flowlines, subject to extreme mechanical stresses in operating conditions, Vallourec is developing coordinated coating and welding services (pre-assembly).

Supporting the Group's customers in the context of a continuous process of discussion

From the creation of the VAM®¹ connection in 1965 to the development of the VAM® TTR², a connection dedicated to offshore production risers that meets the operators’ highest requirements, innovation has led to numerous breakthroughs. These have enabled Vallourec’s customers to access offshore resources which until then were not exploited, or to improve the performance of their facilities. These innovations are attributable to the close working relationship that the Group enjoys with its customers.

Meeting the need for reliability and safety while minimizing our impact on the environment

The increasingly stringent requirements regarding the reliability and safety of installations and tougher regulations testify to the importance of innovation. In line with its premium positioning, the Group’s goal is to respond to the far-reaching and rapid changes in its customers’ needs and to offer suitable solutions which are safe, reliable and mindful of the environment. In order to meet this goal, Vallourec has considerably strengthened its R&D capabilities over the past few years.

Increasing Vallourec’s leadership in processes and innovating in services

Innovation is not limited to developing new premium products. By improving our manufacturing processes, particularly non-destructive tests, Vallourec innovations allows the creation of new services so that customers can get the most out of our products.

¹ VAM® is the Group’s premium connection intended for the most complex applications.
² Risers: pipes bringing the hydrocarbons to the surface.
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VALLOUREC, AN ESSENTIAL PLAYER IN LARGE OFFSHORE PROJECTS IN THE MAIN REGIONS OF THE WORLD

SOUTH AMERICA

- BRAZIL

Petrobras’ announcement, in 2007, of the first pre-salt fields discovery in a zone located 250 km east of Rio de Janeiro was a major event due to the size of the estimated reserves.

These fields – Lula (ex Tupi), discovered in 2007, with 6.5 billion barrels, Iracema with 1.8 billion barrels, Franco, discovered in 2010, with 4.5 billion barrels and Libra, discovered in 2010, with 8 to 15 billion barrels – are amongst the largest discoveries in the world over the last twenty years.

A partner of Petrobras for more than 60 years, Vallourec supplies the Brazilian oil company with unique tubes and connections to reach hydrocarbons buried under 2,200 meters of water and 5 to 7,000 meters below the sea bottom, including a pre-salt layer of 2,000 meters.

Services contracts to support Petrobras in its complex offshore projects

In 2013, Vallourec signed two services contracts with the Brazilian national company, supplementing the vast range of tubular products that Vallourec provides to its main Brazilian customer through a framework contract of five years, renewed at the end of 2012.

The range of high-value-added services is the greatest ever supplied to Petrobras. It includes the inspection and repair of tubes, on-site services, preparation of drilling operation equipment, coordinating the supply of equipment for wells according to the drilling program... To this range of services is added the organization of the supply chain in all ports from which Petrobras supplies its offshore drilling platforms, managing tube tracking using RFID (radio frequency identification) technology, providing engineers and special accessories rental.
Meeting the challenges specific to pre-salt fields

The exploitation of pre-salt fields combines several severe constraints: deep-water offshore conditions, exceptionally deep wells (up to 7,000 meters below the sea bottom), salt layers which increase the risks of collapse, sour service environment, and temperatures and pressures that in certain zones reach HP/HT (high-pressure / high temperature) conditions.

Dedicated solutions

These are the circumstances under which Vallourec develops and supplies Petrobras, within a long-term supply contract (see framed section on the following page), state-of-the-art tubulars and connections, which meet the specific requirements of the most difficult fields exploited by the Brazilian oil company:

- "Sour service" grades that are highly resistant to corrosion
- "High Collapse" grades resistant to collapse, heavy wall casing
- Premium line pipes
- Risers and drill pipe risers
- Premium drill pipes, well bottom tools and accessories
- VAM* premium connections

Enhanced R&D abilities

In order to anticipate new demand related to the development of pre-salt fields, Vallourec very early created a project R&D team, in close collaboration with Petrobras, to develop innovative solutions adapted to these extreme conditions. In 2013, the group opened an expertise center in Rio de Janeiro, located near Petrobras, enabling Vallourec to work even more closely with the Brazilian national oil company on the requirements related to the development of the pre-salt fields. In 2014, Vallourec also increased the capacity of its R&D center in Belo Horizonte (state of Minas Gerais).
PETROBRAS

A historical player in the offshore industry well before the discovery of the pre-salt fields

Since its first offshore discovery in 1968, Petrobras has continuously developed this area, reaching ever greater depths (see the image below). The group produces most of its oil offshore, representing 1.8 million barrels per day out of a total of 2.1 million (average over 10 months in 2014). Still in the process of development 7 years after their discovery, the pre-salt fields represent production of more than 300,000 barrels per day since 2013.

Customized services

Beyond its VAM® licensee network which provides after-sales service, Vallourec do Brasil created storage facilities at various logistic centers belonging to Petrobras in order to perform "just in time" deliveries, reducing storage costs and sourcing deadlines for Petrobras.

The world leader in ultra-deep offshore

With ultra-deep offshore production of about 420,000 barrels per day, Petrobras is now the world leader in deep-water production.

Long-term collaboration between Vallourec and Petrobras

The cooperation between Vallourec do Brasil, a wholly-owned subsidiary of Vallourec, and Petrobras goes back to the very beginnings of Vallourec’s factory at Barreiro (Minas Gerais), built in 1952 to supply tubular products to the emerging national oil industry.

This historical relationship has led to close links and extensive cooperation between the two groups, resulting in a long-term supply contract and extensive services contracts.
Another example of a project in Brazil:

- **Xerelete with Total**

Operated by Total, the Xerelete field is located in the Campos Basin, about 250 km off the coast of Rio de Janeiro and 2,400 meters below sea level.

Vallourec Tubos do Brasil, a subsidiary of Vallourec in Brazil, was selected in October 2013 to supply premium tubes used in wells dedicated to exploration and evaluation of additional oil and gas resources.

As well as premium products, Vallourec Tubos do Brasil supplies several types of services, such as storage, inspection, preparation, and monitoring tubes in the process of installation, providing Total with greater security and faster execution.

**GULF OF MEXICO**

Vallourec supplies OCTG products (tubulars and connections) for a large number of projects located in the Gulf of Mexico.

This activity is supported in Houston by VAM® USA, a subsidiary of Vallourec, which offers a complete range of premium VAM® connections adapted to the requirements of the Gulf of Mexico. VAM® USA develops and tests the connections within its own Connection Technology Center, as well as offering complete technical services and on-site assistance.

*Source: Offshore-technology.com*
CLOV: a large range of premium offshore solutions

Operated by Total, CLOV is the fourth deep-water offshore development center located in Block 17 off Angola, after Girassol, Dalia and Pazflor.

Vallourec has equipped the 34 undersea wells with about 15,000 metric tons of **OCTG tubes fitted with premium VAM® connections**. Furthermore, two of the drilling platforms for the CLOV project use **drill pipes and connections** delivered by Vallourec. These are pipes dedicated to the most difficult drilling conditions, such as highly deviated, extended reach wells. Vallourec also delivered a total of 28,500 metric tons (representing 200 km) of **seamless subsea flowline without bends**, as well as 2,400 metric tons of seamless tubes for **risers**, which transport hydrocarbons to the FPSO.

The solutions supplied by Vallourec include a wide range of services, such as the application of about 150 km of **anti-corrosion coating** on the flowlines, and the supply of some 700 **bends curved** by induction. The production flowlines require the use of "pipe-in-pipe" technology to assure hydrocarbon flow. They were preassembled directly in Angola.

Serimax, the subsidiary of Vallourec specializing in flowline welding services for the oil and gas market, worked for 7 months with its Saturnax 09 welding equipment on board Seven Borealis, the flowline laying ship belonging to Subsea 7. Over 5,500 welds on the flowlines, including sections sensitive to corrosion and fatigue, were provided.

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3 FPSO: Floating Production Storage and Offloading Unit
KAOMBO: premium tubes and connections to equip the ultra-deep offshore Kaombo project

Located 150 km off the Angolan coasts, the Kaombo oil field is one of the largest oil projects operated by Total in this area. The Kaombo project comprises 59 wells drilled in varied and complex geologies requiring different types of wells.

A third of the wells require drilling through salt layers to reach the desired depth. The drilling conditions there are particularly difficult, with water depths of between 1,400 and 2,000 meters, and reservoirs located up to 5,000 meters below the sea bottom.

Vallourec will supply 27,000 metric tons of tubular solutions (OCTG) to equip the offshore oil wells, including VAM® 21 premium connections, VAM® SLIJII, and VAM® BOLT premium integral connections.

The casing and production tubes used will be manufactured and finished in France, Indonesia and Brazil. First production was finished in December 2014. The drilling operations, which will begin in the third quarter of 2015, should finish in 2021.

PROJECT TEN: premium solutions for undersea flowlines

Operated by Tullow Oil PLC, project TEN is located in very deep water off the Ghanaian coast. It is developed by a consortium consisting of Subsea 7 and Technip.

Vallourec was selected in May 2014 to supply Subsea 7 with a total of 15,000 metric tons of undersea seamless flowline tubes, coated against corrosion. Following the delivery of tubes intended for production flowlines (“pipe-in-pipe” system) and a gas export flowline, Serimax, a subsidiary of Vallourec, carried out double-joint welding operations.
West Africa, the other region of pre-salt fields
Discoveries of offshore pre-salt fields off West Africa

Cobalt
ENI

Located 130 km from the Nigerian coast at a depth of 1,750 meters, the Egina offshore oilfield is operated by Total Upstream Nigeria. It is in development and should be in production at the end of 2017.

Vallourec supplies premium undersea flowline tubes to Bell Oil & Gas, a Nigerian oil and gas company. Out of the 24,000 metric tons of tubes ordered for this offshore project, 16,000 metric tons will be used as undersea flowlines for production, water injection and the transport of gas. The remaining 8,000 metric tons will be supplied for the construction of a "pipe-in-pipe" riser.

Vallourec, which is participating in the Human Capacity Development Program (a Nigerian skill development program) is currently training young Nigerian engineers in pipe production and applications, thus complying with requirements for local content in the project.

The offshore pre-salt fields off West Africa are gradually revealing their potential through major discoveries, including Diaman 1, a deep water project discovered by Cobalt and operated by Total Gabon, and Nene Marine, a shallow water project discovered by ENI. Numerous drilling projects are currently in progress.
GREATER STELLA: integrated tubular solutions for the North Sea

The Greater Stella zone, exploited by Ithaca Energy, is located in the central part of the North Sea (block 30/06a), at 238 km south-east off Peterhead (United Kingdom) and 17 km from the median line between the United Kingdom and Norway. Buried at about 85 meters, Vallourec’s premium tubes are used for the oil and gas export flowlines.

The Group supplied premium seamless tubes, as well as coating and welding services. The 96 km of tubes for undersea flowlines were delivered at the beginning of 2013 to Technip, which is in charge of the engineering, the supply of equipment and the construction of the project (EPC*). To prevent corrosion and avoid the formation of paraffinic deposits, the tubes supplied by Vallourec are coated with three layers of polypropylene.

Serimax, a subsidiary of Vallourec and an international welding company, was selected to carry out the welding work on Technip’s assembly base at Evanton (United Kingdom). The contract specifies the welding of 62.6 km of 10 inch gas export flowlines and 33.5 km of 10 inch oil export flowlines.

MIDDLE EAST

VAM® 21 connections for the RED SEA

The Middle East region is well known for its production of onshore oil and gas, but it has an active offshore segment, from shallow waters to very deep water operations.

Given its recognized expertise in this field, Vallourec is particularly well-placed to participate in the exploration and development of new fields in the Red Sea and Arabian Gulf which have huge potential.

Since 2012, Vallourec has signed several orders for VAM® 21 connections in Saudi Arabia to equip offshore and deep-water offshore exploration wells located in the north part of the Red Sea, near the Gulf of Suez.

Thanks to its unique sealing and mechanical resistance properties, the VAM® 21 connection is clearly the best-adapted solution for the extreme conditions encountered when tapping complex deposits.

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*EPC: Engineering Procurement and Construction*
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**Vallourec Saudi Arabia: the importance of local finishing**

Dedicated to heat treatment and threading for the entire range of VAM® premium connections, the Vallourec Saudi Arabia finishing plant located at Dammam was qualified in early 2015.

The tubes intended for Saudi Aramco are manufactured in several of Vallourec’s rolling mills, then sent to Saudi Arabia, either in the form of finished products or in the form of shells. These are then heat-treated and threaded on-site, giving Vallourec a locally produced competitive advantage.

In the region, Vallourec has drilling production centers at Jebel Ali and Abu Dhabi as well as an Internal Plastic Coating (IPC) center in Abu Dhabi.

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**SOUTH-EAST ASIA**

- **INDONESIA**

**PRELUDE: process tubes for the first Liquefied Natural Gas floating unit**

Shell will launch the first LNG floating platform, known as “Prelude”, over a gas deposit located 200 km off the Australian coast and south-east of Indonesia, where it will remain for 25 years, the entire period of deployment. This offshore facility, the surface area of which is greater than four football fields, will open access to new and complex gas deposits.

The FLNG (Floating Liquefied Natural Gas) technology is revolutionary allowing offshore operations near gas deposits, suppressing the need for pipes to transport the product or installing treatment facilities for production on land. Shell’s floating LNG structure will be able to liquefy the gas directly on board, store it and transport it throughout the whole world.

At the end of 2012, Vallourec supplied Samsung Heavy Industries with 1,000 metric tons of process tubes in steel alloy and carbon steel used for surface installations and for the hull of the floating LNG platform.
BRUNEI

ML SOUTH: a 100 million dollar contract to supply premium tubes and VAM® 21 connections

Operated by Total E&P Borneo, a subsidiary of the Total group, the offshore project ML-South, with large reserves of gas and condensates, is located in Block B off Brunei, about 65 meters below sea level. It is an extension of the Maharaja Lela/Jamalulalam field already in operation.

The development well will produce at a depth greater than 5,000 meters, in a highly corrosive environment, with particularly high levels of pressure and temperature (HP/HT).

Vallourec will equip the wells with premium tubes, most of which are composed of highly alloyed grades of steel, resistant to corrosion, and are threaded with the latest premium VAM® 21 connections. The casing and production pipe will be manufactured in Vallourec's European and Indonesian mills. The tubes will be delivered to Total E&P Borneo for the drilling operations, which are planned to begin during the second half of 2015.
Vallourec, a complete range of offshore products and services

**VALLOUREC OFFER FOR OFFSHORE APPLICATIONS**

**Products**
- OCTG (tubing, casing and connections)
- Drilling tools (drill pipes, well bottom tools and accessories)
- Line pipe (risers and flowlines)
- Accessories (Completion equipment mechanical tubes, well screens, etc.)
- Umbilicals
- Tubes for FPSO and other platforms (flowlines and structures)

**Services**
- VAM® Field Services Offshore
- Welding (Serimax)
A VERY WIDE RANGE OF OFFSHORE SOLUTIONS

OCTG (TUBES AND CONNECTIONS)

Valourec produces and markets OCTG to equip offshore oil and gas wells: casing, production tubing, and accessories.

All of these products, made from seamless hot-rolled tubes, are fitted with API/Buttress threaded connections or, more likely, premium connections from the VAM® family. Premium connections guarantee customers tubular system reliability, and therefore meet their requirements with regards to safety, the environment, and performance.

VAM® 21: a connection as strong as the tube

This connection has been validated using ISO13679 FDIS-2011 CAL-IV, the most recent technical specification required by oil companies for the most critical applications, especially offshore. The VAM® 21 connection withstands extremely high temperatures and pressures, and resists the greatest axial loads. It is currently the only connection in the world that is qualified according to the new 2011 standards, and is capable of offering sealing and mechanical performance equivalent to that of the tube over a wide range of sizes.

This coupled solution is perfectly suited to the most extreme environments, such as HP/HT (High Pressure/High Temperature) deposits, highly deviated wells, or when drilling-with-casing. Furthermore, the VAM® 21 facilitates self-alignment of the tubes, ensuring secure and rapid make up on the rig. It can be used with the Cleanwell® Dry coating, which preserves the environment while allowing dope-free tube connection.

VAM® 21 threading can be carried out in most of the Group’s threading units around the world and maintenance is provided by the many VAM® licensees based in over 50 countries.
CLEANWELL®, THE FAMILY OF GREASE-FREE COATING PRODUCTS FOR THE DIFFICULT CONDITIONS OF THE NORTH SEA

There is strong demand for products that are environmentally-friendly and facilitate the installation of tubes, particularly in the North Sea.

Cleanwell Dry®, the latest edition to the Cleanwell® family, is a lubricant ('dry' coating) developed for threaded connections which avoids the use of dope and effectively protects tubes against galling and corrosion, including under extreme low temperature conditions.

VAM® RISER FOR DEEP-WATER APPLICATIONS

Vallourec is the leader in the market for threaded and coupled connections used for riser applications. The threaded tubes that link top-side wellhead systems to the sub-sea wellheads have to withstand exceptional levels of fatigue, therefore cutting-edge technology and specific approval tests were developed. Several projects are currently taking place in Brazil, Australia, the Gulf of Mexico and Indonesia.

VAM® TTR:

VAM® TTR™ is a threaded and coupled connection for risers that provide very high resistance to the fatigue generated by ocean currents.

This connection has been successfully used in several projects over the last ten years and constitutes the industry standard for "high fatigue resistance" applications.
DRILLING PRODUCTS

The Group offers a complete range of products for drilling applications:

- a range of connections providing torque, tension and hydraulic performance adapted to a wide variety of drilling programs
- a wide range of steel grades and wall thicknesses for handling the stresses encountered during drilling operations
- steel grades dedicated to drilling in an H2S environment
- products for specific offshore applications and, in particular, a range of Landing Strings, for installing undersea equipment or casing. In particular, the CrushFree™ landing string enables work at very great depths of water. However, other more conventional products are adapted to shallow water.
- Work-over riser systems, for carrying out maintenance operations on mature wells or installing casing.

In addition to its portfolio of products, Vallourec Drilling is developing tube maintenance and inspection services for customers in the North Sea, to extend the life of these remedial well operation tools.

LINE PIPES (RISERS AND FLOWLINES)

For the specific undersea construction market (or SURF for Subsea Umbilicals Risers & Flowlines), Vallourec supplies risers and flowlines which transport hydrocarbons from the wellhead to the surface, then route them to the processing units.

To cope with the technical and economic issues associated with offshore projects, particularly those in deep water, Vallourec offers solutions adapted to the specific conditions of each project. With the support of its R&D centers, for tubes and welding, but also in cooperation with its customers, Vallourec provides technological solutions to severe technical constraints such as resistance to fatigue, high pressure, high temperatures and corrosion.

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5 Riser: pipe connecting the surface platform to the flowlines which are on the seabed. / Flowline: pipe laid on the seabed for transporting hydrocarbons (oil and gas) and water injected into the reservoirs.
Integrated offers covering tubular requirements for "SURF" applications, take into account the specific characteristics of each project to reduce risks and execution costs, and creating value for the customer.

This is executed by offering an integrated set of products and services. Tubes for flowlines are produced according to required specifications, interior and exterior coatings are applied to ensure proper fluid circulation and pipe protection, and welding tubes for specific equipment and installation at sea by its subsidiary Serimax, supported by an organization dedicated to project management, allows Vallourec to develop innovative solutions for current and future projects.

UMBILICALS

Umbilicals are complex control lines dedicated to transporting fluids, supplying power and transmitting information. They consist of small-diameter tubes, cables and optical fibers connecting equipment installed on the seabed to their control stations on the surface.

Vallourec has a competitive premium range of products for this market. The know-how acquired by the Group through its subsidiary, Vallourec Heat Exchanger Tubes, in the production of long welded tubes has enabled the Group to reduce the number of orbital welding points for these small diameter hydraulic tubes.. The umbilicals assembled with Vallourec tubes are lighter and provide greater resistance to fatigue, which is substantial in a sub-sea environment...

TUBES FOR FPSO AND OTHER PLATFORMS (FLOWLINES AND STRUCTURES)

The Group's products are also intended for hydrocarbon processing facilities located downstream of the energy value delivery chain. In particular, Vallourec's tubes and fittings are part of the processing units on FPSO, FLNG and floating production platforms.
A RANGE OF SERVICES DEDICATED TO THE OFFSHORE INDUSTRY

VAM® Field Service Offshore is a range of on-site services specifically dedicated to the offshore industry. It is a service provided by Field Service inspectors on the rig, with teams overseeing the correct installation and trouble-free running of the tubular systems.

This service is part of a complete range of innovative solutions known as “Vallourec Global Solutions”, designed to meet its customers’ most advanced requirements throughout their projects.

Developed for the oil and gas sector, and particularly for the offshore industry, this combines a set of products and services that provide tailor-made solutions specific to each requirement of oil companies, from pipe and connections manufacturing to their installation in the wells.

OFFSHORE WELDING: SERIMAX

For offshore subsea flowline projects, coordinated coating and welding services (pre-assembly) are now available in addition to the supply of tubes, thanks to the expertise and know-how of Serimax. A wholly-owned subsidiary of Vallourec, Serimax develops new technologies and solutions that widen the Group’s range of services for customers.

Saturnax 09 is the latest welding device developed by Serimax. A versatile system, it can manage all sorts of welding techniques.

The other essential characteristic of this new system is its flexibility relative to the shape and position of the weld at the pipe to pipe intersection. It can weld any type of edge and join two elements in any position, providing considerable time savings.

Key figures:
- 40 projects ongoing
- 1,000 employees
- 50 R&D technicians and engineers
- Offshore: 80% of consolidated revenue
Valloirec at a Glance

The A (or “the”) leading supplier of premium tubular solutions for the energy markets (oil and gas, power generation), Vallourec also provides its expertise to the industrial sector.

With more than 23,000 employees, consolidated revenue of €5.7 billion in 2014, 81% of which is generated outside Europe, integrated production units, advanced R&D and a presence in more than 20 countries, Vallourec offers global innovative solutions adapted to the energy challenges of the 21st century.

Specialized in the most complex applications, Vallourec relies on its six research and development centers throughout the world and more than 500 engineers and technicians to maintain its technological leadership and meet industries changing demands. Our control of the entire chain, from steel production to finishing to installation, is a guarantee of the excellence and reliability of its products.

For the oil and gas market, the Group designs and develops a complete line of products including seamless tubes and premium connections (OCTG) intended for drilling and production operations, and , and line pipes for subsea gathering systems. These products equip wells in the most extreme conditions high-pressure, high-temperature or corrosive environments, highly deviated wells, and deep-water offshore.

In the electrical power generation market, Vallourec offers a range of premium tubes that resist the highest temperatures and pressures, allowing electrical operators to meet the challenges of energy efficiency and control of CO₂ emissions from power stations.

Valloirec also provides a wide range of tubes for petrochemical facilities (refineries), and tubular products intended for mechanical applications (hydraulic jacks, machine tools, etc.), the automobile industry and construction (stadiums and other complex structures and buildings) and for other industries.

To support the growth in energy markets, Vallourec is pursuing a far-reaching local development strategy with new locations in Brazil, the USA, the Middle-East and China, in order to bring solutions closer to its customers and improve its competitiveness.