The future of the oil and gas recovery involves accessing increasingly complex reserves. It involves cost-efficient subsea processing developments, especially for long step-outs marginal and dispersed fields frequently located in deep and ultradeep waters. And it involves advanced supporting power supply and distribution technology.

That’s where Siemens comes in. As the technology leader for land-based power generation, transmission, distribution, drives and automation, we supply complete in-field subsea distribution systems, including the solution experience, expertise and capabilities for configuring complex power transmission to multiple consumers.

Our subsea products and systems portfolio covers a broad spectrum of applications. Going far beyond power and distribution, it comprises of everything from pioneering technologies for subsea control and surveillance to exemplary service and support based on extensive marinization expertise. As a result, we are able to provide answers over the entire life of the field.

Enhancing oil and gas recovery in challenging environments
Dear Reader,

Since the very beginning of the oil adventure in Norway in 1969, Siemens has delivered reliable technological innovations for projects on the Norwegian Continental Shelf. Throughout these last 45 years, the entire industry has had to face many obstacles, from the need to access increasingly complex reserves into ultra-deep waters to building up the highest standards protecting our health, safety, and environment.

The softening oil price in our industry is our current challenge, where ‘efficiency’ and ‘cost cutting’ are the new buzzwords. Siemens Subsea and our R&D activities will generate solutions that will reduce development costs for our customers.

The underlying philosophy behind all development activities is to provide our customers with the best possible products, service and value for money, just as we have done since the very beginning.

If you are visiting UTC in Bergen this year, why not come along to the Siemens Subsea Booth Booth #2 where you can meet our key experts in hydraulics, electrical and fiber optic components and learn all about our exciting plans for the Siemens Subsea Power Grid, along with our exciting new technological developments in R&D.

Are Dahl
CEO Siemens Subsea

Siemens Subsea portfolio

Siemens Subsea systems - Enabling large-scale subsea processing

Dependable power supply and distribution is vital for subsea production facilities. Siemens has the know-how and ability to configure complex power transmissions to multiple subsea functions. We offer a sizeable assortment of specialized systems for reliably supplying electricity to numerous consumers across the seabed and downhole ESP’s from an onshore power plant or platform.

As operators are faced with ever stricter health, safety, security, and environmental (HSSE) guidelines, control and surveillance play an increasingly important role for subsea oil and gas processing. Reliably monitoring well performance is crucial for ensuring maximum availability and oil recovery - as well as for cost savings, maintenance reduction and system life extension.

Siemens has a variety of subsea systems and solutions for condition, performance and environmental monitoring as well as operation control and communication - even direct electrical heating (DEH) systems designed to prevent hydrate formation in pipelines.

With our long-standing expertise in power, distribution and control technology, we are able to provide customers with smart systems specifically tailored to their subsea applications and demands. We can assist you with everything from the studies, design, procurement, and assembly to the testing and installation.

With the Siemens Subsea Power Grid, a supply and distribution system, we combine our high R&D focus and broad subsea power concept experience with our extensive marization experience.

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Siemens Subsea products
Extending your recovery scope
Siemens offers subsea products for customized solutions with a portfolio of market-leading reliability. Our DigiTRON, SpecTRON, and ElecTRON products provide electrical and fiber-optic connector systems for subsea power and communications. Our sensors, in particular, the wellhead pressure sensors (WEPS), pressure temperature sensors (PT) and differential pressure (DP) transducers, are renowned for delivering optimum performance and reliability. The Siemens subsea distribution offering also includes high-performance solutions.

Siemens Subsea Connectors
Our portfolio of products includes the Tronic line of DigiTRON, SpecTRON, FoeTRON and ElecTRON connectors, providing electrical and fiber-optic connector systems for subsea power and communication. We have been the world leader in the subsea connector market for over 30 years and the name to trust for reliability. To date, approximately 150,000 connectors have been in service on over 500 projects worldwide.

Siemens Subsea Sensors
Our sensors have been delivering excellent performance with a high level of dependability for over 25 years. As well as our renowned wellhead pressure temperature sensors and differential pressure sensors, we also offer a range of proven and tested instrument for monitoring the conditions of subsea operations.

Siemens Subsea Distribution Systems
With a solution line up that comprises subsea termination heads, hydraulic, fiber optical and electrical distribution systems, we have the capabilities needed for safe and reliable subsea power and signal distribution. Our Anguila product portfolio, consisting of jumpers, cable terminations and cobra heads – enable termination of hydraulic, fiber optical and electrical umbilical’s to various subsea structures.
World 1st in 45kV connectivity
The SpecTRON 45 Product Development

Siemens Subsea in UK is developing a ‘world first’ range of HV wet mateable connectors, the SpecTRON 45 (26/45(52)kV), in full compliance with the latest industry specification (SEPS SP-1001).

The project commenced with concept design in 2012, with detailed design currently in progress and parts being procured to start an onerous qualification test program later this year. A new state-of-the-art world-class qualification and production facility with new pressure vessels, HV test bays and bespoke test arrangements has been custom built, close to the Subsea Excellence Centre in Ulverston, UK. This new facility will ensure we continue to deliver high standards of quality to our customers.

The new SpecTRON 45 represents a step change in connector technology by offering highly innovative features to enhance performance and reliability. Designed as a modular system it will SpecTRON 45 is an enabler for the Siemens Subsea Power Grid (SPG), providing connection between subsea modules, Transformer, Subsea Switch Unit (SSU) and Variable Speed Drives (VSD), allowing flexibility of system configuration and ease of site termination.
Centres of excellence
Ensuring quality every time

From Ulverston in the UK to Trondheim in Norway, here at Siemens Subsea we are manufacturing and designing some of the leading subsea connectors and sensors in the world.

The reliability of our Subsea portfolio of products is exceptional, and trusted by our customers worldwide. Our products are manufactured and tested in the most advanced R&D facilities in the world. Our state-of-the-art testing and implementation of the strictest HSE procedures (zero harm), lie at the core of our quality and reliability.

At our Subsea Excellence Centre, Ulverston, UK, our in-house laboratory conducts ongoing rigorous material research, focused on cutting edge material science.

Our test and qualification programme is extensive. As an example, we use a fourier transforming infrared spectrometer which allows us to analyze and assess the quality of materials right down to the molecular level, enabling us to identify and assess quality and performance. In addition helping us understand why certain materials perform so well.

All our components go through a critical component testing programme, before detailed design commences which enables us to develop our products and de-risks subsequent qualification programme. On site we have a range of unique bespoke development test equipment which includes our test cages, up to 200 kV, thermal cycling testing facility, an environmental chamber and our numerous pressure vessels – up to 2,000 bar, with HV facility, all of which ensures the reliability of our products is unparalleled.

In Kongsberg, our manufacturing capabilities cover three disciplines (electrical, optical and hydraulics), including an electrical test lab (ESS-test, environmental room, PMI, temperature and hyperbaric test chambers).

We manufacture and test our hydraulic distribution systems (hydraulic flying lead, hydraulic and compensating solutions, chemical injection units, accumulator modules and general mechanical assemblies). Our automated hydraulic hose bundling machine provides perfect HFL assembly every time.

Our centre of competence in Bomlo is a one stop shop, where we have the capability to design electronics, develop software, calibrate sensors and hermetically seal assemblies with our EB welding capabilities to deliver world class subsea sensors.

The technology centre in Trondheim covers an area of 100,000 square feet and is home to the research, development and manufacture of the Subsea Power Grid – an innovative engineering development of medium voltage power supply and distribution installed on the seabed.

Our long standing expertise in power, distribution and control technology, enables us to provide customers with smart systems, specifically tailored to the subsea applications and demands. We can assist with everything from the conceptual studies, design, procurement and assembly to testing and installation. We continually strive to advance subsea technology and it is our meticulous design, manufacturing, testing and assembling that result in products and systems of the highest quality and reliability. This together with our history is why we are market leaders in subsea connectors and sensors.
Siemens Subsea Sensors, monitoring operational conditions for the past 25 years

Siemens Subsea Sensors is dedicated to the development of innovations that result in manufacturing the most reliable products in the subsea market.

“We invite you to come to our Bømlo facility to see our innovative products, meet our team behind the innovations, and learn how we can serve and support your projects” says Tore Geitung, Head of Siemens Subsea Sensors.

Trusted partners: The new Single-phase flow meter solution

By combining our subsea dP transmitter with V-cone or Venturi technologies, we provide accurate and reliable single-phase flow measurement solutions. The single-phase flow meter solution by Siemens Subsea

- calculates flow rates
- measures line pressure
- measure process temperature

For more information, contact Kjetil Haldorsen kjetil.haldorsen@siemens.com

Siemens Subsea Sensors has an impressive record of providing solutions to meet customers’ ever-growing technological challenges.
Good as new: After 17 years, Siemens Subsea Pressure and Temperature Sensors are ready to be reinstalled

Nothing illustrates the proven reliability of our sensors like real projects, where results surpass even our greatest expectations. That is exactly what happened in 2012 when our team in Bømlo received 150 WEPS-2 sensors for status testing, after having been in operation since 1994 in the North Sea.

Typically, the industry standard for recognizing a subsea sensor’s effectiveness is conducted by measuring two criteria; the long term drift and leakage detection. The long term drift in sensors is a gradual degradation of the sensors and other components that can make the readings offset from the original calibrated state and it is usually assumed that all pressure sensors will be susceptible to drift over time.

For leakage detection, there should simply be no leakage because the sealing ring groove should sustain the toughest environments even over a long period of time.

The results of the tests revealed that the sensors were still within the margin of the criteria set in the original Factory Acceptance Test (FAT). Over the years, the drift for these sensors after being in operation for 17 years was proven to be zero. Furthermore, the state of the material and sealing ring groove revealed that there was no leakage whatsoever.

“These tests show exactly how our sensors are able to endure high pressure for decades and that we are a reliable supplier” says Kjetil Haldorsen, project manager in Siemens Subsea Sensors when the original sensors were installed. He adds: "While we strive for innovative breakthroughs, these tests illustrate that our sensors have maintained state-of-the-art quality, and reliability right from the very first batch. Our subsea sensors have withstood the test of time and our goal is to assist our customers by continuing to build on this quality for our customers in the subsea market.”

The WEPS-2 subsea sensors have since been reinstalled on the seabed, enabling another 17 years of maintenance-free operation. «

And the evidence is here: All sensors were well within the original FAT criteria, meaning zero drift

The criteria for long term drift is: +/- 0.02% FS / year. The sensor (full scale or FS) is 400 Bar.

In engineering units (Bar), the allowable drift over 19 years could potentially be 400 Bar * 0.02% * 19 = 1.52 Bar at most. The criteria for the sensor at the time of FAT was 400 Bar * 0.025% FS = 0.100 Bar. The ideal result would be a sensor with zero drift, i.e. within 0.100 Bar.
Siemens Subsea is proud to announce the launch of the first Subsea Hydraulic Power Unit (SHPU) developed in cooperation with Statoil.

The purpose of the SHPU is to supply low pressure (LP) and high pressure (HP) fluid to the subsea control module (SCM) on the Xmas tree to control the hydraulically-operated valves on the tree and the down hole safety valve (DHSV).

This unit will be used for cost-effective repair of hydraulic transmission and distribution systems on brownfields and as a building block in greenfield hydraulic infrastructure developments.

The SHPU takes auxiliary electrical power from existing infrastructure at the well site, and then supplies hydraulic power required for operation of the well valves. Operated in this way, the hydraulic system can achieve faster response and less energy consumption.

Espen Bostadløkken, Head of Global Sales Siemens Subsea Systems says that “the SHPU is an important building block in the industry-wide vision for a subsea factory where the process plant is placed on the seabed. The most significant advantage will be to replace the hydraulic power transmission lines with local subsea hydraulic power generations and storage.”

“The SHPU illustrates the capabilities at Siemens to bring our electrical and hydraulic system expertise subsea.”

Espen Bostadløkken, Head of Global Sales, Siemens Subsea Systems, Oslo

The SHPU having successfully passed hyperbaric testing in November 2014

Key highlights
• Save umbilical cost in long step-outs including deep waters
• Remove hydraulic friction losses in the umbilical
• Reduce topside size and weight (remove topside HPU)
• Significant reduction in fluid volumes and discharge to the environment

Technical Features
• Supply voltage 24 V DC
• Minimum power 20 W
• LP Pressure 207 bar
• HP Pressure 345 bar
• Design Life 20 years
• Design depth 500 metres
Siemens is currently delivering customized DEH power supply systems for ten subsea flow lines to BP Exploration Limited, with an option for two additional systems.

Upon completion this will be the largest subsea pipeline heating power system ever delivered. It is to be deployed on the BP-operated Shah Deniz gas field in the Azerbaijan sector of the Caspian Sea, with delivery scheduled in 2015. The respective modules of the systems contain power components as well as a unique control and protection system for the topside equipment and subsea DEH cables. They will provide power for the heating of pipelines when required by the operations and will be installed on the platform deck.

The order includes full-load testing of the containerized systems that simulates real-life conditions to verify the integrity and full functionality of the system before shipment to Azerbaijan. This is key in order to ensure the reliability and availability required for this type of critical equipment.

Siemens Subsea solutions for direct electrical heating will prevent hydrates formation during planned and unplanned process shutdown in pipelines. Cross section view of DEH interior (right).
Global reach, local focus

A growing international team of experts committed to serving each customer

Siemens Subsea LCM is continually increasing its presence in major oil and gas locations all over the world

EPC’s are facing growing pressures to increase competitiveness, improve services and decrease unnecessary costs. Driving down costs are essential factors. Siemens Subsea LCM is providing support locally to help our clients save time, which means saving money.

With a team of over 100 employees on five continents, Siemens Subsea Lifecycle Management (LCM) continues to expand its offering to customers offering a large scope of activities locally.

LCM services and support consists of installation, commissioning and decommissioning, assembly and testing of EFL’s, ACT’s seismic cables, refurbishing and upgrades, pressure testing, engineering and customer support, training and spare part storage.

“Siemens Subsea LCM operates on a ‘round-the-clock’ basis, based on customer demand. Our approachable, experienced and certified personnel have the knowledge and commitment to serve our customers. We are a growing team and Siemens Subsea LCM offers the customer the best possible delivery of service, quality and value to our Subsea portfolio. This is realized by setting the highest standards in service, excellence, reliability, and safety for our industry.” says Helge Kjøstvedt, Head of Siemens Subsea Lifecycle Management.

“Siemens Subsea LCM offers our customers the best possible delivery of service, quality and value to our Subsea portfolio.”

Helge Kjøstvedt, Head of Siemens Subsea Lifecycle Management.
On-site aftermarket services sites in all major oil and gas hubs worldwide

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New Lifecycle Management site at the heart of the brownfield sector in Norway

In October last year, Siemens Subsea proudly opened a completely new Lifecycle Management (LCM) site at the Coast Center Base (CCB) in Ågotnes, near Bergen, Norway. The 200m² site provides aftermarket services for mounting and dismounting of equipment, CR / IR testing, inspection and repair, all on one site within meters of our main customers. Some of the work can also be done in-house at customers location. The Siemens site is also equipped with a hyperbaric tank with pressure up to 130bar. LCM offerings will be services and knowledge with regards to incoming inspections, pressure vessel services, status checks, and preventative maintenance.

Our presence in Ågotnes illustrates our understanding of the challenges that lie ahead of our customers. The LCM office is located within meters of our key customers, so can we assist you quickly and efficiently. Our investment demonstrates that Siemens Subsea

Tor Anton Grotterud, Head of Siemens Subsea LCM Norway says, “Our goal at Siemens Subsea LCM is to ensure that customer receive the attention and service level you would require from a preferred supplier.”

Siemens Subsea presents innovative products at tradeshows and events worldwide

Offshore Europe is a Bi-annual event that attracts over 50,000 participants with over 1,500 exhibiting companies from over 100 nations. This world-class event will take place this year in Aberdeen, Scotland, from September 8-11, 2015.

Siemens Subsea are proud to present a technical paper, with a focus on the Subsea Hydraulic Power Unit. ‘Avoiding Costly Umbilical Repairs through Utilization of a Subsea Hydraulic Power Unit’.

At OTC Brazil, Siemens Subsea will present, ‘Integrated power solution for enabling large-scale Subsea Processing’, about the Subsea Power Grid.

We look forward to welcoming you to Booth#2 at UTC, Bergen 17/18 June 2015.

We hope to see you again at upcoming events.