Subsea Services
Providing the full scope of services, from installation to abandonment
Global Reach, Life-of-Field Focus

Throughout the entire life cycle of a subsea field, from first discovery to abandonment, OneSubsea offers a full range of services to help you optimize production and enhance the profit potential of your offshore assets. We combine a global footprint; a pool of seasoned industry experts; rental equipment tailored to meet all installation, commissioning, and workover requirements; and real-time operational monitoring and technical support to boost the performance of subsea fields by making them more productive, safer, and cost-effective.
Installation and Commissioning—Providing a Seamless and Efficient Path to First Production

With decades of global experience in virtually every offshore environment, we take a field-proven approach to delivering scalable and comprehensive installation and commissioning services. These services leverage our world-class customer support and field service, as well as a continually expanding scope of rental tools and equipment to get you to first production as quickly and efficiently as possible. Throughout this process, we conduct our work in order to meet all applicable health, safety, and environmental (HSE) standards.
A commitment to efficiency, onshore and offshore

Our roles and responsibilities for the installation and commissioning of subsea production equipment and processing systems begin at the shipyard and do not end until the equipment is onstream. From there, our life-of-field experts can take over to help your equipment run as effectively and efficiently as possible. This approach enables OneSubsea to collaborate with clients long after the equipment is installed on the seafloor.

**ONSHORE**, our support crews coordinate logistics and mobilization—a vital first step toward driving operational excellence in installation campaigns. Onshore services include:

- **Project management**—to help ensure that all necessary subsea equipment and related installation tools are designed to project specifications and are ready for deployment, where and when they are needed.
  - Operations supervision and engineering
  - Preinstall action inspection and maintenance operations
  - Equipment and personnel logistics management
  - Management of spare parts
  - Customized reporting
  - Training, technical, and operational support
- **Mobilization activities**—provide assurances that all equipment is properly placed and secured on the installation vessel prior to leaving the dock.
  - Ensuring equipment readiness
  - Pre-shipment checks
  - Transportation support
  - Lift planning and job hazard analysis (JHA)

So that equipment mobilization runs as smoothly and safely as possible, OneSubsea advocates early engagement with the installation contractor. We foster a seamless handover to the installation vessel crews by providing:

- **Safety management systems**
  - Control of work
  - Permit systems
  - Standardized job risk assessments (JRAs)
- **Equipment hook-up and utilities**
  - Tooling hydraulic power unit (HPU)
  - Controls for the HPU and umbilical (in readiness for an in-situ test system)
  - Workshop container
- **Proper interfaces**
  - Familiarizing the ROV crew with the installation equipment
  - Developing the optimal processes for ROV basket loading and sequencing
  - Subsea tree sea-fastenings (in case of transit on wire)
- **Efficient tool storage and access**
  - Working with the vessel crews to develop suitable tooling test and staging areas

**OFFSHORE** installation and commissioning services focus on ensuring that subsea equipment is deployed and hooked up as safely and seamlessly as possible. Our global field operations teams provide a range of operational support, including:

- **Field services**—pre-deployment testing, equipment installation, subsea commissioning, and reporting.
- **Training and competency development**—training programs for field crews on product designs and installation procedures, plus regular audits to ensure crew competency meets company criteria and regulatory requirements.
- **Rental tooling**—providing tools for installation and workovers, maintaining operational readiness, repairing, and testing tools.
Maximizing recovery with a range of resources

Our portfolio of life-of-field services are organized in three distinct but integrated offerings: surveillance and monitoring, subsea intervention, and subsea sampling.

Surveillance and monitoring

Because you cannot properly maintain what you cannot monitor, OneSubsea offers a full suite of surveillance and monitoring services that allows you to continuously assess the working order of your subsea equipment. Such ongoing monitoring allows problems to be addressed early, before they become significant, more complicated, and costly intervention challenges.

For example, OneSubsea offers the riser annulus condition system (RACS) technology, which was developed in collaboration with a major oil company to monitor the working condition of a subsea annulus. The system continuously measures the level of water in the flexible riser annulus and looks for changes in the amount of gas migrating up the pressure sheath. A failure in the sheath potentially could lead to a hazardous event. To help prevent such an event, continuous monitoring and trend analysis allows the system to provide advanced warning of armor wire fatigue acceleration or accidental sheath breach, giving operators time to address and resolve the issue.

Distributed temperature sensing

For detecting the presence of leaks and measuring flow assurance, OneSubsea provides distributed temperature sensing (DTS) systems that deliver high-resolution distributed temperature profiles along the entire length of the riser and flowline. Such information is used to:

- Improve the effectiveness of flow assurance systems
- Warn of hydrate formation
- Help to optimize the quantity of chemical inhibitors
- Improve production system uptime
- Reduce active heating cycles

Other applications include leak detection, temperature profiling in power cables, and distributed strain measurements for integrity monitoring.

An optical fiber serves as the DTS element and data transmission medium, and can be installed in small conduits after pipeline commissioning. Using a single optical fiber may eliminate the need for low-reliability optical connectors. This fiber can be replaced and upgraded almost at any time to help ensure the availability of data throughout the life of the asset.
The FRIEND remote surveillance and diagnostic system
Condition monitoring based on real-time data is an integral part of the operational support that OneSubsea provides for all of our products and systems. The FRIEND* Remote Surveillance and Diagnostic System provides real-time condition monitoring that enables a 24/7 proactive support designed to optimize performance and increase availability, thereby:

- Ensuring operational best practice
- Extending the lifespan of equipment
- Safeguarding equipment uptime while minimizing unplanned interventions
- Partnering with clients to provide early detection of potential operational issues
- Reducing operational costs

The FRIEND system has been in operation since 2006 and is the industry-leading real-time surveillance and monitoring system for entire subsea production and processing systems. Our monitoring portfolio includes pumps and subsea processing systems, subsea trees and production systems, multiphase meters, and swivel and marine systems.

The FRIEND system service levels

**Control system**
- Product protection
- Product operation control

**Surveillance**
- Product surveillance
- Best practice — operations
- Proactive 24/7 support
- Equipment availability
- Collaboration environment

**Optimization**
- Well, network, and asset optimization
- Reservoir focus
- System integration
- AVOCET* production operations software platform

**Production analysis**
- Production performance
- Well inflow focus
- Data integration/analysis/modeling
- Flow assurance — system centric
- OLGA* dynamic multiphase flow simulator

**Condition-based maintenance**
- Equipment integrity monitoring
- Equipment performance metrics and predictive analysis
- Flow assurance — product centric
- Production system surveillance
Subsea Well Intervention—
Enhancing Production While Minimizing Downtime

We realize the vital importance of keeping production flowing freely, without interruption. Our suite of subsea well intervention offerings aims to deliver on this goal, with subsea well access and control systems that enable intervention services to be performed in a minimally invasive and cost-effective manner.

Workover risers
OneSubsea provides the complete workover riser system, including the installation workover control system (IWOCS), riser, emergency disconnect package (EDP), and the lower riser package (LRP). We have delivered numerous dual-bore and monobore completion workover riser systems worldwide. We also have provided systems in both 10,000 psi and 15,000 psi pressure ratings for shallow-water interventions in the North Sea and deepwater interventions offshore Africa and Brazil.

Subsea sampling
As fluid properties change over the producing life of the field, operators continue to look for more practical and cost-effective alternatives to downhole and surface sampling methods. OneSubsea offers a suite of subsea sampling services that provides high-quality multiphase fluid samples for full recombination and equation of state modeling.

Our sampling systems possess several features that make subsea sampling safe and efficient, including:
- Pump-driven (isobaric) sampling
- Phase detection and phase enrichment
- Three-phase (oil, water, and gas) representative sampling
- Remotely controlled systems
- Transportable and pressure-compensated sample receptacles
- Easy and flexible integration into a variety of subsea hardware
- Compatibility with work-class ROVs
- Flexibility for different sampling applications

Our sampling services cover the entire spectrum of fluid sampling and analysis, from collecting samples at the seafloor to reporting the final results. OneSubsea maintains a complete chain of custody throughout each sample’s journey, with proper controls and procedures in place to maintain the sample’s integrity.
MARS System—
Multiple Application Reinjection System

A cornerstone of our intervention services is the patented MARS* multiple application reinjection system, an insert installed in the subsea tree choke body that enables the addition of production-boosting technologies without the need to modify the tree. The insert effectively replaces a conventional production choke and allows access to process flow through the tree, while keeping existing well barriers in place.

The MARS system includes a suite of specially designed inserts that perform specific intervention functions, and are available in two main configurations:

**Concentric dual bore for process integration**
- Subsea pumping and boosting technology
- Pressure sensor solutions for subsea trees
- Subsea metering solutions for greenfield, brownfield, and manifolds
- Solids handling technologies

**Single bore for fluid interventions**
- Scale squeeze/chemical injection applications
- Well kill equipment for emergency control and containment of the well
- Well abandonment operations for pumping cement during well plugging

The MARS system has been deployed successfully on more than 120 wells as of July 2015 for offshore operators around the globe. Its impressive track record, coupled with the growing industry need for lower cost and less complex intervention solutions, promises to extend its application in the coming years.
Asset Management—Equipment Management
Services to Maximize Returns and Minimize Risks

OneSubsea offers comprehensive asset management services with an aim that each piece of subsea equipment is maintained so that it can run at its optimal condition throughout its operating life. We are dedicated to helping customers maximize returns while enabling and supporting safe operations and environmental compliance.

**Asset management solutions include:**
- Equipment upgrades and refurbishment
- Inventory management
- Obsolescence management
- Planned preventative maintenance (PPM)
- Preservation and storage
- Spare parts management
- Workover programs

**Full-time equipment safety and reliability with planned preventative maintenance**

A foundation of our asset management services is our PPM program. The program consists of comprehensive engineering procedures that target regular maintenance and testing of equipment at predetermined intervals and during pre- and post-mobilization.

Depending on your particular requirements, the PPM program can include, but is not limited to:
- Function and pressure testing
- Flushing
- Complete disassembly and dimensional inspections
- Corrosion inhibitor maintenance
- Proper storage—inside, outside, or climate controlled
Facilities for a global asset management footprint
OneSubsea maintains operational facilities worldwide to support the asset management needs of our global customer base. Each facility is tailored to the asset management requirements of the region it serves.

We have a state-of-the-art asset management facility in Horsøy, Norway, which expands our service offering for the maintenance of processing systems worldwide.

The facility's capabilities include:
- Research and development
- Qualification
- Factory acceptance testing (FAT)
- System integration tests (SITs)
- System operations tests
- Ongoing, long-term customer support
- Service and repair
- Monitoring
- PPM