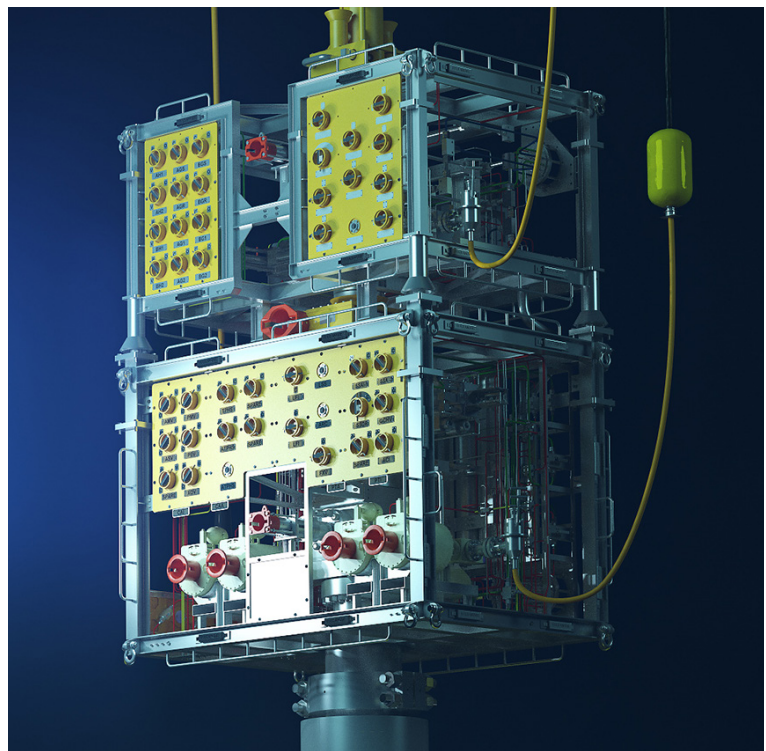


# Blue Ocean Riserless Intervention System (BORIS)

## Riserless light well intervention (RLWI) solution

Oceanengineering provides cost-effective riserless light well intervention (RLWI) solutions for downhole intervention, well stimulation, well remediation, and plug and abandonment of subsea wells.

The Blue Ocean Riserless Intervention System (BORIS) is deployable from a range of hosts, including dynamically positioned multipurpose service vessels (MPSVs) and specific mobile offshore drilling units (MODUs), and is fully compatible with remotely operated vehicles (ROVs). It incorporates a decade's worth of engineering lessons learned on our Interchangeable Riserless Intervention System (IRIS) offering and includes future-proofing features to meet anticipated regulatory requirements.



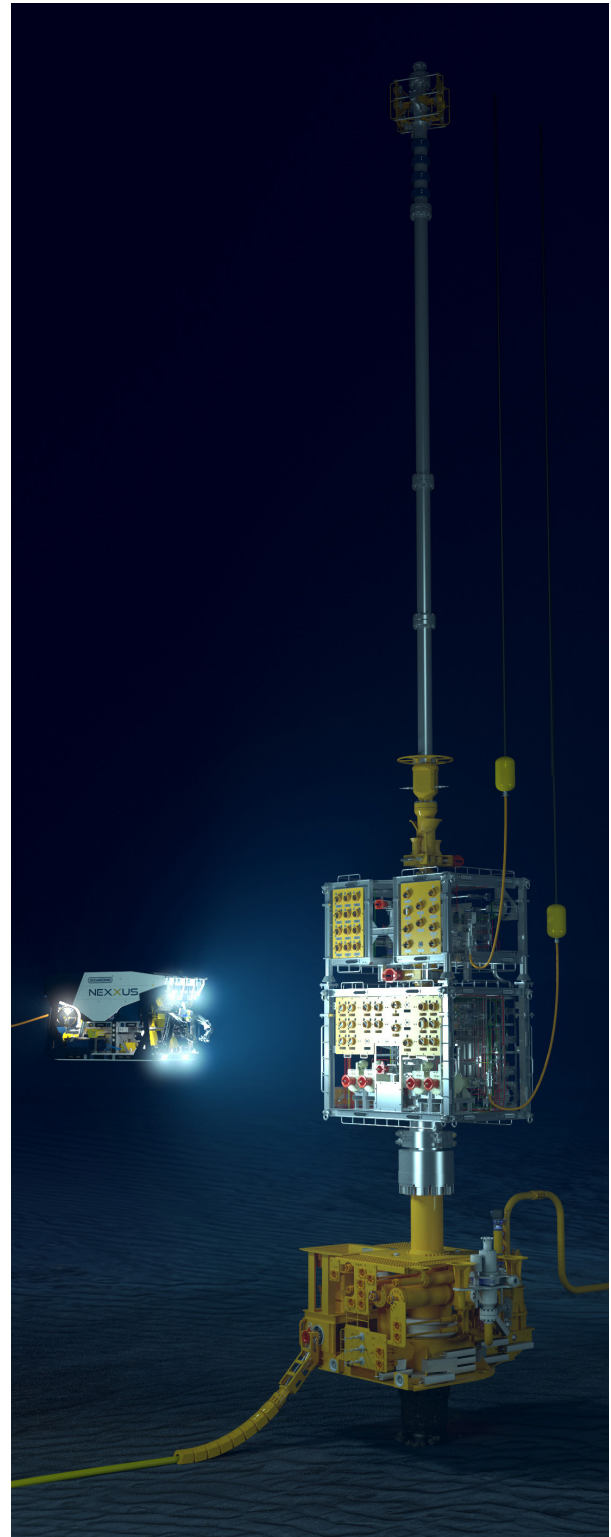
# Riserless Light Well Intervention (RLWI) System Overview

Our wireline-based, riserless intervention capabilities supplement our hydraulic intervention solutions, and these capabilities include:

- » Providing nimble solutions with ultimate flexibility and cost effectiveness
- » Delivering improved workover economics with systems that let the operator reliably complete more work (some work previously not viable due to costs)
- » Supporting activities including operating sleeves, setting and pulling plugs, and logging and perforating operations
- » Being fully functional at both high and low pressures to support life of field applications from greenfield development through brownfield operations to decommissioning
- » Supporting intervention in areas in close proximity to production facilities

A fully Oceaneering-managed spread includes topside fluid handling equipment, fluid conduits, slickline/wireline units, and a subsea well control package. The systems can be used to perform the following typical downhole well interventions on horizontal and vertical trees:

- » Well stimulation and remediation
- » Crown plug installation and removal
- » Real-time wellbore logging during production
- » Through-tubing cast iron bridge plug installation
- » Plug back
- » Perforation
- » Temporary plug setting and recovery
- » Sleeve shifting and fishing operations
- » Straddle isolation/tubing patches
- » Temporary (or partial) plug and abandonment
- » Deployment of specialized downhole diagnostic and remediation tooling via slickline or wireline (e-line and braided)



## Benefits

- » Cost-effective, highly reliable riserless well intervention system
- » Patented, field-proven pressure control technology
- » Global RWLI operations from vessel of opportunity
- » Lower assembly has 13<sup>5</sup>/<sub>8</sub>-in bend capacity for contingency riser package landout
- » MUX-controlled flushing valve sequence (with ROV backup)
- » Clamp spool connection for ease of connector changeout
- » MUX control skid is retrievable, if required, leaving BORIS well control in place on the well/tree.

# Blue Ocean Interchangeable Riserless Intervention System (BORIS)

## Delivering subsea well control

The BORIS subsea well control package provides customers with a light, portable system for completing RLWI. Its field-proven technology builds on the IRIS system's capabilities, which delivered industry-first results in deepwater applications. Globally deployable from a vessel of opportunity, BORIS provides additional flexibility and cost savings, and ensures that customers can complete operations where and when they are required.

### The system

BORIS comprises three connectable sections: a lower well control module, an upper well control module, and a lubricator section. The upper and lower modules are deployed as one with the capability to be disconnected subsea via ROV-operated connectors in contingency riser operations.

The upper and lower assemblies comprise the following main components.

The upper module houses a shear-seal blowout preventer (BOP), a gate valve, and an Oceaneering proprietary wireline grease system with clamp connectors top and bottom.

The lower module contains an additional gate valve, a safety head shear seal BOP, two side outlets with dual gate valves on each, and a spool to allow clamp connections to project-specific connectors and critical function redundancy MQC umbilical interfaces.

The lubricator is the third component of the system and houses a subsea pressure control head with integral dual subsea pack-offs and the

relevant well intervention tool strings. Wireline tool deployment and recovery are completed through the host moonpool with the aid of ROVs.

### Increasing functionality

BORIS provides diverse functionality via its interchangeable wireline tool string. The tool string is changed by unlatching the lubricator assembly from the upper well control module and recovering it to the surface together with the tool string. BORIS is capable of being field configured to run slickline or e-line to meet the demands of varied well conditions and applications.

BORIS shearing and flushing functions are controlled through a MUX system housed on a subsea control skid via a dedicated electro-hydraulic umbilical. The subsea control skid is equipped with dual-redundant control pods for surface control of essential BORIS functions. These functions can also be manually or hydraulically controlled with an ROV (all barriers and system functions are equipped with ROV overrides).

## Delivering Solutions

- » Our experienced team of project managers, engineers, and technicians has a proven track record of completing successful interventions executed with an uncompromised focus on safety.
- » We have set multiple industry depth records in subsea intervention with the IRIS including successfully intervening in 8,200 fsw / 2,600 msw in the Gulf of Mexico.
- » IRIS has successfully delivered with high reliability in riserless wireline runs with slickline and up to 5/16-in electric line at pressures of up to 8,600 psi.
- » BORIS supports deployment of intervention tools including wireline tractors, milling tools, logging tools, and plugs/packers.
- » Dynamic wire sealing at record depths was supported by a pressure control head using our patented Oceaneering grease delivery system.

## Equipment Rating and Specifications BORIS

Subsea Equipment	
System pressure rating	10,000 psi / 69 MPa
Maximum system water depth rating	10,000 fsw / 3048 msw
Minimum system water depth requirement	Defined by ROV operability and tree size
Maximum bore (inside diameter)	7 1/16 in / XX xx
Wireline outside diameter (OD)	5/16 in / XX xx and 3/32 in / XX xx (other sizes can be accommodated)
Slickline OD	All standard sizes
Tool string	Have run up to 4.5 in perforating guns, retrieved, and set multiple crown plugs
E-line and slickline tool string length	Interchangeable lubricator sections to meet customer and length requirements, as required
Material classification	API 6A Class EE
Total deployment weight (including H4 interface)	~ 54 ton
BORIS dimensions	8 x 12.5 x 26 ft / 2.4 x 3.8 x 7.9 m
Grease system	Rated for wellbore pressures up to 9,500 psi / 69 MPa
Safety and fail-safe features	Dual failsafe valves on kill line entry/exit
Gate valves	7 1/16 in, 10,000 psi / 69 MPa , 10,000 fsw / 3,048 msw depth rated
Seal shear BOP	7 1/16 in, 10,000 psi / 69 MPa , 10,000 fsw / 3,048 msw depth rated (NTL compliant)

Safetyhead	7 1/16 in, 10,000 psi / 69 MPa , 10,000 fsw / 3,048 msw depth rated (NTL compliant)
Dual kill line side entry	2 1/16 in, 10,000 psi / 69 MPa, 10,000 fsw / 3,048 msw water depth failsafe gate valves
ROV-controlled and direct-controlled client functions	Yes
Subsea accumulation	As required for function and depth

### Surface Equipment (as required)

Control umbilical reeler	To 10,000 fsw / 3,048 msw at 10,000 / 69 MPa psi working pressure, per DNV 2.7-1
Surface accumulation skid	10,000 psi / 69 MPa max, per DNV 2.7-3
Master control station	10,000 psi / 69 MPa max, per DNV 2.7-2

### X-Mas Tree Control Capability

X-Mas Tree Control Capability	Via electrical downline, host control, ROV override or direct hydraulic control
Low pressure hydraulic system	5,000 psi / 35.5 MPa
High pressure hydraulic system	10,000 psi / 69 MPa max, adjustable – SSV (subsurface safety valve) control
Control fluid	Standard water/glycol or mineral oil based subsea control fluid