



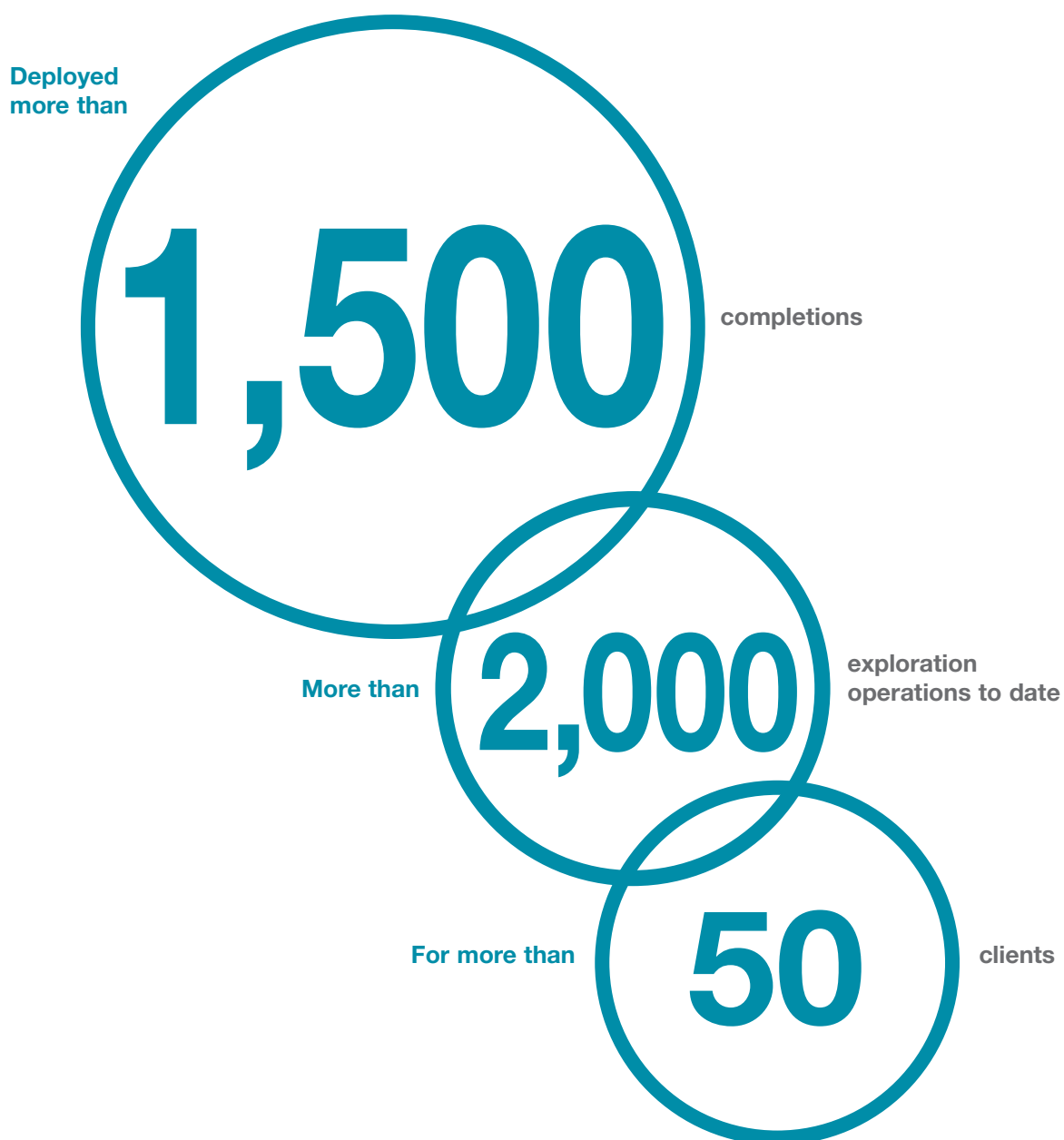
**EXPRO**

WELL FLOW MANAGEMENT™

## Subsea Safety Systems



**Reliability** in Deepwater. Expro's subsea focus is on delivering the **best deepwater technology solutions** to clients around the world.





## What we offer

Subsea landing strings are critical in delivering safe, compliant and efficient operations in all subsea applications. We understand the long term and increasingly complex nature of deepwater subsea well operations and strive to work closely with our clients to provide them with tailor-made solutions that meet their needs for specific operations.

### Exploration & Appraisal (E&A)

- E&A subsea landing string assemblies and
- Deepwater control systems

### Completion and intervention

#### Horizontal trees

- ELSA® HD (High Debris, Deep Water)
- ELSA® DH (Direct Hydraulic)
- ELSA® LBEH (Large Bore)
- ELSA® HP (High Pressure)
- ELSA® CLV (Cutting Lubricator Valves)

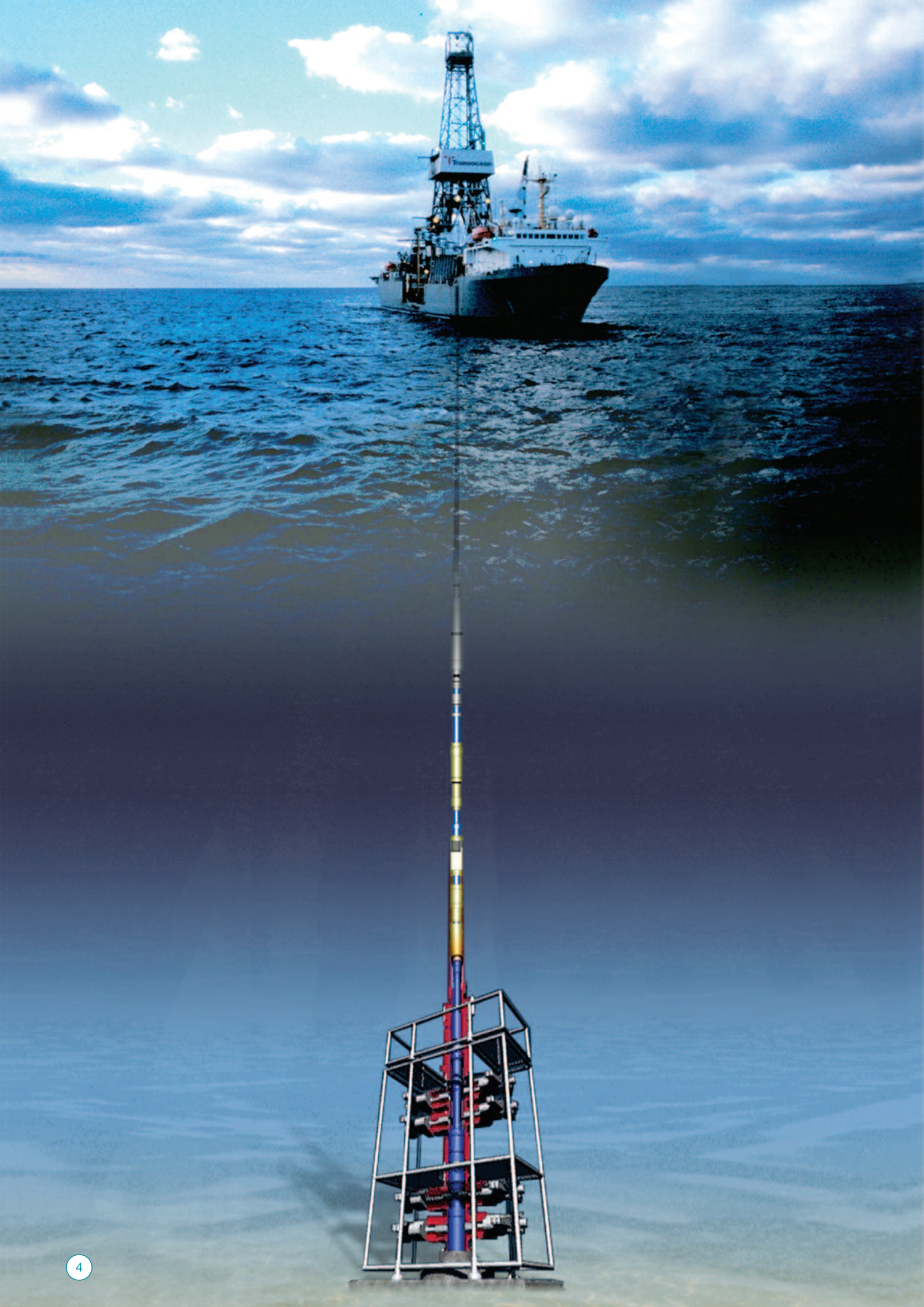
#### Control systems

- EXPRESS EA (Exploration and Appraisal)
- EXPRESS CI (Completion and Intervention)
- EXPRESS HP (High Pressure)

#### Vertical trees

- ELSA® OW (Open Water)
- ELSA® DB (Dual Bore)
- ELSA® Non Flow Back
- ELSA® BS (Bore Selector)





Ultra deepwater discoveries are playing a crucial role in replacing global reserves. The world's operating companies are now confronted with new challenges to ensure the reserves are discovered, appraised and developed safely and efficiently. Subsea landing strings are critical in delivering safe, compliant and efficient operations in all subsea applications.

Expro subsea safety systems (ELSA®) and subsea control systems (EXPRESS) are specifically designed to minimise risk in subsea completion, intervention, exploration and appraisal operations and achieve secure well status in the event of an emergency.

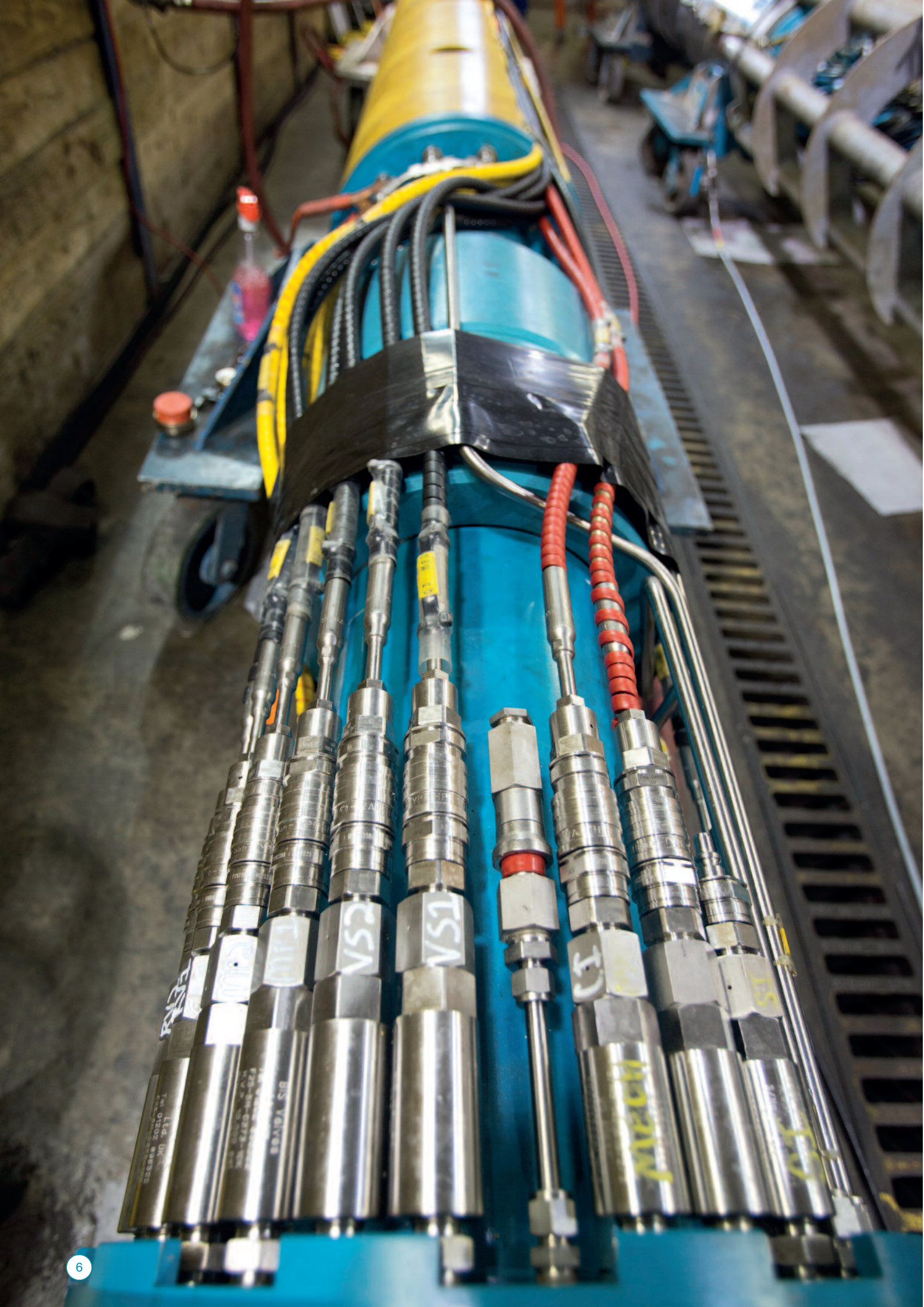
Established in the subsea landing string business since 1981, Expro delivers efficient and reliable subsea solutions around the globe, from in-riser to open water and shallow and deep water applications, meeting our customers' project-specific requirements and the latest industry standards. Our systems are designed to tackle high-debris, higher-pressure and temperature in water depths deeper than ever before, maintaining technical integrity and reliability at all times.

Expro's specialist subsea teams have deployed more than 1,500 completions / 2,000 exploration operations to date, clearly demonstrating that Expro is the first choice global subsea landing string provider for reliability in deepwater.

A large teal circle containing the text "30 years subsea experience" in a bold, sans-serif font.

**30 years  
subsea  
experience**







# Exploration and Appraisal



## Landing string assemblies and deepwater well control systems

ELSA® EA landing strings are in-riser systems used to allow well operations to be conducted safely during Drill Stem Testing from a semi-submersible rig or drillship in water depths up to 10,000 ft. They provide the ability to rapidly shut-in the well and disconnect should conditions require it. Expro has a variety of systems covering high rate, high temperature, deep water and ESP application available ensuring we provide the right solution for our client's needs.

All systems include a subsea test tree, which provides a dual barrier to isolate the well and a disconnect facility from the well in case of emergency. A retainer valve is added to the system just above the BOP shear rams ensuring the landing string contents are isolated upon disconnect. Single or dual lubricator valves can be provided to allow safe deployment of intervention tool strings.

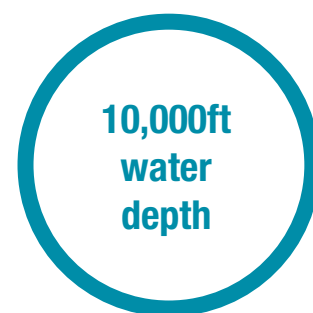
Depending on operational requirements the subsea test tree and retainer valve will be controlled by a direct hydraulic (DH) or an electro-hydraulic (EH) control system.

### Features:

- Cutting capability
- Pump through capability
- Independent ball closure
- Redundancy
- Downhole functionality
- Small operating volumes

### Benefits:

- Guarantees well isolation
- Ability to kill well
- Allowing one ball to cut coiled tubing or wire and other ball to seal
- Rapid response well isolation and unlatch
- Secondary unlatching system
- Option to allow permanent monitoring cable, SSSV control line or chemical injection line to pass across disconnect point of subsea test tree



# Completion and intervention

## Horizontal tree solutions

### ELSA® HD (High debris, deep water)

ELSA® HD was specifically developed to operate in applications with highly aggressive erosive solids and deep water environments, offering exceptional reliability for all horizontal/vertical subsea xmas tree well completion and intervention operations. The ELSA® HD comprises a full suite of valve assemblies. The lubricator valve, retainer valve and subsea test tree provides a full range of well intervention, pressure control functions and disconnection capabilities for harsh completion installation, workover or intervention operations.

### ELSA® DH (Direct hydraulic)

These landing string assemblies are designed for direct hydraulic completion and intervention applications and interface with all mono-bore completions when used in conjunction with horizontal and conventional subsea production trees.

The design incorporates control ports enabling tubing hangar running tool and other downhole functions such as subsurface safety valve (SCSSV) and chemical injection sleeves to be control monitored. In addition electric cabling can be run through the system to monitor downhole gauges or electric submersible pumps.

### ELSA® HP (High pressure)

The ELSA® HP has been developed to service the high pressure horizontal tree completion and intervention market. With systems designed and qualified up to 15,000 psi, 250 degF and 10,000 ft water depth, this landing string assembly provides our clients the safety and reliability required to develop fields with these challenging conditions. Expro used the highly successful and field proven ELSA® HD design as the basis for the development of the ELSA® HP products.

### ELSA® LBEH (Large bore)

These landing string assemblies are designed for electro hydraulic completion and intervention applications and interface with all mono-bore completions when used in conjunction with horizontal and conventional subsea production trees.

The design incorporates control ports enabling tubing hangar running tool and other downhole functions such as subsurface safety valve (SCSSV) and chemical injection sleeves to be controlled monitored. In addition electric cabling can be run through the system to monitor downhole gauges or electric submersible pumps.

### ELSA® CLV (Cutting lubricator valves)

Cutting lubricator valves are used when coiled tubing and / or wireline cutting capability is required in addition to the more traditional requirements for Expro's lubricator valves. This includes facilitating the introduction of through tubing tools (i.e. coiled tubing and wireline) into production strings longer than those acceptable in a customary derrick installed lubricator assembly and to provide a means of pressure testing the surface equipment and lubricator sections once the wireline tool string has been installed. ELSA® CLV provides a method of isolating surface equipment from production flow and a pressure tight barrier between the well bore and BOP stack and/or marine riser.





# Vertical tree solutions

## ELSA® OW (Open water)

Open water valves are used when running subsea production trees/intervention systems on tubing or drill pipe in open water, i.e. no marine riser. Positioned between the tree/intervention running tool and the rig floor, the valves enable safe deployment and retrieval of intervention tools into and out of the well. This provides a safety barrier during 'live well' operations and enables cutting of coiled tubing and or wireline in event of emergency.

## ELSA® DB (Dual bore)

The ELSA® DB is designed to be run with the ELSA® HD retainer valve and lubricator valve.

The Subsea Test Tree (SSTT) forms an integral part of the subsea landing string for well test or intervention operations. The ELSA® DB is a unique landing string system that is used in conjunction with vertical production tree systems. This innovative 'mono-bore' design landing string system enables well clean up/completion deployment from a modu prior to installing the vertical xmas tree. The ELSA® DB incorporates the orientation sleeve/helix as required allowing correct orientation of the tubing hanger into the wellhead at all times.

## ELSA® Non Flow Back

The ELSA® Non Flow Back landing string provides the customer a system to interface with either a mono bore or dual bore production tree depending on the client's individual requirements. Providing an internal bore suitable for through bore operations in a non-flow back scenario whilst still accommodating the required BOP stack ram interfaces required by the industry today.

The ELSA® Non Flow Back landing string system also enables tubing hanger running tool and other down hole functions to be controlled or monitored with the option to accommodate an electric line(s) dependent on the customer's needs.

## ELSA® BS (Bore selector)

The Bore Selector is designed to interface with dualbore production trees and allows deployment of a dual bore system on a mono-bore riser. In this application the bore selector is normally run between the emergency disconnect package and the riser stress joint retainer valve. The system is also sufficiently flexible that it can be interfaced easily with workover control systems.

It offers the advantages of simplification and economy both of equipment and operational sequences.



Excellent job from Expro  
Subsea. Very good  
support . . .







# Control systems



Exploration and appraisal

Completion and intervention

High pressure

Expro's EXPRESS systems control landing and testing string functions during well testing, appraisal, completion and intervention operations. Electro-hydraulic control improves response times, enables 'real time' data feedback, reduces the physical umbilical size on deep water applications and addresses the disconnect philosophy from dynamically positioned mobile drilling units.

EXPRESS employs electrical communication as the primary control method, rapidly improving response times and eliminating the response constraints of conventional hydraulic systems due to water depth. The system comfortably achieves the present industry requirements for the disconnect protocol, achieving system shut-in or well closure and disconnect, within a 15-second time period.

The designs are fully adaptable from 3" to 7" landing strings and provide hydraulic control to the subsea landing string and completion equipment where applicable. It provides a fully integrated control system for full functionality and when applicable incorporating operation of the tubing hanger running tool, tubing hanger and downhole functions.

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Overall performance of Expro Subsea personnel is of high standard and contributes to an expedient and trouble free operation. Good organisation and leadership by the supervisors.





# Technology and innovation

Today's subsea operations in increasing water depths demand equipment with superior functionality, performance and reliability. With this in mind, Expro's subsea tools have been developed using an integrated design and testing process which ensures that equipment meets the highest performance criteria.

Operational feedback continually improves our understanding of system integrity and helps to eliminate failures that could lead to unnecessary downtime. This approach has been proven through the establishment of an industry-leading track record in the field.

All our subsea equipment endures a rigorous test regime to the highest standards in the industry, including:

- Factory Acceptance Testing (FAT)
- Qualification and performance tests on functional, environmental, thermal and endurance performance
- System Integration Testing (SIT) on complete assemblies and individual components
- Expro subsea tools are designed to meet the ISO and API equipment standards and have the added assurance of independent technical certification.
- Expro has ISO 9001:2008 certification. (BVQI) Project Management delivery, processes and procedures are fully accredited to ISO 9001:2008, ensuring on time delivery of a quality and fit for purpose system

Expro is focused on ensuring equipment assurance throughout the life of our products, this increased rigor has been driven by our focus on service quality, customer expectations and updated industry standards. The design of our equipment is focused on equipment integrity during the life of service using the highest specification materials.

# Applications, benefits and features



## Applications:

- Subsea completions – horizontal or vertical
- Subsea completions – in-riser or open water
- Exploration and appraisal systems
- Control systems

## Benefits:

- Redundancy in controls philosophy
- Modular design systems to suit tree design
- Independent ball valve / sleeve functionality
- Rapid response ESD/EQD
- Suitability on all rigs from 1st – 6th generation
- Optimisation on rig time during handling

## Features:

- Efficient coil cutting capability
- Secondary and tertiary functionality
- 10 second ESD / 15 second EQD capability
- API 17G compatibility
- Single string assemblies
- HP / HT High Debris systems



# Case studies and testimonials

## BP Block 31

Angola is Sub-Saharan Africa's largest oil producer and, since 2008, has been a member of the Organisation of Petroleum Exporting Countries (OPEC). Located in the ultra-deep waters off Angola lies Block 31 PVSM, comprising four oil fields; Platao, Saturno, Venus and Marta. Block 31 PVSM was discovered in 2002 and covers an area of some 5,349 square kilometers.

Expro was first hired in 2009 to deliver electro hydraulically controlled completion landing string technology for conventional Xmas trees, which uses a safe, reliable, innovative and novel design to aid completion installation. This was extended in 2012 to provide additional landing string equipment and personnel support alongside the original scope of supply.

Expro was the preferred vendor for BP's PSVM project due to its field proven technology and track record for subsea operations with BP in Angola. Expro has a track record of more than 30 successful completions with BP on its Block 18 project.

BP needs Expro's subsea products so that they can complete, clean up and suspend their wells with hydrocarbons across reservoir in a safe and efficient manner while being more cost-effective by optimizing the use of the drilling rigs.

Expro's subsea safety systems allow for the safe deployment and control of tree vendor running tools, as well as the hydraulic and electrical feed-through for down hole functions and subsea well operations to be conducted under controlled conditions without having to use the BOP.

The benefits of using Expro's ELSA® dualbore landing string means monobore landing strings can be utilised while still providing functionality for vertical xmas trees. To date, the equipment utilised on PSVM has carried out four successful completions.

These successful completions led to BP extending Expro's contract scope of supply in 2012, covering the second phase of PSVM. The additional equipment comprises of two ELSA® dualbore landing string assemblies, two EXPRESS control systems and one set of topside control equipment.

The system has been designed to provide the ability to accommodate an emergency disconnection of the riser system from the wellhead / Xmas tree in the event of a well control situation. The inclusion of the EXPRESS controls system offers a rapid disconnect time which is depth independent.

Its dual ball valve subsea test tree enables the well to be isolated in a controlled manner when any disconnect is required, while at the same time providing the ability to cut coil tubing and wireline. In addition to this the retainer valve allows for the fluid inventory of the riser to be contained during any disconnect.



Expro's mission is **well flow management**. We provide services and products that **measure, improve, control** and **process** flow from high-value oil and gas wells, from exploration and appraisal through to mature field production optimisation and enhancement.

With a specific focus on **offshore, deepwater** and other **technically challenging environments**, we provide a range of mission critical services across **three key areas**:

- Well Test & Appraisal Services
- Subsea, Completion & Intervention Services
- Production Services

Our vision is to be the **market leader** in well flow management, using the industry's best people, to deliver the highest standards of **safety, quality** and **personalised customer service**.

Expro's **40+ years** of experience and innovation empowers the company to offer **tailor-made solutions** for customers across the energy sector. With 4,500 employees in over 50 countries, Expro offers a **truly global service solution**.



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Or visit [www.exprogroup.com/contact](http://www.exprogroup.com/contact)