

MICEDD

DEEPWATER DEVELOPMENT

28 - 30 March 2023 | Millennium Gloucester Hotel | London, UK

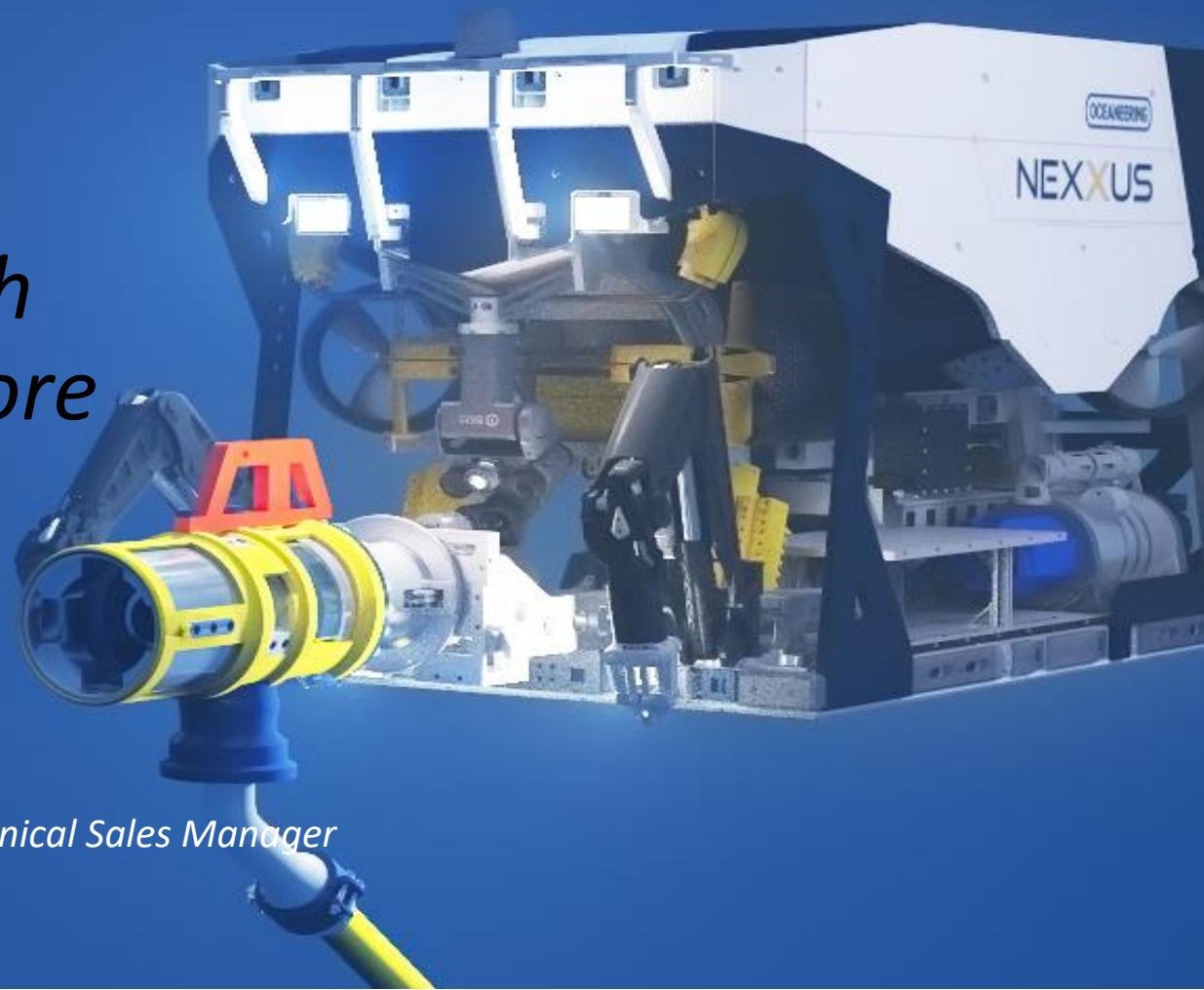
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Quest Offshore

World Oil®

Subsea Flexible Pipe Tie-in with Oceaneering High flow Mono Bore M5 connector



Prepared by Chen Cheng, Product Engineering Lead & Giuseppe Rizzo, Technical Sales Manager

Speaker: Giuseppe Rizzo



Agenda

- Safety Moment
- Oceaneering Operating Model and Locations
- M5 Monobore Connection
 - Applications
 - Design and Technical Information
 - Benefits
 - Design and Efficiency
 - M5 Qualification Program



Stop the Job

Sometimes the most important work you can do is to stop working

Always watch for unsafe conditions or behaviors, and, when necessary, stop the job until it can be done safely.

If you're working and you see a process that is not being followed correctly, or if you notice at-risk behavior going on, exercise your stop work authority by taking a quick time-out.

Then, confer with your workmates and talk to your manager to make sure everyone knows the safe way to continue.



Oceaneering Operating Model

We thrive by creating industry-changing technically creative solutions for the most complex operational challenges under water, on land, and in space.

<https://www.oceaneering.com/>

Subsea Robotics



- ROV
- AUV
- Tooling
- Survey & Positioning
- Rig Positioning
- Subsea Metrology
- Geophys./Geotech Survey
- C-Nav Positioning Solutions
- Remote Services

Offshore Projects



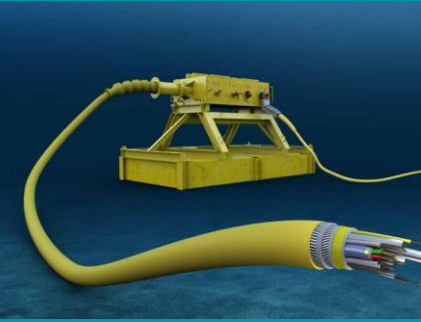
- Field Support Vessels
- IMR
- Diving
- Offshore Renewable
- Installation
- Light Well Intervention
- Well Stimulation
- Hydrate Remediation
- Flow Assurance
- IWOCs & RWOCs
- Engineered Solutions
- Decommissioning, P&A

Integrity Management & Digital Solutions



- Integrity Management
- Inspection Engineering
- Preventive Maintenance
- Data Management
- Engineered Solutions
- Data Communications
- Maritimes Services
- OceanSMART
- OMV & EDGESmart
- Digitalisation
- FPSO Inspection/Integrity

Manufactured Products



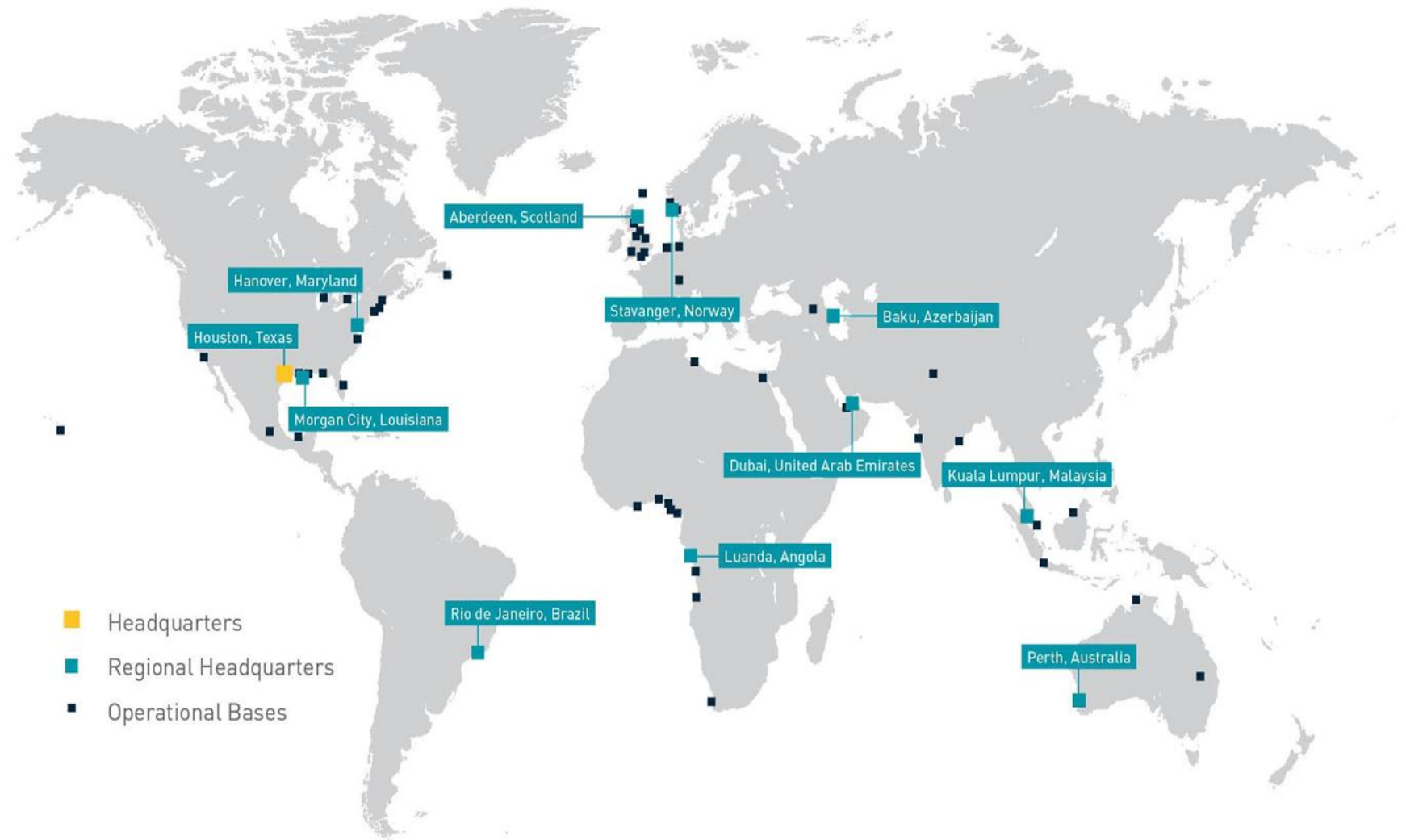
- Umbilicals
- Subsea Distribution
- Subsea Hardware
- Connectors
- Grayloc
- CTVs
- Pipeline Repairs
- Land Robotics & Automation
- Entertainment & Animation
- Subsea Pumping Technology

Aerospace & Defense Technologies



- Defense Subsea Tech.
- Governments
- Marine Services
- Space Systems
- Exploration Suit
- Human Space Flight
- Space Robotics

Locations



Sustainability at Oceaneering



Environmental Engineering the Low Carbon Future

We are advancing capabilities as a technology delivery company and developing clean-energy technologies to mitigate greenhouse gas emissions for customers and our own operations.



Social

We are leveraging Employee Resource Groups, including our Women's Network and Veterans' Network, to foster a **diverse and inclusive** workplace and make positive contributions to our local communities.



Governance

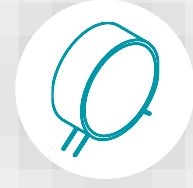
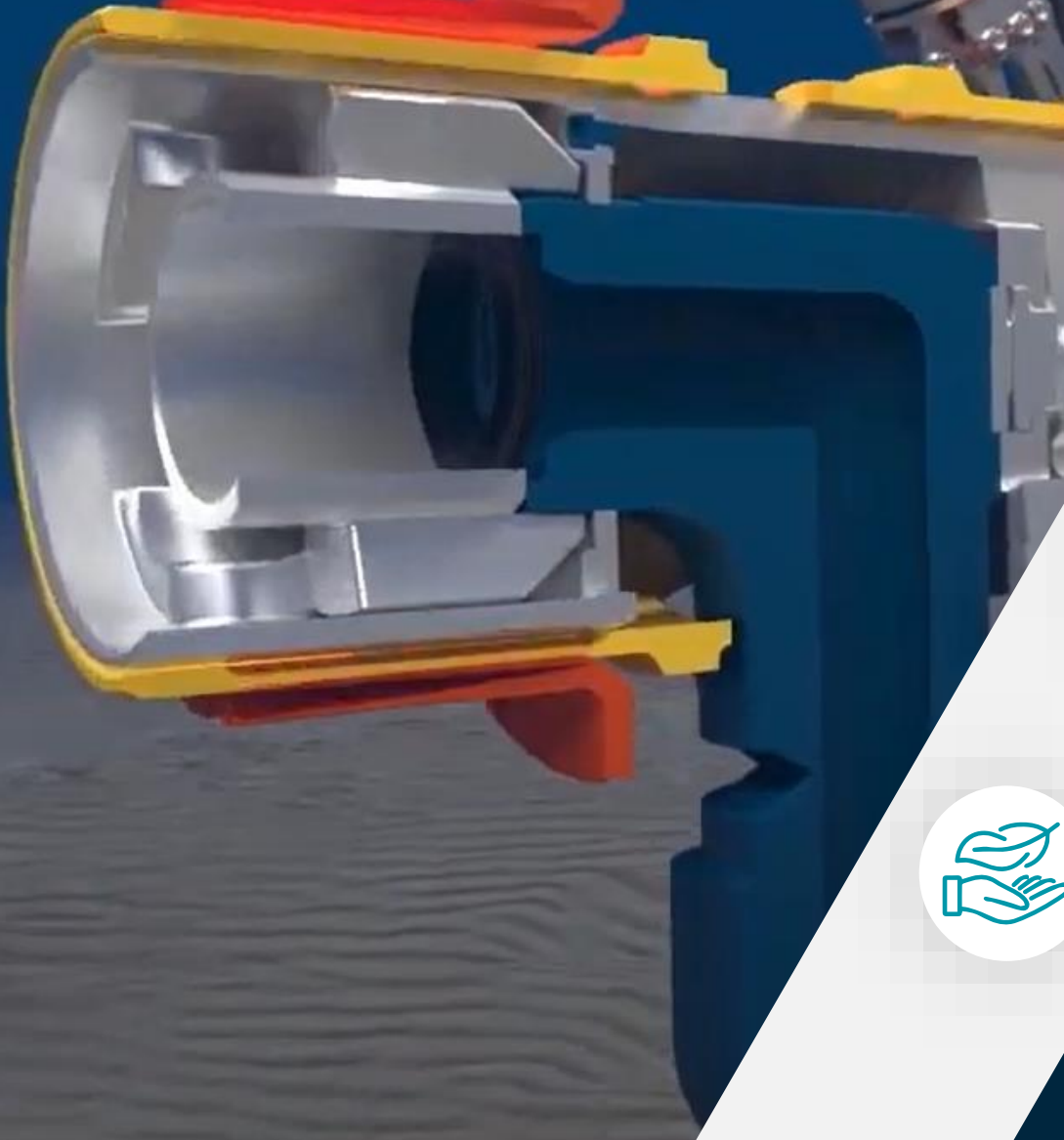
Our Board of Directors is becoming increasingly diverse, independent, and refreshed. We have formalized our **ESG** reporting through our Nominating and Corporate Governance Committee. We have adopted the Sustainability Accounting Standards Board (**SASB**) disclosure methodology.





M5 Monobore Connection

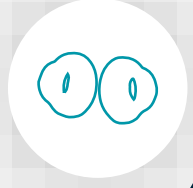
M5 Overcoming Customer Challenges



Open, unobstructed bore



High flow and high-pressure fluid delivery



Grayloc[®] metal to metal seal



Compact footprint, lightweight, and high load capacity

Applications



High-flow
chemical delivery



Gas Lift



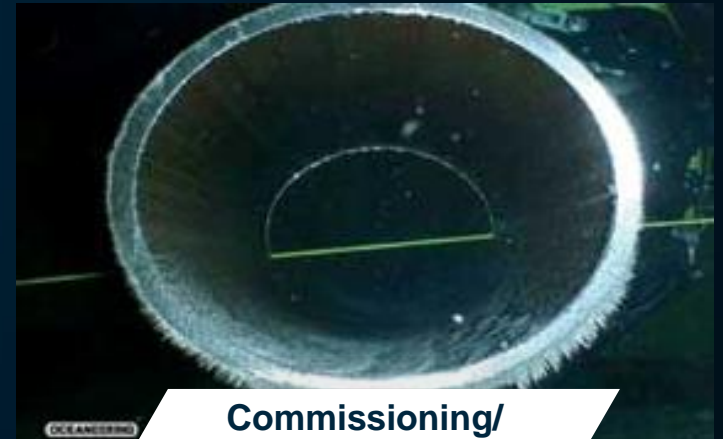
Intervention
Access Point



Hydrate
Remediation

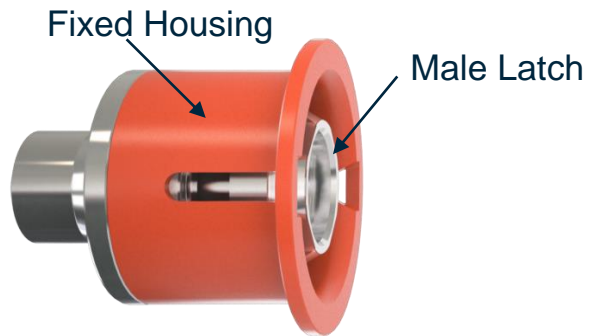


Well Stimulation



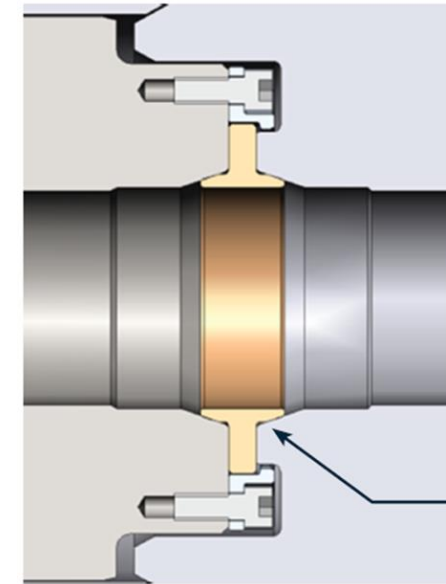
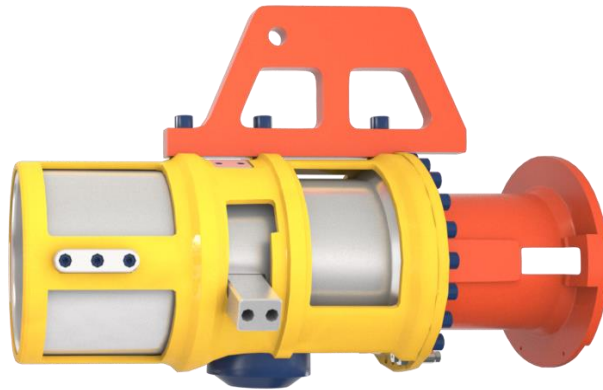
Commissioning/
Decomm

Connector Design and Technical Information



Fixed

Removable



Material Options

- » Inconel 625
- » Inconel 718
- » Inconel 725

Coating Options

- » Silver
- » Teflon

Grayloc® Seal

Fixed connector

Nominal bore:	2 to 3 inch
Design pressure:	Up to 15ksi
Test pressure:	22,500 psi
Design water depth:	10,000 ft
Weight Air	180 lb
Weight Seawater	155 lb
Wetted components	Corrosion resistant alloys

Removable connector

ROV Interface:	API 17H/ISO 13628-8 Class 4 torque tool
Nominal bore:	2 to 3 inch
Design pressure:	Up to 15ksi
Test pressure:	22,500 psi
Weight Air	440 lb
Weight Seawater	378 lb
Wetted components	Corrosion resistant alloys

Benefits

Advantages of the M5 Connector

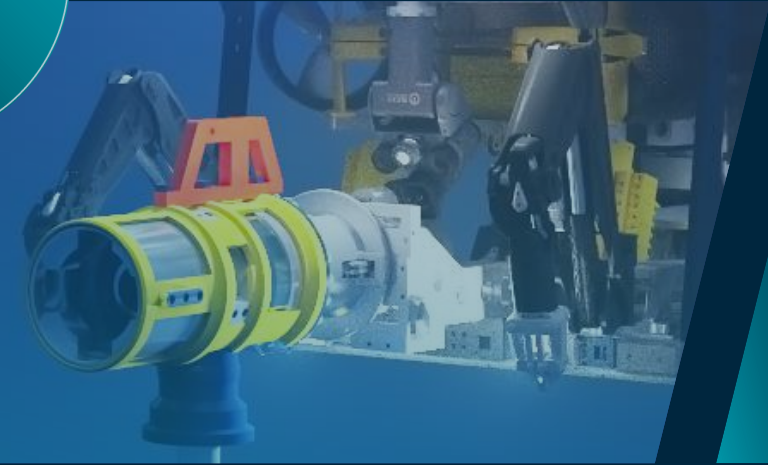
Safety



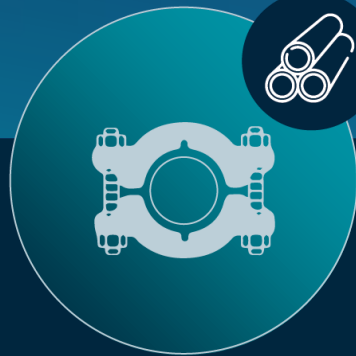
Field proven system



Qualification Program



Designed for life of field



Grayloc® Technology



Time & Cost Saving

Design and Efficiency

Connector Design Improves Efficiency



No specialized tooling required for installation



Compact, lightweight, ROV flyable



Integrated, pre-engaged latching mechanism



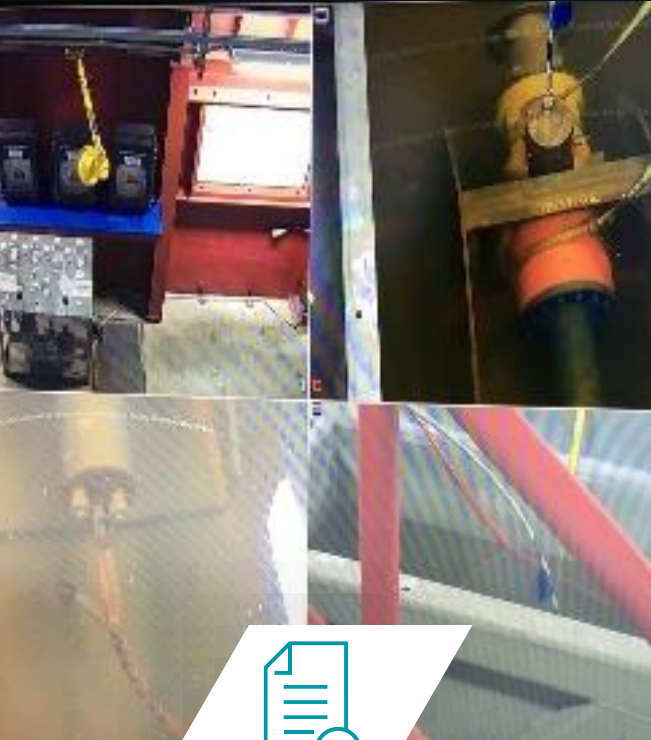
No subsea threading or hydraulic feed needed for actuation



Operational maintenance free

M5 Qualification Program

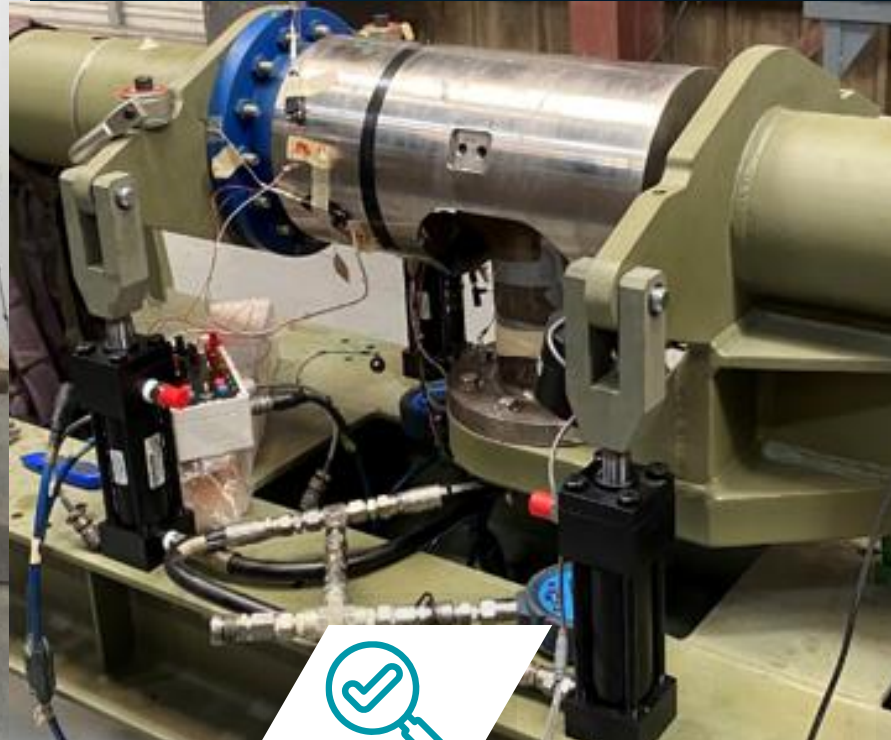
Qualification Program Highlight



Compliance to
API 6A, 17D and
17R



25 times main
seal make break
test while
maintaining
minimum pre-load



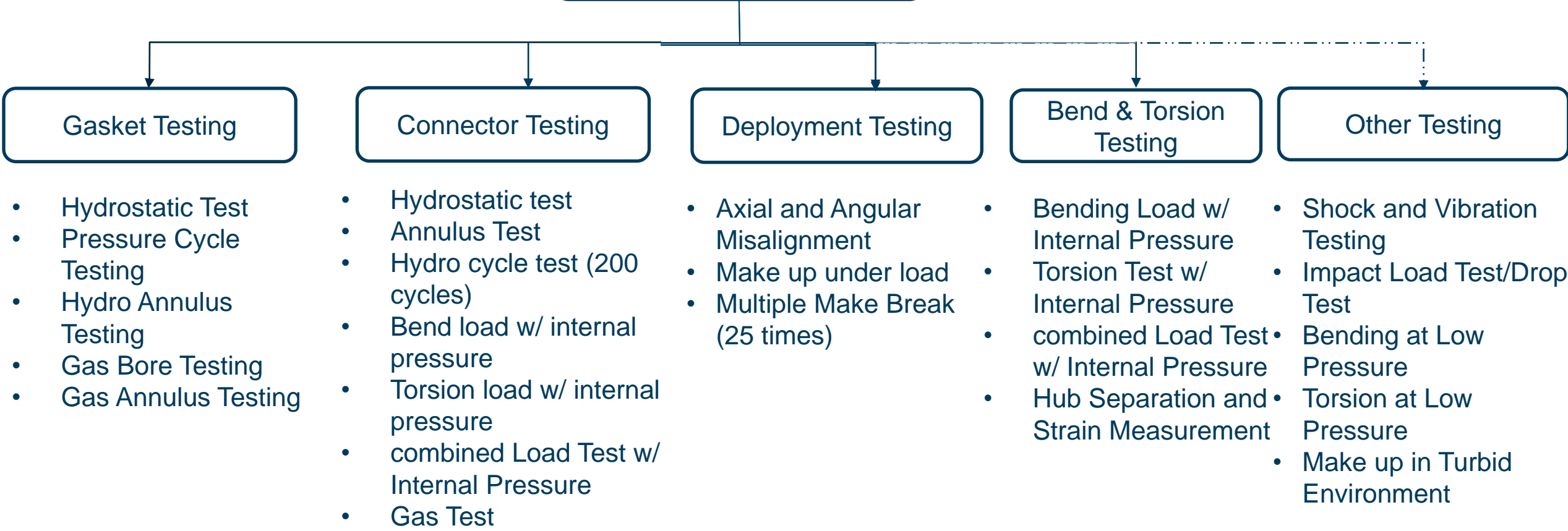
Real time strain
monitor on critical
component to
validate analysis



Tooling
qualification with
simulated
jumper load

API 17R Compliance

API 17R Compliant M5

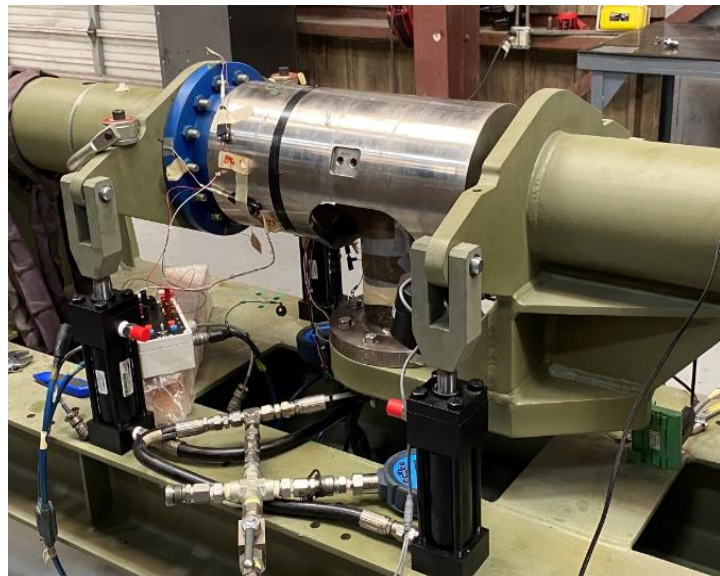


All qualifications tests were reviewed and witnessed by Bureau Veritas.

Qualification Pictures



Horizontal & Vertical configuration



Bending & Torsion Test Setup



3 In M5 connector installation



MEG Jumper Assembly



3" M5 Connector during deployment

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OCEANEERING®

Connecting What's Needed With What's Next™

Please visit www.oceaneering.com for more information

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