

Society for Underwater Technology Middle East Branch

Emergency Pipeline Repair Systems (EPRS)

An overview of the tools and methods available for the
on-bottom repair of rigid pipelines



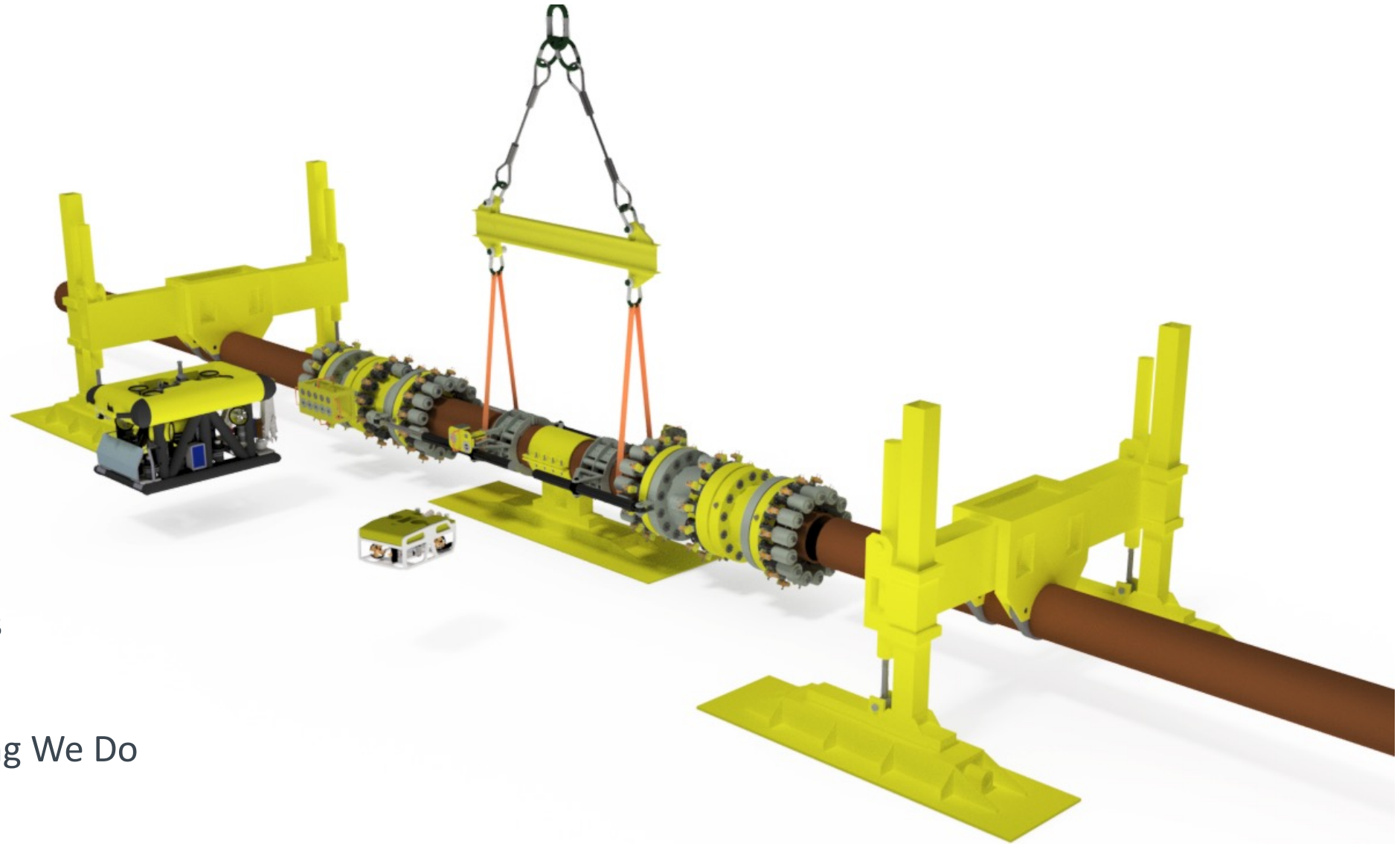
Tuesday 13 December 2022




09:00 - 15:30 at Khalifa University, SAN Campus and
Dolphin Energy KIZAD

Presenter: Mr. Dave Thompson, Managing Director – Subsea Innovation

EPRS - A Qatar Perspective



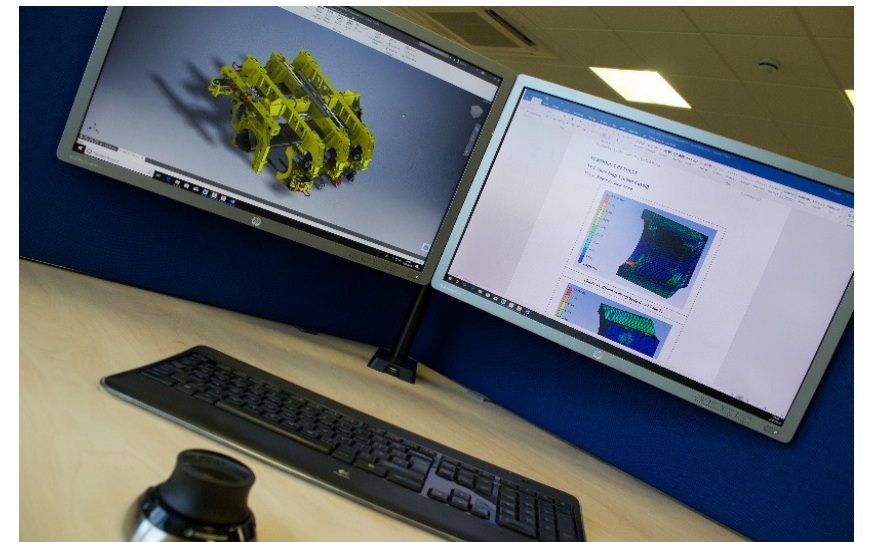


-  Innovative Engineering
-  Reliable Robust Solutions
-  Safety First – In Everything We Do

Introduction to Subsea Innovation

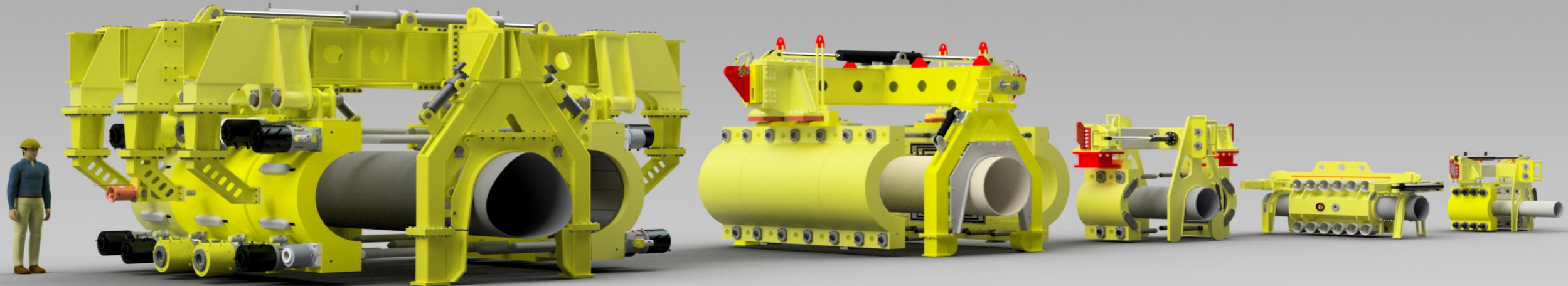
Overview

- Providing support on a Consultancy Basis or as a Solutions Provider.
- Delivering turnkey solutions to the Oil and Gas and Energy Sectors.
- Specialist in the design & build of bespoke equipment.
- In-house team of skilled Engineers and Technicians.
 - Design
 - Analysis
 - Project management and execution
 - Offshore team
- Comprehensive track record in the offshore Oil and Gas and Energy Sectors
- Established over 35 Years ago.
- In Excess of 450 Design & Build Projects Delivered
- 150+ Launch & Recovery Systems (LARS) Supplied
- Global Client Base



EPRS typical ranges

- Pipeline range 2" NS to 48" NS
- Pressure range 0 to 600 bar.g
- Temperatures 0° C to +150° C
- Diver or ROV installed shallow or deep water
- Special designs undertaken for specific temperature and pressures, also specific geometry i.e. sealing over a flange joint
- Inter-changeable structural collet packs
- 25 - 40 year design life
- Designed to accept API 5L or DNV diameter tolerances with a single seal set
- Additional change parts can be supplied to increase diameter tolerances or cater for multiple wall thickness of pipes



Engineering Consultancy

- Pre feed
- Feed
- Dynamic analysis
- Local Analysis
- CFD
- Installation analysis

Subsea Products / Projects

- J tube seals
- Sealing Hang off clamps
- Water-stop seals
- Environmental plugs
- Tie back clamps
- Recovery clamps
- Special Projects

Mission Equipment

- Handling equipment
- LARS systems
- Winches
- Skidding systems
- PLET handling systems
- Moon Pool Towers
- Special Projects

EPRS solutions

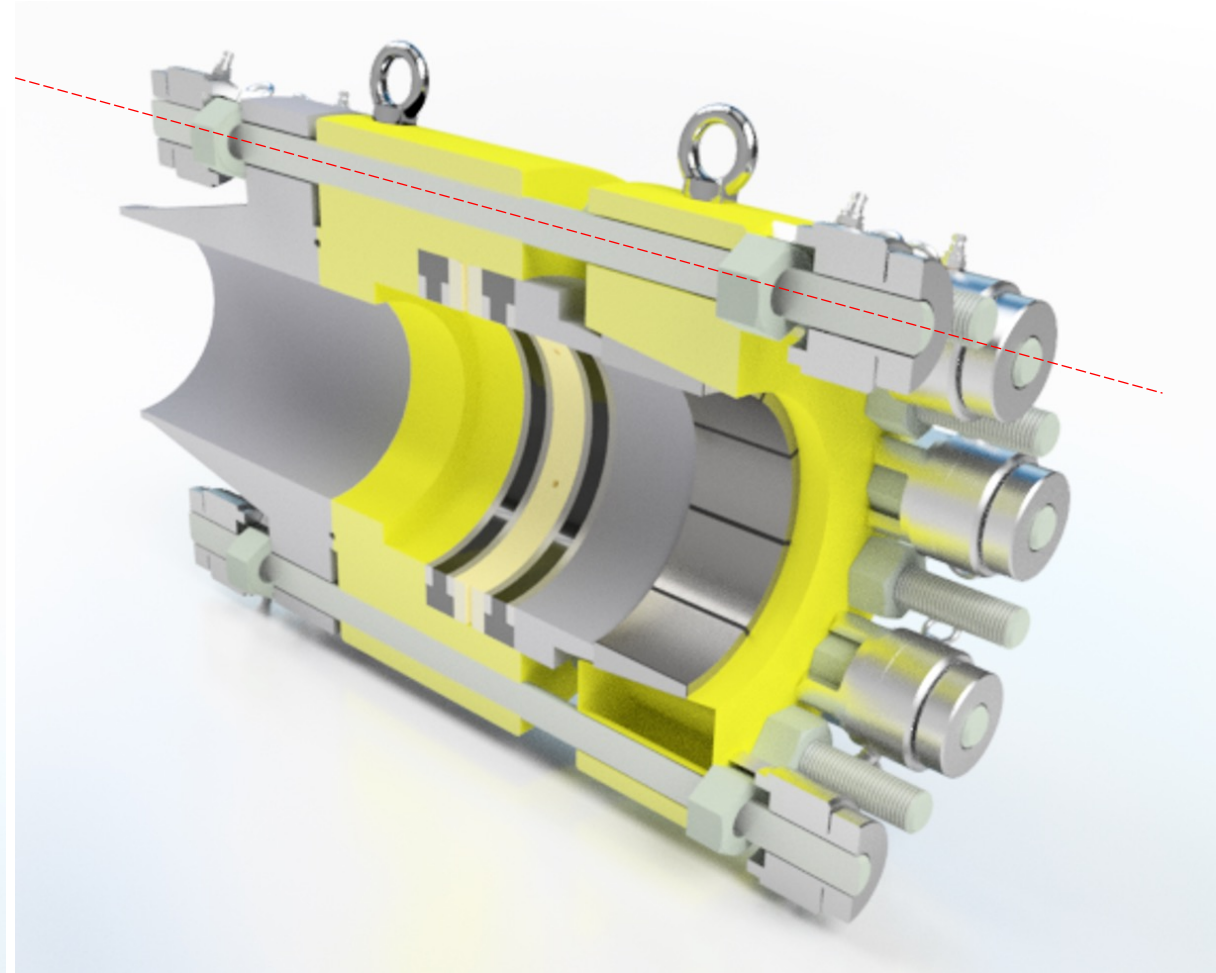
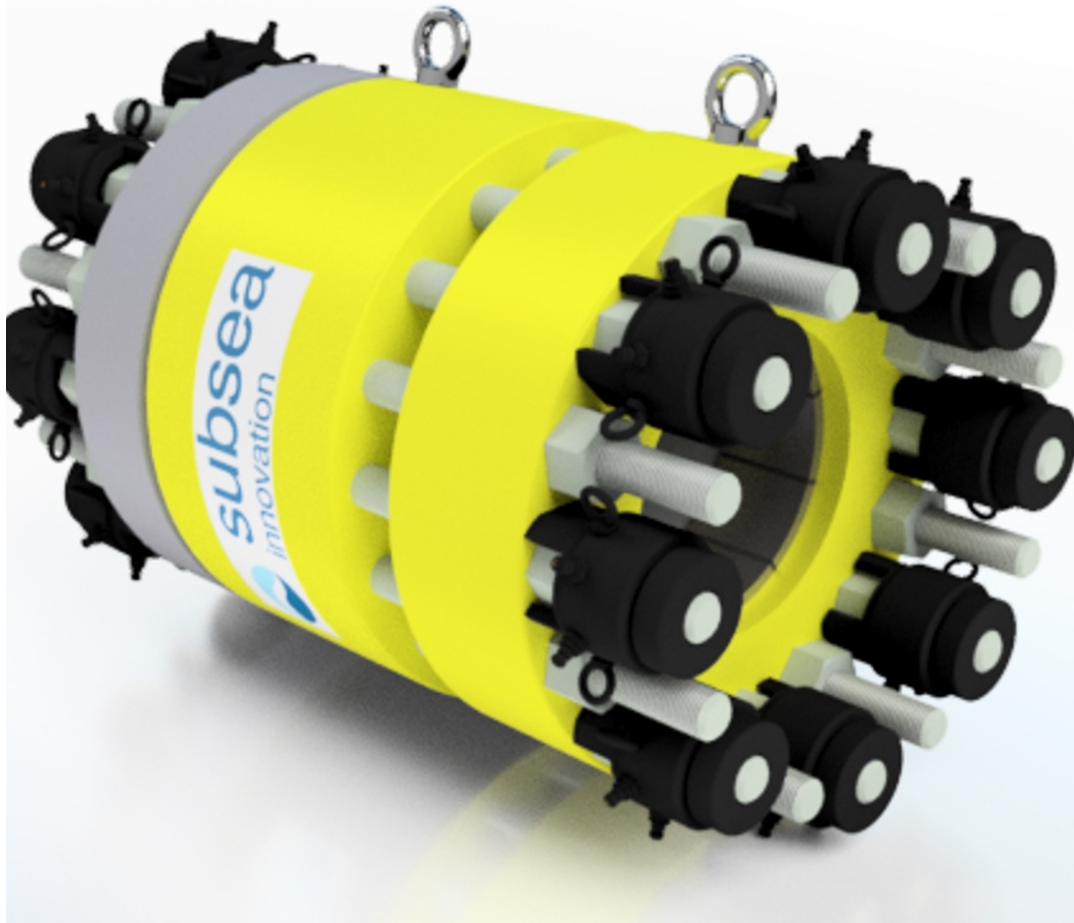
- Sealing clamps
- Structural clamps
- Connectors
- Sleeve connectors
- Hot Taps Ts

Renewables

- CPS bandage system
- Retro fit Dynamics
- As built analysis
- Special Projects

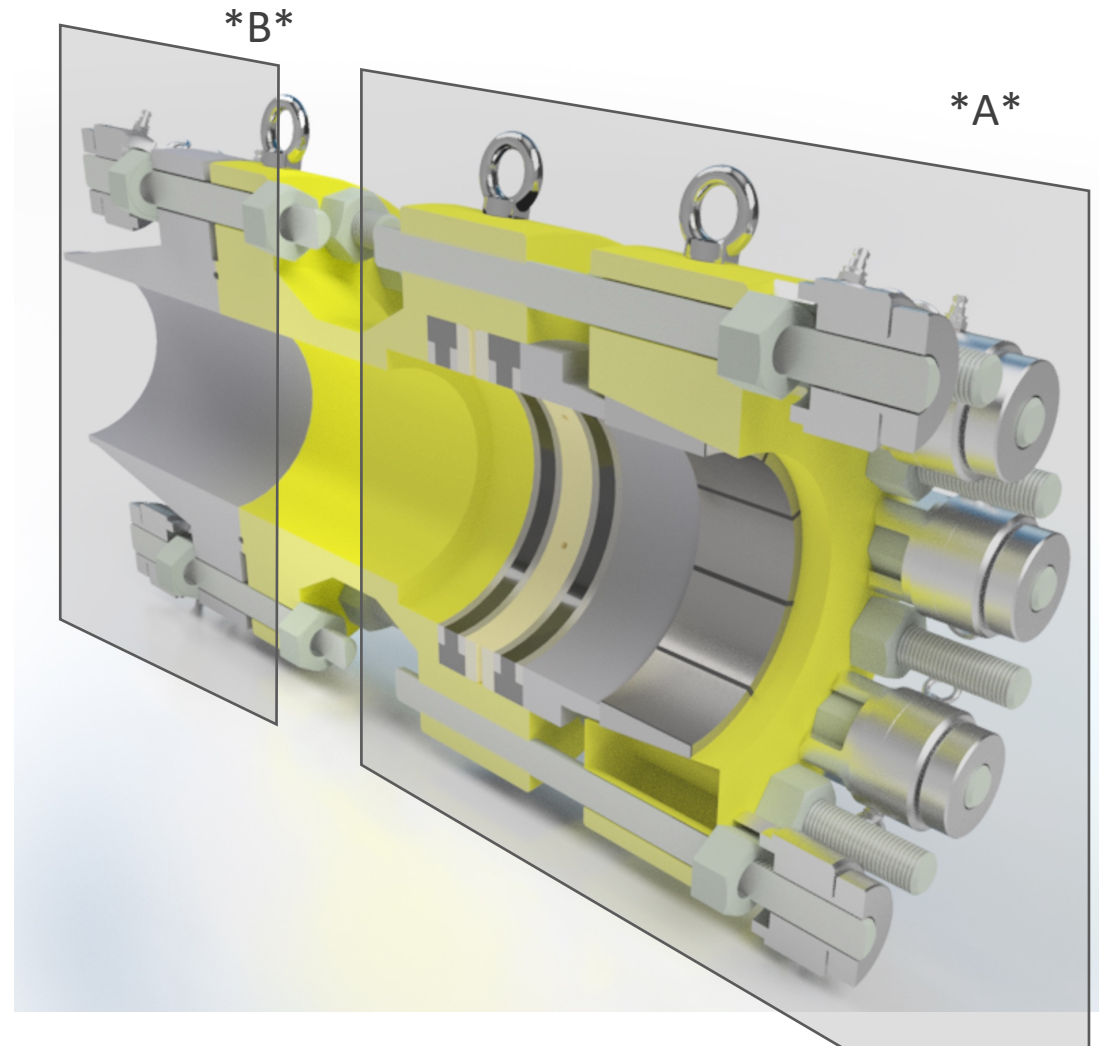
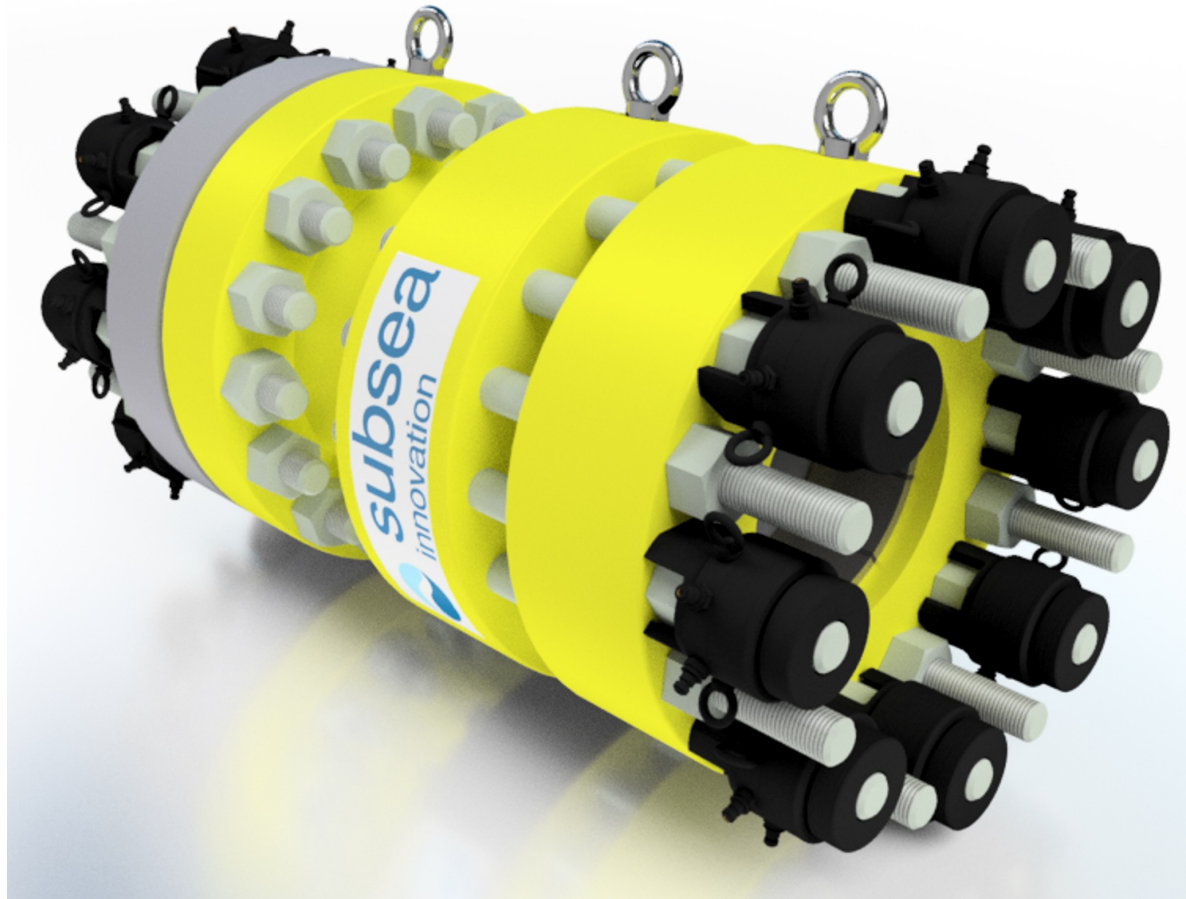
What is a Typical Std Connector?

- The simpler versions use an array of long bolts to activate the seal, the collets and to connect to the spool piece.



What is a Typical Std Connector – with more features

- The collets and seals are jointly activated (*A*)
- A spool piece is added post activation and testing (*B*).



DNV Approval and testing

- DNV DVR
- DNV Product approval / survey of manufacture
- DNV type approval for Clamps
- DNV Type approval Structural Clamps
- Any additional client specifications and testing can be accommodated


Certificate No:
TAP00001JG

TYPE APPROVAL CERTIFICATE

This is to certify:
That the Pipe Couplings

with type designation(s)
SIClamp

Issued to
Subsea Innovation Ltd
Darlington, County Durham, United Kingdom

is found to comply with
DNVGL-ST-F101 Submarine pipeline systems
DNVGL-RP-F113 Pipeline subsea repair

Application :

For use as temporary and permanent "structural repair clamp and sealing-only clamp" for carbon steel pipelines for water, oil and/or gas transport. Conditions and limitations are given below and in reference documents. Design to follow approved design documentation and test procedures given in the reference documents.

This Type Approval is not valid for application on DNV GL class systems.

Temperature range: -4 to +80 °C
Sizes: 8" to 44"

Issued at **Høvik** on **2018-11-29**

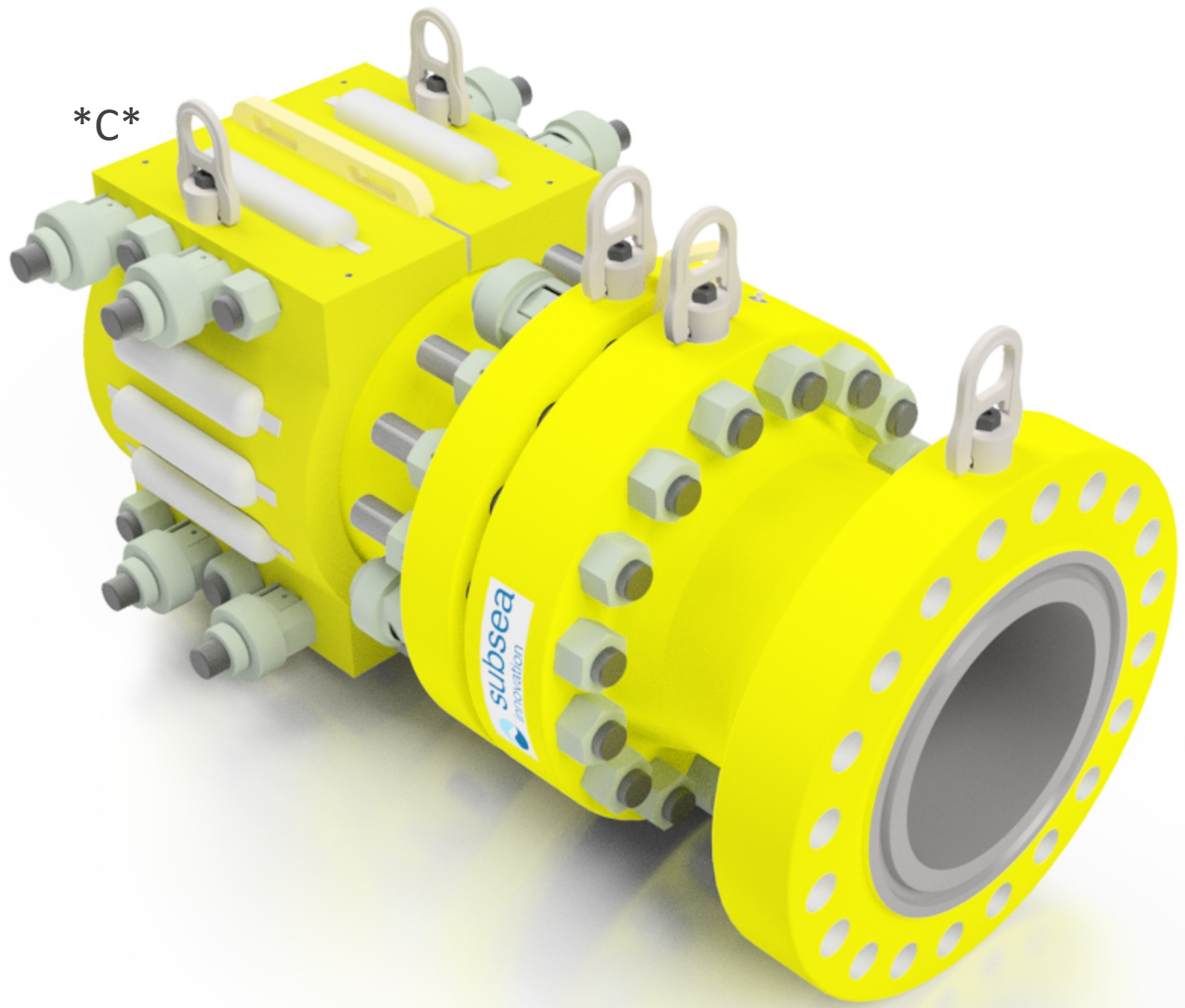
This Certificate is valid until **2023-11-28**.
DNV GL local station: **Aberdeen**

Approval Engineer: **Jonathan Wiggen**

for **DNV GL**
Digitally signed by *Anne Britt Høydal*
Anne Britt Høydal
Date: 2018.11.29 11:38:05
+0100'

Anne Britt Høydal
Head of Section

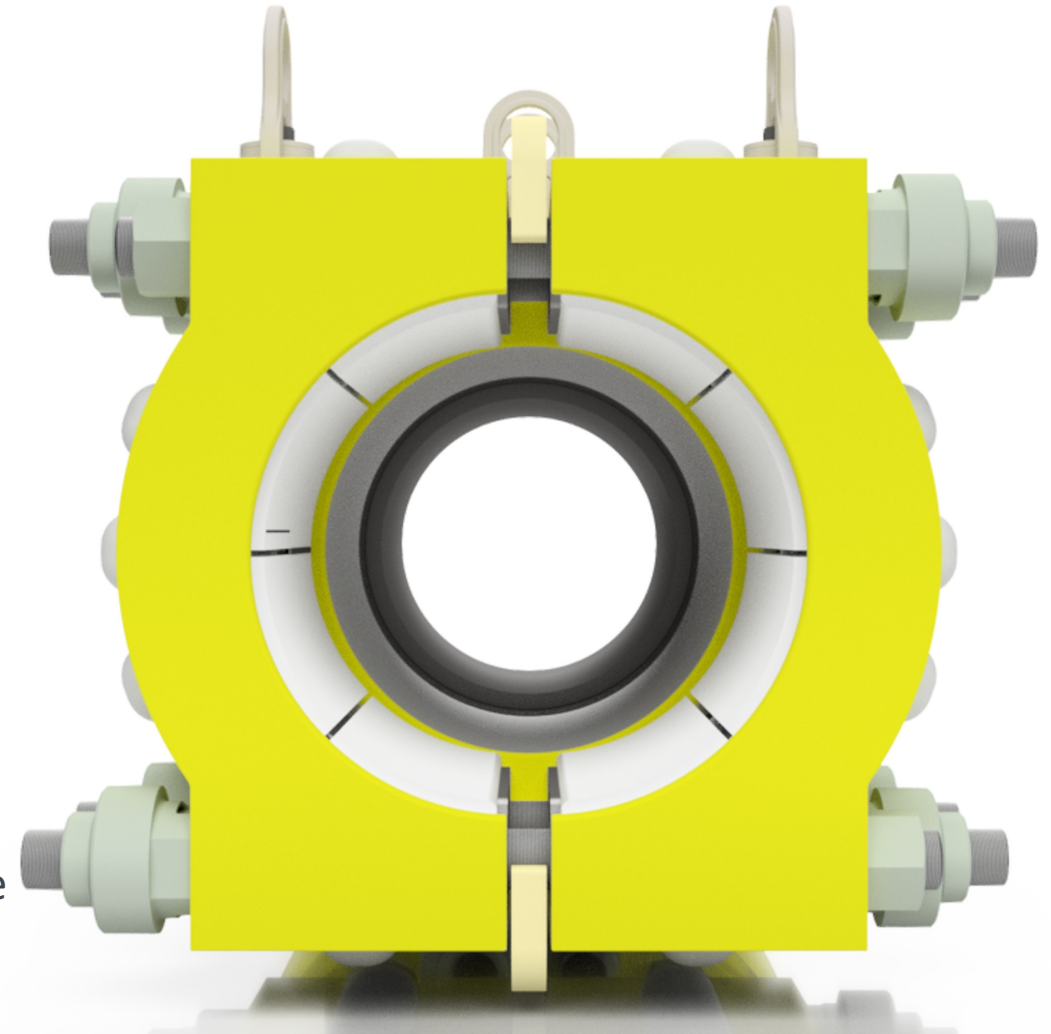
This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



- Collets, Seals and Flange connection bolts are all independently activated.
- Split collet housing (*C*) used to increase pipeline clearance.
- Dual Sealing (Triple option)
- F22 Forged bodies (NACE compliant)
- Inconel Clad
- Inconel Anti Extrusion System
- Interchangeable seals and collets accommodate a range of pipe wall thicknesses.

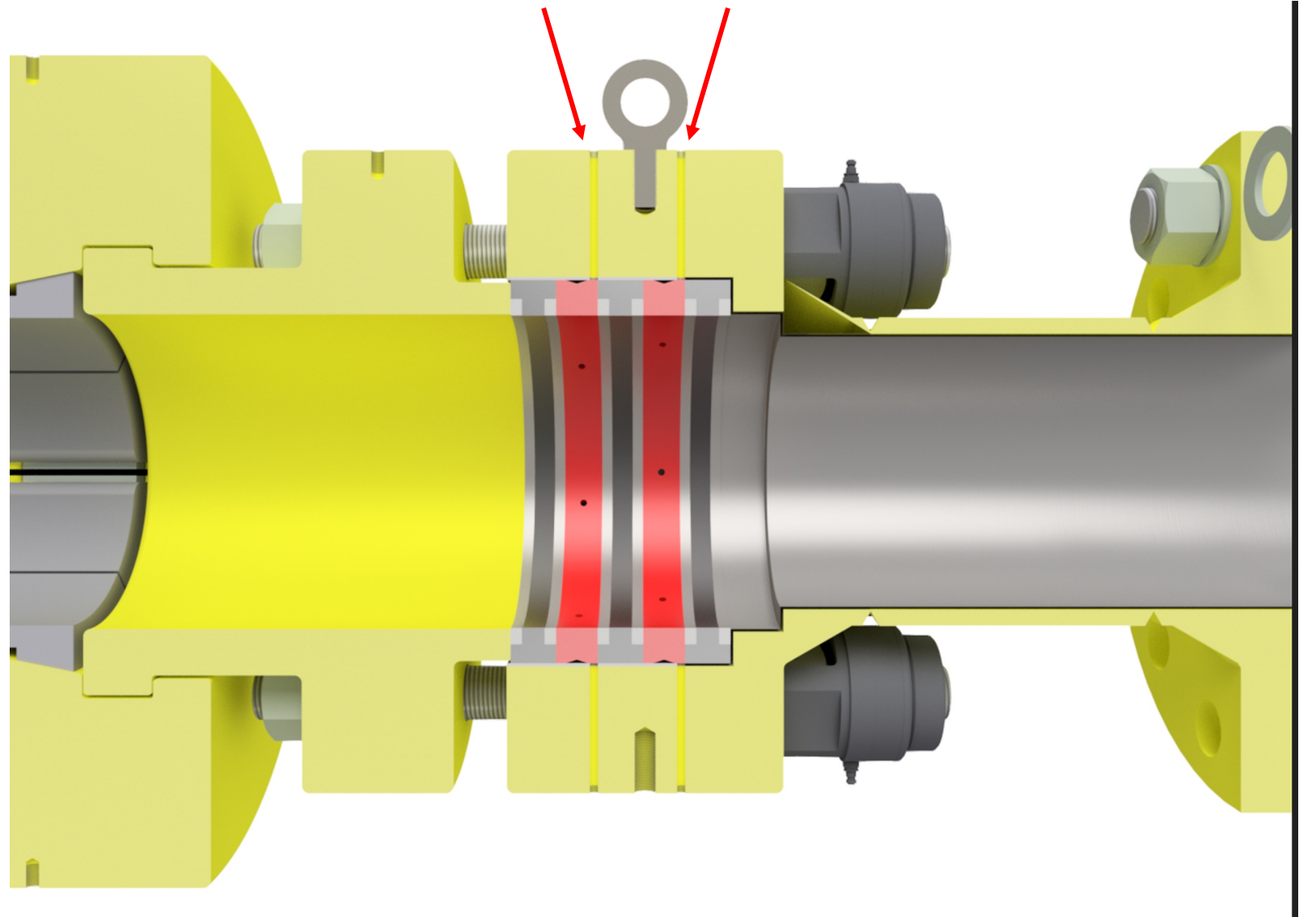


- Wetted Area (*D*) is Inconel clad.
- Split collet housing to increase pipeline clearance.
- Split collet housing increases the clearance in the collet area



Triple Seal Option

- Triple seal - 2 test ports .



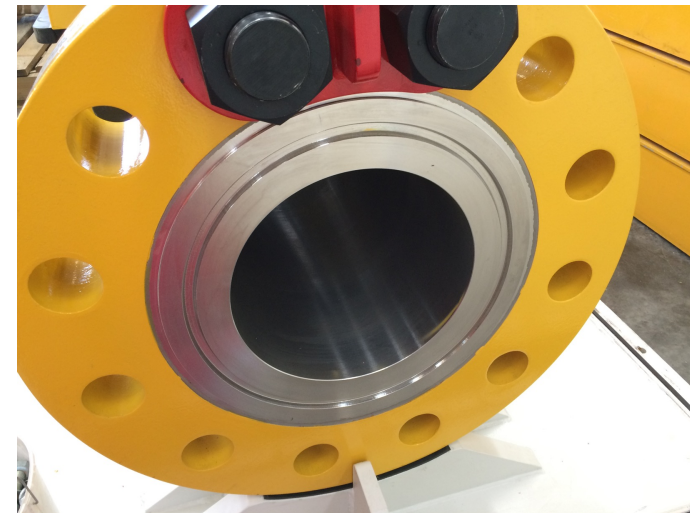
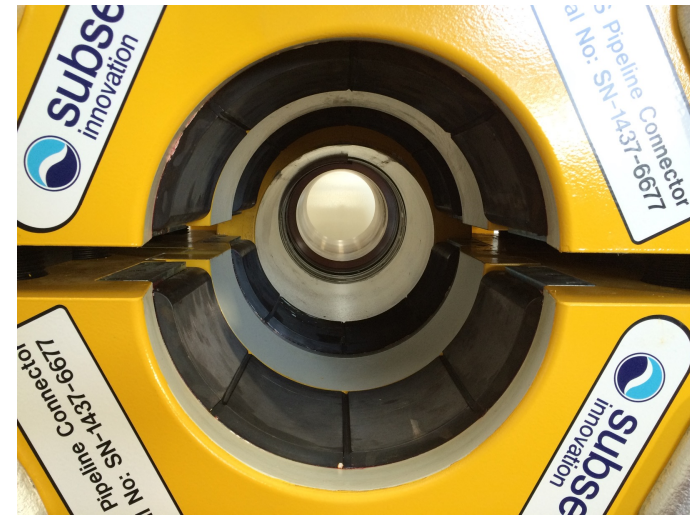
Pair of High pressure 16" Connectors

- 1 x Pair of 16" Connectors hydro-structural test testing
- Back-to-back using a split pipe creating a steel wall effect axial load at test pressure 420 bar.



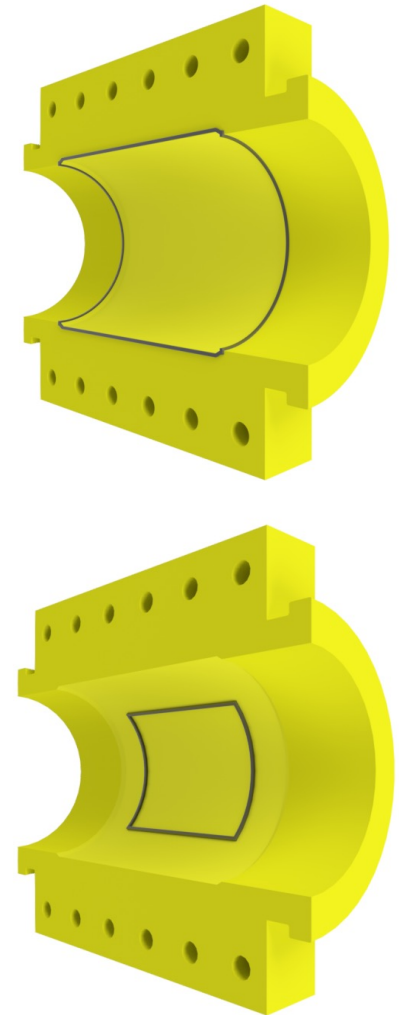
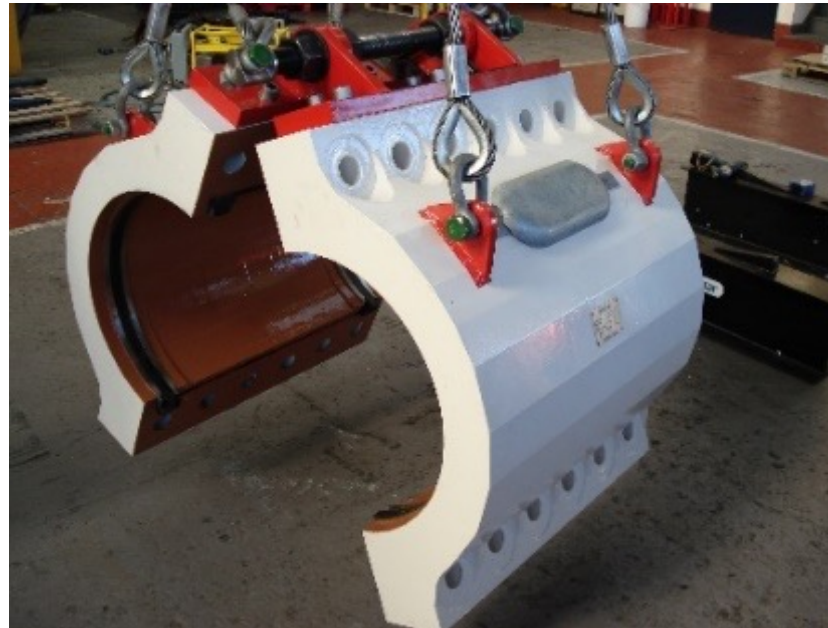
Pair of High pressure 16" Connectors

- All wetted faces are clad
- Split collet housing to increase pipeline clearance.
- Seal, Collet and Spool piece connection are independent.



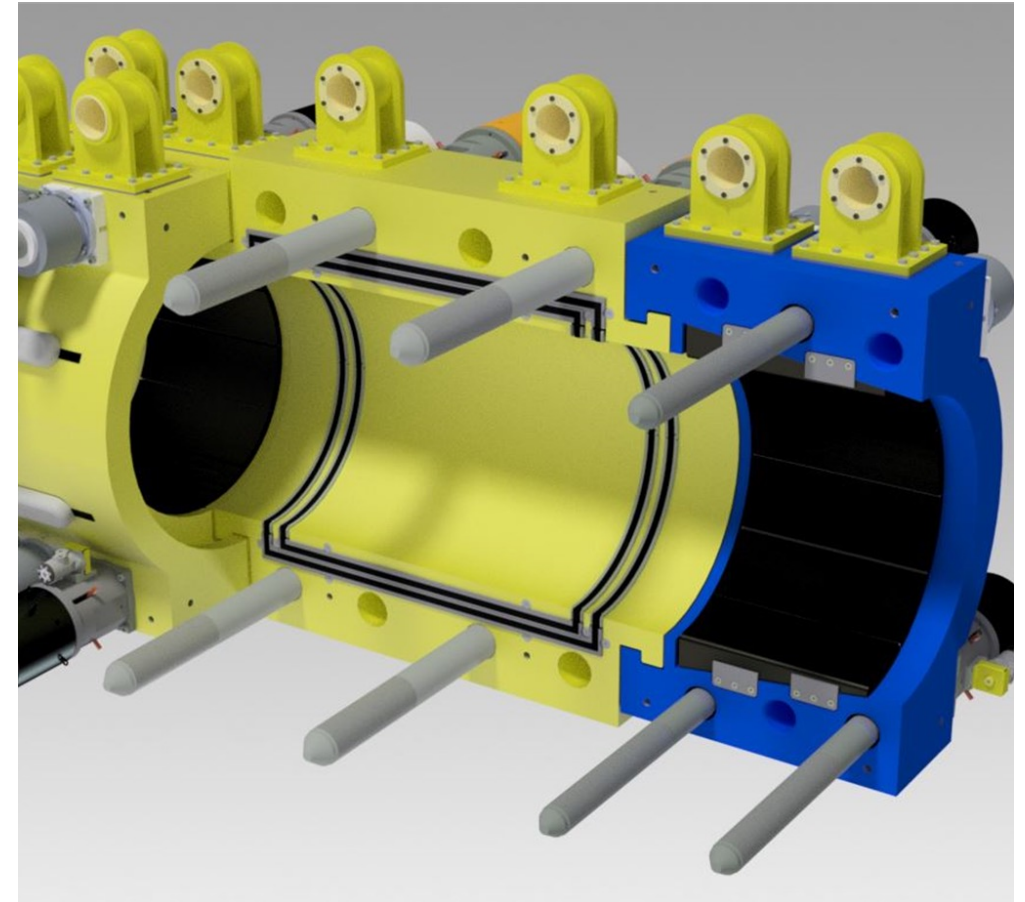
What is a Typical Standard Clamp?

- Hinged install
- Single seal set
- Possibly not full circumferential (TV window)



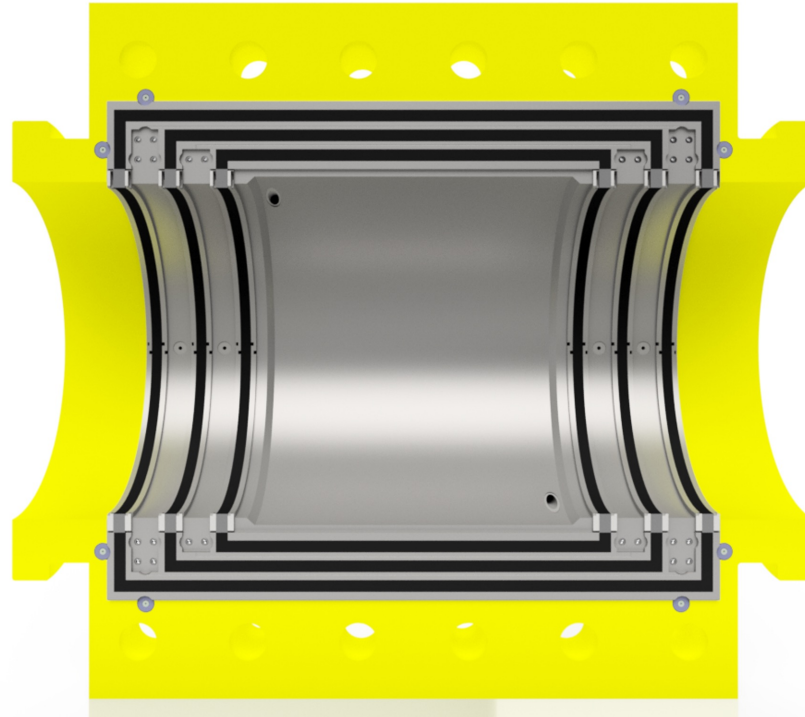
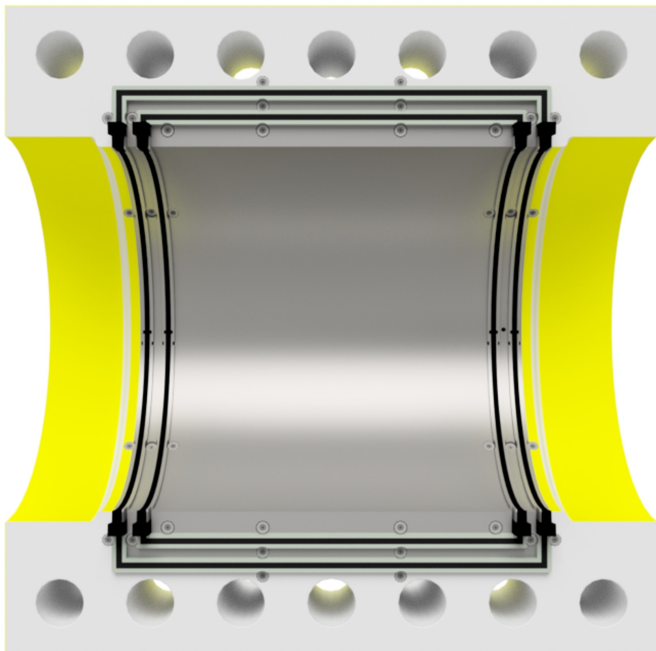
Connector Solutions used in Qatar

- Modular design
 - Collet packs can be added or removed
 - Shared with a same size connector
- Double or Triple seals
 - One complete test circuit
- Interchangeable seals or different pipeline thicknesses
- Interchangeable collet packs for pipeline thicknesses
- Hinged or installation tool compatible
- Grips to uncoated pipe across full API or DNV tolerances
- Self-locking taper, providing a proportional grip increase with axial tension
- Split design to allow bolt pre-load to be applied independently to Seal activation



Dual and Triple Seal sets

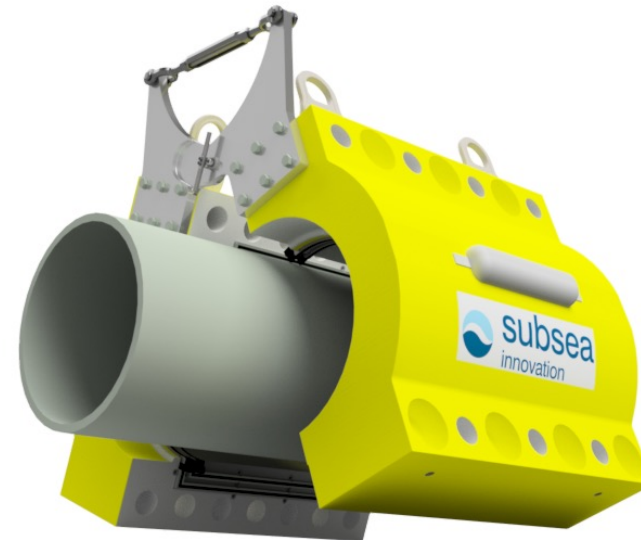
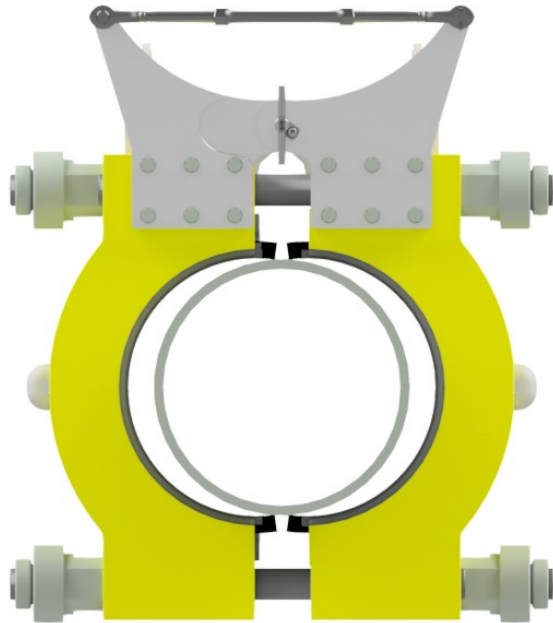
- Dual sea sets
- Triple seal sets
- Complete circuits with 2 possible access points



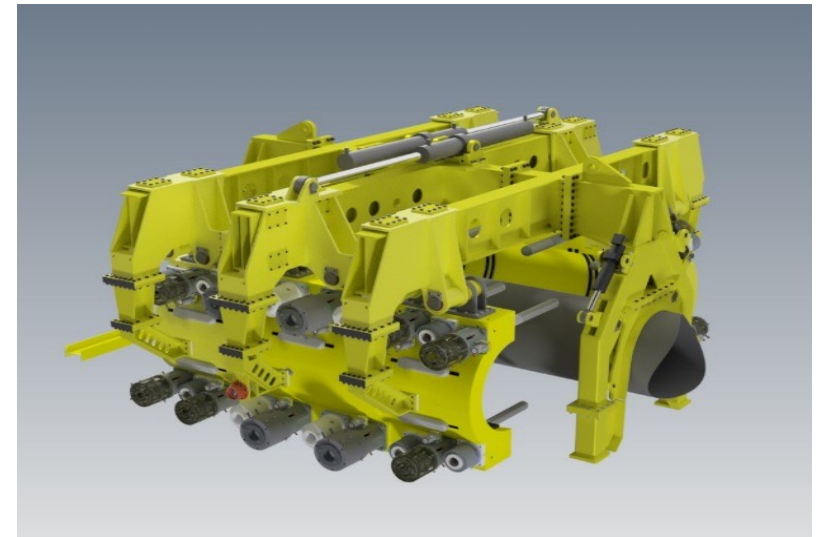
Duel and Triple Seal sets



Simple Hinge design with screw activated closure



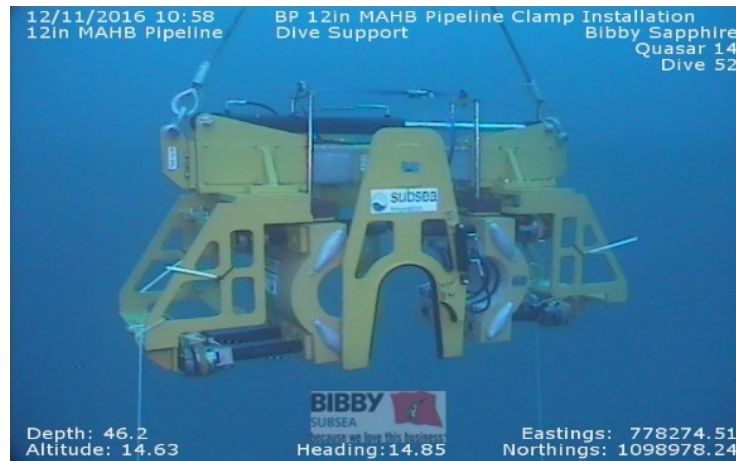
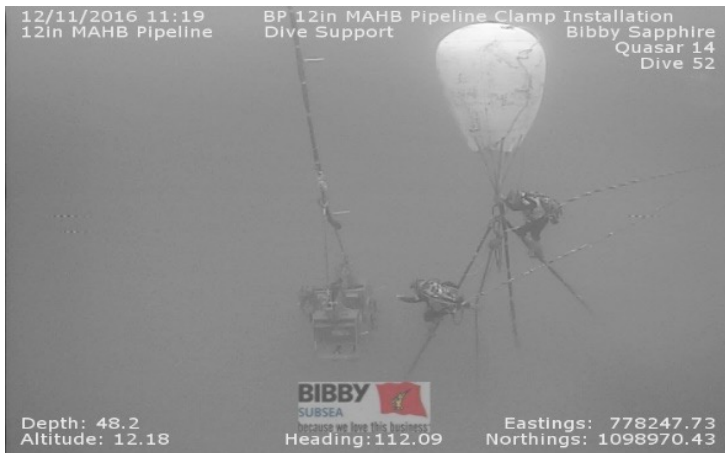
Installation tool options



Installation tool options

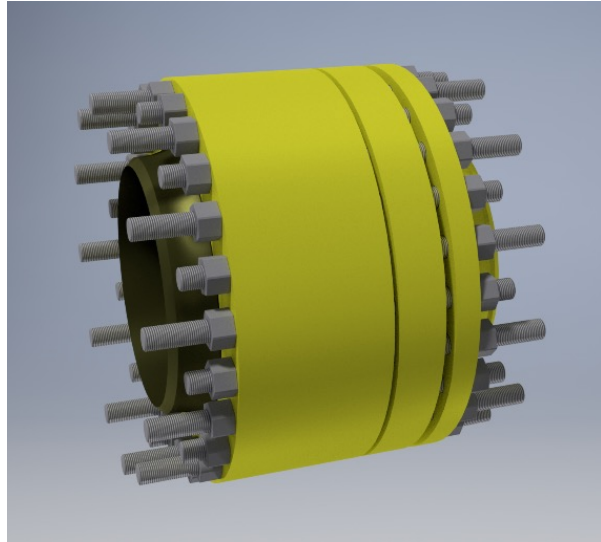


- Controls landing and alignment
- Can be deployed with tensioners and stud bolts fitted at the surface
- Reduces time
- Improves efficiency
- Improves safety
- ROV or diver operated

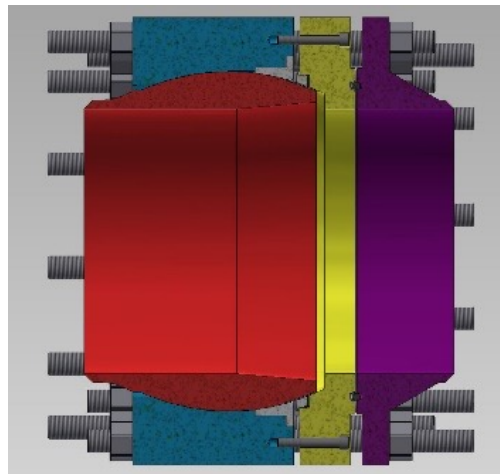




- All structural and Pressure test conducted in house
- Testing of both pressure containment and structural loads
- Full endcap axial load testing completed as standard on all structural connectors and clamps
- (testing carried out on fully split pipeline)
- Additional axial testing loads can be applied by arrangement
- 5m x 5m x 5m Test pit for submerged testing If required



- Swivel and misalignment flanges
- Improves alignment of bolt holes
- Reduces installation time for connectors



Track Record & Past Project

Emergency Pipeline Repair Systems



Standard High Pressure Repair Clamp
(Diver installed)



16" Connectors 420Bar
(Diver Installed)



Standard connectors 38"
(Diver Installed)



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