



RADCO

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About The Company

RADCO Commercial, Engineering and Consultant Startup company is an entrepreneurial venture which aims to provide state of the art engineering products for the smart repair of onshore and offshore pipelines and structures. The company launched in 2018 to offer Reliable, Available, Durable, Cost-effective and Original (RADCO) products to reduce cost and time of pipeline repair. Furthermore, the supervision services to oversee the successful deployment and installation of the products will be provided. With total control of the manufacturing process, RADCO is able to design and develop repair systems specifically tailored to individual client projects. RADCO offers products which justify the following benefits:

- Elimination of the need for costly pipeline shutdowns.
- Offering very competitive prices compared to similar products.
- Presenting innovative products as per client's necessity.
 - Repairing when the integrity has been compromised.
 - Saving the installation dead time.

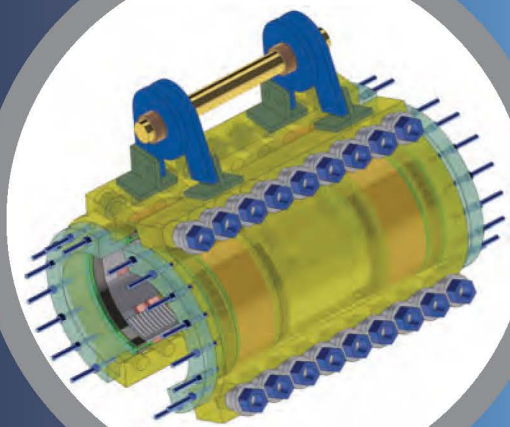
A range of pipeline repair products are supplied including:

- Leak repair products.
- Tie in products.
- Hydraulic pipe to pipe Connectors.



Smart Clamp

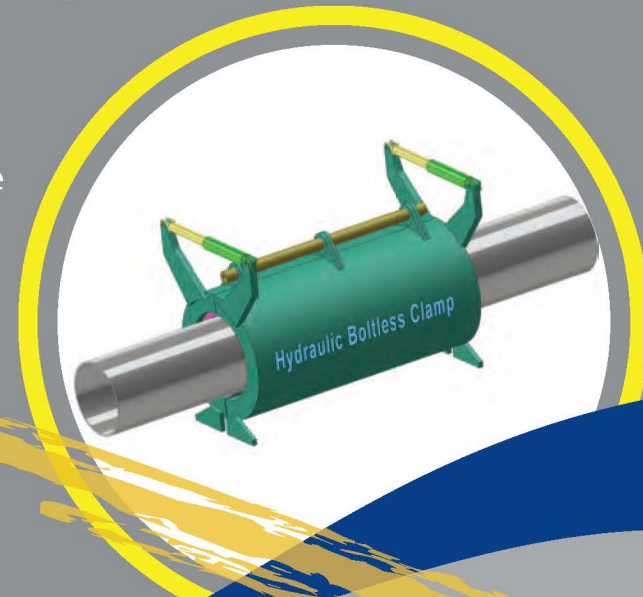
Smart Clamps are split mechanical fittings used to repair a damaged or leaking subsea pipeline. The fittings are available in structural and non-structural versions. The non-structural versions may be used to repair a pipeline that has only minor damage such as pinhole leaks, local pipe wall thinning or shallow dents. The structural versions, replace structural integrity in more severely damaged pipelines with cracked girth welds, kinks, or punctures.



Hydraulic Smart Clamp

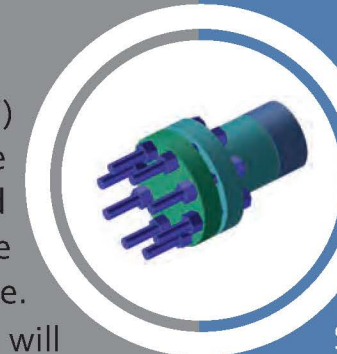
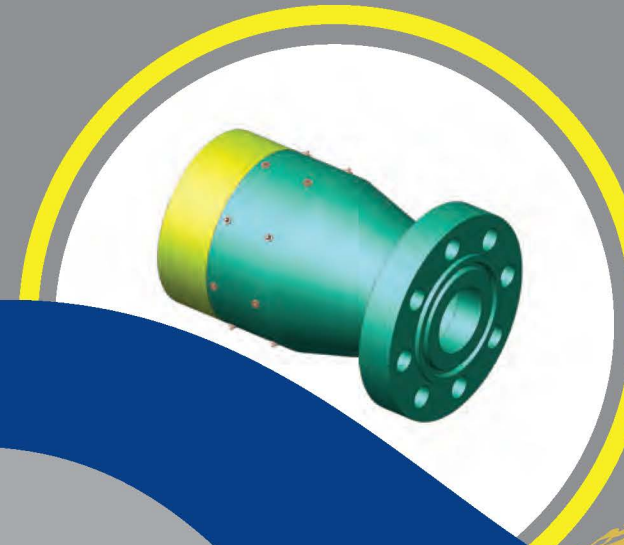
Hydraulic Activated Smart Clamps are innovative products designed to eliminate the time consuming bolt tightening procedure. These products are supplied in both sealing and structural models.

- Very fast installation and activation
- Less operation cost
- Positive mechanical locking mechanism
- Dual seals for long term integrity
- Elimination of the time consuming bolt tightening procedure
- Tolerating high bending and axial force



Hydraulic Smart Flange

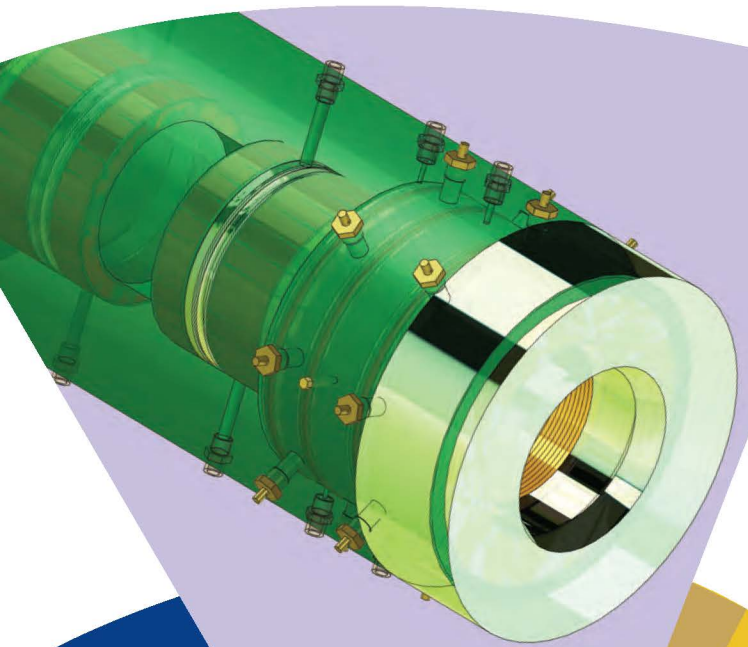
Hydraulic Smart Flanges (HSF) are hydraulically-set smart flange connectors in which sealing and gripping mechanisms are activated by hydraulic pressure. When actuated, HSF Connectors will structurally attach to and seal against the pipe. HSF Connectors can be designed in sizes and pressure ratings to meet any customer requirements.



Smart Flange

Smart Flanges are mechanical pipe end connectors which utilizes grips that mechanically attach to a pipe and create a permanent, structural flanged end on the pipe. A dual seal are considered to deliver long-term integrity and comes equipped with a test port to verify the annulus seal. The connectors are capable of withstanding full pipeline axial, bending and torsional loads while withstanding hydrostatic loads from the pipeline.

- Pipeline Repairs
- Pipeline Reroutes
- Pipeline Abandonments
- Riser Repairs



Smart Hydraulic Pipe to Pipe Connector

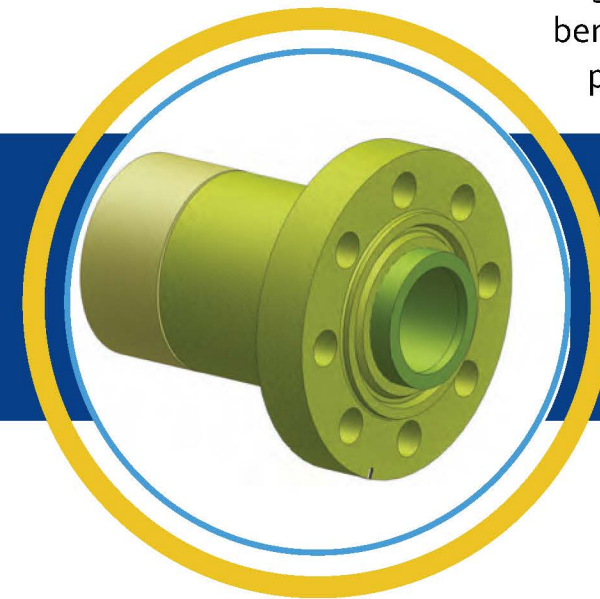
Smart Hydraulic Pipe to Pipe Connectors are designed to provide structural connection against both pipe ends. These products eliminate the use of flange-flange or flange-smart flange connections for tie in and then significantly reduce repair dead time. In order to complete a pipeline repair, both pipeline ends are cut and beveled. Then the pipe to pipe connector is fully replaced on the pipeline at one side. The operator then reacts against the connector and move it until the half of the connector is stabbed over the bare pipe. Once stabbed, the operator starts setting the sealing and gripping mechanism on both pipe ends by hydraulic pressure. After installation, the annulus test will be performed on two test ports available on the products.

- Very fast installation
- Tie in application
- Used with mid spool
- Riser Repairs
- Structural Repairs

Products Technical Specification

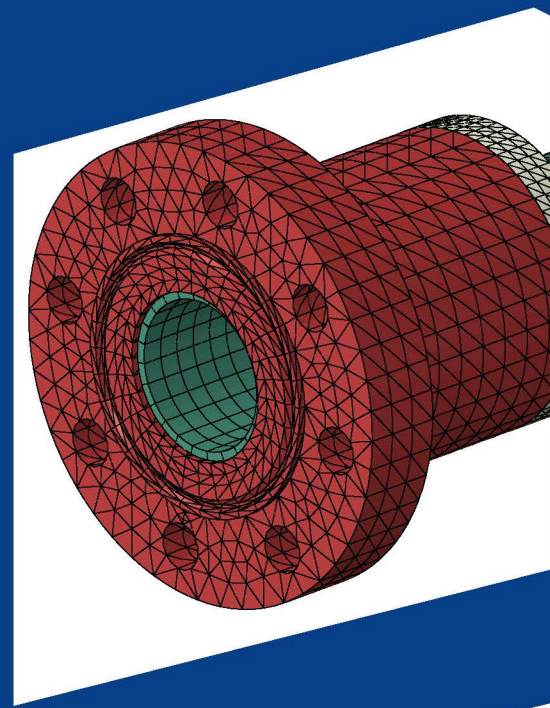
Customized designs are performed in order to tailor the following technical specifications for the offshore and onshore pipelines.

- Less installation dead time.
- Very fast installation time for hydraulic activated models.
- Diver friendly products to ease the installation.
- Less dependency of the installation to the operator.
- Optional grouting and filling ports.
- Inboard seals & outboard grips for NACE compliance (for sour service).
- Dual seals for long term integrity and to enable annulus pressure verification test.
- Smart mechanism to prevent seals failure during installation.
- Typical backup rings to prevent seal extrusion under high internal pressure.
- Longer gripper area to withstand full pipeline axial, bending, and torsional loads while maintaining full line pressure integrity.



The design of the clamps, flanges and connectors will be in accordance with ASME VIII div 2, ASME PCC2 and verified against DNV-RP113, Recommended Practice for Pipeline Repair. General Design considerations are listed below:

Design Philosophy



- Products are designed to be used on pipe that meets the tolerances and ovality listed in API 5L.
- Nominal Pipe Size of any API Specification 5L pipe , e.g. 4inch and 32 inch, wall thickness and grade are considered.
- Design Temperature Range is considered as (0°C) to (100°C).
- Products will be applicable for standard service such as crude oil, natural gas, hydrocarbons, sour service, water or chemical injection, etc.
- Smart Clamps incorporate sacrificial anodes to provide cathodic protection.
- Dual seals each end would be supplied to enable a pressure verification test.

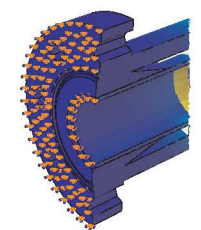
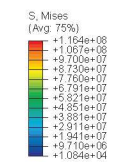
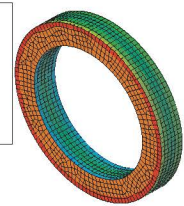
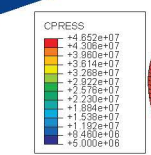
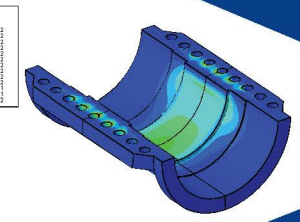
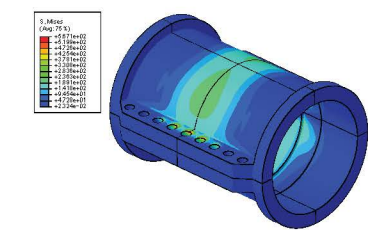
- Typical innovative products design according to client requirement.
- Pilot design of installation set up on the workshop to brief installation team.
- Subcontract international consulting companied to provide solutions and products for any unpredicted failure.

Engineering Support

- Failure analysis of any pipeline leaks and full bore ruptures.
- Comprehensive FE Analysis for any client requirements.
- On site engineering support for product installation.

Detail design

A range of products are designed and supplied to modify repair operation in terms of time and cost. Moreover, customized designs will be performed according to the client specific requirement. A detail design will be performed including FEA analysis of the product and hand calculations with respect to accepted codes and standards. All 3D models and detail drawings are generated using SolidWorks and AutoCAD. FEA analyses are performed by Abaqus and other respective softwares. Upon request, detail finite element analysis for typical circumstance stated in DNV standards, BS 7910 and other standards will be conducted, e.g. ECA.



Manufacturing

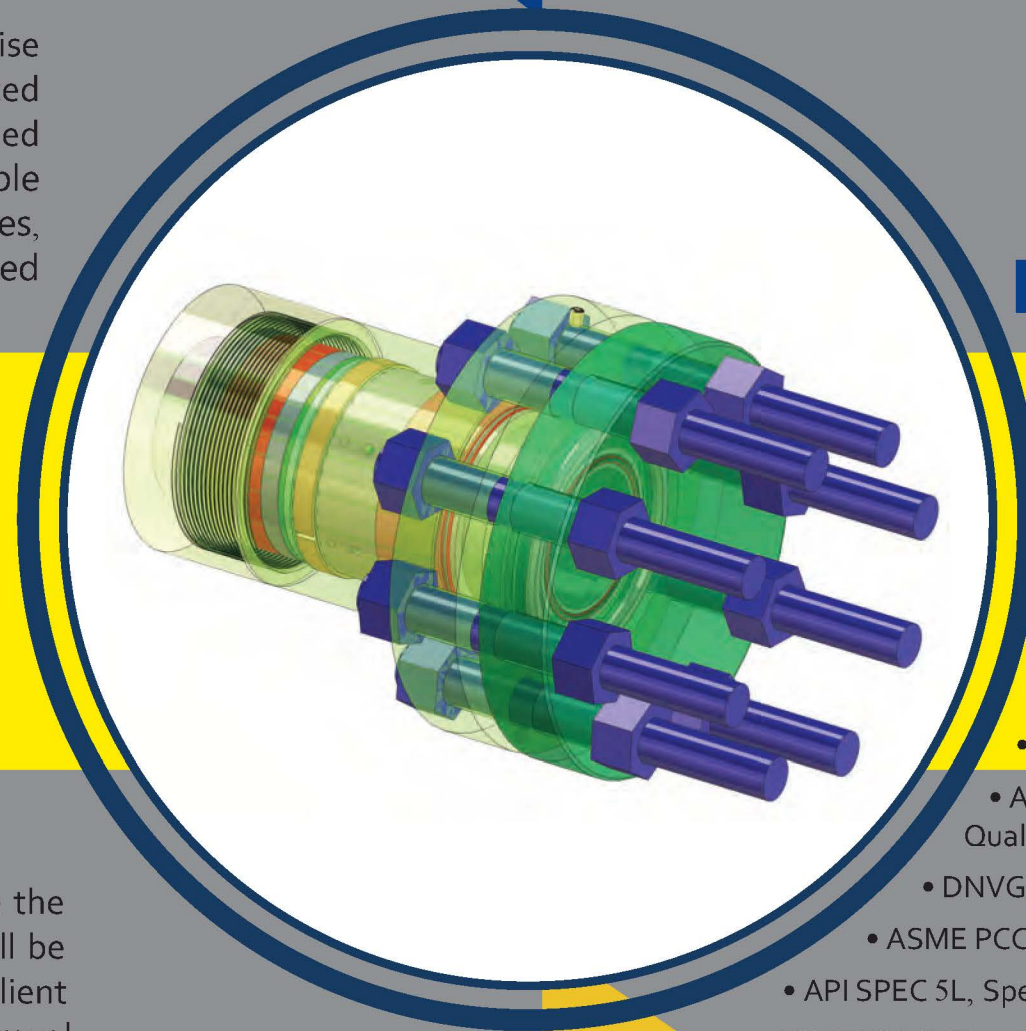
Manufacturing are performed by CNC and high precise machining tools. All manufactured components are subjected to %100 inspection and quality control. All machined components will be done by the following facilities available at the main workshop. For typical circumstances, machining would be outsourced to approved manufacturers.

- Heavy duty floor type NC boring
- Heavy duty milling
- Heavy duty lathe machining
- Heavy duty carousel machining
- Casting utilities
- Heavy duty plate rolling machine

Testing and Inspection

Products will be subjected to a FAT test to demonstrate the intended and required functionality are met. All testing will be performed by competent persons in the presence of the client and third party. The FAT procedure will be submitted for approval prior to commencing of any tests. Testing shall include:

- Proper assembly and interaction between internal components
- Activation
- Hydrostatic test
- Proper overall functionality



Industry standard references

- API SPEC 6H, Specification on End Closures, Connectors and Swivels.
- ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 and 2.
- NACE MR 0175, Part1 & Part2 (resist sulfide stress cracking).
- ASME B31.8, Gas Transmission and Distribution Piping System.
- ASME B31.4, Piping Transportation System for Liquid Hydrocarbons and other Liquids.
- DNV RP-F113, Pipeline Subsea Repair.
- DNV Recommended Practice RP B401, Cathodic Protection Design.
- ASME Boiler and Pressure Vessel Code, Section IX Welding and Brazing Qualifications.
- DNVGL-RP-F113, Pipeline Subsea Repair - Rules and Standards.
- ASME PCC1, Guidelines for Pressure Boundary Bolted Flange Joint Assembly.
- API SPEC 5L, Specification for Line Pipe.
- ASME B16.5, Pipe Flanges and Flanged Fittings.
- ASME B31G, Manual for Determining the Remaining Strength of Corroded Pipelines.
- ASME PCC2, Repair of Pressure Equipment and Piping.
- DNV-OS-F101, Submarine Pipeline Systems.