

# A DIVERLESS SOLUTION TO SHALLOW WATER TIE-INS

## CASE STUDY

### HOW DEEPWATER TECHNOLOGY WAS USED COST-EFFECTIVELY TO REPLACE DIVING IN A BARE-PIPE SHALLOW WATER TIE IN APPLICATION.

The subsea pipeline repair market is increasingly demanding ROV-installed solutions, for life extension projects such as the tie-in of new assets to existing infrastructure. This 'diverless' approach proven in deepwater environments is now being utilised in shallower water depths as a response to the safety-case for eliminating the risks associated with diving, and the diminishing availability and increasing cost of saturation-spreads and vessels.

Connector Subsea Solutions (CSS) is a clear world-leader in the provision of pipeline intervention tools and equipment, with unrivalled experience of ROV-operated repair and connector installation applications beyond diver depths. Our recent focus has been to transfer these proven solutions into shallower water environments and deliver them at a sustainable cost, thereby providing clients with a viable alternative to the use of divers. Rated to 3000mwd, the CSS MORGRIP® 3000R range of mechanical pipeline connectors were holistically developed alongside its installation, pipe-handling and preparation equipment inventory optimised for fully remote operation. Together,



SSIV Skid mounted with diverless connectors, awaiting installation

the system provides a robust and reliable, cost-effective repair or tie-in solution, regardless of water-depth.

The use of mechanical connectors is a key element of pipeline repair at any depth, having overtaken hyperbaric welding in terms of practicality and cost whilst matching its performance and longevity. The CSS MORGRIP® connector product has a 30-year track record of pipeline repair, with an unrivalled number of these being in deepwater. These include numerous world's-firsts, such as the first diverless rigid riser repair. The experience CSS has developed is invaluable, in an environment where the cost of failure and environmental risk is monumental.

The most recent 'acid-test' of CSS' diverless capability came in the 2020-21 bare-pipe diverless tie-in of an SSIV skid to an existing shallow water pipeline in Trinidad and Tobago, performed using CSS ROV-operated equipment. The client elected to eliminate the use of divers in favour of CSS' diverless technology, and the SSIV was successfully installed using two 12" MORGRIP® pipe-pipe couplings to attach the existing pipeline to either side of the SSIV.

### APPLICATION OVERVIEW

The Barracuda subsea field is located in Block 5C, approximately 90km off the east coast of Trinidad and Tobago, in the East Coast Marine Area (ECMA). The development consists of a subsea tie-back to the Shell operated Dolphin A production platform (DAP) via the existing Dolphin Deep (DD) subsea infrastructure. CSS' client, TechnipFMC, required the supply of two 12" pipeline connectors and associated installation equipment, to allow the installation of a wye connection with SSIV to the existing Dolphin Deep pipeline, to allow safe operation of the newly tied-in field.

The project was to be completed;

- Through entirely diverless operation from a standard construction support vessel
- At comparable cost and duration to completing the project with diver support

CSS worked closely with TechnipFMC in the planning, design and manufacture of the methodology and equipment, including extensive integration testing ahead of mobilisation. The CSS scope of supply included both standard connectors and products as well as built-for-purpose equipment:



12" CSS MORGRIP® 3000R Diverless Pipeline Coupling

- Two MORGRIP® diverless mechanical couplings – capable of directly joining two bare-end pipes. This product has been supplied for approximately 100 similar applications, for use either with CSS or customer-owned installation equipment
- The connectors were used at each end of an SSIV skid, modified by CSS to include activation trolleys and fine alignment claws to assist in pipe alignment prior to connector activation

In addition, CSS provided numerous other fully remotely operated tools and equipment from its own standard equipment rental inventory. This equipment is designed for convenient transportation around the world to perform a variety of IRM applications via ROV, with the emphasis on certainty of outcome. The scope of supply included;

- Pipeline lifting and handling frames (PLHFs)
- Pipeline coating removal tool – critical to the success of installing any bare-pipe mechanical connector
- ROV skids and control packages
- Technician on-site support

## INSTALLATION PROCESS

After measuring and cutting the existing pipeline and removing this section, the SSIV skid was inserted in line with the existing pipeline and connected to the two cut pipe-ends by the MORGRIP® connectors. The summarised steps of the installation methodology are as follows:

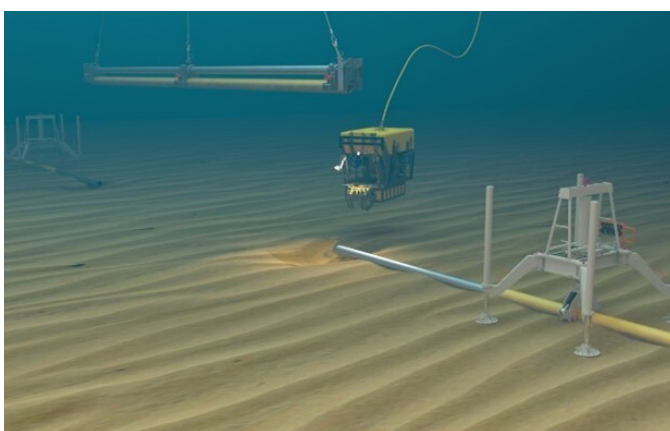


Illustration of pipe cutting process

- ① Lift pipeline clear of seabed: CSS pipeline lifting and handling frames raise and provide lateral movement to allow access around the circumference of the pipe for the operation of tooling.
- ② Remove pipeline coating: CSS coating removal tool is used to remove coating to a bare metal finish thus ensuring connector seal and grip is not compromised by residual coating.
- ③ Repeat pipeline coating removal in second location.
- ④ Rough-cut pipeline and recover the cut pipe section – using an industry-standard diamond wire cutting tool.
- ⑤ SSIV deployed to the seabed with MORGRIP® connectors pre-mounted on the skid. The skid is inserted between the cut ends of the existing pipeline.
- ⑥ Final cut-to-length of pipeline, ensuring distance between pipe-ends within connector installation tolerance.

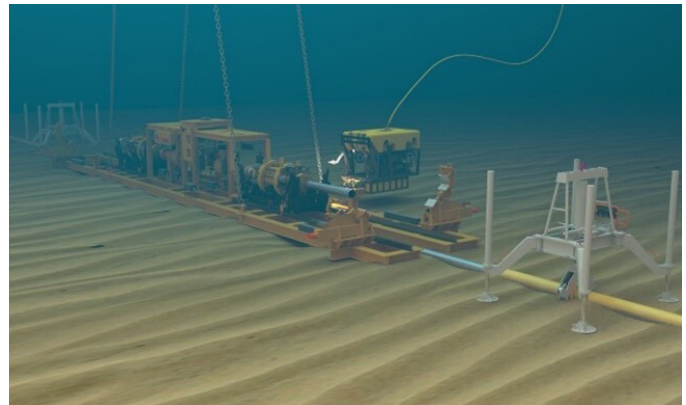
- ⑦ Pipe-end preparation – the pipe-end preparation tool allows the removal of any skew profile from the cutting and any sharp edges after the pipe is cut, as well as adding a leading chamfer onto the pipe.
- ⑧ Alignment of pipe-ends – this critical process is performed by the PLHFs and the fine alignment and centralising feature on the skid. It ensures the MORGRIP® connector can be slid into the correct position over the pipe join.
- ⑨ MORGRIP® coupling moved into position over pipe-ends via a hydraulic push/pull system within the SSIV skid.
- ⑩ Coupling activated and tested via ROV and topside control systems. The connector includes position indicators and sensors to confirm correct activation. External pressure testing confirms that seals have set correctly and retain full hydrotest pressure.
- ⑪ Repeat steps 6-10 for second cut location (opposite side of SSIV).

Thus completing the SSIV installation.

Total operating time, excluding deployment time of the equipment to and from the seabed was approximately 24 hours.

For more information about this project contact John Spain, Business Development Manager – [john.spain@connectorsubsea.com](mailto:john.spain@connectorsubsea.com)

To learn more about Connector Subsea Solutions visit [www.connectorsubsea.com](http://www.connectorsubsea.com)



SSIV positioned and aligned with existing pipeline

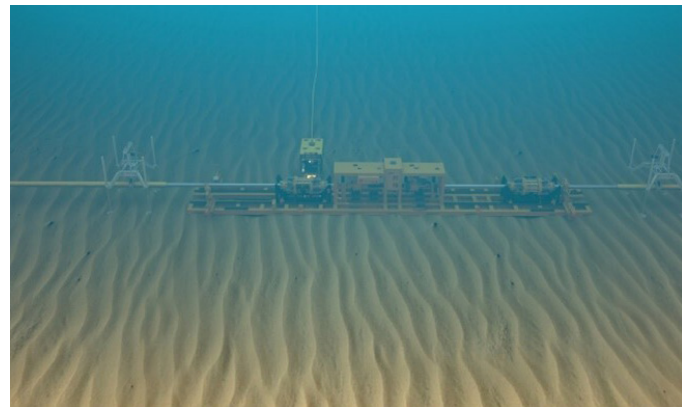
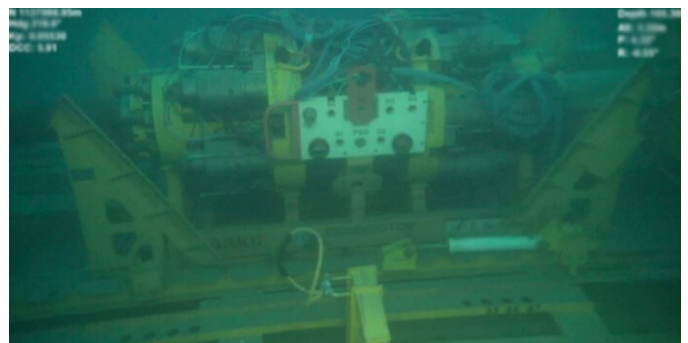


Illustration of SSIV and ROV-operated installation equipment



Connector activated on pipeline



"As left" picture of downstream connector