

Offshore Drilling Rig Weld Inspection with Diverless ACFM®



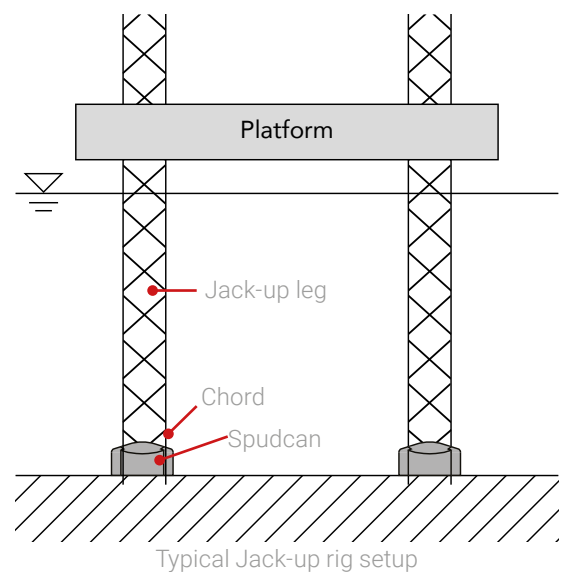
THE CHALLENGE

TSC Subsea responded to an urgent inquiry to inspect a mobile offshore drilling unit (MODU) or a Jack-Up drilling rig, which is widely used in offshore well drilling in the oil and gas industry. This specific drilling rig was situated in the North Sea. The client's primary concern was the weld integrity of the critical leg-to-spudcan connections.

Spudcans play a pivotal role in offshore drilling by ensuring rig stability and the safe and efficient execution of drilling operations. Their design effectively distributes the rig's weight over the seabed, preventing subsidence into the soft ocean floor sediment.

The need for this inspection arose from a recent visual assessment that reported a possible crack-like indication. The limitations of underwater visual inspections necessitated a more comprehensive evaluation to confirm weld integrity, allowing the client to make an informed decision on its operations.

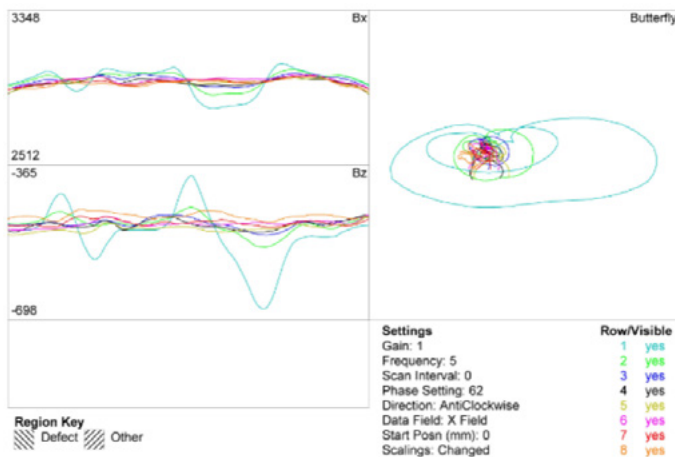
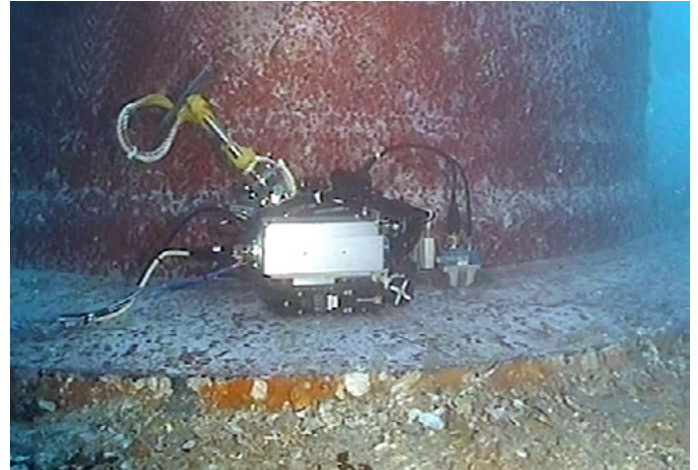
The inspection involved nine chord-to-spudcan connections, comprising of 18 welds, with additional locations specified by the surveyor, bringing the total number of welds to 23, spanning approximately 69 meters.



THE SOLUTION

Initially, the client requested an Eddy Current (EC) inspection, which is more suited to clean, topside environments as found in the aerospace and nuclear market. TSC Subsea proposed a more suitable approach, Alternating Current Field Measurement (ACFM®). ACFM is a mature, certified and accepted technique and offers numerous advantages for subsea inspections, including increased tolerance for surface condition, probe lift-off and coatings.

TSC Subsea had successfully deployed ACFM robotics for structural weldments on offshore structures for several years, earning approval from class societies such as DNV and ABS.



NDT Technology

ACFM, an electromagnetic inspection technology, is widely recognised and approved by major certification bodies such as DNV, BV and ABS. It has a proven track record in detecting and sizing subsea surface-breaking cracks in welds, replacing traditional non-computerized methods like magnetic particle inspection (MPI). ACFM reduces user dependency and generates computerised, auditable reports.

ACFM demonstrated significantly fewer missed and spurious signals compared to EC testing, resulting in shorter inspection times, increased probability of detection (PoD) and optimising inspection campaigns.

Deployment

The inspection was scheduled during the harsh winter months, bringing additional challenges, and planning required careful consideration of environmental conditions.

To deploy the ACFM technology effectively, the team chose the reliable MagCrawler equipped with a TSC Subsea's custom array probe, maximising coverage per scan. This diverless robotic solution features remote-controlled scanning capabilities, which smoothly navigates the ACFM array probe along the welds while detecting and sizing potential cracks in the welds and surrounding areas.



PROJECT HIGHLIGHTS

- ✓ Rapid deployment and execution in harsh winter conditions.
- ✓ MagCrawler delivered a cost-efficient, effective, and dependable solution.
- ✓ Reliable ACFM technology ensured precise crack identification and measurement.
- ✓ Enhanced personnel safety through the use of a non-diver scanning solution.

Before each dive, the ACFM equipment underwent a pre-dive function check by TSC Subsea's ACFM L3 operator to ensure proper operation. This check was repeated at the end of each dive to validate scan data. Additionally, a pre-dive function check of the MagCrawler confirmed the functionality of drive motors, compliant probe mount motion, and camera views.

The MagCrawler was transported to the inspection surface by a Remotely Operated Vehicle (ROV). Once a secure contact was confirmed, the ROV released the MagCrawler and observed the inspection from a safe distance. All welds were thoroughly inspected by the MagCrawler covering heat affected zone (HAZ), toe and cap, ensuring complete coverage.



THE RESULT



The combination of robotically controlled and consistent scan speed, custom array probe and meticulous inspection procedures resulted in high-quality, repeatable, and consistent scan data. No indications or cracks above the reporting threshold were detected during the inspection, enabling the client to proceed with operations confidently.

The project's turnaround time, from purchase order to the final report, was completed within eight weeks despite the winter conditions. This timeframe included scope review, equipment preparation, logistics, and actual operations. The successful completion showcased TSC Subsea's operational efficiency and commitment to meeting project deadlines.

In summary, the integration of ACFM technology and the MagCrawler provided a cost-effective, efficient, and reliable solution for inspecting critical welds on the offshore jack-up drilling rig spudcan connections. This approach ensured the safety and uninterrupted operations of the client's valuable asset.

UK

Davy Avenue
Knowlhill
Milton Keynes MK5 8PB
UNITED KINGDOM

T: +44 (0)1908 317444

NORWAY

Glasskaret 1
5106 Øvre Ervik
Hordaland,
NORWAY

BRAZIL

Av. Republica do Chile 330,
14o andar, Torre Oeste, Centro,
20031-170 –Rio de Janeiro
– RJ, BRAZIL

T: +55 21 3983 1890

US

c/o NDT Global LLC
15500 International Plaza Dr,
Houston, TX 77032,
USA