



**TSC**  
SUBSEA

# SUBSEA ROBOTIC INSPECTION SOLUTIONS

Hull Surveys

[www.tscsubsea.com](http://www.tscsubsea.com)





# Keep Moving Forward

## Ensuring Continuous Operations with TSC Subsea's Innovative Solutions

Over the past decade, TSC Subsea has emerged as a leading technology-enabled service provider in the field of diverless robotic subsea inspections. With a strong focus on innovation, TSC Subsea has actively pioneered the development and implementation of advanced proprietary Non-Destructive Testing (NDT) technologies, addressing the challenges associated with in-service hull inspections.

Through close collaboration with operators worldwide, TSC Subsea has harnessed its expertise to deliver underwater robotic solutions. Our primary objective is to assist our clients in ensuring the safety and integrity of their ship hulls and floating production platforms. We are dedicated to providing comprehensive inspection, which enables our clients to conduct accurate asset integrity assessments.

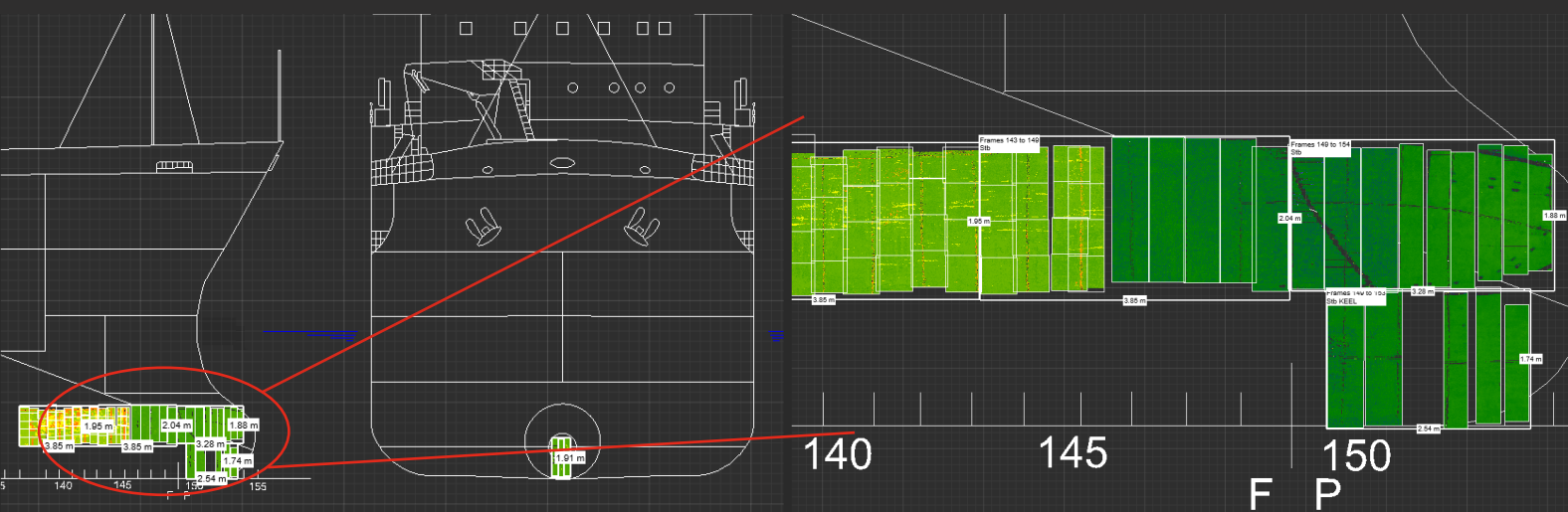
In the past, the hull of large tankers and FPSOs (Floating Production, Storage, and Offloading vessels) was often seen as a basic structure solely supporting production and process equipment. The hull's condition was considered low-risk, with a perceived low probability of failure. However, recent changes in FPSO classification standards now require a drydock hull inspection every five years.

Conducting a drydock inspection presents challenges due to its unique nature, and the associated costs, including production loss, can be significant. Some operators have chosen not to classify their assets. Instead, they opt to apply the principles of structural integrity management strategies used for fixed assets to their floating assets and conducting hull inspections while the vessel is in-service.



The challenges are not exclusive to the Oil and Gas industry alone. The maritime and shipping sector has also recognised the significance of faster and more productive non-intrusive weld inspection and corrosion mapping for a ship's structure, while in-service brings major benefits. Moreover, the naval defence industry increasingly seeks in-service inspection solutions for their ships and submarines.

Traditionally, in-service hull inspections were conducted by teams of divers. However, with the technological advancements in the industry, there has been a shift towards diverless robotics solutions. This change has been driven by safety concerns and the desire for more efficient, data-rich, effective solutions for in-service or Under water inspections in lieu of drydock (UWILD) inspections.



# HULL SURVEYS

## WALL THICKNESS MEASUREMENTS AND CORROSION MAPPING

### TSC SUBSEA'S SOLUTION

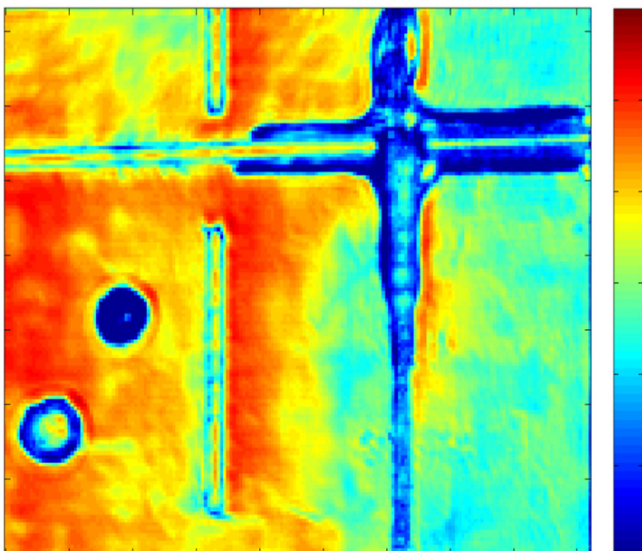
- > Non-contact method requires less surface preparation.
- > Exceptionally resilient to soft marine growth.
- > Quantitative wall thickness measurement with highly accurate depth sizing of +/- 0.2 mm.
- > Unmatched coating penetration, even when dealing with thick attenuative materials.
- > Corrosion mapping of external and internal surfaces.
- > Detect coating disbondment & degradation.
- > Geometry measurements for assessing dents and other anomalies.

### ACOUSTIC RESONANCE TECHNOLOGY (ART)

TSC Subsea's proprietary ART has gained significant recognition within the subsea inspection field. Its exceptional capabilities for coating penetration and high accuracy in conducting through-wall inspections of ferrous materials make ART an excellent choice for conducting hull integrity assessments.

At the heart of TSC Subsea's ART lies its patented ultra-wideband acoustic inspection technology, surpassing existing inspection technologies in terms of penetration and measurement capabilities through coatings.

ART distinguishes itself from other NDT technologies due to its non-contact nature and remarkable tolerance to marine growth. When coupled with its coating penetration capability, it enables corrosion mapping of internal surfaces, even in regions with stiffening plates.



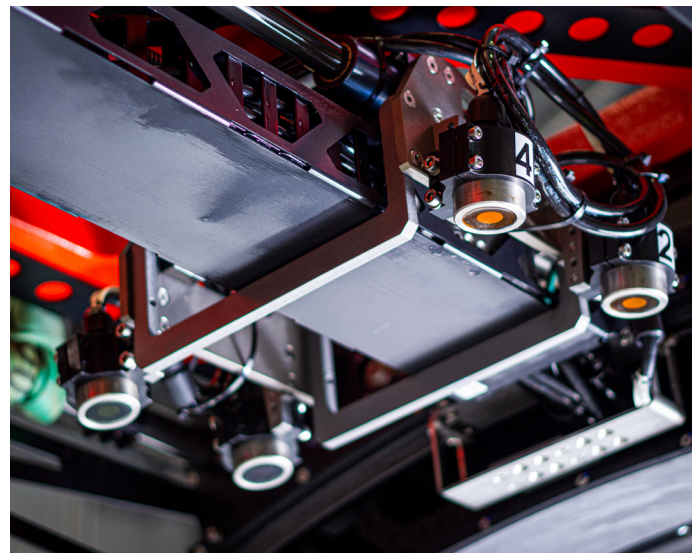
ART scan data detailing wall thickness measurements and internal fixings.

### HULLSCANNER™

The HullScanner is deployed remotely using either work or inspection class ROVs. The ROV places the HullScanner onto the vessel, which is then securely held in place by strong magnets. Thanks to the integration of multiple sensors, the scanning time is significantly reduced, with a 1 m<sup>2</sup> inspection taking only 30 minutes.

The HullScanner maintains direct communication with the top side, enabling data to be processed and accessed in real-time during the scanning operation, providing instant assessment capabilities.

By acquiring accurate data through direct wall thickness measurements while the floating vessel remains in-service. This capability facilitates the calculation of corrosion rates, allowing for more dependable asset integrity assessments without any disruption to production or service.



4 ART sensors for maximum productivity.





# WELD INSPECTION

## BILGE KEELS AND HULL WELDS

### TSC SUBSEA'S SOLUTION

- > Field proven Alternating Current Field Measurement (ACFM®).
- > DNV, ABS and Lloyds approved.
- > Crack detection and sizing through coatings.
- > Accurate and auditable inspection data.
- > Deployed by ROV or via deck launch.
- > High Probability of Detection (PoD).
- > Array probe for greater coverage and efficiency.

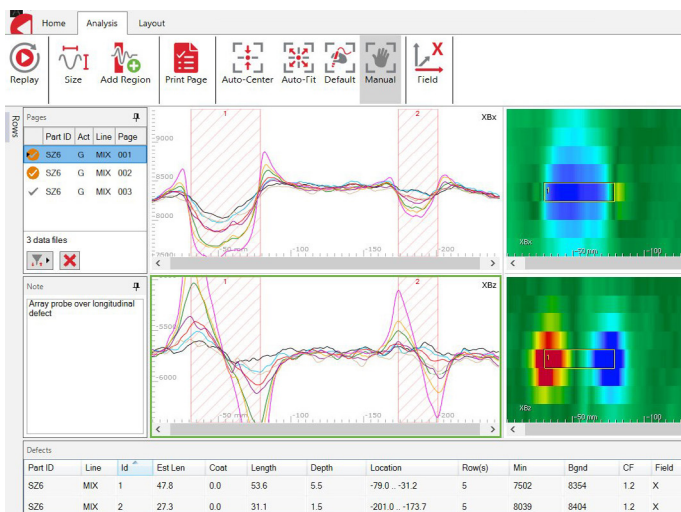


### ACFM

Regular inspections of the structural hull and bilge welds are crucial to identify cracks and defects resulting from dynamic loading.

TSC Subsea's ACFM electromagnetic inspection technology has been the method of choice for detecting and sizing subsea surface-breaking cracks in critical welds for over a decade.

Recognised and approved by many certification bodies, including DNV, ABS and Lloyds, the technique has been used successfully to supersede traditional non-computerised and more user-dependent methods, such as magnetic particle inspection (MPI) for subsea weld inspection.



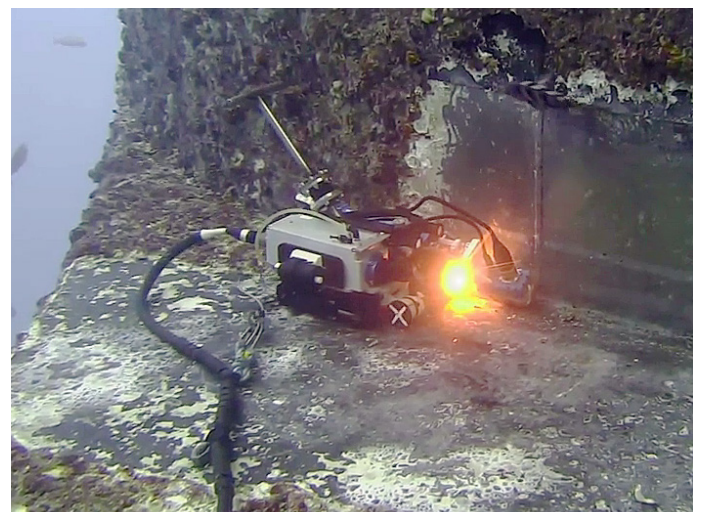
ACFM data detailing crack length and depth

### MAGCRAWLER™

The robotic MagCrawler is designed to perform diverless ACFM inspections of critical subsea welds, offering precise location and sizing data on surface-breaking cracks.

Equipped with array probes, the MagCrawler surpasses standard probes in speed and efficiency during weld inspections. Its rotating head enables seamless coverage of the entire weld and heat-affected zone (HAZ).

To navigate the subsea environment, the crawler employs two magnetic caterpillar tracks that adhere firmly to the hull. Onboard cameras play a crucial role by providing real-time visual feedback, ensuring comprehensive coverage and compliance with ACFM scan criteria.



MagCrawler conducting weld inspection