

SUBSEA ROBOTIC INSPECTION SOLUTIONS

Offshore Wind Farms

www.tscsubsea.com



Keeping the Power on

Subsea inspection services for offshore wind farms.

Inspecting offshore wind turbines' structural components is crucial for maximising the lifespan of these assets. Regular inspections are essential to prevent potential failures, which could lead to catastrophic consequences, including unplanned shutdowns and revenue loss.

Conducting inspections on offshore wind farms presents additional challenges and higher levels of risk compared to onshore wind farms. These locations are often remote and accessible only by boats and remotely operated vehicles (ROVs). The complexities further increase when considering the inspection of critical subsea structural elements.

Historically, investment in technology and skills for offshore subsea inspection has primarily focused on the Oil and Gas industry. This has resulted in the existence of a considerable

talent pool of highly skilled professionals and technology-driven service providers. The transition to offshore wind energy can leverage these skills and technologies to address the inspection requirements effectively.

TSC Subsea, as a technology-enabled service provider, has been at the forefront of the movement towards diversless robotic subsea inspections for the past decade.

Through close collaboration with global operators, TSC Subsea has developed and implemented cutting-edge proprietary technologies to tackle challenges in some of the world's most demanding offshore worksites. With our expertise and advanced solutions, we are committed to supporting the energy transition to offshore wind by delivering efficient and reliable inspection services.



GROUT INTEGRITY/DISPLACEMENT MEASUREMENTS

Grouted connections play a vital role in offshore structures, such as monopile and jacket foundations for platforms and wind turbine installations. However, over time, these structures may develop damages caused by cyclic stress, resulting in issues like voids in shear key areas or variations in grout structures due to inadequate grout installation.

The remotely deployed ART GUIDE system with Acoustic Resonance Technology (ART) is specifically suited for detecting the various failure modes found both in the steel and the grouted structure in the annulus.

- > Dis-bondment between the steel and the grout.
- > Voids, crushing and cracks in the grout.
- > Density change in the grout behind the steel plate.



STRUCTURAL WELDS - SURFACE CRACKING AND VOLUMETRIC INSPECTION

Regular inspections of structural nodal welds are crucial to identify cracks and defects that can result from significant dynamic loading. Due to the intricate nature of these welds, conducting inspections through direct scanning is not feasible. The challenging access associated with these areas often exceed the capabilities of divers.

The NodeScanner is designed to inspect tubular welded node joints and complex geometries. Equipped with ACFM® for detecting surface-breaking cracks and Subsea Phased Array (SPA™) for volumetric weld inspection.

- > Surface breaking cracks.
- > Lack of fusion or porosity.
- > Slag and other inclusions.



TECHNOLOGIES

Alternating Current Field Measurement (ACFM)

- > Weld surface-breaking crack detection and sizing.
- > Requires less cleaning than other NDT methods.
- > Approved by many certification bodies, including DNV and ABS.

Acoustic Resonance Technology (ART)

- > Flooded Member Detection (FMD) and grout integrity.
- > Grout integrity - detect voids, crushing and cracks.
- > Penetrate subsea attenuative coatings up to 100mm (4in).

Subsea Phased Array (SPA)

- > Volumetric weld inspection - detect and size in all orientations.
- > High-resolution wall thickness/corrosion mapping.
- > Advanced data analysis and reporting tools.

CORROSION MAPPING AND WALL THICKNESS MEASUREMENT

The steel foundations or floaters of offshore wind turbines are susceptible to accelerated corrosion rates due to harsh environmental conditions, posing a significant challenge for wind farm owners. The increased corrosion risk raises concerns about potential structural failures and their catastrophic consequences.

We offer a comprehensive range of remotely deployable robotic scanners specifically designed for Subsea Phased Array (SPA™). By leveraging SPA technology, we enable precise and efficient corrosion assessment, providing numerous advantages for our clients.

- > Quantitative inspection data.
- > Crack detection at varying depths and orientations.
- > High-resolution wall thickness/corrosion mapping.



ADVANCED FLOODED MEMBER DETECTION (FMD)

The presence of water within a subsea structure can indicate potential through-wall defects or cracked welds, which, if undetected, can greatly increase the risk of failure. Conducting comprehensive inspections is vital to identify and address these issues in a timely manner, mitigating the risks associated with water ingress and flooded members.

Acoustic Resonance Technology (ART) is the perfect technology. Its ability to penetrate thick subsea coatings and materials gives it the power to detect unwanted mediums, such as water inside a structure from its external surface.

- > Accurate and reliable readings through subsea coatings.
- > Reduced cleaning times due to marine growth tolerance.
- > Water level measurements.



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