

## MoorInspect - Development of an advanced medium range ultrasonic technique for mooring chains inspection in water

As offshore exploration and production goes further afield and into deeper waters more offshore operations, such as oil and gas operations, are conducted from floating platforms which are moored to the seabed by chains.

Mooring lines are safety-critical systems on offshore floating and semi-submersible platforms. The lines are usually subject to immense environmental and structural forces such as currents, ocean waves, and hurricanes. Other forces include impact with the seabed, abrasion, increased drag due to accumulation of marine organisms and salt water corrosion. Failure of one or more of these mooring lines can result in disastrous consequences for safety, the environment and production.



Periodical inspection of chain systems is mandatory for safety and early detection of possible faults and is usually done either: (i) Through an in-air (outside the water) process that necessitates the decommissioning of production and (ii) in-water inspection, which is carried out with the chain system in situ. It has been found that these techniques are inadequate in providing a reasonable level of early detection of fatigue in chain joints and consequently in the integrity of mooring chain systems supporting the floating platforms.

### Project objective

Recorded instances of damage to mooring systems of floating offshore structures indicate the existence of a problem. MoorInspect will develop a guided wave ultrasonic inspection system for identifying cracks and fatigue in floating production, storage and

offloading vessel mooring chains. The project will give rise to significant advances in guided wave non-destructive testing procedures using 100 KHz to 0.5 MHz ultrasound, signal processing in the presence of multiple guided wave modes, transducer design for use on rough, tightly curved surfaces, and robot capability for climbing chains to deploy the inspection capsule both above and below water.

To summarise, the technical challenges of the project aim to:

- Develop a medium range ultrasonic testing (MRUT) technique for detecting cracks and corrosion in studless chains used to moor Floating Production Storage and Offloading vessels.
- Investigate different types of transducer and transducer array for propagating guided waves in chains leading to the design a marinised transducer collar.
- Develop software to aid defect recognition in A-scan data collected from MRUT of chains.
- Develop an inspection capsule that can climb the chain, above and below the water-line, in order to deploy the transducer collar.

The MoorInspect project will bring a step change to the current in-water moor chain inspection systems through the development and introduction of a new method for detection of fatigue cracks in the large chain links used in deep water offshore facilities.

For further information, please visit the project website at [www.moorinspect.eu](http://www.moorinspect.eu).

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