

Donut: Digital Twinning of Mooring Systems A Hybrid Non-intrusive Technology

Phase 1: Feasibility evaluation of inspection through marine growth

Reliable assessment of the integrity of mooring lines is of substantial importance for offshore floating structures, such as floating production and storage units (FPSOs) and floating wind-turbines, since issues can create unacceptable risks to the entire asset and to the subsea environment. Despite considerable progress on non-destructive evaluation methods for mooring systems over the past few years, the state-of-the-art solutions in the market are either (i) not sufficiently quantitative for implementation of predictive maintenance, or (ii) require proper access to the surface of the chain for detailed diagnosis, which involves cleaning of the chain from marine growth. The implications of these requirements are substantial for the operators, both technically and financially.



Donut is a multiple-phase Joint Industry Project (JIP) aiming at digital twinning of mooring systems enabling damage diagnosis and prognosis without a need for chain cleaning.

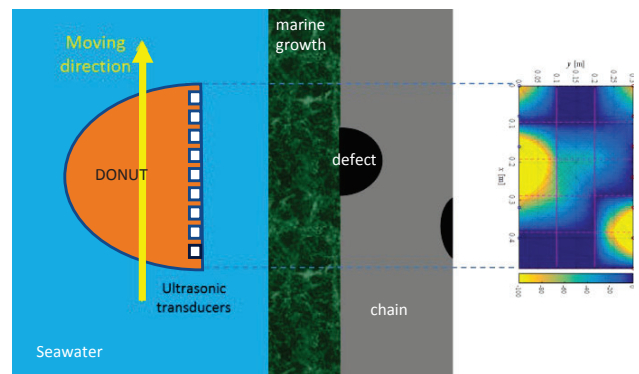
The general approach in Donut JIP is as follows:

- Damage diagnosis system with collocated active and passive ultrasound tomography systems
- Load measurement on the mooring line
- Damage prognosis by combining the damage diagnosis results and load measurement, and feeding them into damage growth models
- Laboratory and field demonstrations



Scope of Phase 1

The feasibility of passive and active tomographic inspection of mooring chains in the presence of marine growth will be quantitatively evaluated in Phase 1. Damaged and undamaged pieces of chains with and without marine growth will be experimentally and numerically investigated. The experimental evaluations will be carried out in an immersion tank at TU Delft. The operational requirements and system specifications for both active and passive imaging systems will be the main deliverables of this phase.



Participation in Phase 1

- Kick-off: May 2020
- Duration: 12 month
- Participation fee: 25 k€
- In-kind contribution possible
- Coordinator's contribution will amount to 100% of the total cash contribution by all industrial partners

Contact (coordinator)

Dr. Pooria L. Pahlavan
Delft University of Technology
Mekelweg 2, 2628 CD, Delft, The Netherlands
T+31 (0) 15 2787682, M +31 (0) 6 22043646
E l.pahlavan@tudelft.nl