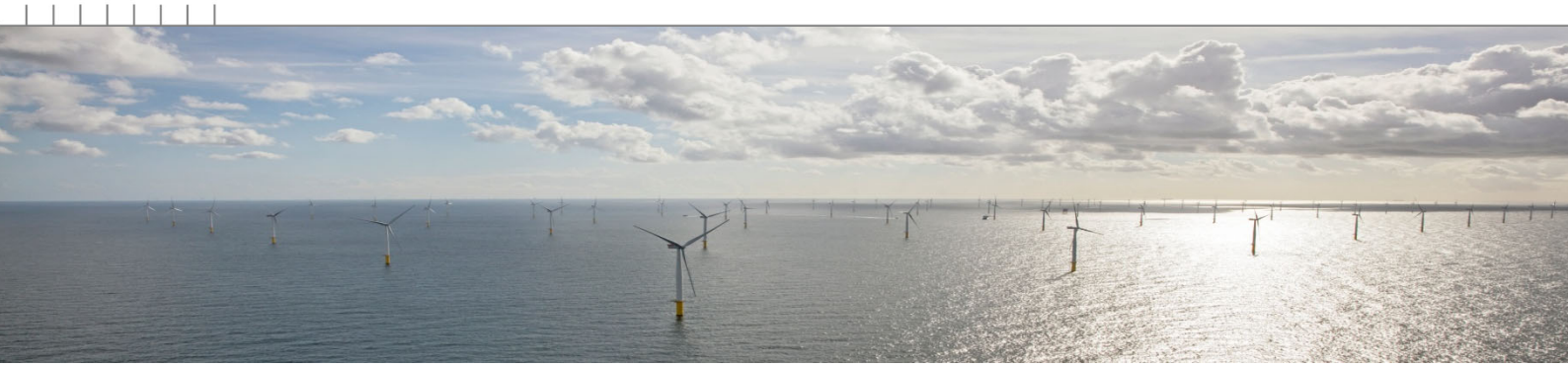


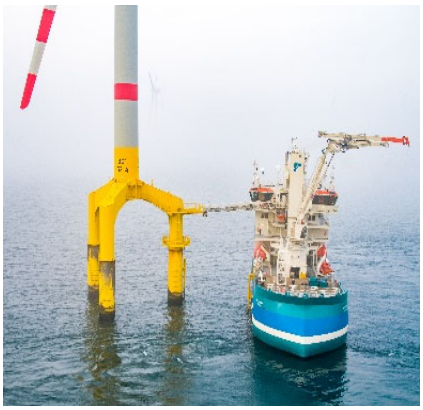
Offshore Operational Advisory System (OOAS)

Giving upfront advice for the planning and execution of critical offshore operations

OOAS is a joint industry project aiming to improve the efficiency of offshore wind farm installation and maintenance vessels, by using better data for planning and executing operations. For a typical vessel it is expected that this method will result in tens of additional working days per year. A consortium including Acta Marine, MO4, Next Ocean, Radac and SMST was formed and is led by MARIN. The OOAS project will run from Q4 2020 until the end of 2022.

Scope of work
Sensor development, numerical modelling, full-scale trials, implementation and evaluation of the system are all part of the scope of work.

To deliver a system with TRL8 readiness level, validation is an important part of the project.



Background and motivation

The operability of offshore wind farm installation and maintenance vessels strongly depends on weather conditions. Winds, waves and currents impact the ability of a vessel to keep station. High motions in waves can lead up to dangerous situations for the crew or jeopardizing integrity of equipment. For example, walk-to-work vessels need to operate closely to wind turbines and connect with a gangway for personnel to access the turbine. These ships cannot drift too far away from a turbine or the connection will be lost. Furthermore, the gangway has a limited capacity to compensate motions. Just as in many other offshore operations, operational limits are used to guarantee that operations are executed under safe conditions.

In 2019 a feasibility study (TKI project ‘Operational Decision Support’) was performed where ship motions and workability were predicted based on basic wave characteristics. This showed the need for more complex sea state characterisation and inclusion of nonlinear responses of the vessel to the DP system, anti-roll tank and gangway.

Objective and scope of work

The project partners will develop, test and validate a planning system that makes use of a digital twin of the walk-to-work vessel Acta Auriga of Acta Marine and the gangway of SMST. The digital twin model considers the hydrodynamic characteristics, the DP system and gangway and an anti-roll tank. The digital twin is developed by MARIN and MO4. This accurate model is coupled to a weather forecast and used to predict the operability. The model will be validated with detailed environmental and response data gathered on board by project partners Next Ocean and RADAC.

Schedule
The OOAS project started Q4 2020 and will run until the end of 2022.

Budget
The total secured budget for the OOAS project is 1.2 million Euro.

For more information contact MARIN:
Willemijn Pauw
T + 31 317 49 33 15
E w.pauw@marin.nl

This project is made possible by the grant of Topsector Energy of the Dutch Ministry of Economic Affairs.

Work packages

The OOAS project consists of the following work packages:

WP1. Development of an adaptive motion simulation model with interfaces to the gangway, DP system, anti-roll tank, ship's loading
WP2. Development of a high-fidelity wave finecast method using onboard sensors, incl. validation using external reference sensors
WP3. Full-scale validation of adaptive motion simulations on board the OSV Acta Auriga
WP4. Development of the onboard operational decision support and planning tool
WP5. Implementation, testing and evaluation of the advisory and planning tool on board the OSV Acta Auriga
WP6. Project management

Project deliverables

The project delivers a system which gives planning advice in several stages of operation, from heading and routing advice on board to workability planning one year prior to operation. The system provides advice based on a generic hydrodynamic approach, which is able to take into account the non-linear behaviour of the DP system, anti-roll tank, gangway characteristics and complex environmental conditions. Measured 2D wave spectra from the vessel and measured ship motions are used to continuously update and improve the hydrodynamic calculations and wave monitoring algorithms to deliver unprecedented accuracy in terms of operational advice.

The planning methodology is not limited to walk-to-work vessels and can be used for many other operations taking place in critical environmental conditions. The method has the potential to increase a vessel's uptime by many days per year, without investing in costly hardware and by merely adopting a smarter way of working.