

## Performance analysis for fish farm support vessels

The operational performance of fish farm support vessels (e.g. CTV's or work boats) depends on the seakeeping characteristics of the vessel and the resulting wellbeing of the crew on-board. MARIN can determine this operational performance for your dedicated vessel with in-house developed state-of-the-art hydrodynamic software. The results will be delivered to you in combination with one of MARIN's dedicated visualisation tools. OperabilityViewer or PerformancePlotViewer will assist you in the determination of the operability of your vessel through easy-to-use and interactive plots.

### Services for hydrodynamic performance analysis:

- Concept/ Design phase:  
Determine the uptime/ downtime of your vessel.
- Operational phase:  
Determine if the operation can be performed on a daily basis.
- Onboard decision support of daily operations.
- Fish farm maintenance strategy:  
Determine the uptime/ downtime of your vessel for the fish farm at any location

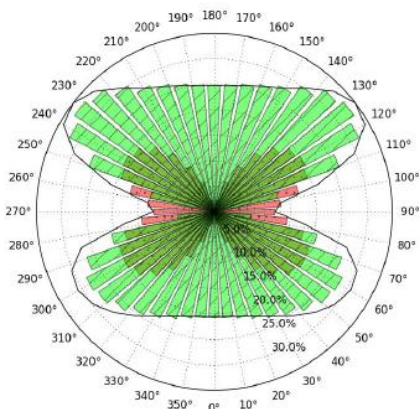
### Assessing the operability of your fish farm support vessel

O&M operations for aquaculture play an important role in the viability of fish farms. This role will be even more dominant with the trend of the siting of fish farms in more unsheltered locations. Therefore the market demands solutions such that weather windows at these unsheltered sites for all support vessels are increased. A thorough assessment of the operability (uptime/ downtime) of your vessel concept or design allows to optimise for the various operations of the farm.

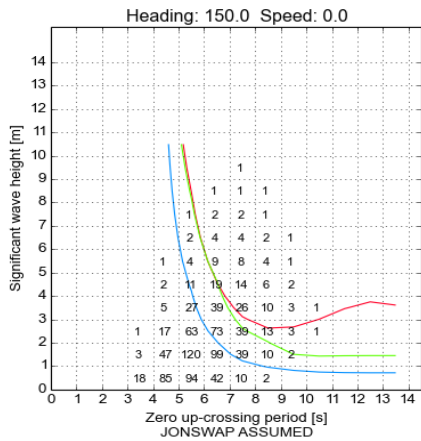
The hydrodynamic analysis will be performed by MARIN with its existing hydrodynamic software's and based on more than 80 years of expertise in hydrodynamic analysis and model testing. The analysis will be performed for both the transit as well as the transfer phase. Based on your user defined operational criteria, for example for roll or human comfort, the operational limits of the vessel are determined. The operability can be presented by a scatter diagram including uptime/ downtime lines in MARIN's OperabilityViewer or in industrial standard performance plots, so-called P-plots, by MARIN's PerformancePlotViewer.

### Concept/ Design phase: Hydrodynamic performance analysis

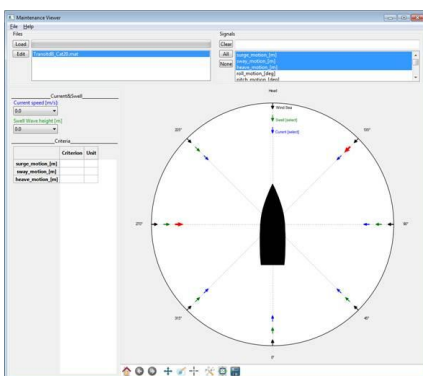
In the design phase of a vessel one wants to know the seakeeping characteristics and associated operational performance of the vessel. This can effectively be assessed by means of numerical simulations.



Operability of the vessel assessed per relative heading with respect to the incoming wave



Screenshot OperabilityViewer



Screenshot PerformancePlotViewer

#### Related products:

- MARIN services in fish farms
- Optimization of boat landing alignment

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The simulations can be performed for both transit as well as station keeping or transfer stages, since the seakeeping characteristics and operational criteria in these operating stages, with and without forward speed, are different. In the transit stage the focus is on human comfort and seasickness of the crew, while the transfer stage the focus is on the safe transfer of the crew between the vessel and the farm. The simulations can be performed for small work boats, Crew Transfer Vessels (CTVs) as well as larger Fish Farm Support Vessels. Both types of vessels require a dedicated calculation approach.

#### Operational phase: Support in daily operations

The results of the numerical hydrodynamic performance analysis of the final design can be used in MARIN's PerformancePlotViewer to determine if a transit or transfer operation can be performed within user defined operational criteria. This tool can be used on a day-to-day basis in combination with short term weather predictions or onboard to judge the feasibility of the operation.

#### Fish farm maintenance strategy: Calculating the average uptime/ downtime

The results of the numerical hydrodynamic performance analysis can also be used in MARIN's OperabilityViewer to determine the uptime/ downtime of your vessel at any specific location. Based on a user defined scatter diagram the monthly or annual uptime/ downtime is calculated. This information is an essential input for annual maintenance planning and to the overall maintenance strategy of the farm.

#### State of the art tools

Use will be made of MARIN's existing state-of-the-art hydrodynamic software to calculate the performance of your vessel. The applied software includes: Precal, DIFFRAC, PANSHIP and aNySIM-XMF and ReFRESCO. The results of these dedicated hydrodynamic performance simulations will be delivered in combination with MARIN's easy-to-use visualisation tools. PerformancePlotViewer and OperabilityViewer allow you to determine the operability of your vessel based on user defined criteria.

#### Expertise and experience

MARIN is an independent and innovative service provider specialising in hydrodynamic assessments and investigations. With over 80 years experience, we are fully conversant with challenging metocean conditions in Oil & Gas and renewable energy projects worldwide. MARIN offers services for hydrodynamic analysis of various types of installations and operations offshore. Our expertise includes concept validation, slamming, operability of various type of vessels and platform, motion compensation, mooring, dynamic positioning and logistic scenario analysis.