



## Performance at Sea serves the Maritime Industry

The MARIN Performance at Sea division serves the maritime industry with full-scale investigations and monitoring campaigns on board ships and platforms worldwide. With a dedicated group of 25 naval architects, structural engineers and instrumentation engineers, we are specialised in hydrodynamics, loading as well as structural response.

As an independent and not-for profit institute MARIN has been providing tests and R&D efforts with a scientific basis and a practical application for more than 80 years. Besides measurements on board, numerical analyses, model tests and simulator studies, specialists in all relevant disciplines are at your disposal.

Work for individual clients is carried out on a strictly confidential basis. Performance at Sea also conducts several Joint Industry Projects where we share expertise, results and costs with a group of clients.

The current JIPs are grouped in our R&D topics:

- Fuel saving & emission reduction; STA-Group, Refit-2-Save, Defos, Wageningen CD Propeller Series, CRISM, ShoalsPower, BollardPull.
- Workability at sea; HELIOS, Offloading operations, Transwell.
- Impacts; PhaseTransition.
- Fatigue and lifetime extension; Monitas-Group, Valid, Ship-e-Motion, MonaRisa, LineSense.
- Arctic; IceStream, IcePower, IceTower.

### Ship trials

During the delivery trial the performance of the vessel is tested against the new building contract and the regulations such as issued by IMO (Manoeuvring & EEDI) and by the flag state. We have a long track record in the following services:

- Speed/power trials to derive speed at contract and EEDI condition compliant with IMO ([www.staimo.org](http://www.staimo.org)).
- Manoeuvring trials compliant with IMO.
- Noise and Vibration in accordance with ISO.
- Bollard pull & escort trials.
- DP trials.



*Shaft power measurement during speed/power trial*



On board propeller cavitation observation



Installation of Advisory Hull Monitoring System on CLOV FPSO

For more information contact MARIN:

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## Trouble shooting

On short notice we are sending experts to assist in case of speed/power issues, noise and vibration, cavitation erosion or structural damage.

Cavitation is observed with vessel in service by dedicated boroscopic cameras through a minimum hull puncture. Trouble shooting activities include advice as to improvements on hull, appendages or propeller.

With respect to Noise & Vibration problems we advise on practical measures to reduce excitation and possible structural modifications.

## Offshore Monitoring Campaigns

Both for the shipping and offshore industry we conduct monitoring campaigns on board ships and platforms to provide insight into the actual performance of the vessel or platform in wind, waves and current. The data can be used to support the operations, to provide feedback to the design or to validate numerical or physical models or rules used in the design and engineering stage.

Such campaigns are tailored to the specific goal and can be focussed on specific aspects such as:

- Motions, tracks & offsets.
- Seakeeping & powering in waves.
- Wave loads & structural response.
- Mooring loads & line fatigue.
- Impacts & hull structural response.
- Ice loads and structural response.
- Fatigue loads and response; lifetime monitoring.

## Equipment

For the above services Performance at Sea operates a large variety of state-of-the-art equipment; most of it tailor-made for this purpose. Our equipment is made for use on board, calibrated and certified. We have special arrangements to ship our equipment overnight to any location in the world. Spare parts and hull fittings such as required for cavitation observations and dynamic pressure measurements are available from stock. Our equipment comprises amongst others:

- Shaft Power Measurement Systems (Smarti).
- Noise & Vibration equipment.
- Cavitation observation (high speed & boroscopic).
- Pressure sensors (full range).
- Strain gauges (Shaft torque, hull, long base).
- Wave sensors (buoy, radar and ADCP).
- Wind meters.
- Current meters (ADCP, ADV, Impeller).
- Flow measurement (LDV, PIV, Pitot).
- Accelerometers.
- Motions sensor units 6 dof (PHINS, MRU).
- GPS (D-GPS, Twin-GPS, rtk-GPS).
- Wireless load cells (up to 250 tonf).