

Full scale cavitation observations

Cavitation occurs at nearly all propellers and can even occur at foils, fins and other appendages. It can be responsible for significant propeller performance degradation and potentially causes vibrations, noise and propeller blade erosion.

Services:

- Trouble shooting activities, e.g. vibrations caused by propeller cavitation, cavitation erosion on struts, nozzles, fins, etc.
- Verification of propeller performance, for example after modifications
- Validation of model tests or CFD
- Research on off-design conditions such as cavitation inception in waves or during manoeuvring

Background

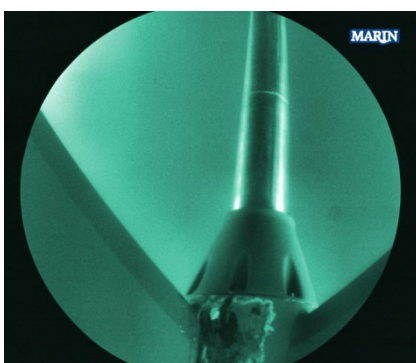
Over the last 20 years MARIN has developed substantial knowledge of cavitation by means of model tests, CFD calculations and full scale tests. Full scale cavitation observations are indispensable for trouble shooting on board and as feedback for propeller design and interpretation of model tests. MARIN offers a unique full scale consulting and monitoring service, and has gained considerable experience in a broad field of ship types over the years (e.g. cruise ships, container ships, bulk carriers, navy vessels, working vessels, etc.).

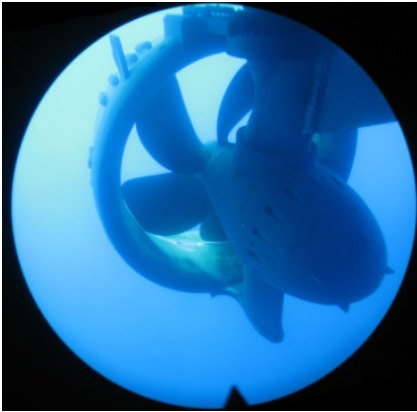
State of the art tools

In the past, windows with a diameter of 20 cm had to be installed in the aft ship to perform high-speed, high-quality cavitation observations. But nowadays, high-speed cavitation observations can also be done with a boroscope with a diameter of only 1.2 cm. Installing this boroscope requires hull penetrations below the waterline which can be drilled with the ship in afloat condition; hence no docking operation is necessary. This step forward is attributed to the light enhancement equipment and the new generation of high-speed video cameras.

At the same time, using the state-of-the-art equipment in combination with windows still offers the best image quality and the highest frame rates. For a deeper investigation into the physical behaviour of the cavitation or when light conditions are more critical, a window can be used.

The resolution and the light sensitivity of the camera are such that observations can be conducted without artificial illumination. However, clear water is still a strict requirement to perform successful observations.





Installation without dry-docking

The boroscope provides several advantages when compared to the original observation system through windows. The small penetrations needed for the boroscope equipment can be drilled with the ship in afloat condition. This reduces the installation time from days to hours and eliminates the need for expensive docking operations.

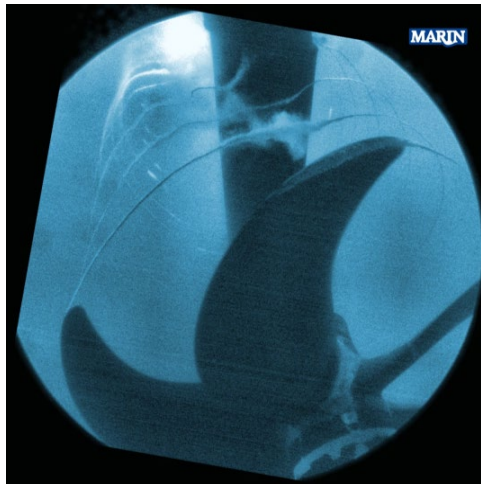
Superb viewing angle

As the boroscope is a small tube which can be rotated in the hull penetration, a 360 degrees viewing angle can be obtained. This means that the equipment is most suitable to view the flow towards the propeller, around the rudder, propeller shaft, stabiliser fins and other appendices. This feature is essential for troubleshooting activities such as finding the cause of noise and vibration problems.

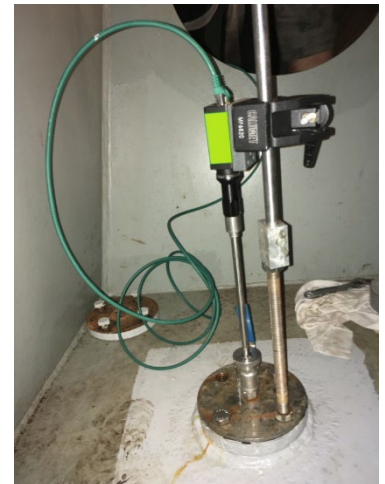


Related products:

- Noise and vibration measurements
- Pressure pulse measurements
- Sea trial acceptance tests
- Speed/power trials
- MARIN consultancy



Video recording through boroscope



Installed boroscope and camera

For more information contact MARIN:

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Video recording through window