

Full-scale cavitation observation of a ship's propeller, rudder or other appendices, is becoming more and more practical. A powerful combination of a borescope, advanced light enhancement and a dedicated high-speed video camera, now enables observations of a fast moving propeller blade through a 12 mm hull puncture.

High-speed borescope facilitates a *hole* lot of success

High-speed Cavitation Observation through a 12 mm hole

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In the past, windows with a diameter of 0.20 m had to be installed in the aftship to perform high-speed, high-quality cavitation observations. But nowadays, high-speed cavitation observations with similar quality can be done with the borescope with a diameter of only 0.012 m.

Installing this borescope equipment 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. The resolution and the light sensitivity of the camera are such that observations can be conducted using only the sun. There is no need for artificial illumination but clear water is still a strict requirement to perform observations.

Superb viewing angle

As the borescope 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 around the rudder, propeller shaft, stabiliser fins and other appendices. This feature is essential for trouble-shooting activities such as finding the cause of noise and vibration problems.

In addition to the improvement of the observation system, the high-speed video can be synchronised with the measurement computer. Hence, it is possible to present the measured signals in combination with the recorded images. The visual information in combination with measured signals gives a perfect insight into the dynamics of the cavitation in sailing conditions. This new tool gives the



Measurement setup: high-speed video on top of the light enhancement equipment and borescope on board.

possibility of bringing cavitation observation to a new level. Cavitation can be observed and studied in all kind of dynamic sailing conditions, such as manoeuvring conditions for instance.

A high-speed borescope provides several advantages when compared to the original observation system through windows. First of all, the small penetrations needed for the borescope equipment can be drilled with the ship in afloat condition. This reduces the installation time from days to hours and saves money from expensive docking operations. Secondly, the measured signals can be synchronised with the recorded images of the high-speed video, which gives a good understanding of the cavitation and finally, the viewing angle of the borescope is 360 degrees.

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POD propeller observed through borescope, with and without cavitation (of design condition).