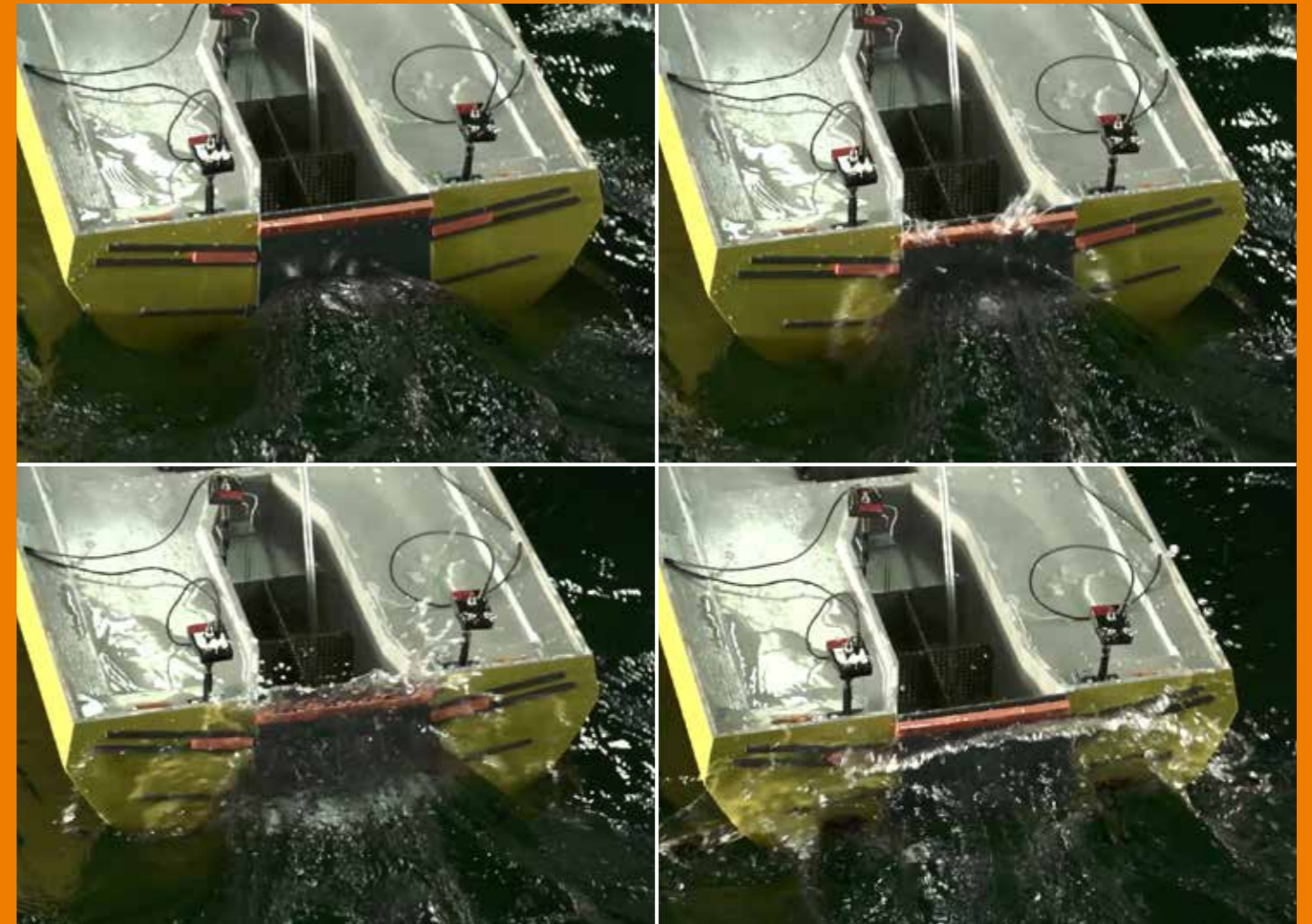


# The US Coast Guard and MARIN: a long-term link

MARIN's naval activities do not stop at Dutch shores. MARIN has strong relationships with many international navies and naval shipyards. This relates to international cooperation initiatives such as the Cooperative Research Navies (CRNAV), but also to newbuilds and problem solving. The relationship with the US Coast Guard is such an example. Many of its existing and new ships were tested at MARIN.

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Deflector in action



**A**s an example MARIN recently assisted with the extensive testing of the new USCG Offshore Patrol Cutter (OPC). The OPC will provide a capability bridge between the National Security Cutter and the Fast Response Cutter, which operates closer to shore. MARIN was involved in the design phase performing both calculations and model tests regarding lines and appendage optimisation and checking on typical manoeuvring and seakeeping issues such as accelerations, rolling and other motions and especially survivability in a severe seaway. MARIN is proud to have assisted on the fleet modernisation programme of the USCG. MARIN worked on all three ships designs - the national security cutter (NSC), offshore

patrol cutter (OPC) and fast response cutter (FRC) - carrying out calculations, model tests and full-scale measurements.

A second example deals with small RHIB cutter boats, which are being employed by the USCG in relatively high sea states for law enforcement, search and rescue. In order to develop safe operating limits, tests were performed on two completely free running models, delivering data on motions, accelerations, relative wave heights outside and inside of the boat. For MARIN it was a challenge to achieve a truly free running model (also able to partly operate outside the carriage), having all the electronics, batteries, propulsion, steering, and sensors

- including a webcam - installed in a 1.3 metre model of 12.5 kg! The data obtained during the tests was used to identify non-linear events and their precursors including capsizing, broaching, surf-riding and swamping. The experimental data was used to validate numerical tools, including FREDYN and PANSHIP, simulating the non-linear motions in waves.

Finally, the USCG recently involved MARIN in an important problem solving exercise. During operations in higher seas, the USCG National Security Cutters sometime ship water over the stern door into their closed stern slipways. The amount of water was sometimes so high that the RHIBs inside

were flooded and damaged. Surprisingly, this mainly occurred in head waves. While the ship was pitching stern down out of phase with the wave elevation, a large hole in the water was formed. This hole was filled rapidly with the surrounding water, resulting in high velocity jets against the stern door and up in the air. This caused the overtopping of the existing stern door. MARIN then assisted in the development of the solutions: a deflector at the top of the door and a slightly higher door. The combination deflected the run up away from the stern door and prevented the flooding. A practical solution for a serious problem! ▸