MARIN's track record in ferries

Ferry good

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Tests in deep and shallow water, using the Offshore Basin's adjustable floor.

This article gives an overview of MARIN's contribution to the development of ferries over the past years, focusing especially on the calm water performance of fast ferries and shallow water manoeuvring.

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Fast Ferries

After the Greek ship owner Superfast started operating the fast ferries SUPERFAST I and II, and especially SUPERFAST III and IV, the shipping and shipbuilding worlds were impressed by their performance. Because MARIN was deeply involved in the hydrodynamic design of the last two vessels, a number of owners and shipyards approached MARIN for assistance in the hydrodynamic design of several large new monohull ferries, as follows:

- Kvaerner Masa Yards for the Superfast III and IV.
- HDW, for owner Superfast Ferries with the Superfast V and VI.
- Fincantieri, three ferries for owners Minoan Lines and Tirrenia. With a design speed of 29.5 knots, the Minoan Lines ferry achieved a maximum speed on trials of 32 knots, combined with low vibration and noise levels.
- Deltamarin, for a short ferry of 120 m with a design speed of 24 knots and a Froude number of 0.35. for owner Strintzis/Blue Star Ferries
- Hellenic Shipyards for Strintzis, again in cooperation with Deltamarin, a 126 m long, 26 knots fast ferry with a Froude number of 0.38, the highest for a large monohull ferry at this time.
- Nuovi Cantieri Apuania for Grimaldi Grande Navi Veloci, a ferry with a design speed of 28 knots.

Through all of these projects, MARIN gained vast experience in designing typical fast ferry lines with a so-called wave-damping afterbody for a reduced wave resistance, in combination with a ducktail and a trim wedge. The RAPID potential flow program (how appropriate!) was used in each of these projects for preliminary hull form optimisation, followed by calm water tests to optimise the hull form, appendages and propellers further.

Special attention was given to strut cavitation. MARIN designed special strut profiles to sup-

press strut cavitation and recommended the use of twisted struts to account for the change in flow direction over the strut.

To ensure passenger comfort on board these high-powered ships, the cavitation and pressure pulse characteristics behind the final hull form were investigated.

Shallow water manoeuvring

Brittany Ferries, Van der Giessen-De Noord and Deltamarin performed a number of tests at MARIN to determine and improve the behaviour of a new RoPax ferry. One exciting challenge was to predict the manoeuvring behaviour of the ferry when sailing up and down a very shallow channel with a keel clearance at some points as low as 1 metre.

The manoeuvrability of a vessel in very shallow water cannot be compared to the manoeuvrability in deep water. Generally, a vessel in shallow water will be more sluggish, e.g. the vessel will have more difficulty in sailing into and out of a turn. The trends mentioned above will be different for each vessel, depending on the propulsive configuration and hull form.

Sailing into and out of a turn

A set of free sailing manoeuvring tests was therefore performed for the RoPax in very shallow water and in deep water. In this way, the results could be compared directly and demonstrate the influence of water depth on manoeuvring characteristics. One assumption is that if the vessel is controllable in these extreme conditions, it will be controllable in all intermediate water depths. The RoPax passed all tests with flying colours.

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