Fast transatlantic ocean liner design

Queen of the North Atlantic

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In succession to their famous passenger liners Queen Mary and Queen Elizabeth, Cunard Line has developed plans for another fast ocean liner, Queen Mary 2, the first to be built since Queen Elizabeth 2 over 30 years ago. MARIN studied the main features of this new vessel which is designed to serve a scheduled high-speed North Atlantic line service of six days duration. The building contract has been awarded to the French shipyard Alstom Chantiers de l'Atlantique.

Main challenges of the new design are the required high sustained speed and passenger comfort in the rough seas encountered on the given route, combined with the desire to maintain a classic profile for this newest Cunard Queen in the fleet. Her length of 345 metres, beam of 41 metres and estimated tonnage of 150,000 GRT make her the largest, longest and widest passenger ship ever designed.

Propulsion is afforded by an unprecedented arrangement of two fixed forward pods and two steerable pods aft. This novel design demands special attention on the part of propulsion and manoeuvring. MARIN carried out extensive initial desk studies to establish the feasibility of the design and to reduce the required model test programme.

Model tests for manoeuvrability showed the design to comply with similar ships using different propulsion and steering systems. Seakeeping tests were executed to check passenger comfort, sustained speed and course keeping in waves. The test results met the designers' high expectations.

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Queen Mary 2-artist impression versus ship model

Reliability was the subject of scenario simulations with the new GULLIVER computer program (see MARIN Report 72). Based on the combined results of calculations, model testing and detailed wind/wave climate descriptions, this program was used to predict the expected number of voyages with either delay or comfort problems. Results showed that the combination of fine hull form, size and adequate roll stabilisation will allow this design to operate at high speeds in nearly all conditions.

The results showed that the design is a perfectly feasible hybrid of classic lines above the waterline with modern hull lines and an innovative propulsion and steering system below the waterline.

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