On test:

Halter Marine, Inc. has undertaken an extensive model testing program of a new generation articulated tug and barge (AT/B) unit at MARIN. A report by Merel Plante (Manoeuvring), Guilhem Gaillarde (Seakeeping) and Jaap van Heerd (Resistance and Propulsion).

In order to determine the operational characteristics of the advanced AT/B design in coastal and deepwater environments and to ensure the manoeuvrability, in unlimited and in confined waters, a series of different tests were developed and completed. Furthermore, the requirements given for the speed and power in operational conditions have been verified.

Halter Marine's Steffen Shelley commented:

"Halter Marine Inc. appreciates the value of the extensive data obtained from this testing program and has embarked upon a program of computational analysis with MARIN to assist with optimising subsequent generations of AT/B units – both for coastal and deepwater service. Halter Marine Inc. is also evaluating further testing as part of its continuing research and engineering development program."

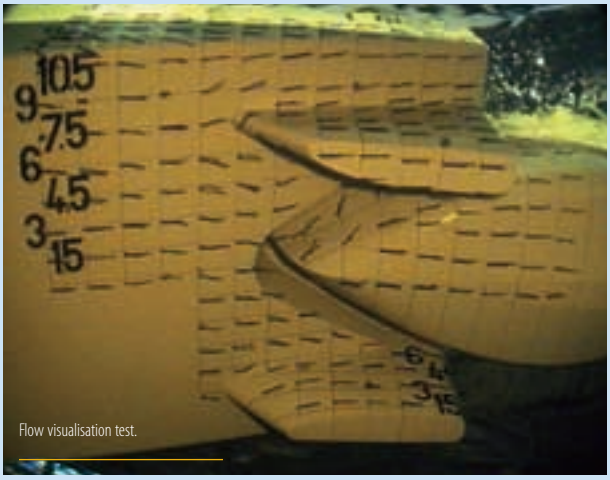
He added: "Halter Marine Inc. also greatly appreciated the expertise and involvement of MARIN personnel and is quite pleased with the co-operative teamwork approach demonstrated by all MARIN personnel."

Halter Marine's new tug-barge design

Sailing up and down

One of the more extreme goals of the test program was to get an impression whether the AT/B is able to sail up and down the Colombia River bar. The actual bar is shallow, about 15 m water depth, with a strong stream from the river and a steady swell from the Pacific Ocean, and the navigable channel having a very restricted width (about ¼ mile). Both stream and swell meet at the river bar and together with the shallow water result in a relatively complex situation. Tests in high and steep waves in shallow water were performed in order to approach the real conditions as close as possible.

In order to indicate whether the AT/B unit could safely cross the Columbia River bar, course keeping and manoeuvring tests in high waves and shallow water were performed. The course keeping ability in waves was determined by autopilot tests in bow and stern waves with autopilot settings that match reality as close as possible. Also zig-zag tests have been performed in bow and stern waves, to determine the AT/B unit's characteristics in these waves. But before the tests in waves could be performed, it had to be clear that the manoeuvring behaviour in shallow water and calm water was adequate. For this , a number of zig-zag tests for different load conditions is performed.



Flow visualisation test.

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Course keeping in bow waves.

Verification

Some of the deepwater tests conducted included resistance and propulsion tests for various load conditions to determine the power needed for the required forward speed, and wake field tests for the propeller design. Flow visualisation tests have also been completed to help with design development of the connection between the tug and barge and of the steering devices. The connection between tug and barge is a particular important area and proper design and verification is therefore of utmost importance for resistance optimisation.

Further, roll response and the sustained speed in waves have been determined, together with the operational limit of the vessel with respect to the risk of green water over the bow and maximum accelerations. As this combination is longer than 100 metres, the IMO recommendations for manoeuvring have been verified. MARIN