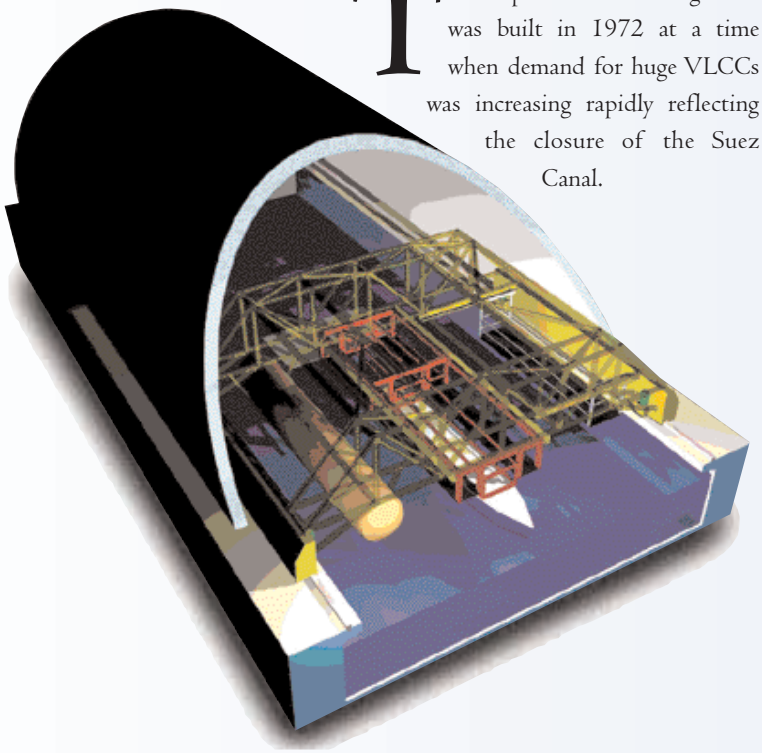
Further analysis led to renovation decision

Depressurised Towing Tank - bigger, better, quicker

Towards the end of this year, MARIN's newly rebuilt and modernised Depressurised Towing Tank (DTT) will be back in service. Henk Valkhof and Tom van Terwisga outline the last steps in a comprehensive series of improvements which have been underway.

Cross section DTT with new carriage.



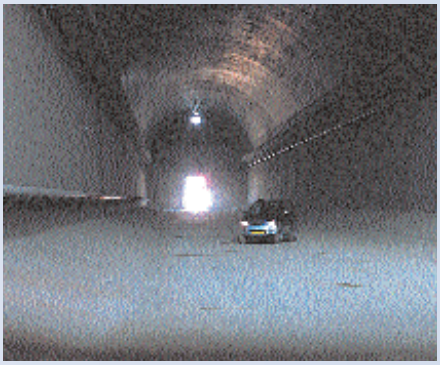
The Depressurised Towing Tank was built in 1972 at a time when demand for huge VLCCs was increasing rapidly reflecting the closure of the Suez Canal.

Usually fully laden, supertankers were forced to cross South Africa on their routes from the Middle East to Europe and America. Propeller loading also significantly increased to achieve relatively high speeds and the trend of increasing ship size, the need for speed and more reliable propellers found its way back to the research laboratories. Larger ship models were needed to ensure a high level of accuracy and reliability in powering and cavitation predictions.

And increased propeller loading means the need to study cavitation phenomena was increasingly important. Particularly, very full block ships often suffer from flow separation problems. Flow separation and the related poor propeller inflow characteristics often lead to cavitation (erosion) and vibration hindrance. Hence, to study the cavitation and related phenomena on a model scale, an accurate simulation of the wake and propeller-hull interaction is essential. To achieve these targets, the Depressurised Towing Tank - 240 metres long, 18m breadth and 8m deep - was constructed. To properly model cavitation phenomena, it had the unique capability to scale the air pressure as well.

Outstanding tool for cavitation observations

During its 25 year-plus operation, the facility has proven to be an outstanding tool for cavitation observations, cavitation inception measurements, propeller induced hull-pressure fluctuations and noise measurements. Other experiments became possible as well, such as cavitation observations of the bow when sailing at a drift angle, cavitation observations of hull appendages and investiga-



00-163-26

DTT under construction.

tions of ventilation and/or cavitation when sailing at very light ballast draught, accounting for possible interference effects. Apart from these cavitation tests, the more 'normal' resistance and propulsion tests could be carried out in the facility, however only under depressurised conditions given the influence on the wave generation induced by the cylindrical tubes of the carriage when atmospheric. Since the first opening of the basin, many types of ships, such as navy vessels, container vessels, ferries, cruise liners, and full block ships have been tested.

Renovation

After a thorough analysis of MARIN's experience in operating the original DTT and several discussions on expected future trends, it was decided to renovate the facility. There are two principle incentives for the renovation:

- Improved operational performance of the facility with greater flexibility, leading to reduced operating costs, improved quality of cavitation observations and broader application for the laboratory.
- Adapting the facility to meet new market developments, such as higher ship speeds and the ability to model true operational conditions, such as met for example during manoeuvring.

A number of significant improvements are being implemented:

- A direct driven towing carriage, capable of speeds up to 8 m/s (formerly 4 m/s), making the DTT suitable for modern high speed ships
- An open frame carriage, leading to a minimum aerodynamic interference with the ship model, enabling atmospheric resistance and propulsion tests
- Improved access to the carriage, including a visitors platform for tests under atmospheric conditions
- Improved quality and flexibility of cavitation visualisation
- Allowance for all types of powering tests. Time to depressurise the basin is reduced from approx. 8 hours to approx. 4 hours.
- Complete test set-up preparation and check-up, prior to transferring the model to the depressurised basin
- Increased data transfer rate through optical fibres and minimal electromagnetic interference on data acquisition.

Cavitation observations in DTT.

At present, the basin is under construction and full completion is scheduled for shortly thereafter. Readers seeking even more DTT information should run the CD-ROM accompanying this issue of MARIN Report.