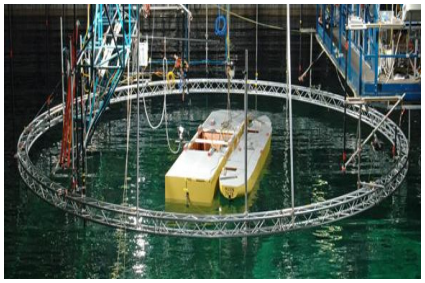
Simulate, test, experience

Unique facilities to solve specific design and research issues

To challenge the uncontrollable wind and waves we need facilities that can recreate and simulate natural conditions to test ships and operations. We offer a complete range of model testing, computer simulation, full scale measurement and training facilities. The synergy between these activities is the basis of our problem solving capacity to make ships and operations safer, cleaner and smarter.

Seakeeping and Manoeuvring Basin

Verifying performance and safety requires accurate representation of a ship and its ride control elements in relevant wave conditions. Our Seakeeping and Manoeuvring Basin (170 x 40 x 5 m) is designed for making arbitrary (high-speed) manoeuvres in realistic waves from various directions. The free-sailing or captive tests provide insight into the seakeeping and manoeuvring characteristics.



Offshore Basin

The Offshore Basin (45 x 36 x 10 m) is a realistic environment for testing offshore models or renawables like floating windturbines and offshore farming. Its current generation system allows different vertical current profiles. Combined wind, waves and swell are generated using wave generators on both sides of the basin and a movable windbed. A movable floor allows testing from shallow to deep water, while a 30 m deep pit is available for ultra-deep water testing.

Deep Water Basin

The Deep Water Basin (252 x 10.5 x 5.5 m) is used to optimise resistance and propulsion characteristics of ship designs. To provide insight into the possible improvements in performance this facility has the features to measure various wave and flow patterns. In addition to the standard resistance and propulsion tests the rudder or pod angle, pod position and propeller rotation direction can be optimised.

Depressurised Wave Basin

Models of ships and offshore structures can be tested in most realistic operational conditions in the Depressurised Wave Basin (220 x 16 x 8 m). The capability to reduce ambient air pressure as low as 2,5% of atmospheric pressure and installed wave makers for short and long crested waves up to 0.75 m, makes it ideal for investigations into cavitation, air chambers and wave impacts with air entrapment. Tests like resistance propulsion, seakeeping, VIM are also performed in this basin.

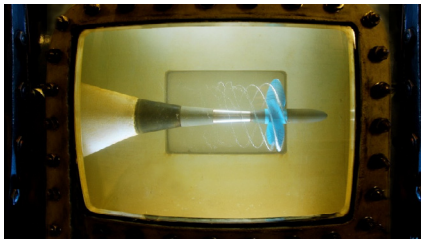
Concept Basin

This basin (220 x 4 x 3.6 m) is mainly designed to perform calm water and seakeeping model tests of ships and structures in their concept phase. It is equipped with a wave generator that can reach a significant wave height of 0.55 m at a peak period of 2.3 seconds, and a wind simulator, which together provide a realistic environment.

To stimulate innovation in the Dutch maritime sector and to lower the threshold for MKB (Small & Medium Enterprise) clients to test their new ideas, MARIN offers free basin slots to (MKB) clients in this basin. These tests allow feasibility checks and improvements in an early phase of new concept developments.

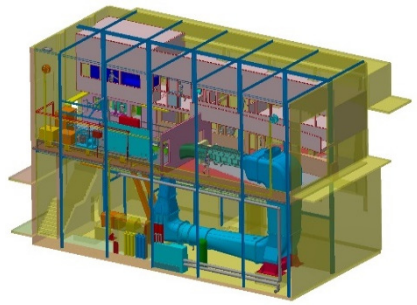
Shallow Water Basin

We use this basin (220 x 15.75 x 1.1 m) to optimise the performance and behaviour of a ship or operation in shallow water. With a depth adjustable from 0 to 1.15 m the basin can be used as input for simulations to help optimise nautical strategies. This includes factors like proximity of quays and bank suction. This facility is also used for Concept Development and Design Support for operations and new ship and offshore designs in shallow water.



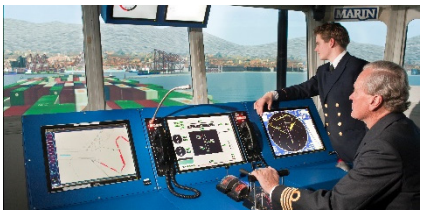
Cavitation Tunnel

The Cavitation Tunnel tests a range of propulsor designs. Large propellers can be tested at high Reynolds numbers to predict accurate cavitation behaviour. A tunnel loop is available to test the performance and cavitation properties of water jet impellers. Observation with high-speed cameras enables detailed cavitation flow investigations.



Zero Emission Lab

ZEL is a unique test facility worldwide for the research and testing of future marine propulsion and power systems, applying realistic, dynamic operating profiles. This engine room of the future integrates power and the hydro propulsion system and enables the representative coupling of the propulsion hydrodynamics with the power supply. The engine room will be used to study the use of new fuels like hydrogen and the required techniques.



Simulators

MARIN's nautical centre operates various real-time simulators for research, consultancy and training purposes of professional mariners. The simulators can be used separately or combined in the same scenario. The steering controls can be easily adapted to the specifications of the simulated vessel.

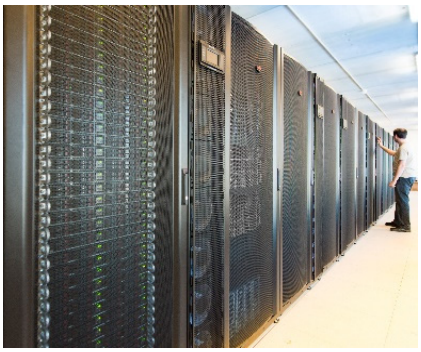
- Full Mission Bridge I: especially suitable to simulate large ocean-going vessels.
- Full Mission Bridge II: a flexible facility, capable of simulating a wide range of vessels.
- Four Compact Manoeuvring Simulators: smaller simulators to simulate all kind of tugs and smaller vessels.

Fast Small Ship Simulator

This moving Fast Small Ship Simulator (FSSS) was originally built by MARIN and partners Cruden and TreeC under a DMO project as catalyst for the development of this prototype, to provide a safe and accurate environment for the training of drivers and navigators of RHIBs. The motion platform has been outfitted with a nearly exact representation of the control console of the actual RHIB used by the Royal Netherlands Navy, including engine controls, VHF radio and a GPS system. The FSSS can be modified to perform simulations on any high-speed vessel or operation.

Multiphase Wave Lab

The Multiphase Wave Lab (MWL) is used to simulate multiphase flow at different conditions in a tightly controlled environment. The tests conditions range from 15 - 170 °C, a pressure of 0.005 - 10 bar(a) and gas composition consisting of precisely controlled mixtures of helium, nitrogen, SF_6 and/or steam, the liquid being water in all cases. The physical set up itself consists of a 15 m long autoclave which serves as the controlled environment and can house different test setups.



Numerical facilities

For over 20 years we have been using computational clusters to assist with time consuming numerical studies. Our current Marclus5 production cluster has 9000 CPU and 60000 GPU cores and 50TB RAM spread over 370 nodes available for batch computations with a central storage of over 2 PB. Marclus5 is our 5th generation HPC cluster, our previous Marclus4 cluster, which is now used for development and external users, has roughly 4000 CPU cores and 800TB of storage.

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