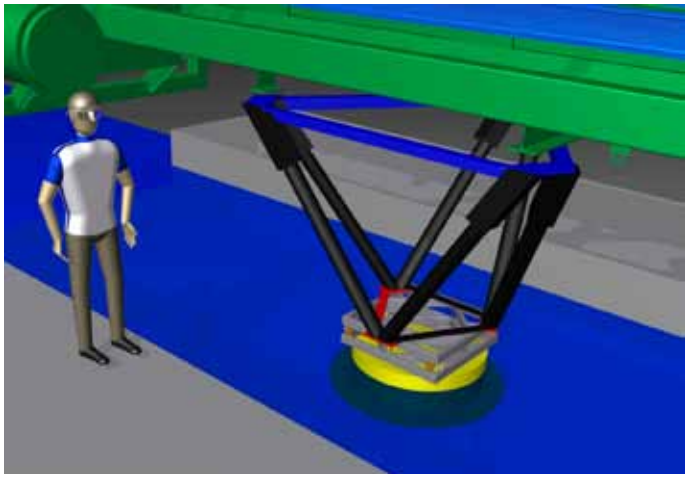
Giant six-legged robot gives MARIN model the shakes

Headlines are of course, designed to grab the attention of the reader. But luckily all is not as it seems... Report introduces MARIN's new hexapod oscillator.



Design drawing of the Hexapod in the new DWB facility

In the past, forced oscillation tests were elementary for the prediction of ship motions in waves. But when better computer power became available in the eighties, the experiments could be replaced by potential flow calculations. This however, did not mean that the forced oscillations test became obsolete.

MARIN has a number of different on-shelf mechanical and electrical oscillators. The general-purpose oscillator has two push rods for driving harmonic oscillations in two degrees of freedom. This is useful, for instance, for testing heave and pitch motions of ship models (see Vugts 1970). In addition, several dedicated oscillators have been developed for specific projects. A new hexapod oscillator is under design, which can replace the old general-purpose oscillator and operate under depressurised conditions in the Depressurised Wave Basin (DWB). Hexapods are large hydraulic or electric driven machines for manipulating objects in six degrees of freedom (three translations and three rotations). Like insects (Hexapoda), they have six legs, which can be independently controlled. A position measurement with feedback control system is built in for motion control. Applications are typically found in flight simulators, automotive testing, gaming and defence.

The new hexapod in the DWB will be mounted upside down for testing models in the waterline or when submerged. The motions can be regular, irregular, single mode, multi-mode or can be played from a time trace in file form. The hydrodynamic forces on the model will be measured with a six-component force frame at the connection with the hexapod. The hexapod can also be used in captive mode to change the position of the model between test series or to study for instance the step-by-step sinking of a capsizing ship. Remote testing is an obvious requirement for the depressurised conditions in the DWB.

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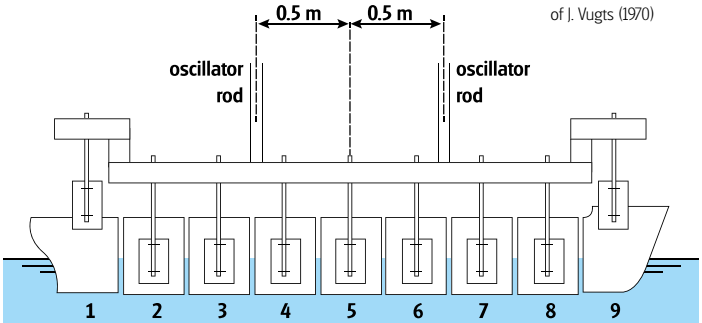
Forced oscillation test in the PhD thesis of J. Vugts (1970)



Specifications of the new DWB Hexapod

- 0.5 m single amplitude x, y and z translations
- 30 deg single amplitude roll, pitch and yaw rotations
- 0.7 m/s and 40°/s translational and rotational speeds
- 6 m/s2 accelerations with 1,000 kg payload