

Welcome to the Ocean and Coastal Engineering Laboratory

- an integrated part of the research and teaching at the Department of Civil Engineering, Aalborg University

At the Ocean and Coastal Engineering Laboratory, we have created a modern, flexible laboratory with state-of-the-art equipment. We are located on the ground floor of the Department of Civil Engineering and are visible from several locations in the building. The research group has more than 30 years of research experience related to physical model testing and have developed advanced model testing techniques to test ports, coastal structures, offshore structure, wave energy converters etc.

The wave basin is 14.6 m x 19.3 m x 1.5 m (length x width x depth) with an active test area of 13 x 10 m. A deep water pit with size 6.5 m x 2.0 m with up to 6 m extra depth is available. The basin holds up to approximately 400 m³ water (400.000 liters) and accommodates testing on deep and shallow water. The basin is equipped with long-stroke segmented piston wavemaker for accurate short-crested (3-dimensional) random wave generation with active absorption and pumps for currents.

The wave flume is 22.1 m x 1.5 m x 1.5 m (length x width x depth) and equipped with long-stroke piston wavemaker for random wave generation and active absorption.

The wavemakers are powered by electric motors which allows for less acoustic noise, no oil pollution in the basin and more accurate waves. Our water treatment system in the basement enables us to reuse the water from one test to the next. This makes a more operational/efficient laboratory and also minimizes the environmental impact.

The equipment

Wave and current generation system for basin

- 13 x 1.5 m (width and height).
- 30 individually controlled wave paddles (snake type configuration) powered by electric motors.
- Accurate generation of 3D waves due to narrow vertically hinged paddles (0.43 m segment width).
- Maximum wave height up to 45 cm (at 3 s period).
- Typical maximum significant wave height in the range of 0.25-0.30 m
- Built with stainless steel and fibreglass for minimum maintenance.
- Pumps with a total maximum flow of 3500 m³/h for generation of strong current in the basin (up to 0.15 m/s at 0.5 m water depth). Structures can be tested in combined waves and current (following or opposing).

Wave and current generation system for flume

- 1.5 x 1.5 m (width and height).
- Single-element wave generator powered by electric motors.
- Exact generation of 2D waves.
- Maximum wave height up to 65 cm (at 3 s period).
- Built with stainless steel and fibreglass for minimum maintenance.
- Pumps with a total maximum flow of 1100 m³/h for generation of strong current in the flume (up to 0.4 m/s at 0.5 m water depth). Structures can be tested in combined waves and current (following or opposing).

Passive wave absorber elements

- For absorption of waves in the wave basin and wave flume.
- Built with stainless steel and hot galvanized stretch metal sheets for minimum maintenance.

Water treatment system

- Contains sand filters and UV filters.
- Reuses the water in the reservoir.
- Automatic fast filling to specified water depth and fast emptying of the facilities (adjustable speed)

Wave generation software

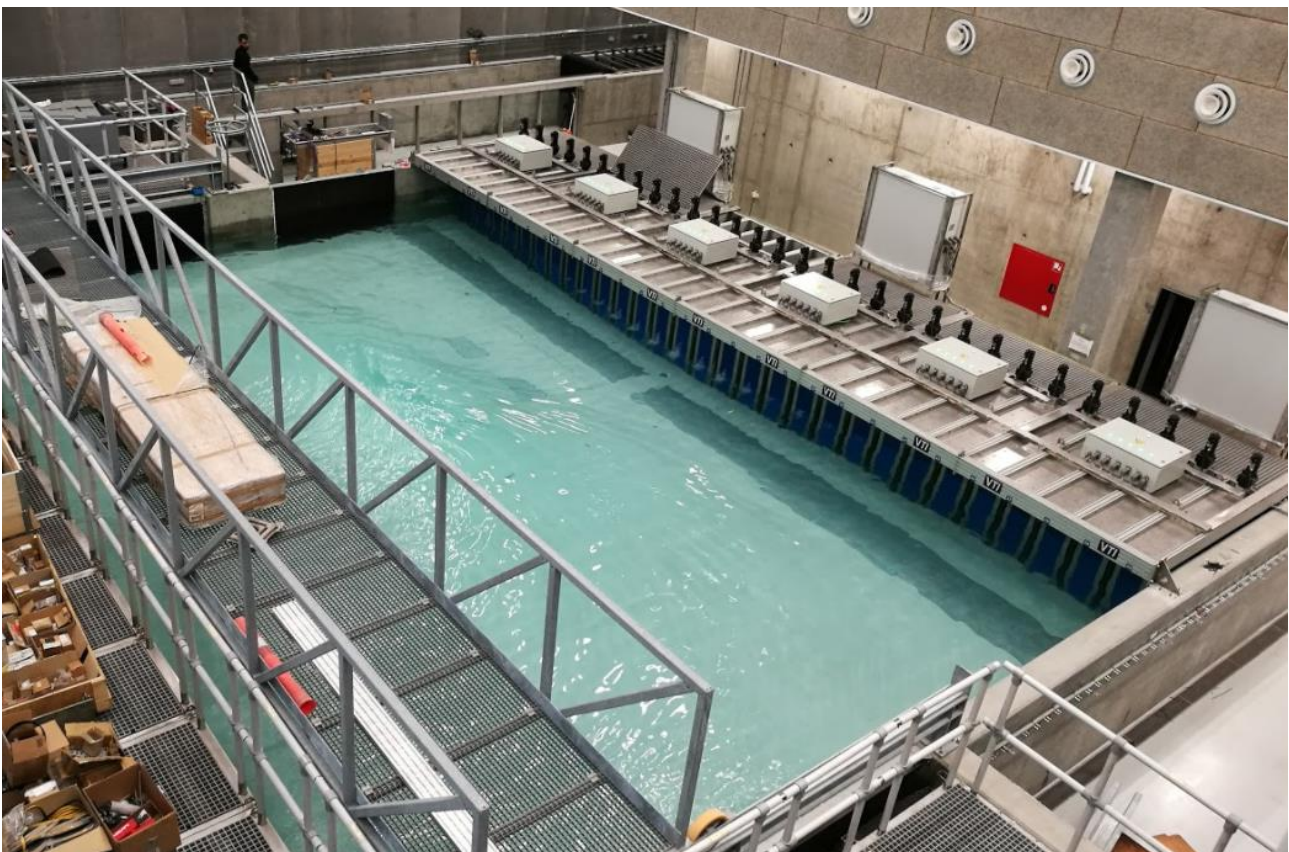
- In-house designed AwaSys software utilizing state-of-the-art wave generation principles (used by more than 25 labs)
- Generation of regular, irregular, solitary waves
- 2-D and 3-D active wave absorption (reflection compensation)
- 2nd order irregular unidirectional and multidirectional wave generation

Wave analysis software

- In-house designed WaveLab software for data acquisition and wave analysis (used by more than 20 labs)
- Data acquisition system that support simultaneous sampling of 80 channels at more than 1 kHz sampling rate
- Reflection separation of linear and nonlinear 2-D waves
- Directional wave analysis of short-crested waves using BDM and MLM methods

Other equipment

- More than 40 resistance type wave gauges including electronics
- Large selection of pressure transducers and load cells
- Various equipment for measurement of flow velocities (lasers, ADV, etc.)
- Laser profiler for automatic profiling of scour holes and surfaces of rubble mound structures
- OptiTrack Flex 13 object tracking system
- Step gauge for run-up measurement
- Large selection of breakwater armour units



The lab getting ready (01.06.2017).



Testing of breakwater for Port of Hanstholm (19.01.2018).