MARINTEK

Hydrodynamic Laboratories

- Ocean Basin Laboratory -
- Towing Tanks -
- Cavitation Laboratory -

Technical specifications and testing facilities

SINTEF

The Ocean Basin Laboratory

Test facilities

The Ocean Basin Laboratory is used for studying basic as well as applied ship and offshore problems.

A total environmental simulation including wind, waves and current offers unique testing conditions for models of all types of fixed and floating structures.

A water depth of 10 metres offers excellent testing possibilities for deep water structures intended for the offshore industry in future.

Applications

- Seakeeping
- Ship manoeuvring
- Fixed and floating structures
- Mooring systems
- Energy production from the sea
- Floating islands
- Offshore loading systems
- Offshore floating production
- Offshore marine operations
- Subsea systems and operations
- Pipelines

Ocean basin laboratory data

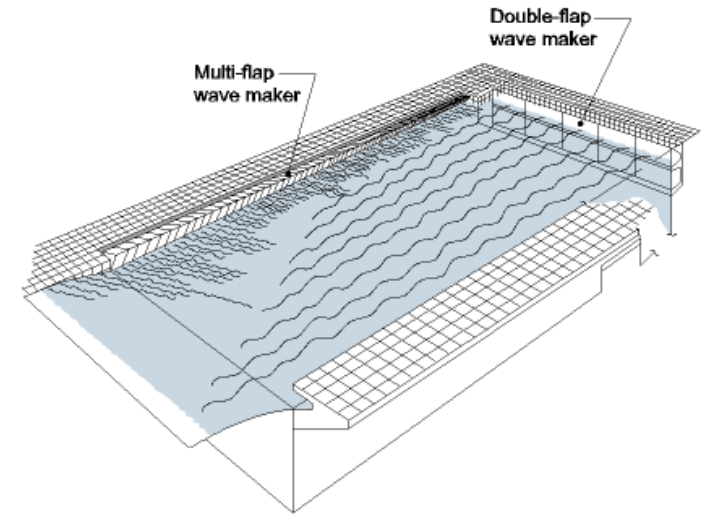
Length: 80 m
Width: 50 m
Depth: 0-10 m

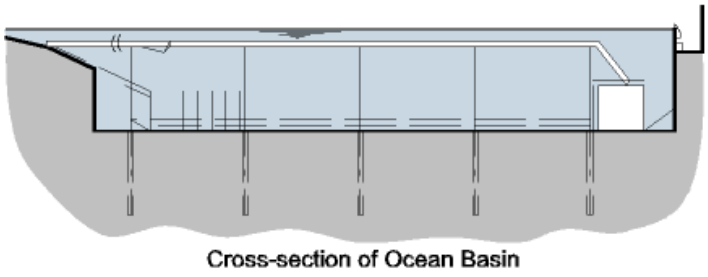
Maximum current velocity approx. 0.2 m/s at 5 m water depth. Down at 7.5 m water depth maximum current velocity is approx. 0.15 m/s.

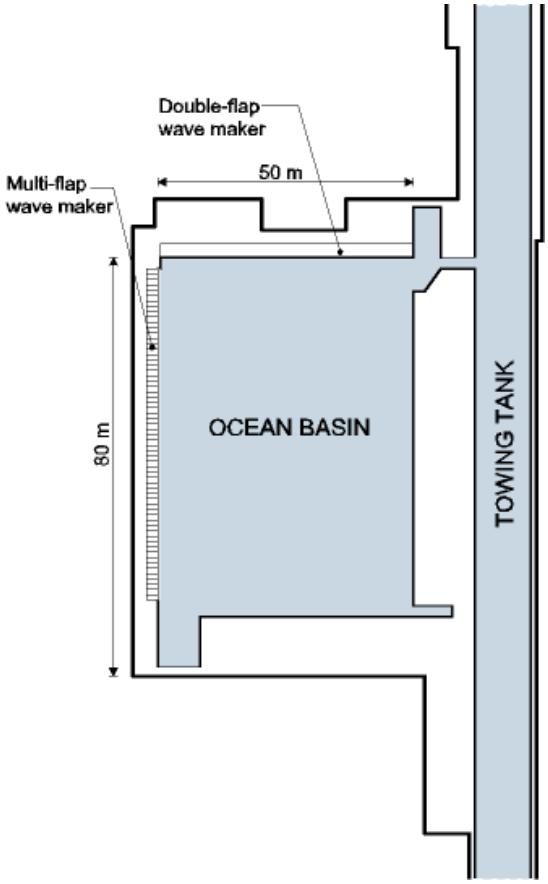
Double flap wave maker
Hydraulic driven, hinged double-flap type.
Wave characteristics:
Regular waves. Maximum wave height: 0.9 m.
Wave periods: 0.8 s and above.
Wave spectra: Computer generated or from magnetic tape.

Multiflap wave maker
Electrically driven, hinged single-flap type.
144 individually controlled flaps.
Wave characteristics:
Regular waves: Maximum wave height: 0.4 m.
Wave periods: 0.6 s and above.
Wave spectra: Computer generated shortcrested or longcrested waves of specified direction.

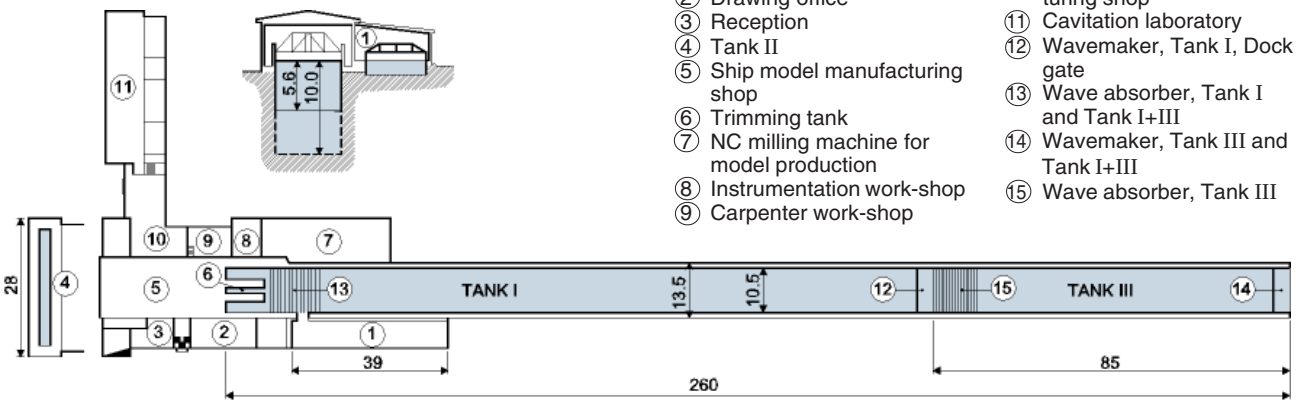
The carriage system follows free running models with no constraints at speed up to 5 m/s, at any heading to the waves.




Cross-section of Ocean Basin



The Towing Tanks



① Model store
② Drawing office
③ Reception
④ Tank II
⑤ Ship model manufacturing shop
⑥ Trimming tank
⑦ NC milling machine for model production
⑧ Instrumentation work-shop
⑨ Carpenter work-shop
⑩ Propeller model manufacturing shop
⑪ Cavitation laboratory
⑫ Wavemaker, Tank I, Dock gate
⑬ Wave absorber, Tank I and Tank I+III
⑭ Wavemaker, Tank III and Tank I+III
⑮ Wave absorber, Tank III

Towing tanks I and III

Dynamometers for ship model testing

All dynamometers compatible with computerized data collection and reduction. Strain gauge based dynamometers for:
- Towing force
- Open water tests
- Propulsion tests

Test equipment for fixed and floating structures measuring:
- Pressure
- Forces and moments in six degrees of freedom
- Displacement in six degrees of freedom

Modular force gauges give flexibility for special instrumentation requirements.

3-dimensional wake measurements by use of 5-holes pitot tubes.

Strain gauges and inductive propeller nozzle dynamometers.

Selspot opto-electronic system for motion measurements in six degrees of freedom.

Towing tank II

Dynamometers

6-component dynamometer, forces and moments in 3-dimensions.

Selspot opto-electronic system.

Modular force gauges for special requirements.

Towing tank data

	Tank I	Tank II	Tank III	Tank I + III*
Length:	175 metres	25 metres	85 metres	260 metres
Width:	10.5 metres	2.8 metres	10.5 metres	10.5 metres
Depth:	5.6 metres	1.0 metres	10 metres	5.6/10.0 metres
Total weight carriage:	20 tons	0.2 ton	4 tons	20/4 tons
Carriage type:	Tubular member truss	Open bay	Closed beam	Tubular member truss
Wheelbase:	11.04 metres	3 metres	11.04 metres	11.04 metres
Speed range:	0.02-8 m/sec.	0.05-1.75 m/sec.	0-0.5 m/sec.	0.02-12 m/sec.
Maximum acceleration:	1 m/sec^2	1 m/sec^2	1 m/sec^2	1 m/sec^2
Driving motors:	4 DC shunt motors in series	1 DC shunt motor with gear and remotely controlled variator. Wire traction.	2 DC shunt motors	4 DC shunt motors in series
Power system:	Thyristor controlled	Thyristor controlled	Thyristor controlled	Thyristor controlled
Model size range:	8 metres	1 metre	-	8 metres
Wavemaker:		Plunger type	Double flap	Double flap
		Regular and irregular waves	Regular and irregular waves	
Maximum wave height:		0.3 metre	0.9 metre	0.9 metre
Wave period range:		0.25-3 sec.	0.8-5 sec.	0.8-5 sec.
Maximum wave steepness:		1:8	1:10	1:10
Wave spectra:		Computer generated, based on 4000 sine components		

* Tank I and III can be used simultaneously and also as one long tank (Tank I + III) by removing the gate (12) and wave absorber (15). In tank I + III either of the two carriages can be used.

The Cavitation Laboratory

Cavitation tunnel data

Height between center lines:	10 metres
Width between center lines:	22.22 metres
Contraction area ratio:	6.25
Diameter of working section:	1.20 metre
Length of working section:	2.08 metres
Type of working section:	Closed throat
Maximum water velocity:	18 m/sec.
Maximum propeller RPM:	3000
Propeller motor power:	50 KW
Maximum working pressure:	6.0 atm.abs.
Minimum working pressure:	0.1 atm.abs./σ_v~0.2
Impeller motor power:	1150 KW

Honeycomb for flow straightening.

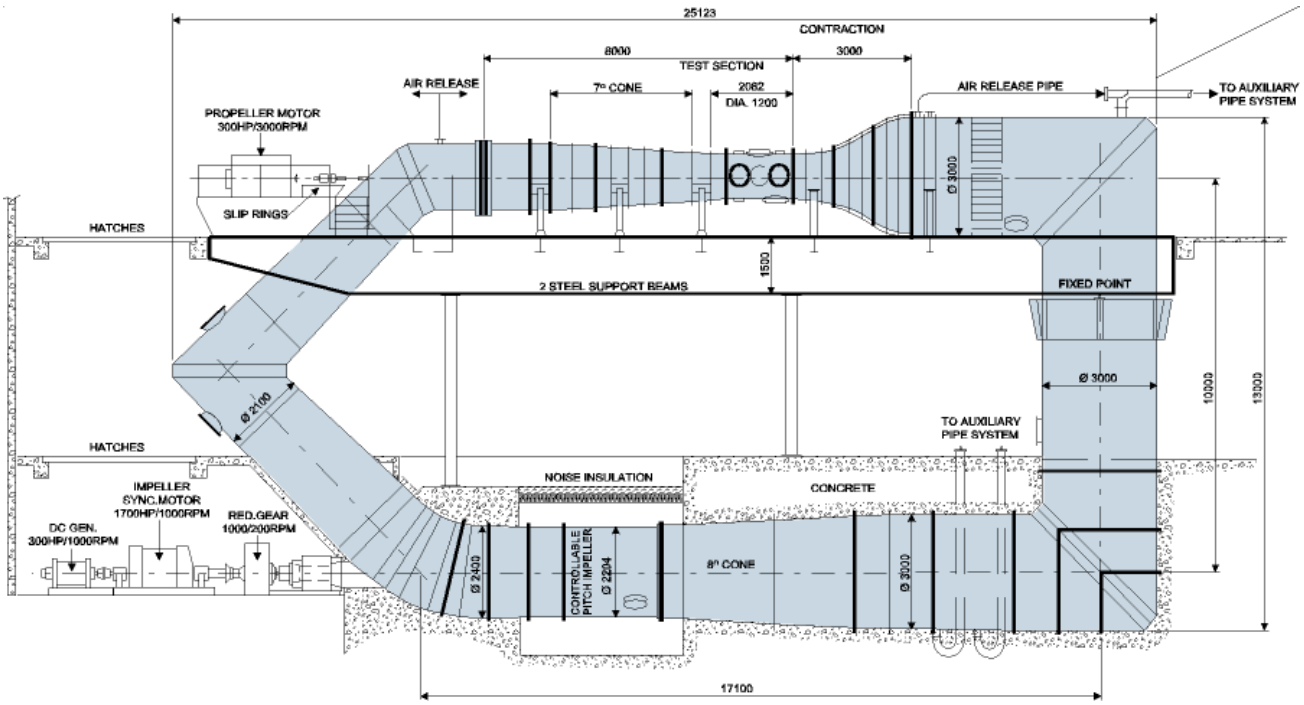
Test activities

- Open water tests with propeller (and duct) in axial or oblique flow.
- Behind hull condition with single, twin or triple screw installations.
- Azimuth thrusters.
- Z-drive installations.
- Underwater vehicles (submarines, ROV's etc.)
- Hydrofoils with or without remotely controlled flaps.

Measurements and observations

- Cavitation observation (Documentation by sketches, photos and video recordings).
- Cavitation erosion detection by paint technique.
- Measurements of propeller induced pressure fluctuations in the aftbody.
- Measurements of propeller induced noise.
- Six-component force measurements.

MARINTEK's standard procedure for propeller cavitation testing in behind condition, is to use dummy aftbody model and simulation of estimated full scale wake distribution, based on the measured wake distribution in the towing tank.



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