Name of organization
UCL

Year of information updating
2016

Year established
1826

Year of joining the ITTC
2016

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Naval Architecture & Marine Engineering (NAME) Office
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Status in the ITTC
Member

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Website
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Type of facility
Towing tank

Year constructed/upgraded
2005/2016

Name of facility
Ocean Towing Tank
UCL Fluids Research Laboratory

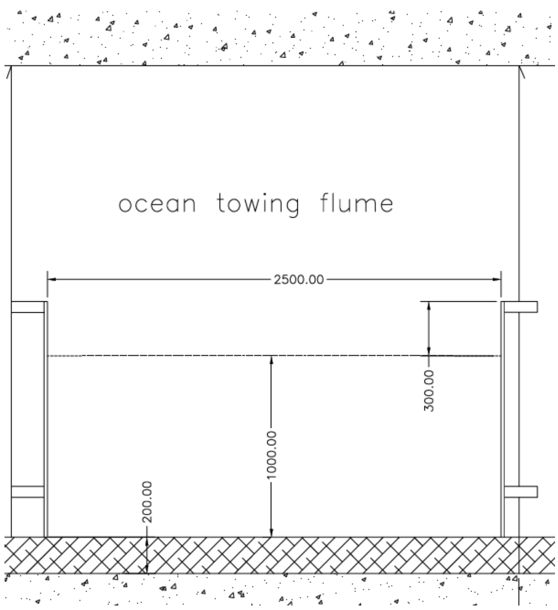
Location (if different from the above address)
Lower Basement

Main characteristics (dimensions of tank/basin/test section; for simulators: full mission, part task or desk top)

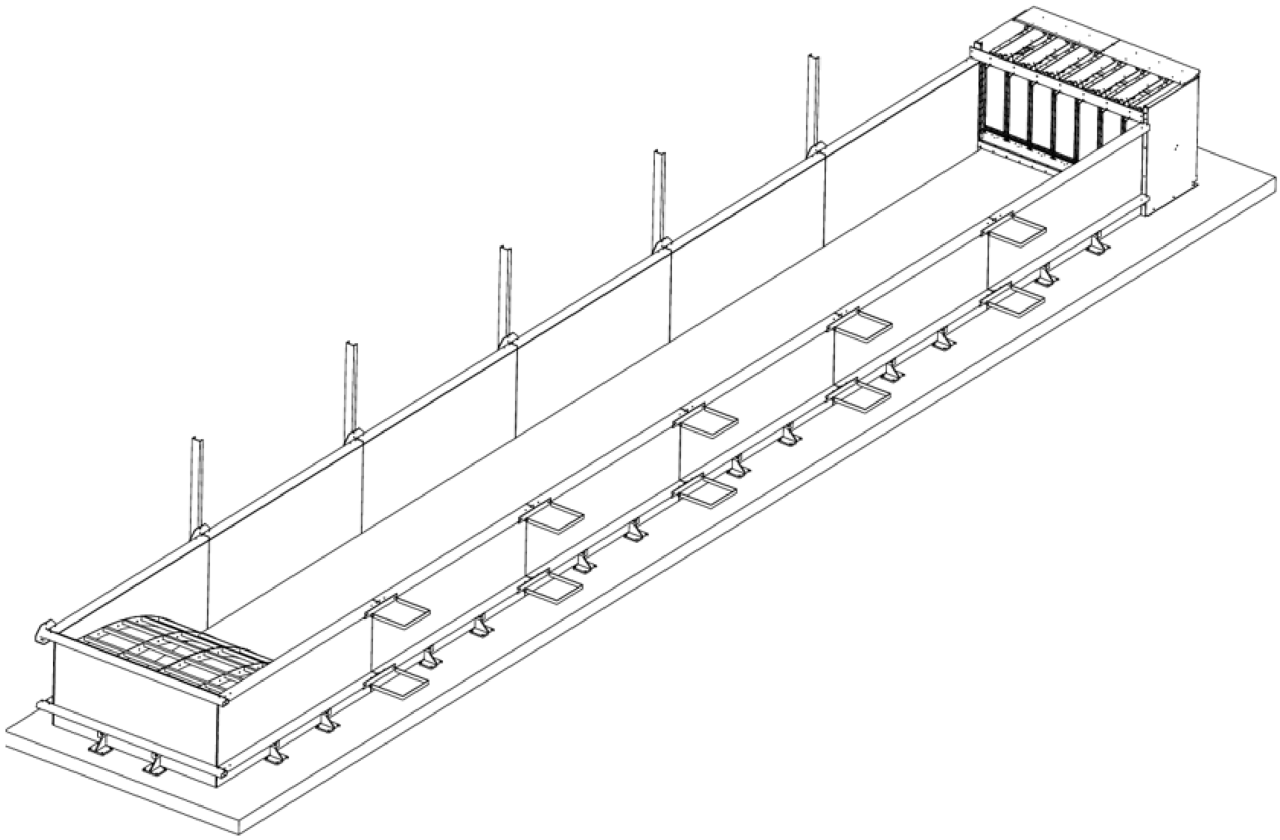
Length	19.8m
Width	2.5m
Water Depth	1.0m

The tank is deep mounted to a concrete slab, coated with waterproof polyurethane membrane. One end of the tank is connected to a bank of flap wavemakers. Two steel horizontal sections run around the remainder of the three sides of the tank. These three sides are made from toughened 15mm glass.

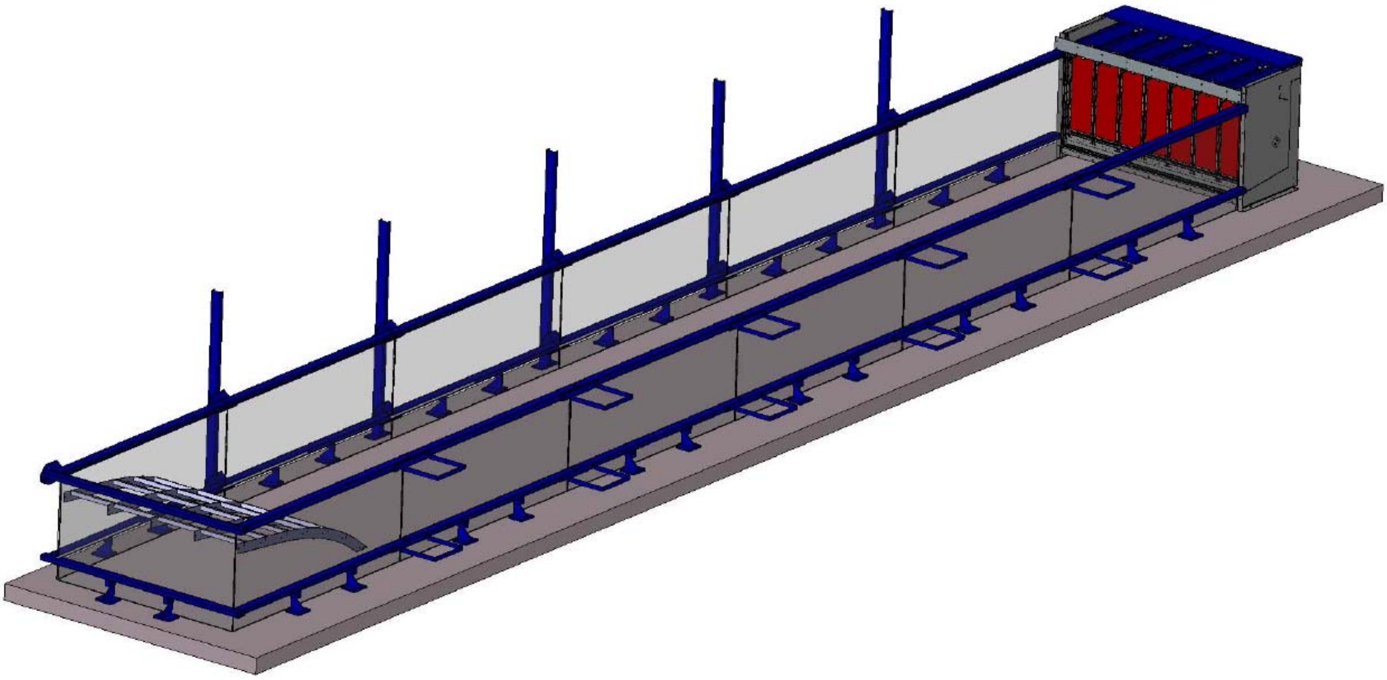
Drawings of facility



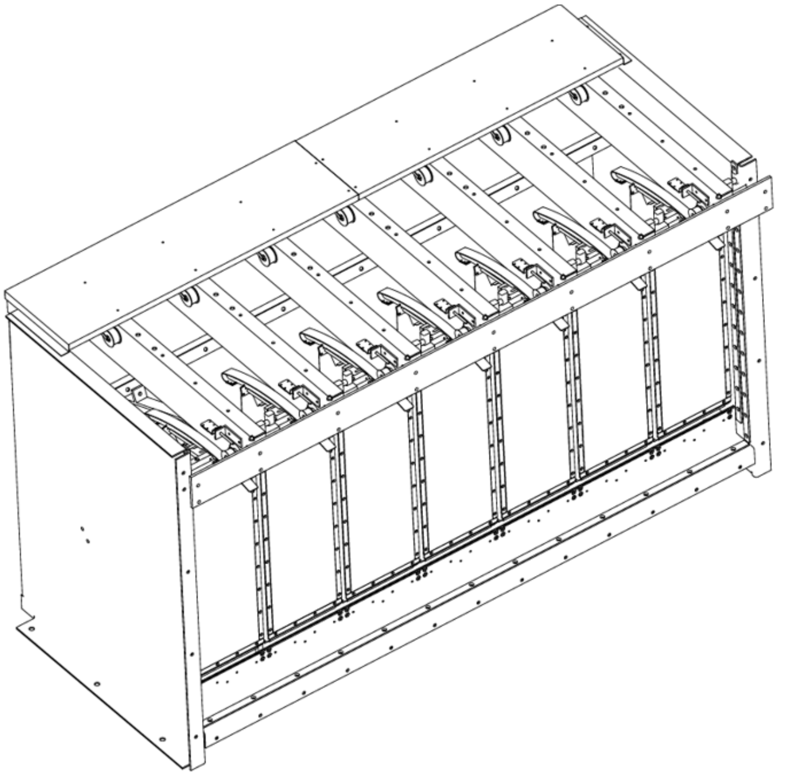
End Section of Ocean Towing Tank



General Isometric View of Ocean Towing Tank without pillars



General View 2 of Ocean Towing Tank without pillars



View of Ocean Wave Generation Paddle Module

Detailed characteristics (carriages, wave/current/wind generators, instrumentations, etc.)

Carriage:

Run Speed	< 4m/s
Acceleration rate	0.1-3.0 m/s^2

The towing carriage runs on two longitudinal rails suspended 1.8m (with waterline clearance of 0.2m) over the tank and driven by a motor and pulley system (with tensioner assembly). The overall length of travel is approximately 15m. The rails are comprised of structural channel sections made from standard 6000 series aluminium, with an internal rail for the carriage to run along. The drive system comprises a Bosch Rexroth MKD090 AC Servo motor and GTE 160 single stage gearbox.

Wave Maker:

Frequency Range	0.2> 2.0Hz
Wave Height	0.35m at 0.7Hz
Control	Programmable digital position and absorption
Power Absorption	Better than 95% at 0.5-1.5Hz
Wave Angle	< 90^0 at 1.2Hz
Drive	Brushless Servo
Type	Piston (Mixed fixed depth paddle)

Seven independently controlled piston flap wave paddles with force feedback control, allowing accurate generation and absorption of waves down to a few millimeters.

Data Acquisition:

Type	Wireless
Number of Analogue Channels	8
Sampling Frequency	1Hz - 1kHz
Connection Type	3-pin
Supply voltage to sensors	12/24V
Extra Channel	1 TTL Connection
Max. Signal Voltage	10V

Software and control (waves):

Built in spectra	Pierson Moskovitch, ISSC, Scott Breitschneider, Neumann, Gaussian Mitsuyasu and JONSWAP
Spreading	Cos^n, Cos^{2n}, phase focusing
Absorption	Programmable
Special Effects	Focusing

Complex experiments involving multiple runs of different waves can be compiled at the same time then the individual runs selected from a menu. Special effects can be generated by manipulating individual fronts, moving them in space and time. Deep water breaking waves can be created by manipulating the fronts to focus energy at a particular point in the tank. This is particularly useful for investigating the effects on structures of large statistically rare waves.

Instrumentation:

- Resistive wave probes
- OBUG Type SGA-A Load Cells, Calibrated to 0.001V
- VN-100 Rugged Inertial Measurement Unit and Attitude Heading Reference System (3-axis accelerometer with gyros, magnetic sensor and barometric pressure sensor)
- LVDTs with +/-100mm (AML/EU+/-100mm)

Beach: A full width parabolic beach is fitted across the tank at the opposite end to the wave paddle bank. It consists of a stainless steel frame bolted to lugs on the inside of the tank.

Applications (Tests performed)

Bare Hull Resistance Tests
Seakeeping Tests
Added Resistance in Waves
Visual Observation of Underwater Effects (using glass sides)

Published description (Publications on this facility)

Smith, TWP; Drake, KR and Wrobel P (2009). Experiments on a damaged ship section. In: GuedesSoares, C and Das,PK, (eds.) ANALYSIS AND DESIGN OF MARINE STRUCTURES. (pp. 27-36). CRC PRESS-TAYLOR & FRANCIS GROUP (2009).

Smith, TWP; Drake, KR and Fone, D. Calculating the Global Structural Loads on a Damaged Ship. As part of a Damaged Ship Structural Integrity Analysis. In: (Proceedings) 5th International ASRANet Conference.

Drake, KR and Smith, TWP (2010). An Investigation into the use of an Articulated Column Supported Wind Turbine in Water Depths of 60-120m. In: (Proceedings) RINA Marine Renewables (2010).

Drake, KR; Smith, TWP and Fone, D (2013). A simple hydraulic model for the hydrodynamic loading on a heaving horizontal cylinder with a small damage opening at its keel. *Ocean Engineering, 59 pp. 15-19 (2013).*

Eatock Taylor, R; Taylor, PH and Drake, KR (2009). Tank wall reflections in transient testing. In: (Proceedings) International Workshop on water waves and floating bodies. 19-22 April, Zelenogorsk, Russia (2009).

Drake, KR; Taylor, RE; Taylor, PH and Bai, W (2009). On the hydrodynamics of bobbing cones. *OCEAN ENG., 36 (15-16) 1270-1277 (2009).*

Drake, KR (2001). Wave profile characterization of green water loading events from model test data. *APPL OCEAN RES, 23(4) 187-193 (2001).*