FOW SuPER TeST

Floating Offshore Wind Sub-Physical Experimental Round robin Tests to assess Seakeeping and Transit performance

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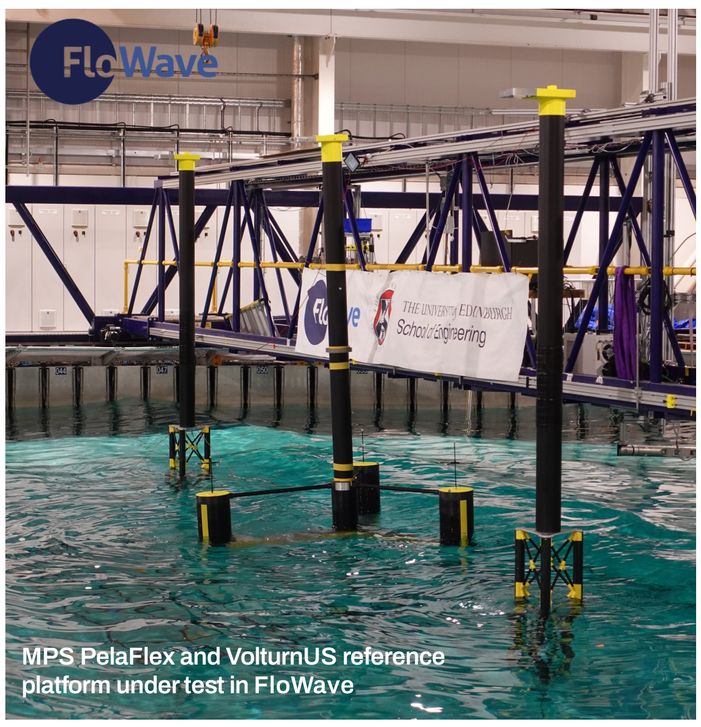
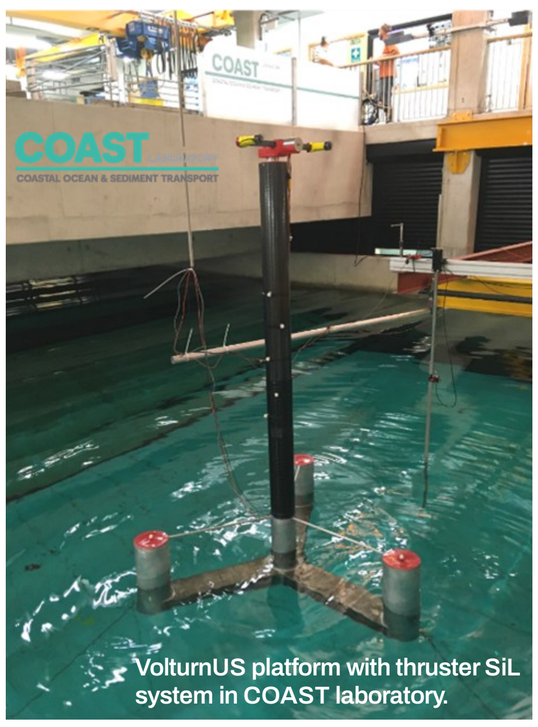


MPS PelaFlex and VolturnUS reference platform under test in FloWave

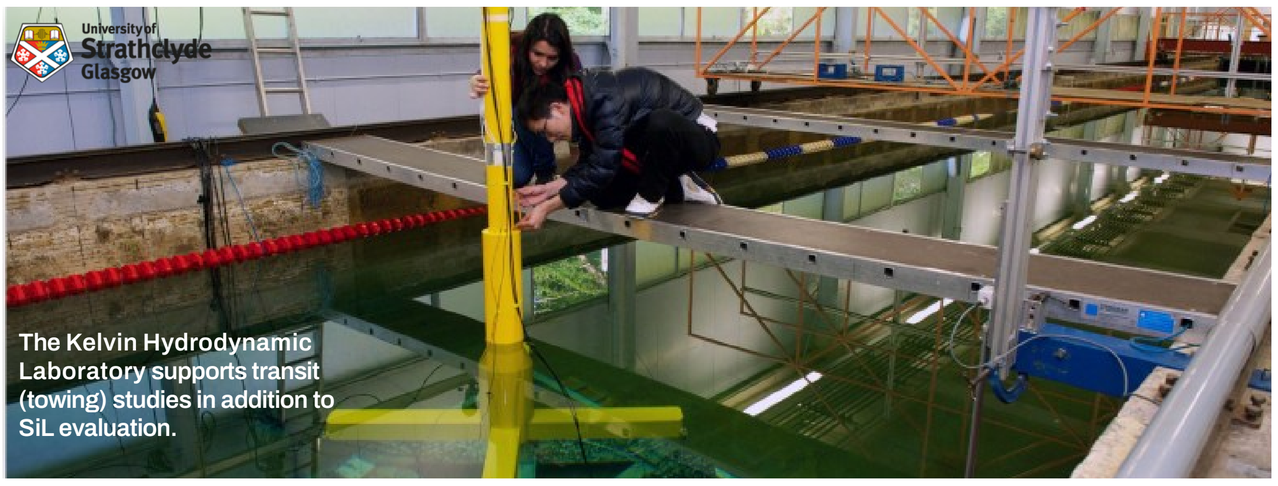


VolturnUS platform with thruster SiL system in COAST laboratory.

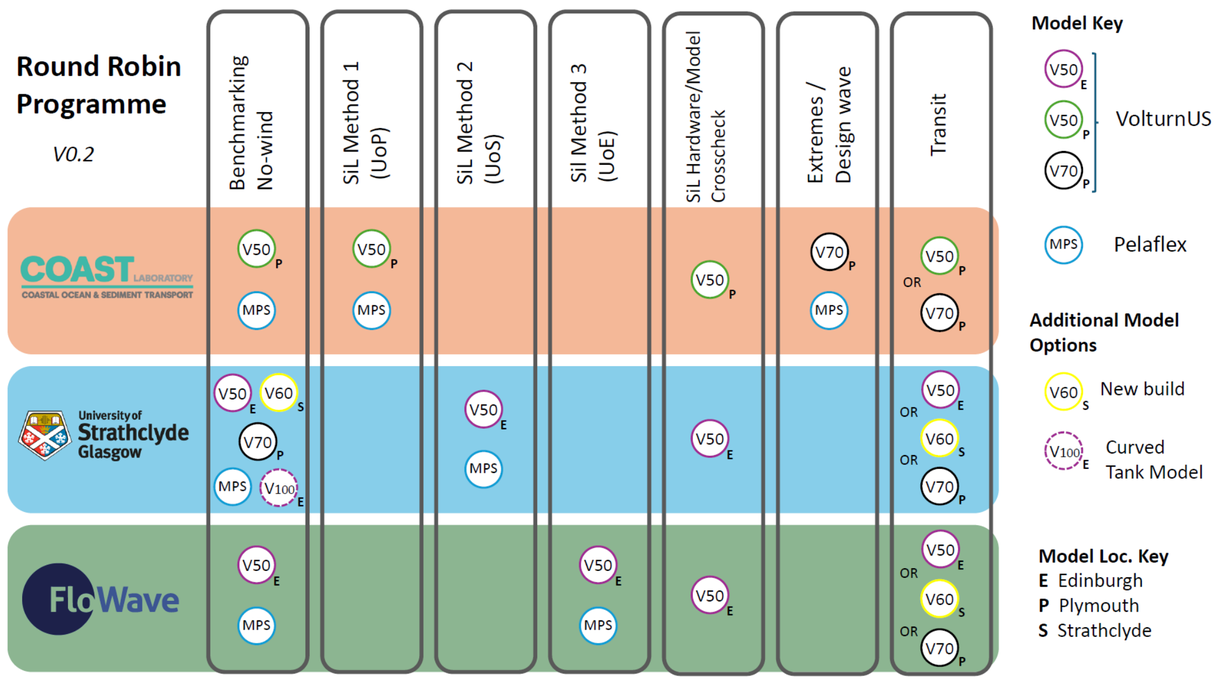
The **FOW SuPER TeST** project aims to improve the commercial viability of floating wind energy by advancing laboratory testing methods and reducing uncertainty in hydrodynamic and aerodynamic modelling. It brings together three leading UK facilities - Plymouth **COAST**, Strathclyde **KHL**, and Edinburgh **FloWave** - to benchmark and standardise hybrid software-in-the-loop (SiL) testing approaches.

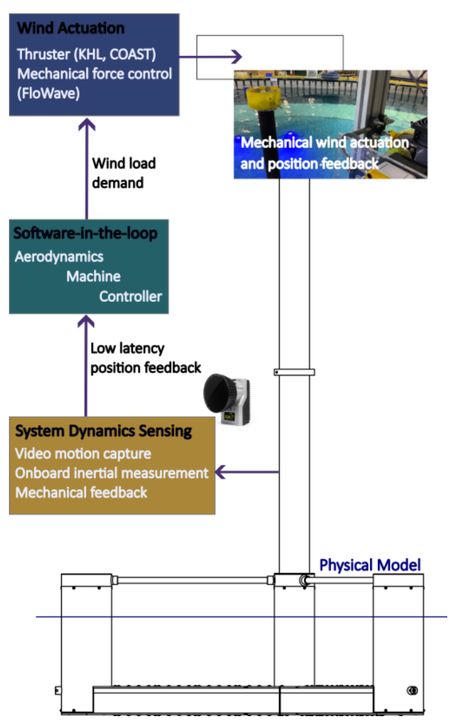
The project focuses on **improving modelling accuracy**, developing **real-time SiL systems** for aerodynamic load simulation, and providing **standardised data and tools** to support faster FOWT development. Key work includes creating modular SiL software, developing surrogate models, integrating these systems with existing hardware, and validating aerodynamic actuation methods through laboratory testing and comparison with tools such as OpenFAST.

The project is assessing system performance under operational and extreme conditions, including comparative 'round robin' testing across multiple facilities in 2026. Supported by industrial partners **Marine Power Systems** and **Lloyd's Register**, the project is addressing the current lack of guidance and standards for FOWT testing by providing an evidence-based foundation for the practical use of SiL methodologies.



The Kelvin Hydrodynamic Laboratory supports transit (towing) studies in addition to SiL evaluation.






Mechanical wind actuator (FloWave)

Sub-physical modelling processes

SiL testing methods often use a surrogate numerical model with reduced fidelity to provide real-time, tank-scale estimates of rotor thrust based on the measured motion of the floating turbine.

This model takes inputs from video motion capture and/or onboard sensors to track nacelle motion in real time and calculate the corresponding wind thrust. It may also include a turbine controller, enabling functions such as real-time virtual blade pitching.

The virtual thrust must then be converted into a model-scale force input. In this project, this is done using either turbine-mounted thrusters or mechanical line (winch) actuation.

Key challenges include validating that the correct forces are generated and minimising system latency. Latency is particularly critical because a 1:50 scale model operates in a time-compressed environment, with dynamics occurring more than seven times faster than at full scale.