

FLOATING POWER PLANT

Use of Wave Tanks for FPP's Device Technology Development

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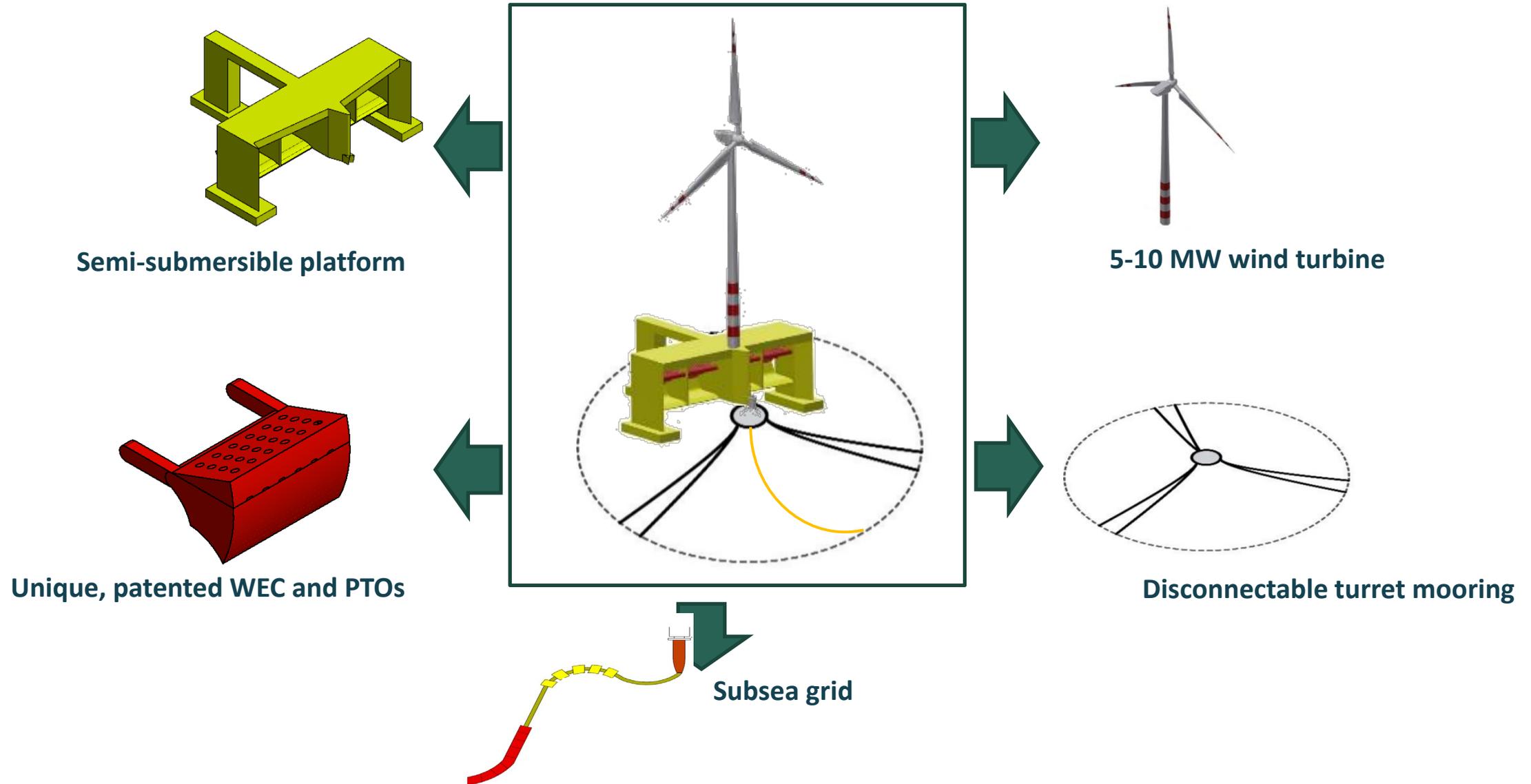
AGENDA

1. FPP TECHNOLOGY AND TESTING HISTORY
2. HOW TO PREPARE FOR WAVE TANK TESTING
3. WHAT TO TEST ONCE YOU ARE IN THE BASIN

TECHNOLOGY & TESTING HISTORY



POSEIDON 80 (P80) – KEY COMPONENTS



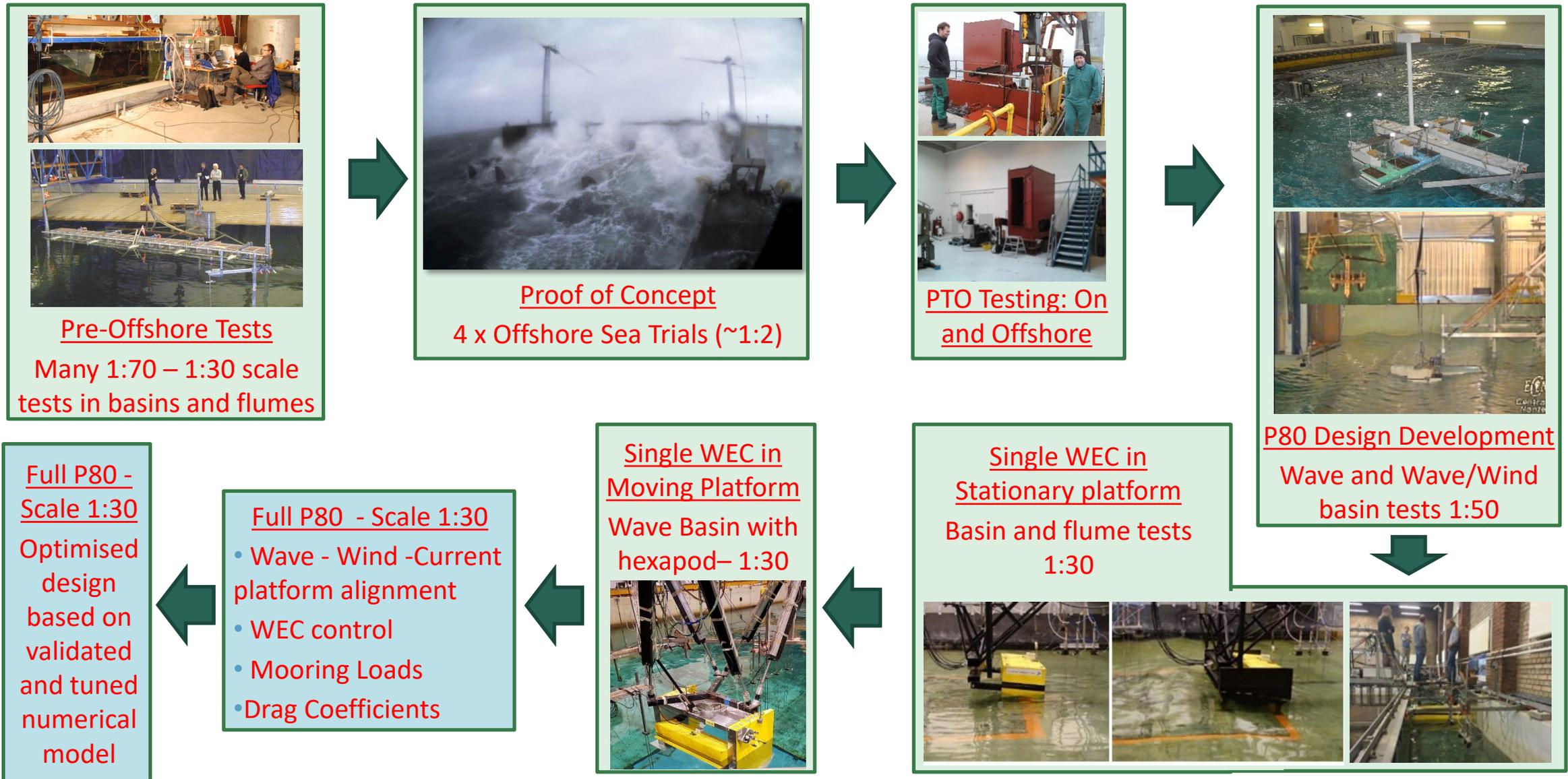
FPP'S TECHNOLOGY: P80 COMMERCIAL DEVICE



FPP'S TECHNOLOGY: P37 HALF SCALE PROTOTYPE



FPP PHYSICAL TESTING



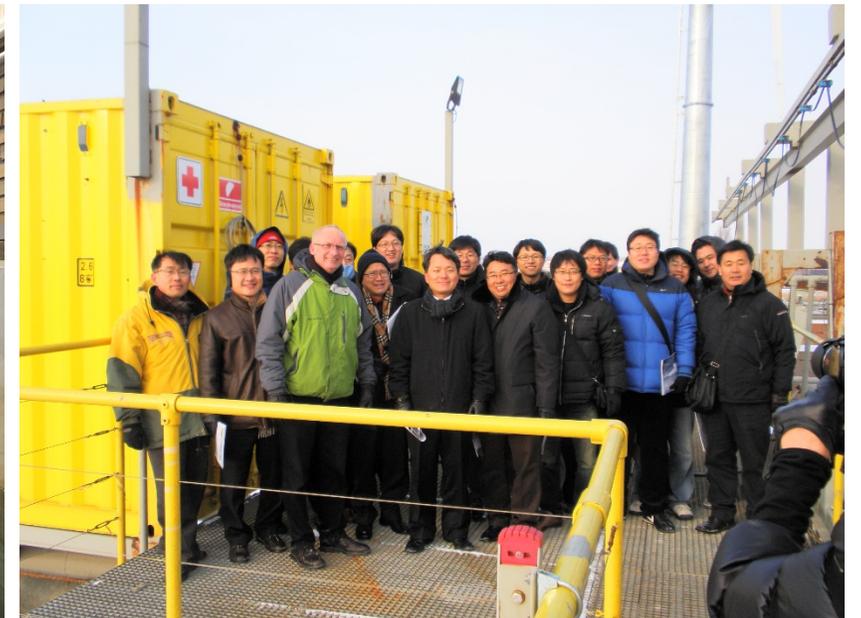
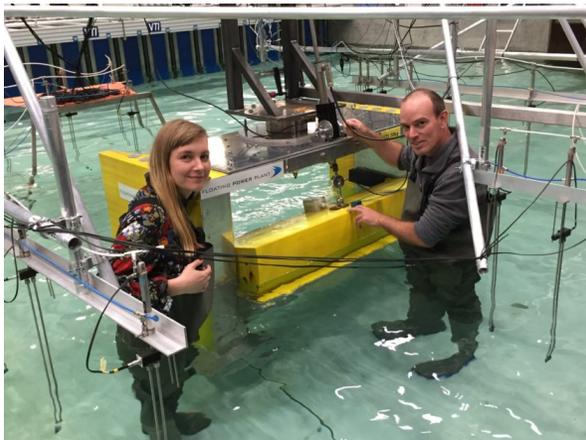
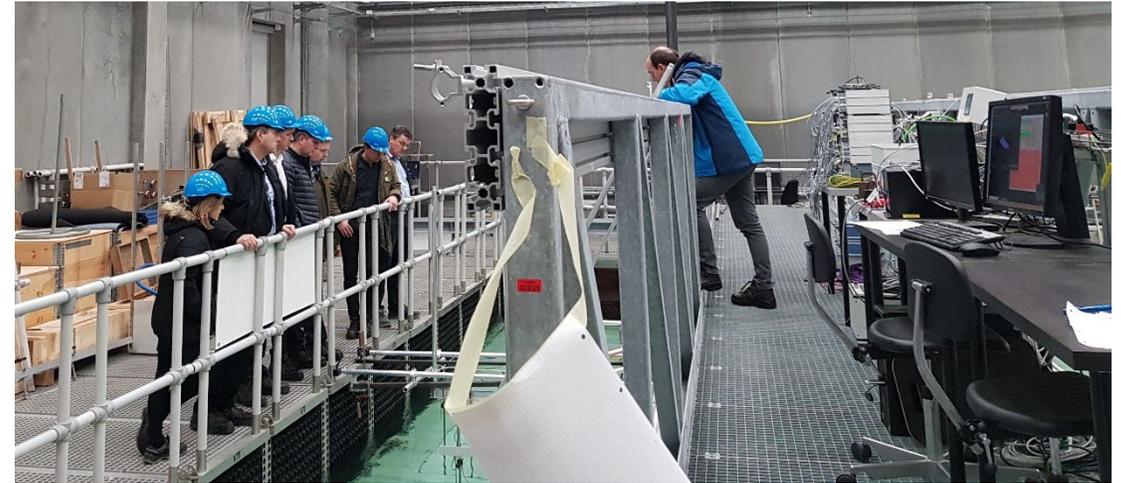
WHY DO WAVE TANK TESTS

1. To compare the data to numerical models

- To obtain input coefficients for models e.g. Cd drag
- To validate the numerical model
- To determine the range of conditions the numerical model gives acceptable results

2. As a business development tool

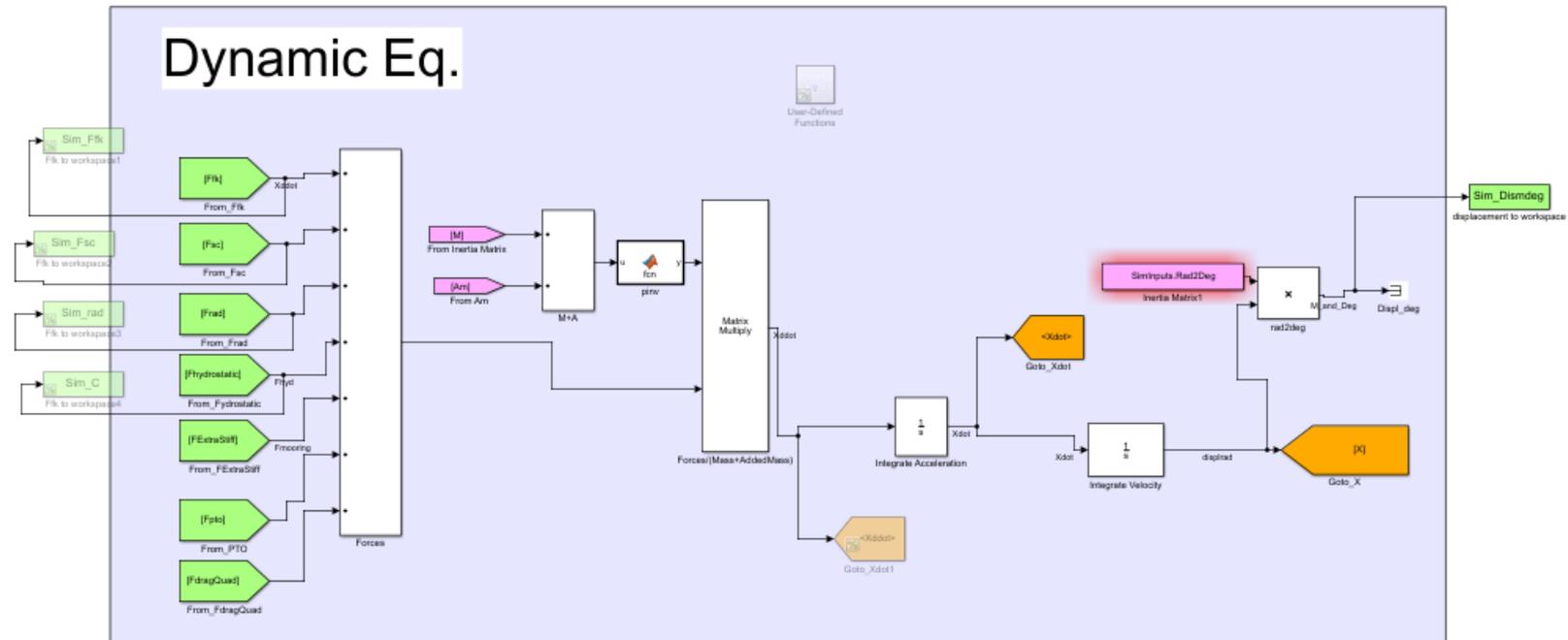
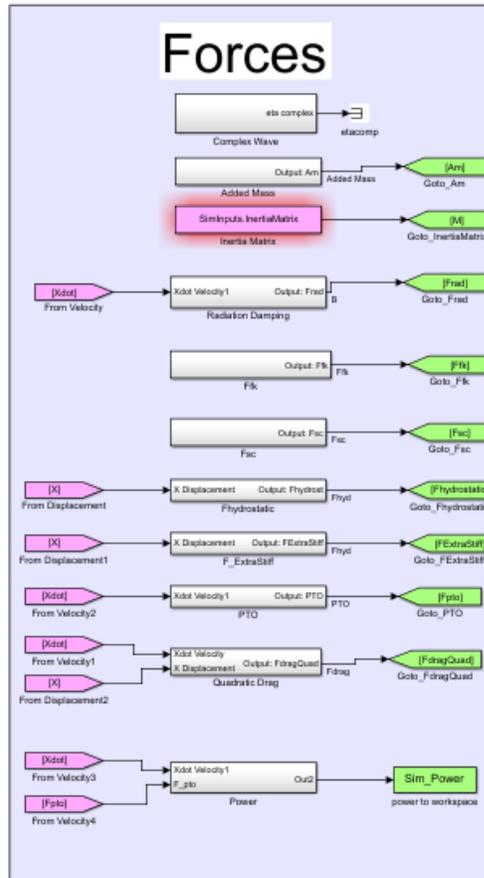
- Existing and potential investors
- Journalists
- Engineering partners



HOW TO PREPARE FOR WAVE TANK TESTING



PREPARATION:- PREPARE NUMERICAL MODELS TO VALIDATE



$$\ddot{X} = \frac{F_{FK} + F_{sc} + F_{other} - \int_0^t K(t - \tau) \dot{X}(\tau) d\tau - CX}{M + A_{inf}}$$

Set up the model and run the simulations first.

Decide exactly what you want to validate and what data you need for that

PREPARATION:- BEFORE ARRIVING AT THE TEST FACILITY



Design the scaled device
(including desired mass
properties)



Build it



Adjust all drawings and
calculations to match reality!

PREPARATION:- DRY TESTING

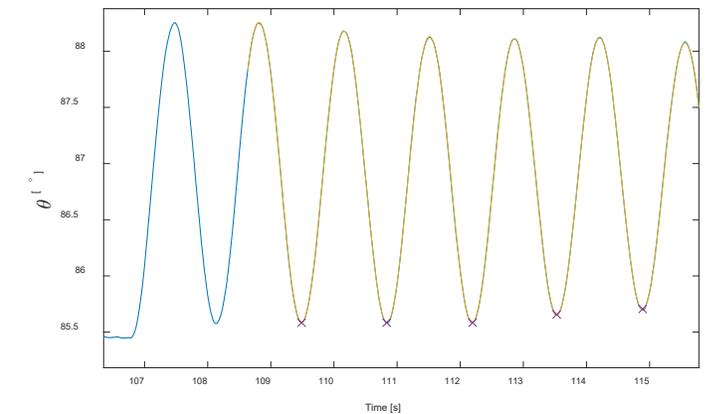
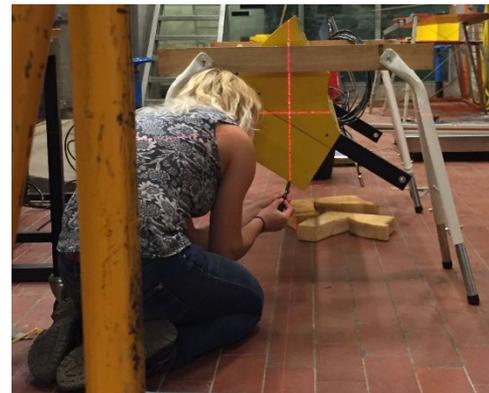
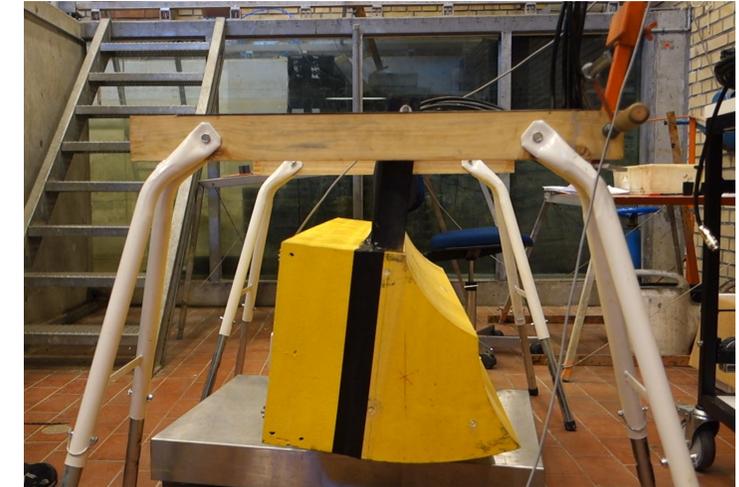
Weigh all components and entire device



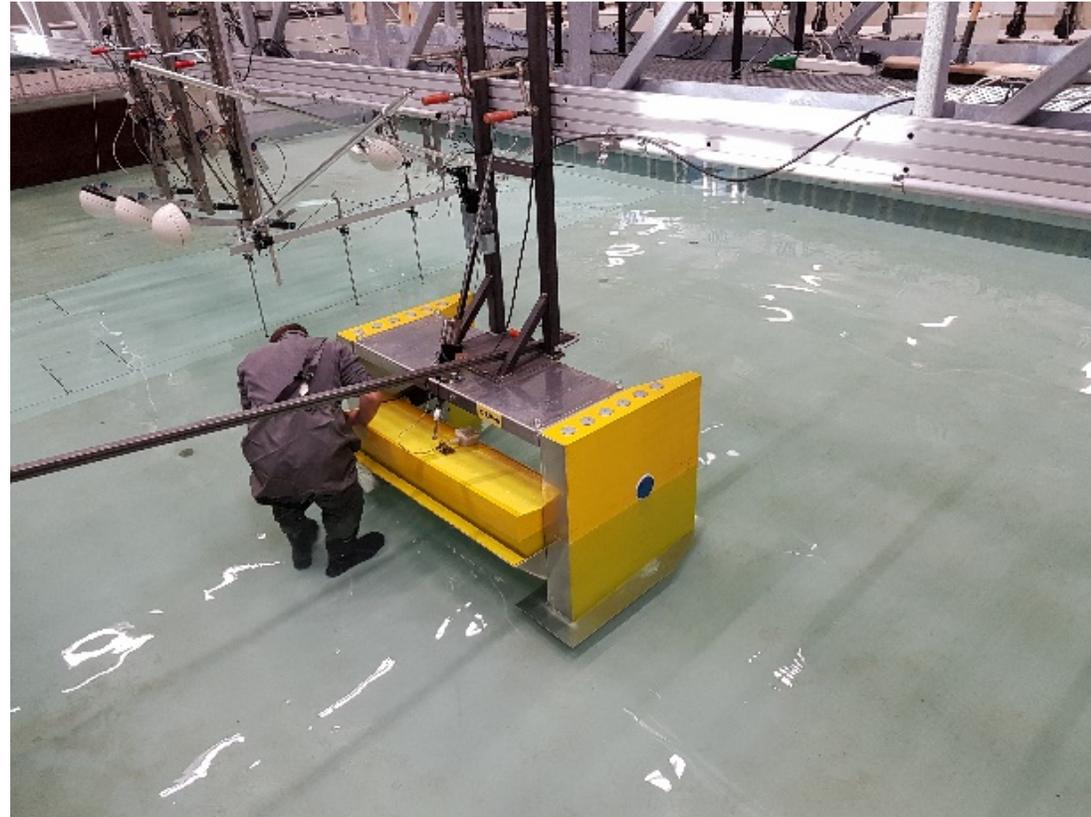
Measure Centre of Gravity



Measure Moment of Inertia



PREPARATION:- IN ANY WATER YOU CAN FIND!

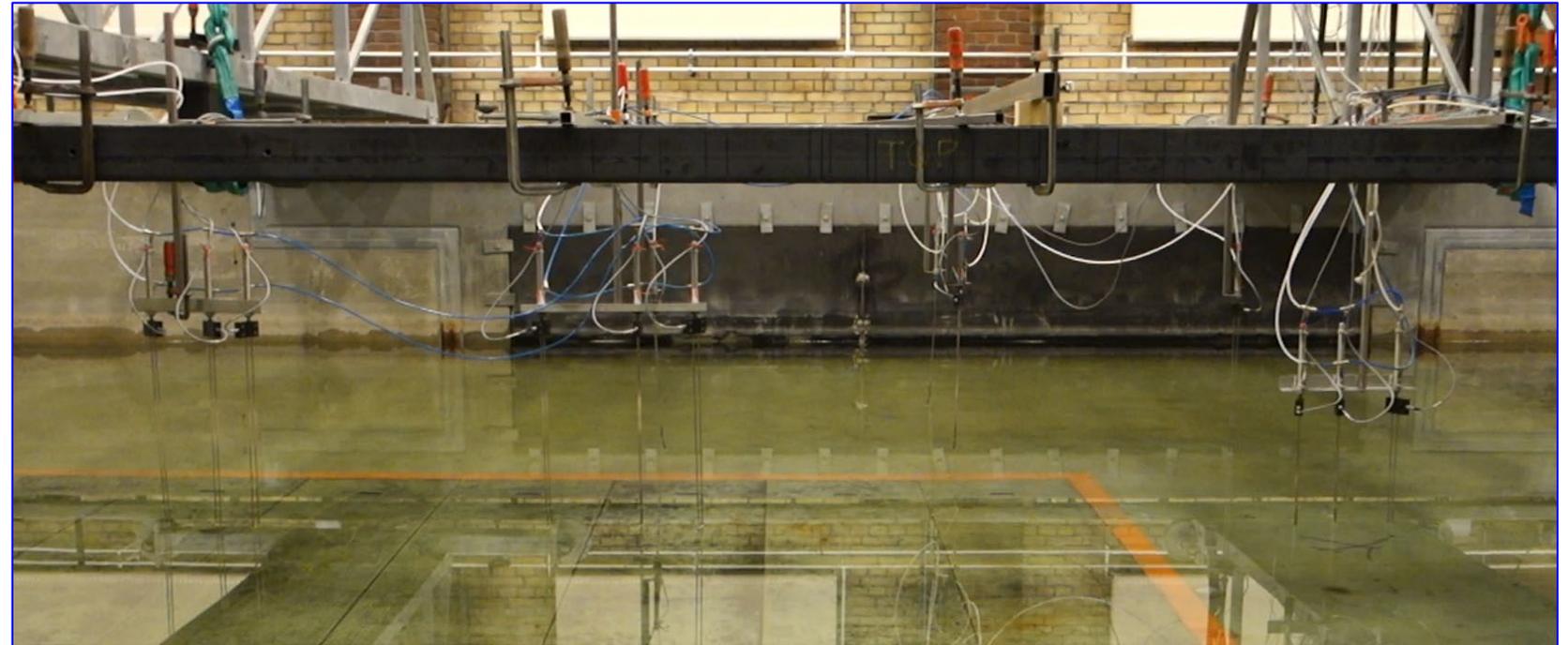
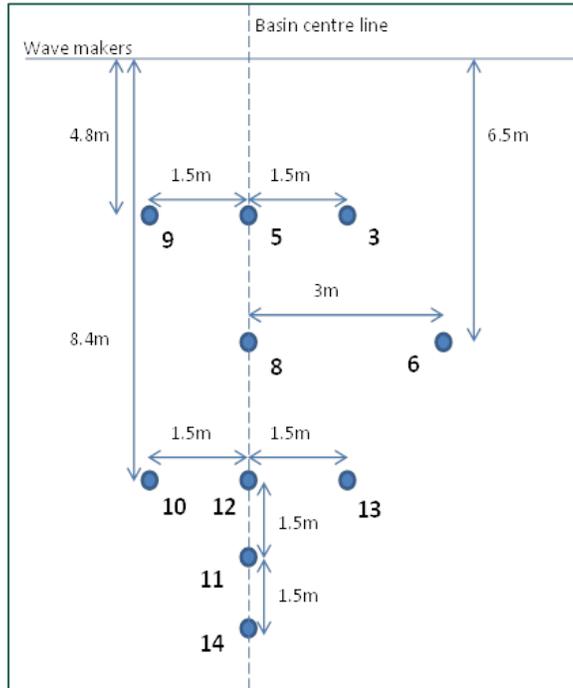


Check everything moves well in water and floats!

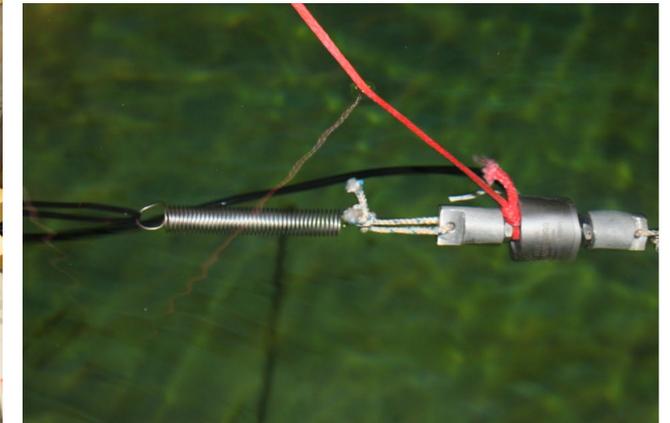
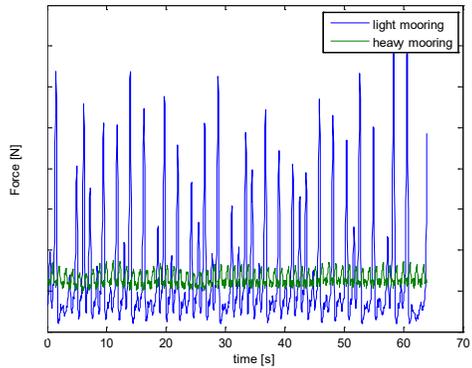
**ONCE YOU ARE IN
THE BASIN**



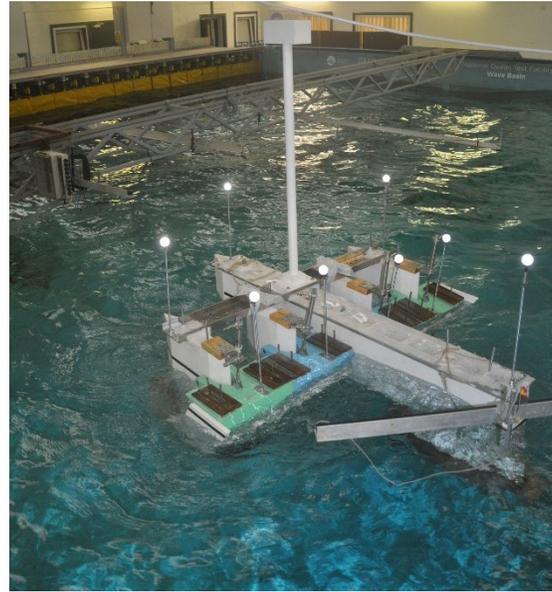
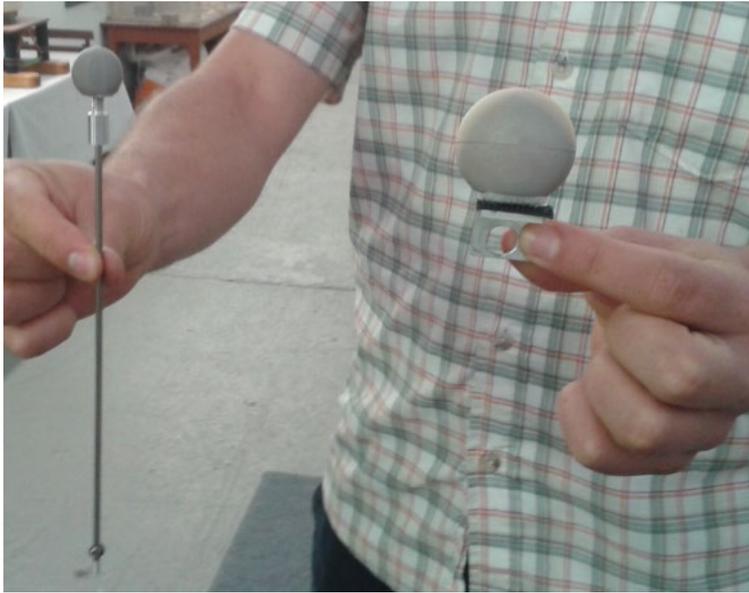
IN THE BASIN:- WAVE CALIBRATION



IN THE BASIN:- LAY THE MOORING / SUPPORT STRUCTURE

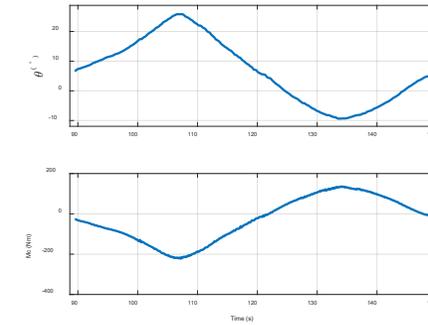
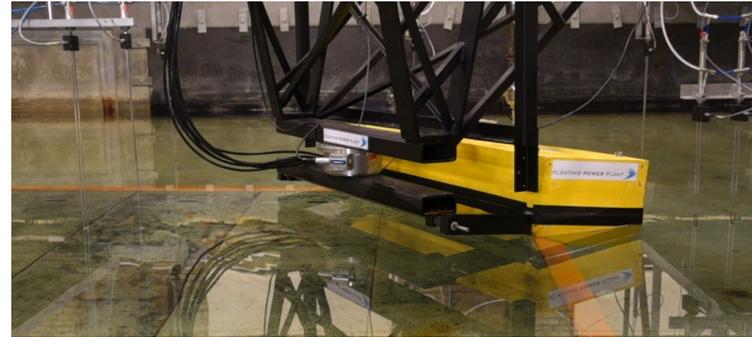


IN THE BASIN:- DEVICE SENSOR CALIBRATION

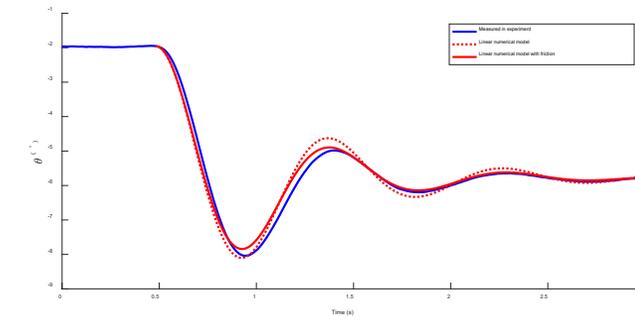
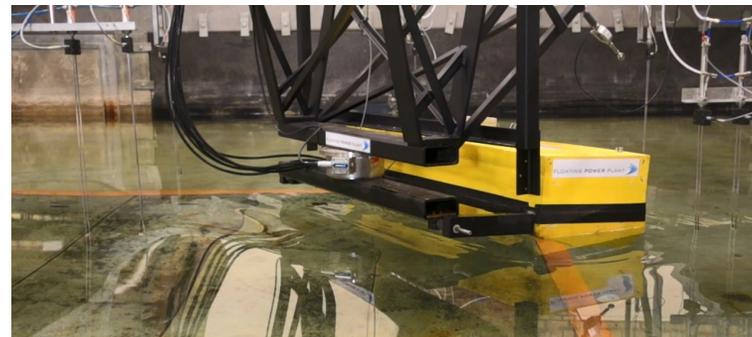


IN THE BASIN:- WITHOUT WAVES

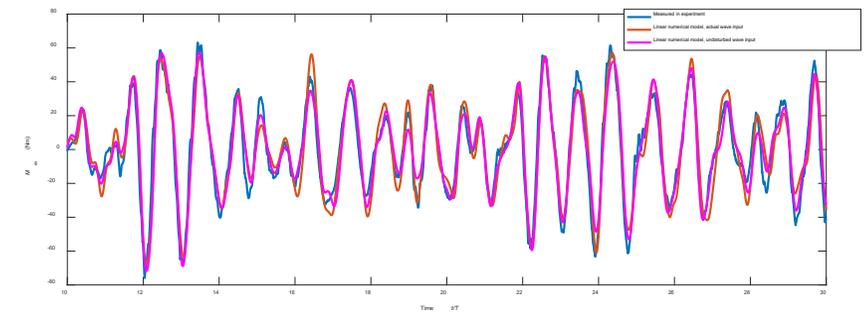
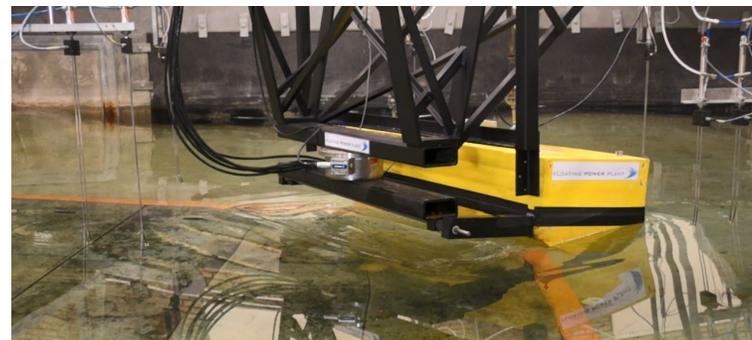
Buoyancy:- Slow motion in calm water



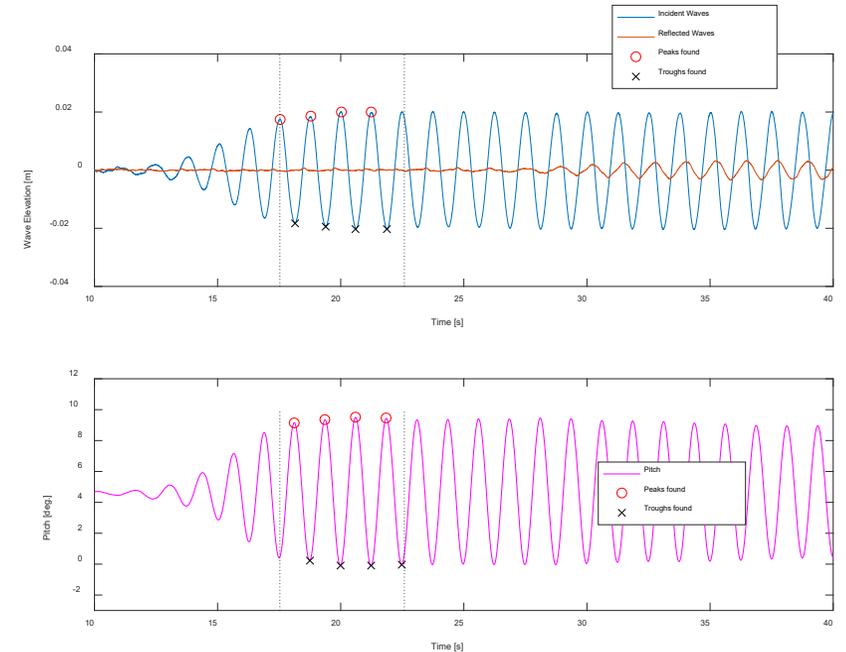
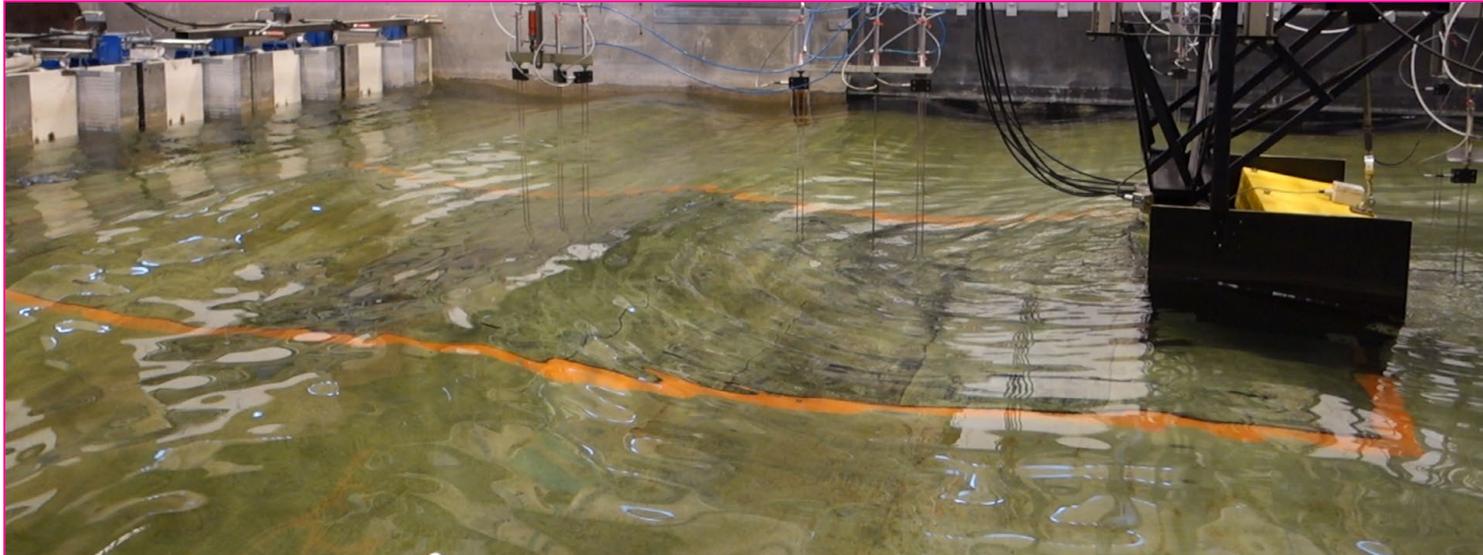
Damping: - motion decay



Fixed:- Excitation



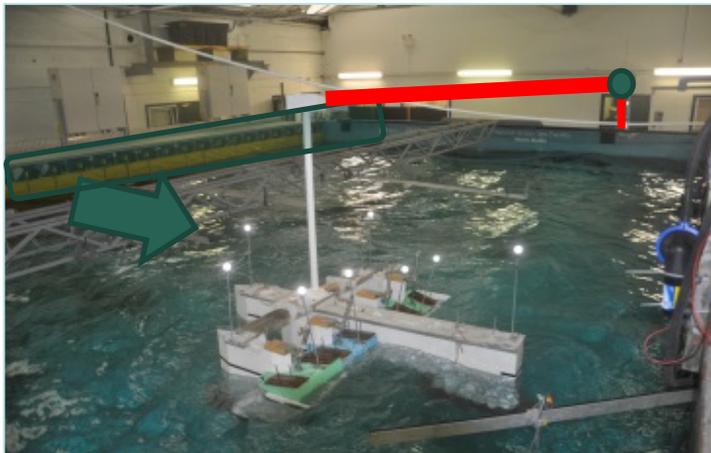
IN THE BASIN WITH WAVES:-



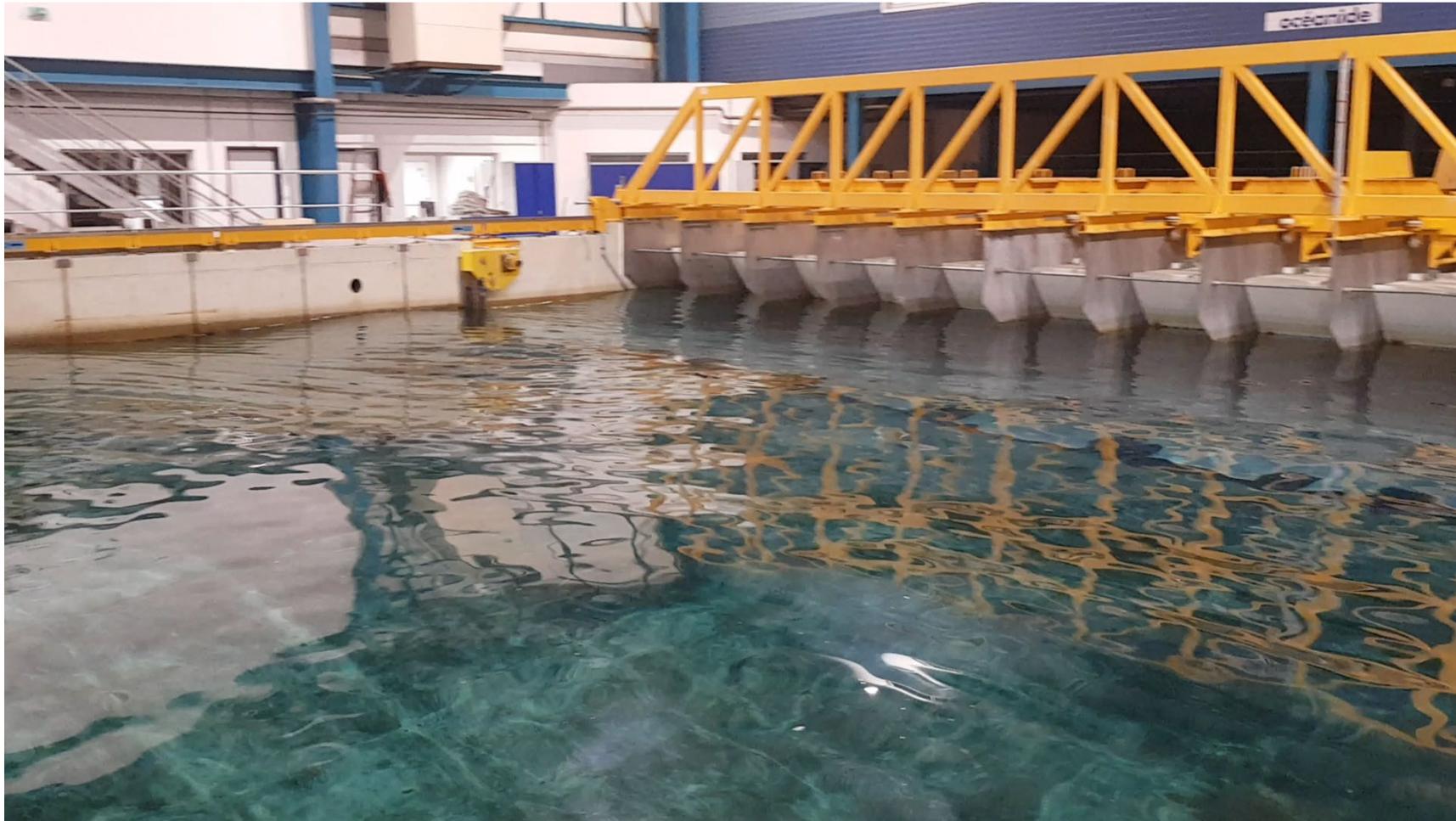
- Free device motion in waves (RAO)
- Device motion with Power Take-Off active
- Power control strategies
- Extreme waves – mooring forces

ADDITIONAL BASIN COMBINATIONS

- Wind
 - Using a string-pulley system to side of basin
 - Using a wind generator
 - Using a thruster
- Current
 - Using current generators
 - Dragging the anchor-points with current speed
- Hexapod :- To move a body with a pre-described motion



MULTI-DEGREE HEXAPOD MOTION OF PLATFORM: WEC MOVES WITH WAVES



**THANK-YOU FOR
LISTENING**

