D3.5 HexaFloat robot

This report describes the design process, the realization and verification of the 6-DoF setup designed for wind tunnel hybrid tests of floating offshore wind turbines. This setup consists in a parallel kinematic robot, "HexaFloat", designed and developed by the authors of this report, to test the dynamics of floating offshore wind turbine concepts, selected within LIFES50+ project, at the Politecnico di Milano wind tunnel.

A Hybrid/HIL methodology is implemented which combines, in real-time, measurements (i.e. aerodynamic forces on the wind turbine scale model) and computations (i.e. hydrodynamic forces on the wind turbine platform).

The "HexaFloat" robot (see Fig.1) is designed to provide the 6-DoF motions to the base of the wind turbine's scale model, due to such combination of measurements and computation (i.e. hybrid approach).

LIFES50+ wind tunnel hybrid tests represent the complementary approach with respect to the one developed at SINTEF Ocean basin.

Figure 1 6-DoF robot HexaFloat coupled with 1/75 DTU 10 MW wind turbine scale model. Politecnico di Milano Atmospheric Boundary Layer.

More specifically, the different chapters of Deliverable 3.5 give the following information:

- Geometric optimization
- Actuation chain sizing
- Mechanical design and sizing
- Control architecture and mechatronics