

Title: HF4 – Designing a DP Vessel to Support Offshore Renewables

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Abstract

Mojo Maritime is leading the design and development of a high performance vessel, the Hi Flo 4 (HF4), which will catalyse the industrialisation of tidal power. The HF4 design is based upon the need to install, operate and maintain tidal turbines, and their supporting foundations and cabling, in high energy tidal races, such as Scotland’s Pentland Firth or Canada’s Bay of Fundy, which are amongst the most demanding marine engineering environments in the world. In contrast to existing offshore construction vessels (OCVs) that are designed to operate in high winds and up to 3 knots of current, the heart of HF4 design is a dynamic positioning (DP) system capable of holding station in currents up to 10 knots. This allows the HF4 to operate throughout a high energy lunar tidal cycle, providing a high degree of operational availability and thus much improved productivity during the construction, operation and maintenance of tidal energy farms. HF4 is a catamaran vessel powered by four Voith Schneider Propellers (VSPs), with a key design focus on the hydrodynamics of the twin hulls coupled with maximising the unique operational advantages of VSPs. The vessel is capable of installing foundations, cables, subsea connectors and turbines in a wide range of oceanographic conditions.

A key innovation is the unique DP system, the research for which is being led by partners GE Power Conversion. The system needs to be able to cope with an extremely challenging oceanographic environment, where imposed currents and levels of turbulence are substantial, as has been confirmed through live current data acquisition by University of Exeter. The DP system gives options to work in different operational regimes by providing system modes which depend on the state of the tide, the power required for the engineering rôle, and the level of operational risk.

This paper provides an update of progress of the Mojo-led collaboration, in the development of a high performance DP system for HF4 and explains how the design of the DP system and power system is being monitored against the “DP Vessel Design Philosophy Guidelines” published by the Marine Technology Society.

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