In early 2004, Marine Current Turbines (MCT) was looking for a control platform for their commercial demonstration tidal turbine, SeaGen. SeaGen is a 1.2MW twin rotor device. Each rotor functions much like a wind turbine, but the kinetic energy is derived from the flow of water created in tidal races instead of wind.

Each rotor is capable of generating 650kW of electricity using a fully-rated variable speed drive. Power is regulated by a standard wind turbine pitch system. The pitch system is also used to generate on each tide (flood and ebb). As the tide flows in, the rotor is upstream of the supporting beam. As the tide flow out, the blades are pitched through 180 degrees and the rotor is downstream of the supporting beam.

Choosing Control Platform

MCT’s control development plan involved designing the control system in Simulink using a plant model developed by IWES (formerly ISET) to derisk the control work required on the real-machine. MCT’s challenge was then to find a control platform that allowed the integration of this Simulink code onto an established industrial control system to enable rapid deployment of future systems (i.e. commercially ready).

The solution that was found was to use the Mita-Teknik WP4x00 series of control equipment – this was programmable in “C” and so the Mathworks Real-time Workshop could be used to generate “C” code from the Simulink model. Mita-Teknik fully supported this approach by engaging with early meetings between MCT and Mathworks.

With further support from Mita-Teknik and Mathworks, MCT developed its own hardware-in-the-loop test bench to help test the software on real Mita-Teknik hardware to help debug and accelerate the tidal turbine application software development.

Easy Assembly

The Mita-Teknik solution allows for a distributed control system. This suited MCT’s assembly strategy very well. Much of the control equipment (switchgear, transformer, frequency converters) was assembled on individual modules and inserted into the turbine tower at the quayside. This allowed MCT to complete all module wiring and module test in their own facility before shipping to site. Only fibre-optic communication and power was required to be completed at quayside assembly.

“MCT has enjoyed the full support of Mita-Teknik throughout the entire commissioning process.”

Felix Francis, MCT
Marine Current Turbines (MCT)

Marine Current Turbines (MCT) collaborates with Mita-Teknik for Pioneering Tidal Turbine.

"Because Mita-Teknik are already in the wind market, their control system has additional benefits that were realised by MCT only once the early commissioning was underway – easily configurable engineering HMI, trigger logs, 5 minute trend logs, status code logs, summations, availability… the list is endless." says Felix Francis, Electrical Systems Manager in MCT.

MCT use Gateway, the Mita-Teknik SCADA solution, for collecting all of this data from the turbine. Additionally, MCT have 24/7 access to their data through MiScout Web. The combination between Gateway and MiScout Web will benefit MCT by optimizing and simplifying everyday operation.

SeaGen was eventually installed in March 2008 and has enjoyed Mita-Teknik’s full support throughout the commissioning process. To-date, SeaGen has clocked up nearly 9GWh of electricity.

Future Cooperation

Mita-Teknik has been chosen by MCT to continue as the control system supplier for their future product portfolio.

MCT currently has a full 1.1MW powertrain/inverter/transformer kit under accelerated life test in NaREC (UK) for its next product development. This is fully supported by Mita-Teknik control equipment. This equipment will be used in a range of tidal turbine devices, starting with a small array of twin rotor surface piercing devices in Wales, due for installation in 2015.

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