

Open Hydro - Orkneys



Description:

Atlantic tidal currents of up to 15 m/h off the coast of Orkney make this an attractive site for renewable power generation. It was in this harsh environment that QuinnPiling and McLaughlin & Harvey battled for three months to install European Marine Energy Centre's first tidal turbine.

Reassured by the presence of rigid-hulled Inflatable Boats (RIB's) circling the two barges. Workers cracked on with drilling piles some 11m into the seabed to support the turbine. RPS's marine engineering team undertook the detailed design of the platform structure that now supports the turbine resting on two monopiles, socketed into the rock seabed. There was a minimal basic site investigation because of the cost and practicalities, so contingency plans had to be built in.

The pairs of monopiles had to cope with hydrodynamic loading and turbulence associated with the tidal location. Unpredictable seabed conditions caused some initial problems for ourselves and the main contractors McLaughlin & Harvey who were forced to find a replacement barge after one was badly damaged on the seabed. "the first barge hit a totally uncharted rock while its legs were partially down, the legs bent and that delayed the project for a number of weeks because there were very few jack up barges available" says Shaw But we were able to get another barge and complete the project before Christmas. In the end two barges were used.

The drilling itself was particularly difficult. A small rig was initially used to pre-drill several holes in the rock using a down the hole hammer system. The Idea was to weaken the rock and a carousel was fabricated as a guide to locate these holes accurately. A larger 80 ton machine was utilised with a wide range of tools to complete the holes to the specified depth. Several crews were present and necessary backup equipment to keep the project going 24/7. One driller recalls "it was the hardest rock I have ever come across". When we tested some sample drillings the results show rock strengths of up to 350 Mpa. Two casings were set into the boreholes with a special high strength grout to complete our phase of the project.

Title: Installation of an Underwater Tidal Turbine for the generation of electricity

Client: Open Hydro

Contractor: McLaughlin & Harvey / Quinn Piling

Engineer: RPS Belfast

