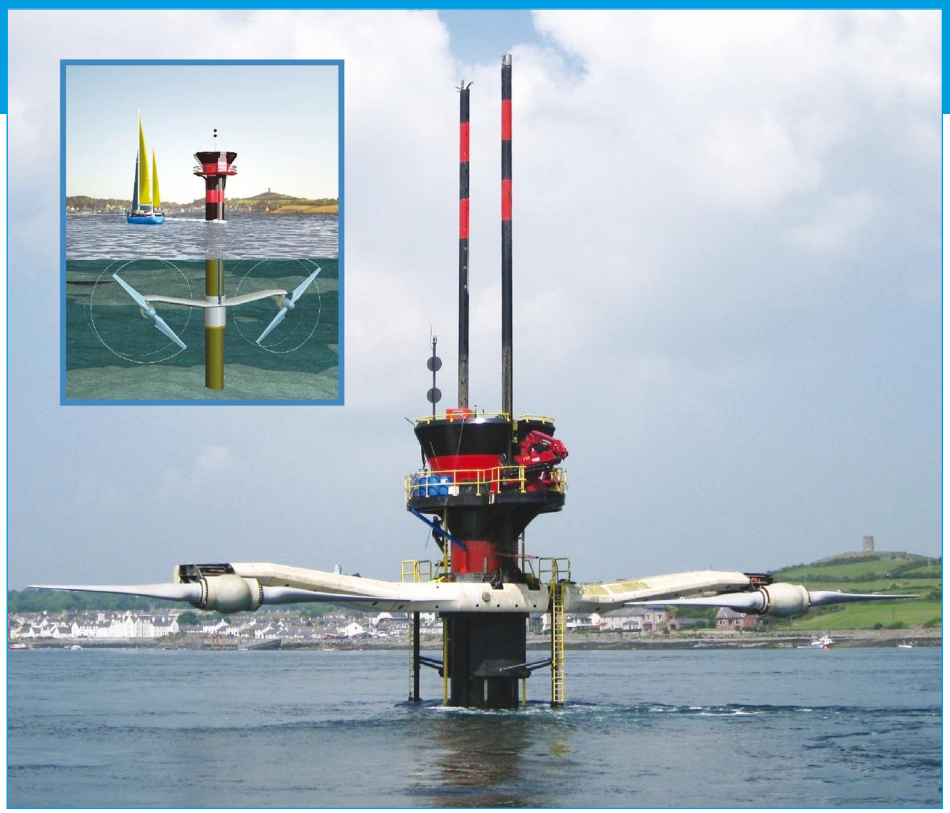
World's Largest Tidal Current Turbine

Marine Current Turbines (Bristol, UK) was established in 2000 to develop commercial tidal energy systems. Its shareholders include ESB International, EDF Energy, and Guernsey Electricity.

In May 2008 its SeaGen tidal stream turbine was deployed in Strangford Lough in Northern Ireland. This commercial-scale prototype has a maximum capacity of 1.2 megawatts - sufficient to meet the electricity needs of 1,000 homes. It is currently the world's largest tidal current turbine.



The SeaGen system that has been deployed in Strangford Lough. Shown here in the raised (maintenance) position. Inset graphic shows the SeaGen in operational mode.

Technology

The SeaGen system generates power from sea currents by using a pair of axial flow turbine blades driving generators through gearboxes using similar principles to wind generator technology. It can be installed at coastal locations with high tidal current velocities (as is the case with Strangford Lough) and even in parts of the open ocean where there are strong currents.

SeaGen turbines have a patented feature by which the rotor blades can be pitched through 180° in order to allow them to operate in bi-direction flows – that is on both the ebb and the flood tides. The twin power units of each system are mounted on wing-like extensions either side of a tubular steel monopile some 3 metres (9.8 ft.) in diameter.

The complete wing with its power units can be raised above sea level to permit safe and reliable maintenance. MCT maintain that SeaGen is more efficient, safer, easier to maintain and more environmentally-friendly than anything that has been proposed to date.

As is the case with land based wind turbines, the SeaGen system makes extensive use of sandwich composites in order to reduce weight and minimise maintenance costs. In addition to the turbine blades and the central control pod, sandwich composites are used for the large fairings that cover each of the 30 metre (98 ft.) long cross beam onto which the turbine blades are mounted.

These fairings are not cosmetic but have been carefully designed to minimise turbulence and direct the water flow towards the blades in the most efficient and precise way during both tide states.

The fairings, which cover a total area of 101 square metres (1,086 ft.^{2}) were manufactured for MCT by Independent Composites who are also based in Bristol. For these components, sandwich composites were also chosen because they could provide the required level of impact resistance and stiffness.

In order to achieve high fibre volume fractions, a smooth surface finish and excellent skin to core bonding, Independent Composites produced the fairings out of female molds using resin infusion. The laminates comprised quadraxial glass skins over principally a Divinycell H130 core with a GSW/GPC1 finish. The resin used was a Sicomin 8100 infusion epoxy supplied by MCMC Ltd.

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