

Lightweight composites for an electric passenger ferry

With many nations looking towards a carbon neutral future, there has never been more focus on reducing greenhouse gas emissions.

Electrification of transport is one of the key ways that we will be able to reduce carbon emissions. High speed ferries, an integral part of the transport network of many cities pose a particular challenge but also massive potential in reducing emissions. When it comes to electric propulsion reducing the weight of the vessel is paramount.

Gurit is involved in a project of a 19m vessel being built by Wellington Electric Boat Builders (WEBB) for the ferry operator East by West Ferries in Wellington, New Zealand. Upon completion it will be the Southern Hemisphere's first large, fully electric, high speed zero emission commuter ferry. The ferry will operate in the Wellington area at 20 knots service speed on a return trip of 50 minutes, with charging available only at one end of the intended route. The vessel will use electricity from 100% renewable sources and will save around 14000 tonnes of carbon dioxide over its operational life.

Cutting down on energy consumption

On a conventional commercial ferry energy consumption followed by maintenance are by far the largest costs for the owner and operator over the life of the vessel and can easily be 4-5 times the purchase price of the vessel. As a result, minimising weight and improving efficiency can have a significant impact on the running costs.



Fully electric: East by West Ferries, New Zealand

Electric propulsion reduces operating costs with the energy cost being approximately half that of diesel per kWh. However, the on board Energy Storage System (ESS) are heavy to achieve the required endurance. This weight in turn increases energy consumption, so it is a careful balance of providing sufficient energy storage without over burdening the vessel. To compensate for the weight of the ESS, the logical option is to reduce the structural weight of the vessel to ensure maximum efficiency.

Lightweight engineering

With a key focus on minimising the ferry's weight, designers SSC Marine and Gurit selected carbon fibre sandwich panels for the construction. Preliminary design analysis showed that light weight carbon construction was the enabling technology that helped minimise vessel dead weight and therefore improving energy consumption.

Gurit's Hi-Panel system of pre-infused CNC cut flat panels were selected for the construction. The Hi-Panels are epoxy infused composite panels, in this case the wingdeck and hull were made from Gurit's Corecell™ foam for its excellent shock absorbing properties and high strength to weight ratio, with carbon fibre skins to minimise the weight.

The Hi-Panel method minimises tooling and labour costs in building a one-off composite vessel, while allowing flexibility in the construction process by not having to commit to large moulds. With the option of delivery as finished panels with maximum dimensions of 9 m x 2 m or cut to shape, the method provides for an easier and faster construction process.

Gurit looks forward to following the construction progress using the Hi-Panel system and to seeing the success of the high speed electric ferry once up and running.