

Life plan

Dr David Fryer and **Dr Stephanie Merry**, principal technical consultants at MTMC Ltd, discuss a 'cradle to grave' research and testing facility for tidal energy generation

Two years after it was first conceived in February 2006, plans for the Solent Ocean Energy Centre (SOEC) have been launched. The Isle of Wight Council commissioned MTMC to conduct a study exploring the feasibility of establishing a centre for evaluation and research into marine renewable energy technologies based on the

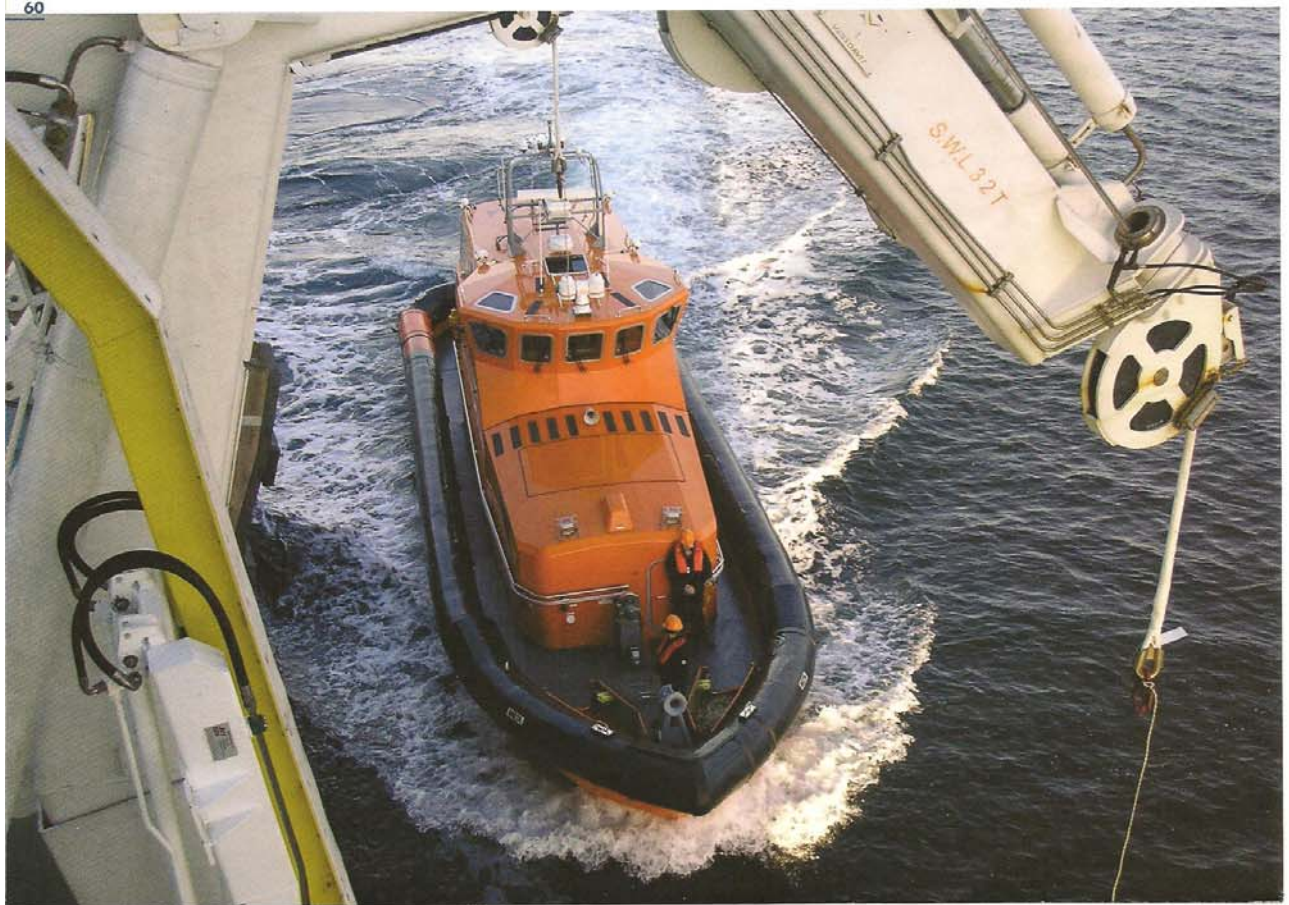
Island. The study concluded that it would be feasible for such a centre to start operating immediately using existing laboratory facilities, and that the concept should be taken forward at the earliest opportunity.

Unique

The tidal regime around the Isle of Wight has some unique features that

make it especially suitable for demonstrating the concept of tidal stream energy. There are two periods of strong tidal stream (on the flood and ebb), with a fairly short temporal separation between them. Local eddies and races occur during these periods, resulting in very strong streams at a number of locations. The waters within the Solent - the stretch of water between the

60



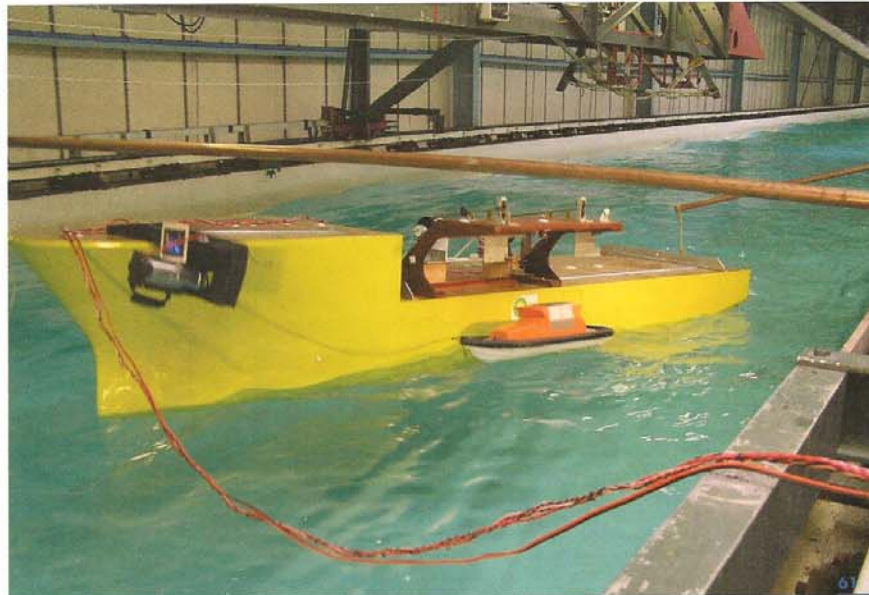
Island and the mainland - are sheltered from strong wind and waves, which is attractive for first-time marine deployment of tidal energy devices.

The Island is unique in the amount of data and the level of understanding of local coastal processes, because it has its own Centre for the Coastal Environment. The Centre, which exists because of the Island's coastal regime and susceptibility to coastal erosion, manages and catalogues data at the Coastal Visitor Centre in Ventnor. The expertise of the Centre will be beneficial in monitoring and analysing the environmental effects of tidal energy devices.

The Island's technical, industrial, and scientific infrastructure is substantial - particularly in areas associated with marine technology. A few large, high-technology companies are based there, tracing their origins back to famous names such as Plessey Radar, GKN-Westland Aerospace and the British Hovercraft Corporation. As these companies down-sized, a number of small, highly specialised and technically competent spin-off businesses were created. MTMC is one example. Others range from Strainstall (marine structure and strain monitoring), through Physe (provision of MetOcean data and analysis to offshore oil contractors), MedTec (3D modelling, draughting and engineering services) down to one-man businesses with specialised engineering skills.

Structure

The commercial structure proposed for the Centre is based on a successful model, developed by an informal grouping of Isle of Wight companies, to provide an integrated technical and commercial service to clients. An office



facility with a technical and administrative manager will be established for the Centre, to coordinate and manage specific projects. All other specialist services will be provided by external contractors, building on the local strength of marine-related companies on the Isle of Wight described above and on the technical and research expertise of companies and institutions in the surrounding mainland region. These will include academic or research organisations, such as the National Oceanography Centre (NOC), the Universities of Southampton and Portsmouth, QinetiQ Haslar and ABPmer.

The SOEC will offer a 'cradle to grave' research, testing and evaluation service for tidal energy devices and laboratory testing for wave energy devices. Small-scale models of new marine energy converters will be tested in the existing towing tank (with wavemaking facilities) at GKN on the

Island, using a standardised evaluation procedure that will inform decisions regarding further investment and / or funding from the public purse. Those energy converters identified as worthy of development will be supported by the Centre's resource of technical contractors, who will assist with performance optimisation and other technical aspects, as required by the device owners.

Development

Further development for tidal devices will then be available through SOEC. Initial, short-term testing will be offered at a designated, pre-licensed, inshore marine site, with a strong tidal regime that is sheltered from waves, close to shore and easily accessible from harbour facilities. Four candidate sites on the north and east shores of the Isle of Wight have been identified and ranked according to their suitability for this test facility. Further investigations

Above: Testing of an autonomous recovery and rescue craft, a project undertaken by MTMC on behalf of BT.

and discussions with other marine stakeholders are currently underway, prior to final site selection and application for permits.

The SOEC will also offer access to a deep tank at Bembridge on the Isle, which may be used to practise deployment, O&M and decommissioning procedures under controlled, H&S compliant conditions. Once perfected, these procedures may then be conducted under the more realistic tidal conditions of the inshore marine site mentioned above.

If there is sufficient demand, a grid-connected demonstration site for commercial-scale tidal devices will be established off the south coast of the Isle of Wight. A particular benefit of this high tidal stream resource location is that it is close to centres of population such as Ventnor - where the electricity network could absorb an additional 5MWV of power from external sources.

Relationship

The SOEC complements other UK marine energy test centres, such as NaREC, EMEC and Wavehub. For example, deployment at the relatively sheltered inshore marine test site will give developers confidence in the practicality of their operations and in the survivability of their devices, prior to installation of commercial-scale demonstrators in the harsh marine environment at EMEC.

This is an opportunity to collaborate with device developers and other centres of excellence in the marine renewable energy field, to accelerate progress towards commercialisation in the sector.

MTMC Ltd (formerly MTMC) has taken ownership of SOEC and is following

its own recommendation: that the concept should be taken forward at the earliest opportunity. The company has been approached by a number of device developers to discuss how it might help progress their ideas and are currently working with some to evaluate and optimise their devices.

One such developer is John Sweet, of the engineering company Loadpoint. Sweet has a history of founding and running successful businesses, ranging from civil engineering contractors, through food distribution, to the manufacture and use of silicon wafer processing machinery. His tidal energy generator has been deployed at model scale in a number of rivers and streams and has been shown to operate in principle, but now some quantitative data is required from systematic tests in a controlled environment.

The first series of tests will be designed just to prove (or disprove) the viability of the concept. These tests will be conducted by MTMC Ltd in the GKN towing tank on the Isle of Wight, to measure the load characteristic of the basic design (i.e. the speed/torque characteristic at a number of discrete flow speeds and directions). As it is a drag device, the load characteristic is likely to be significantly different from that of a conventional turbine, and this has implications for the design of its associated electricity generating machinery and load controller. Some of the implications have already been anticipated in the development of a generator with an exceptionally large number of poles.

Assuming that the first tests demonstrate viability, a second set of tests will then be conducted to collect data that can be used to optimise the design. In the first part of these tests, the load

characteristics will be re-measured for a number of different configurations, such as different ratios of device radius to paddle width. The second part of the tests will examine the effect on the load characteristics of changing the rotational variation of device geometry.

The proposed business model for SOEC, with external suppliers contracted to provide specialist services for specific projects, works well. The engineering design company MedTec, based at the same industrial complex as MTMC Ltd, will supply detailed structural design and Finite Element Analysis for another of SOEC's clients.

Future

The feasibility study for SOEC identified an immediate demand by device developers who are further advanced towards marine deployment for a sheltered, inshore marine tidal test site. The company aims to secure funding for the site, possibly through a European programme such as Interreg IVA. The company would welcome discussion about these future plans with potential partners who may have complementary skills or objectives in the UK and Europe.

The company's efforts are currently focused on this inshore site. When the way forward is secured, they will pursue the concept of a deep-water site for tidal stream demonstrators.

Enormous potential exists for marine companies on the Isle of Wight and in the south of England to become part of the burgeoning marine renewable energy industry, where the UK is a world leader. The Solent Ocean Energy Centre provides a focus for this to occur. □

www.focus-offshore.com

