NEW VESSEL DESIGNS

No limits to leisure

Camdesign has developed an eco-friendly and wheelchair-accessible catamaran, combining ease of access and unobstructed spaces with stability and racing yacht aesthetics

The Camdesign 45 is intended to be simple to board and move around

Recreational boating should be a pastime for all, and its surge in appeal over the past few years has certainly broadened the demographic, challenging perceptions of who might constitute the 'typical' boatowner.

One notable change has been the willingness of designers to make boats more accessible to wheelchair users. A series of wheelchair-accessible powerboats, designed by naval architect Andrew Wolstenholme, have enabled UK charity The Wheelyboat Trust to offer days out on the waves for disabled persons, for example, while Fraser Yachts and Cohh Yachts have both developed cruisers specifically for sailors with mobility issues.

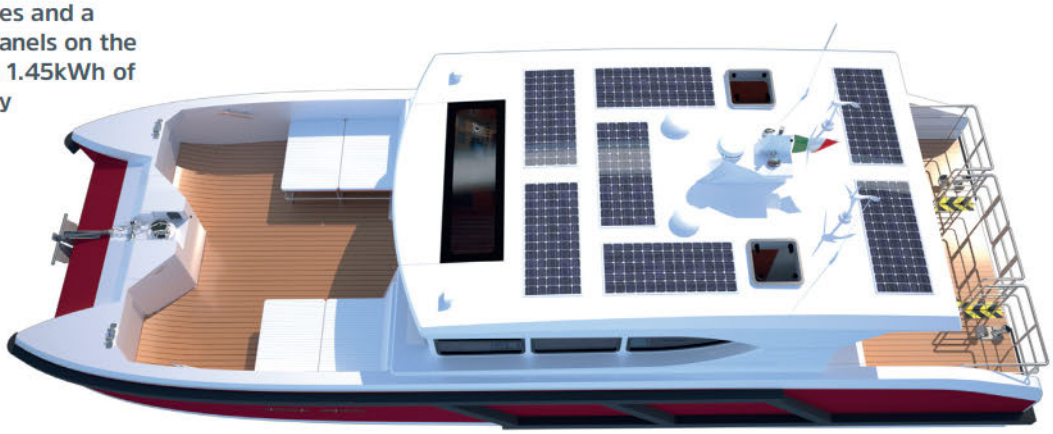
In turn, Camillo De Gaspari, AMRINA and owner of design studio Camdesign, has devised the specs for a wheelchair user-friendly, hybrid-electric catamaran yacht. The concept was born over a bottle of red in May 2019, when a fortuitous chat with a yachtbroker in Sardinia led to a discussion on how such a vessel could be realised.

"Inclusivity was the first requirement," De Gaspari tells *Ship & Boat International*. However, despite the challenges inherent in the design, certain features were non-negotiable: the yacht had to feature a "racing look" and "perfect visibility", and should provide wheelchair access without the need for onboard ladders and cranes, which might blight the aesthetics: the yacht is also intended for solo sailors.

Optimal stability

After sketching a preliminary design on the back of a napkin, De Gaspari then approached Thailand-based Albatross Marine Design, a specialist in multihull craft, for some handy design tips. This was then followed by

Twin wind turbines and a spread of solar panels on the roof will produce 1.45kWh of renewable energy



All doors aboard the Camdesign 45 are wider than 1m to accommodate wheelchair users

40 hours of 3D modelling, plus CFD tests at Croatia's Cloud Towing Tank, as the sketch took further form.

The resultant concept is the Camdesign 45, featuring an overall length of 14m, a 5m beam, a hull depth of 2.68m and a 700mm draught. Overall, the yacht would weigh 13.5tonnes; have the capacity to carry up to 12 passengers; and match a GRP hull to a composite superstructure.

"Wheelchair users can board through a door in the cockpit on the starboard side," De Gaspari explains. "They can then travel from the stern to the bow without encountering any barriers." The vessel would also feature a submersible hydraulic swimming platform, enabling users to dive into and climb up from the water. Every door on board has been designed with a width greater than 1m, given that "1m is considered the optimal radius for wheelchairs", he adds.

An ample freeboard of 1.9m, combined with the double hulls, wide beam and low superstructure, should be sufficient to grant the yacht a high degree of stability, with no need to incorporate stabilisers.

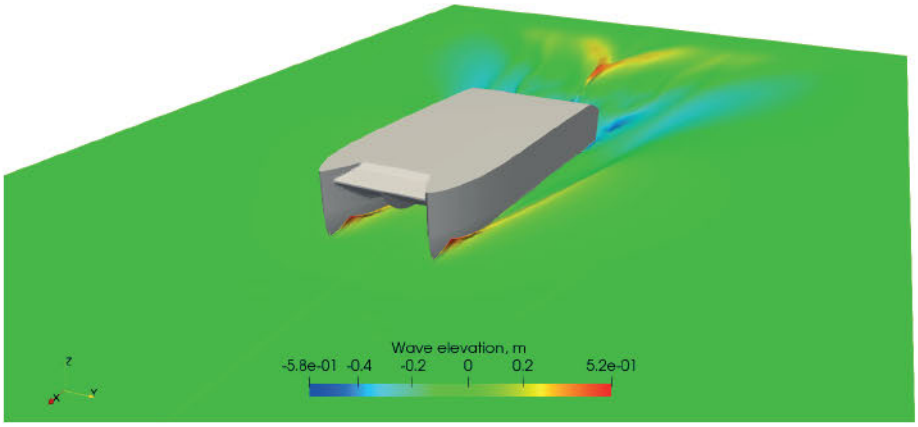
The yacht was also designed to ensure 360° visibility from a height of just 1.25m above the floors. De Gaspari adds: "The moving equipment and the windlass have hand-operated switches, and the accessible bathroom provides 1.3m × 1.3m of space for manoeuvrability." The dining table in the cabin can, if required, be transformed into a king-size bed, or the owner can specify a different layout to accommodate a greater number of bunks.

Hybrid powertrain

Power-wise, the cat would run on a mix of diesel and clean electricity, the latter generated by the wind and the sun. The suggested diesel contribution would be a Yanmar YDG6600TN generator rated 6.2kW at 3,600rpm, which would be fed by a 100litre-capacity fuel tank. This would be supported by Torqeedo BMW i3 lithium-ion battery packs, each producing 40kWh and weighing 278kg – though "any other brand of high-voltage lithium marinised batteries could be used, such as Super-B or Varta," says De Gaspari.

The electricity is derived from two main sources: a 7m² array of photovoltaic panels on the roof, capable of producing around 0.7kWh, would capture energy from the sun; while a pair of wind turbines, also roof-mounted, would generate around 350W each. De Gaspari says: "This means a total of 1.45kWh of renewable energy that should be sufficient for hotel loads, and to add a little more range."

The twin hulls, combined with a relatively wide beam, will offer a high degree of stability



CFD testing was conducted at Cloud Towing Tank in Croatia, to flesh out De Gaspari's concept

With five battery packs installed, offering a combined 200kWh of energy, the yacht would be able to sail for three hours at 7knots, De Gaspari estimates, and this would result in a range of approximately 15nm. However, he says, the range could be extended to 20nm when the Yanmar diesel engine is also used.

Dutch power solutions firm Advanced Electromagnetics (AE-Group) was selected to supply the Camdesign 45 with a pair of Azipods, powered by permanent magnets and capable of 110kW of electric thrust, and these should help the yacht to attain a top speed of 12.5knots.

Design tweak

In terms of certification, the cat has been designed to comply with the requirements for CE Class C boats, which are intended for operation in predominantly coastal and inland environments, or at least in areas where winds do not exceed Force 6 and waves do not exceed 2m.

Pending a first order, Camdesign has tweaked the design a little following the Cloud Towing Tank CFD testing. For example, De Gaspari says: "The CFD had shown some interruption of the water flow in the area of the redan [or hull 'step'] immediately after the canoe hull, creating unnecessary drag. A more streamlined hullform with a lower step has now been prepared." **SBI**