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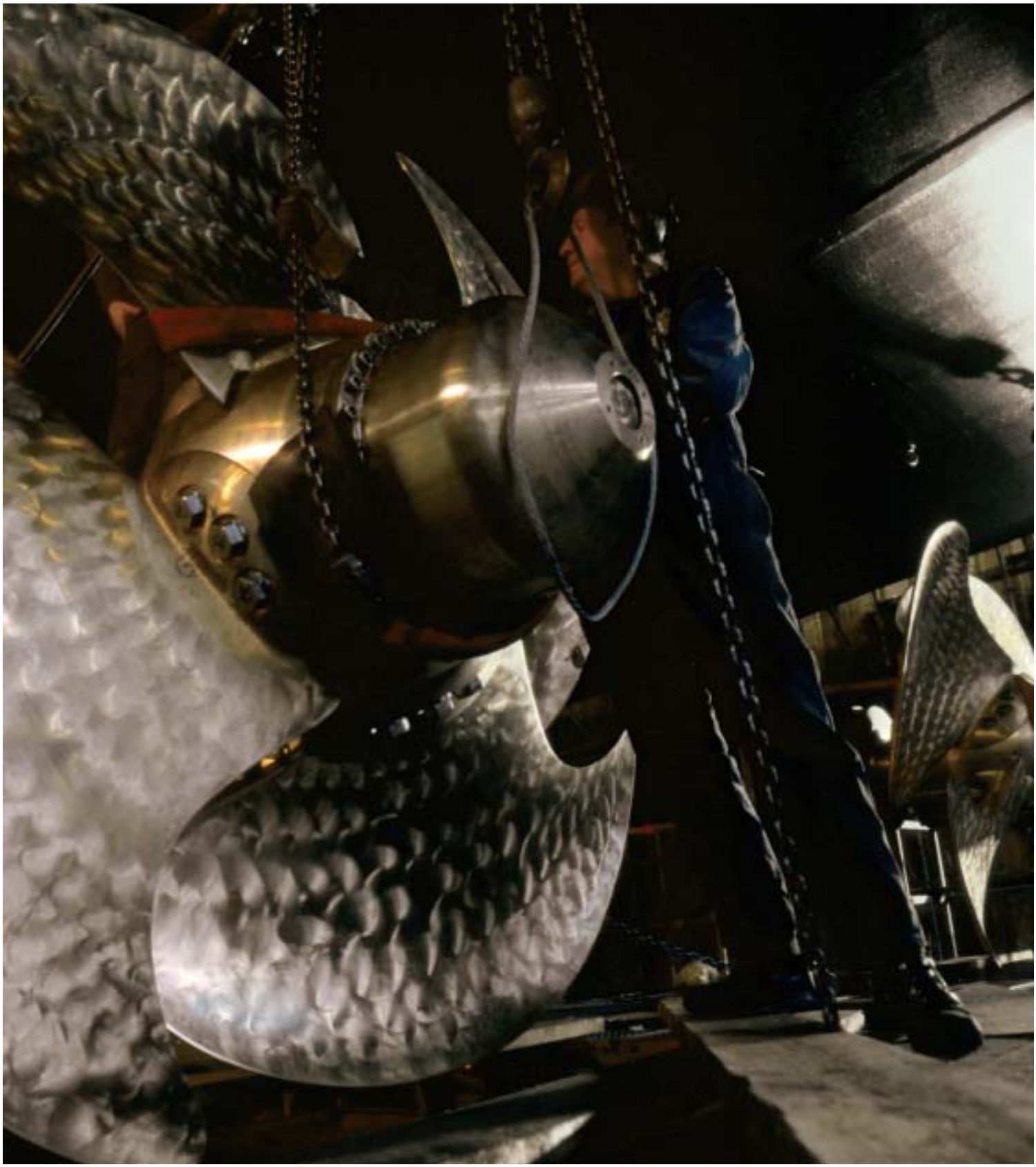


Alsphere in Venice

I waited on the dock of The San Clemente Palace on the Venetian Island of the same name. The hotel is an amalgam of old and new; a Camaldolesi monastery in 1131, latterly during the Austrian occupation a hospital for the insane, now a luxury hotel. I arrived by traditional Venetian water taxi, but I would depart on an Austrian, prototype vessel of radical design. *Challenger II* is Alsphere Engineering's 14.45-m demonstrator for a new hull concept: Displacement Glider.

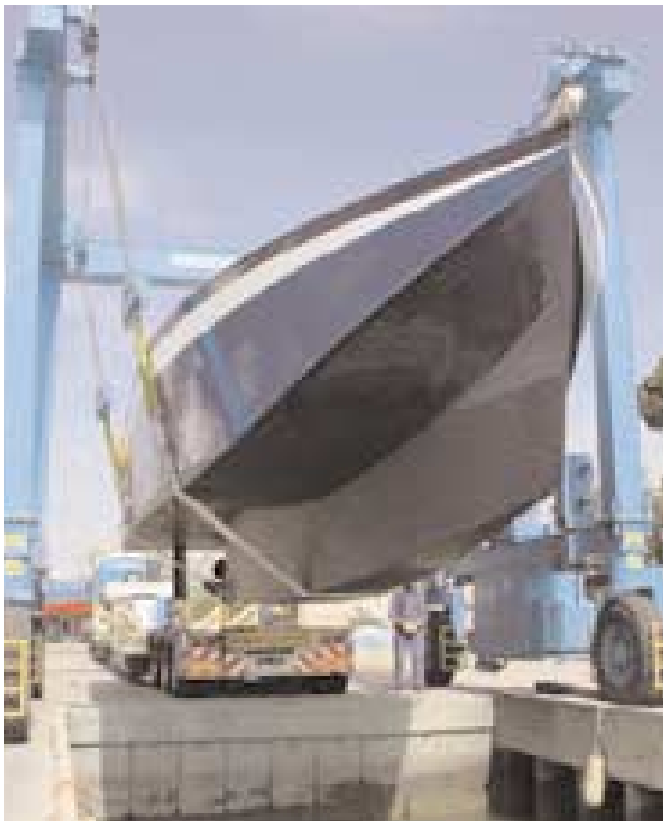
The hull shape echoes the retro idiom of the hotel: a near vertical stem recalls a New York commuter boat, but like the hotel the underlying hardware is very advanced.

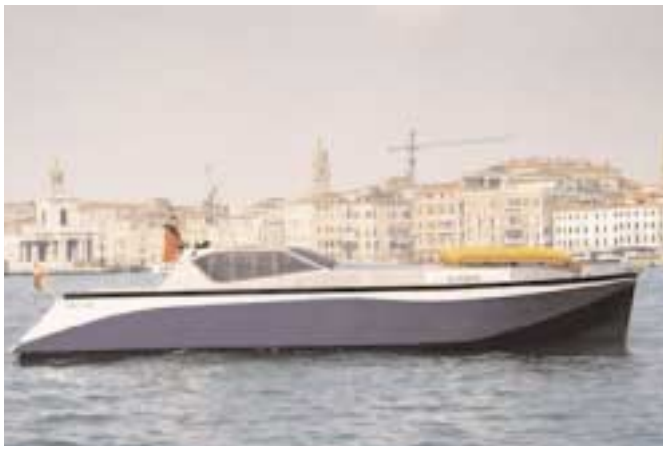
The hull is formed of two elements – a relatively wide 'keel' containing the propulsion machinery and a virtually flat-bottomed hull with a slight wave shape. Alsphere refer to the keel as the "displacement keel" and to the rest of the wetted surface as the "planing surface".

The vessel's keel has relatively narrow width compared with length, yet 75% of the displacement occurs here. At 19 kt top speed this DG hull cheats the displacement hull-speed limitation that restricts top speed to around 11 kt.

Alsphere's Martjaz Peterman explained, "Wave systems produced by the two elements cancel each other out in the optimum speed range". The shapes of two elements are optimised for flow, e.g. the keel continues to the stem.

The result: a minimal wake in the optimum speed zone: for this hull 9 to 19 knots. A wake represents lost or wasted energy so a smaller wake equals greater efficiency.





Alsphere claim a potential reduction in fuel costs of 30%. Further cost savings are found in a lower power, thus lower cost, prime mover.

A graph of shaft power V speed shows significant speed advantage over planing hulls through the range, optimised in the middle and diminishing at the either end.

Against displacement hulls the advantage simply gets larger as you go faster. Of course the displacement hull has reached hull speed in the middle of the DG hulls' speed range. Another advantage claimed is that the interior usable volume is 20% greater, as machinery – tanks etc – are in the 'keel'.

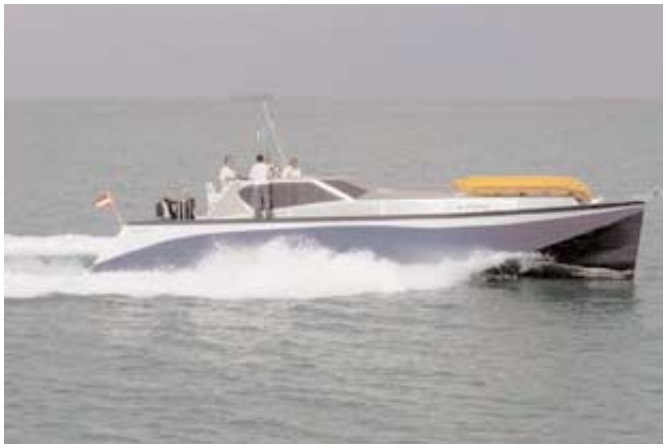
Danny Lenard of Nuvolari-Lenard design endorsed this, stating, "For yachts of 12 to 20 m . . . improved efficiency, and minimal wake with maximal interior volume (from such a hull) are very interesting".

For larger yachts efficiency savings are impressive; a hypothetical 59-m yacht based on an existing style above the waterline, with DG technology below, reduces propulsion power requirements at 15 kt from 2,908 to 1,060 kW. Unfortunately it's clear that there would be less usable interior volume than in conventional displacement design. Unless operational area requires minimal wake it is unlikely mega yachts will use DG hulls.

Commercial operation is different; a 40-m crew boat for the Gulf of Mexico oil fields is in build with a modified DG hull drawn by Louisiana naval architects AK. Suda Inc. The main attraction for this operator is fuel savings with an added bonus of ride comfort; wake reduction per se is of no interest.

Challenger II features an unusual construction technique: interlocking extruded aluminium 'planks' minimally welded, caulked then faired. That Pinnacle construction system is another design of the DG hull inventor, Theodore Eder. In this system the vessel needs no frames. Formers are used during construction and were left in place on the original (open) *Challenger II*. Once the superstructure was fitted, Mr Peterman told me, they could have been removed.

Alsphere do not wish to be boat builders; they propose to license construction to other builders.



It's difficult to assess how our market will respond, both to such innovative design and unusual commercial approach. Danny Lenard is enthusiastic too about the styling possibilities; construction may be from any material and as all the hydrodynamic 'work' is done below the waterline, the hull above can be in any style: traditional, modern, 'picnic' boat; here form need not follow function.

Minimal wake (above right) is of less interest to such yachts at sea; however, in areas like the U.S. Intracoastal waterway or Europe's inland waterways there are benefits where speed limit criteria are 'no wake' rather than 'x knots'.

It was not by chance the *Challenger II* was trucked to Venice after construction in Vienna; Venetian authorities expressed interest in replacing the ACTV Vaporreto fleet with a limited-wake vessel. However, as the inventor points out it is the smaller high-speed vessels such as those used by the emergency services that damage la Serenissima the most.

Challenger II's motion underway is not unpleasant but certainly odd; Danny Lenard described it as gliding; to me it was similar to a catamaran. There is negligible roll, pitch and yaw or heel when turning. Claims of minimal wake from 9 to 19 kt are valid. As expected below 9 kt the wake is as for a displacement hull. The boat is quite stiff, understandably, as on this empty prototype almost all the weight is below the water line. She turns well, though steering is heavy, and manoeuvring as well as draft (deep, compared with a planing hull) must be considered disadvantages. The keel has considerable lateral resistance; bow and stern thrusters are required to manoeuvre transversely. Around 15 m LOA is required to gain the 20% extra interior space single engine operation; there is no room in the keel for two engines. Indeed there is little room either side of a single engine.

The Displacement Glider is an unusual design that will certainly find a niche in yachting, though perhaps it will find a larger application in commercial shipping where wake damage is a serious, in many cases unanticipated, problem for high-speed ferry operators.

Captain Tork Buckley