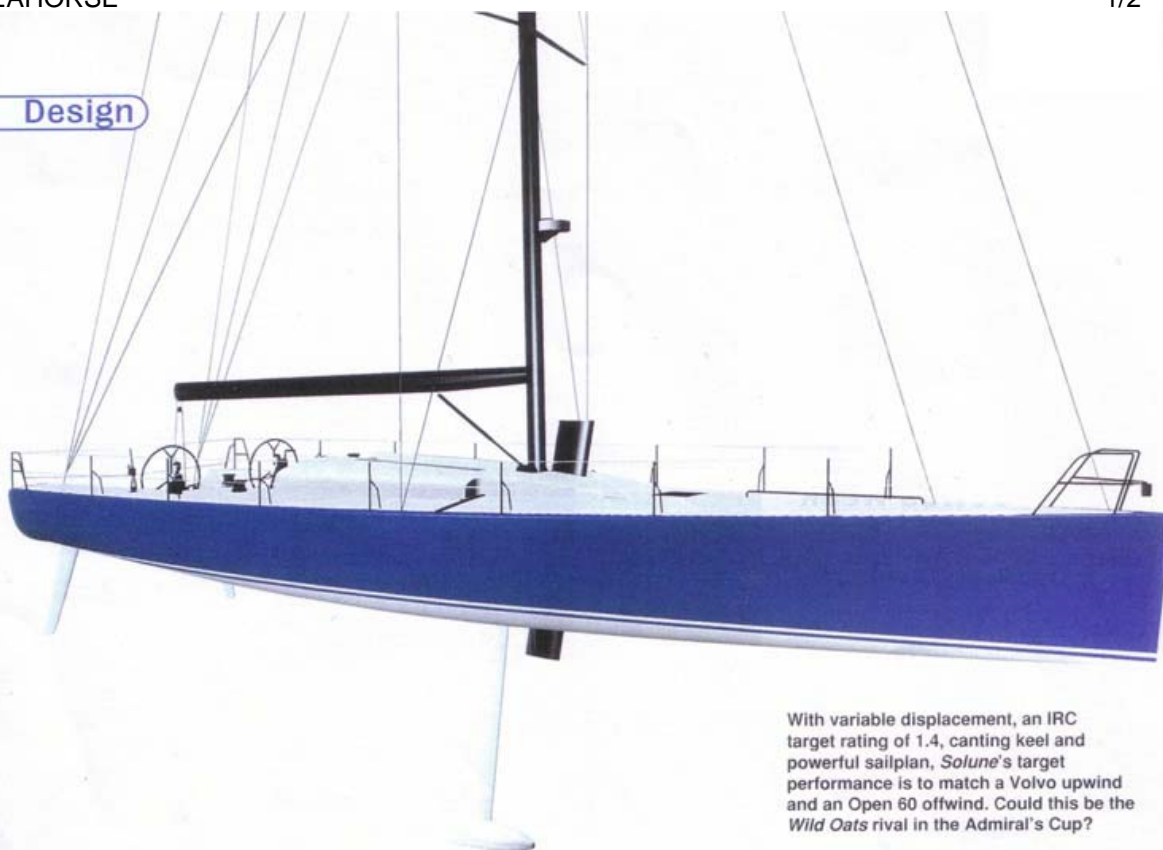


Design



With variable displacement, an IRC target rating of 1.4, canting keel and powerful sailplan, *Solune's* target performance is to match a Volvo upwind and an Open 60 offwind. Could this be the *Wild Oats* rival in the Admiral's Cup?

New kids on the block

Axel de Beaufort describes the innovative multi-role 60-footer *Solune* from the recently formed Nacira Yacht Design Group

Following several years of serious racing in a variety of offshore classes, Jean Philippe Chomette asked us if it was possible to produce a new breed of offshore racer incorporating the advantages offered by both the Volvo 60 and IMOCA Open 60 types, in terms of speed potential, ergonomics and safety...

His main goal would be to compete in classic offshore races such as the Sydney-Hobart and the Fastnet, as well as making various record-breaking attempts. Target full crew would be six to eight and the boat should take advantage of all current technology.

Extensive research by both the design office and the owner led us to an exciting concept that is now also eligible for the new-look Admiral's Cup. Looking at the offshore programme planned for the new boat, it soon became apparent that the bulk of competition would take place under the IRC system. An analysis of the existing large, fast IRC fleet produced an indication of the final target rating for the boat. Knowing that a typical Volvo 60 is surprisingly around 1.425 and a typical Open 60 around 1.5, we could reasonably say that we should aim to evolve around 1.43-1.44. We have nevertheless preserved some margin in terms of rating evolution during the design process, bearing in mind that the goal would be to try to stay nearer to 1.4 by means of a variety of ballasting and rig options.

As this boat is to be raced relatively shorthanded, and with light displacement (9.5 tonnes), we needed to develop a powerful enough hull shape to ensure good

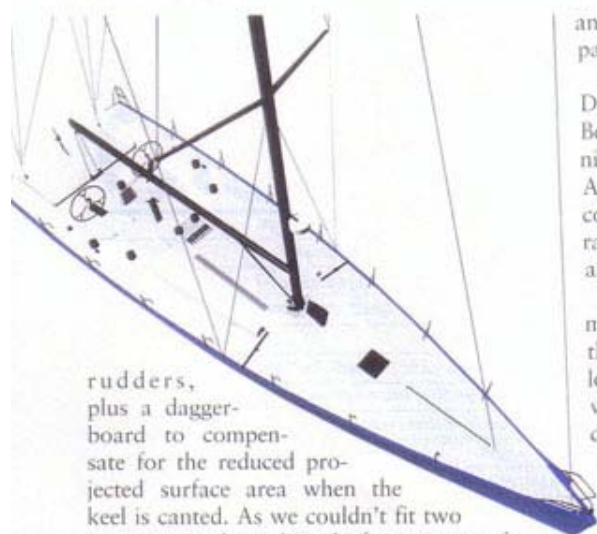
form stability and efficient application of the canting keel concept, taking account of the 10-degree rule on static heel. No water ballast will be used. (We would welcome a revisiting of this 10-degree rule, since canting keels are becoming such an important part of modern development that a move to more ideal hull shapes would be welcome – if permissible).

To find the right compromise between the extra-large waterline of the Open 60s (impossible to compete effectively in IRC due to the maximum beam being too large), and the more classic, narrower design that one might find touring the Pacific, we ran comprehensive numerical simulations of four different hull shapes with Mick Kermarec and his team in Milan.

The primary aim of this research was to reach the best compromise between righting moment per degree and induced dynamic drag. The hardest task, with the plentiful results that are produced by the REVA programme, is to use these findings for what they represent; numerical evaluation alone is not the answer, but it does provide a good comparative tool.

Compared to a typical Open 60, we ended up with the LCB (centre of buoyancy) relatively further forward, a very pronounced chine, and quite fine entry lines. On this last point we had to establish a rocker that would compensate for our preferred smaller volume in the bow to prevent nosediving...

The combination of a powerful hull shape with a canting keel configuration inevitably led us to fit the boat with twin



rudders, plus a daggerboard to compensate for the reduced projected surface area when the keel is canted. As we couldn't fit two asymmetric daggerboards for reasons of ergonomics, we decided to fit a central daggerboard with some careful detailing to increase efficiency.

The sailplan has been developed with the new engineering office in La Rochelle, Tensyl. The use of 3D rig modelling to compare developed power and induced drag, depending on sail configuration chosen, appeared to be both useful and very cost effective for this type of project.

In particular, we worked hard to refine rig details (such as mainsail roach profiles, genoa overlaps and bowsprit length) to match the hull targets that we had defined from Mick Kermarec's earlier research. The goal here was to achieve a rig configuration that would match our performance criteria without being over-penalised under IRC. We ended up with two mast-head asymmetric spinnakers, a moderate mainsail roach – but fully controllable with a powerful downhaul (multihull style) and a 105 per cent genoa set at 7/8th mast height.

Further, these aerodynamic results allowed us to achieve precise VPP data between the aero and hydro results. The principal target is to match a Volvo 60 upwind but be nearer the pace of an Open 60 off the wind.

All the structural engineering has been performed by Thomas Gaveriaux from the High Modulus office in Vannes, France. This collaboration has proved particularly successful; the naval architects could spend more time on design while High Modulus first developed the most efficient structural configuration for the overall budget, as well as the yard's preferred build technique

and our own weight and stiffness parameters.

It was decided to build the boat at Decision SA, in Switzerland, where Bertrand Cardis and Jean-Marie Fragnieres' yard recently built Alinghi's ACC designs, as well as a multitude of composite boats from Swiss lake racers to round-the-world yachts such as *Merit*.

It was decided to build the hull on a male plug, with a female mould for the deck. The boat is being built with low-temperature pre-preg carbon with a variety of cores (Nomex of different density and foam) depending on the area concerned.

Remarkably, having signed a contract with Decision at the end of August, come the beginning of December the hull was complete, the bulkheads and internal structure fitted inside, the appendages finished and the deck cured... For this speed of building considerable credit must go to the partnership established between Nacira, High Modulus and the yard!

One thing is certain in a project of this type, with new multi-function benchmarks being pursued: it is crucial that the structural engineers' intervention goes further than just establishing laminates. High Modulus, together with Nacira, have worked closely with the yard throughout construction to ensure structural coherence and continuity.

The next step will be the launch in April in La Rochelle!

Nacira Yacht Design was created in January 2002 by Axel de Beaufort (BEng) and Cesar Dobry (BSc), both graduates of Southampton Institute. Their offices in La Rochelle are currently engaged on a variety of projects, including a new Open 40 design and a range of fast cruising yachts from 60ft to 75ft. As well as design Nacira offer a full range of design and build management service. □

SOLUNE

LOA	18.28m
BOA	4.8m
DSPL in IRC configuration	9.5 tonnes
DSPL in records configuration	8.8 tonnes
Draft	4m
Hydraulic canting keel with three different canting speed configurations	
Rig	Nordic Masts (carbon M40J)
FEA analysis	High Modulus

Carène m1 - Gite 20° - Vitesse 13nds

