DIAMOND

Ten Rater design by SAILSetc

background

In late 2005 we experimented with a Marblehead hull made for us from pre-preg carbon baked at 70 degrees C using an existing mould. The result was very encouraging and we have continued to explore this method of making hulls. In fact, except for our IOMs, all our boats are made this way now.

The pre-preg hulls have several advantages. They are stronger, stiffer, heat resistant and longer lasting hulls, with the possibility of supplying hull mouldings and hull kits almost 'from stock' and more time available for us to carry out other work. One side effect (possibly good, possibly not so good) is that the natural carbon and clear resin produces a black hull thus requiring the hull to be painted/sprayed if you want any other colour.

Ideally parts made of pre-preg carbon are cured at 100 decrees C or more. To do that we had to make new mould. Because we had to make a new mould we also took the opportunity to make the hull in a different way that would enable the primary hull moulding to be made with all the deck structure, as well as a number of other useful features, all in one. By the end of 2006 we had also modified the moulds to enable the fin box and mast tube to be moulded as part of the primary hull moulding.

New moulds for the A Class SWORD were also made in early 2006 and all new SWORDS will be made this way.

Rather than make a new mould for the 1999 design Ten Rater PRIZM, we took the opportunity to go through the design exercise afresh to see what gain in performance could be made in light of the experience gained from use of PRIZM as well as the lighter expected build weight.

The new Ten Rater, called DIAMOND, sailed first in spring 2007.

design development

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DIAMOND is a development of PRIZM but the hull form has been tuned to improve the straight line performance across the wind speed range while, at the same time, retaining the excellent manoeuvrability that PRIZM has. In fact we believe it is this ability to steer and be steered that gives PRIZM an edge in light airs over smaller boats with larger sail area that, in principle, should have better straight line speed in those conditions. The ability to change course to take advantage of a freeing shift, or to tack on a header, without losing too much speed seems to translate into better speed. Keeping the underwater hull form very close to PRIZM means we can retain those characteristics.

Overall beam is substantially lower than for PRIZM at around 190 mm. This ensures the hull immerses to maximum waterline length as soon as it is heeled slightly and moving in its own wave pattern. It also keeps the hull moulding weight down and gains back some of the heeled stability by virtue of a lower centre of gravity.

construction

The hull with integral centre deck and foredeck, fin box, and mast tube is moulded in two layers of pre-preg carbon with additional reinforcement where needed. The bare hulls weigh around 450 grams. Many useful detail design features are incorporated into the primary hull moulding: witness marks for station positions, recess for keel bolt, recess for headsail sheet fairleads, recess for headsail boom swivels.

performance

The prototype won the Brittany Cup and GBR national championships in 2007 each sailed in a range of wind conditions. In 2008 DIAMONDs have won the French championship, the Viry Chatillon Cup, the UK national championship and placed 2nd in the German championship.

specification

See the Boat Specification sheet for full details.

statistics

Length over all	1680 mm	Length on waterline	1230 mm
Sail Area	1.02 m^2	Disp	5.8 kgs
Ballast (approx)	4.2 kgs	Draught	590 mm
Maximum Beam	190 mm		

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construction

For the first time we have commissioned a CNC machined hull prototype from which to take the mould. This will enable a mould to be made in pre-preg carbon at a much higher temperature than has been possible from our older timber plugs. This should give a better surface finish as well as guarantee symmetry.

The mould will be in three parts: port and starboard sides of the hull and the deck. This permits many features to be incorporated into the deck that are not possible with moulds split on the centreline. For example a recess in front of the mast allows the headsail sheet fairleads to be fitted flush with the deck instead of above the surrounding deck. A recess in the foredeck permits the attachments for the headsail boom swivel to be below deck level and keeps the headsail boom as low as possible to the deck.

The fin box and mast tube will also be incorporated into the primary hull moulding guaranteeing repeatability and symmetry of these important elements.

A recess for a pot (containing the receiver and batteries) at deck level is also incorporated into the primary hull moulding and all boats will be completed this way. Since 2006 we have developed a universal moulding (item 311p) for installing the winch and rudder servo. Any winch can be installed using this moulding but we think the RMG 280 most suitable for the purpose.

DIAMOND will also feature the attachments for the new snap in/out rigging screws (item 31s). These are a quick and simple-to-attach rigging screw that create no snag points whether on or off the boat, and which can be adjusted in situ. If using our rigs we imagine they would be used only for the No 1 rig. The lower rigs will be stiff enough without the use of shrouds.

See the Specification for fuller details.

rigging

DIAMOND is intended to be used with conventional (shroudless or with shrouds) rigs rather than with swing rigs.
Choose a No 1 rig mainsail luff of 2000 mm if you sail in generally breezy conditions. Performance at all higher wind speeds will be superb. For those who sail regularly in winds above 10 knots it would be worthwhile using a heavier ballast.

Choose a No 1 rig mainsail luff of 2100, or even 2200 mm, if you sail in predominantly lighter winds. A ballast reduction from 4.2 kgs to 3.85 kgs (bigger sails required) would further enhance performance. The taller rig means shorter boom lengths and reduced performance relative to the standard rig at higher wind speeds.

If you have knowledge of the probability of any given wind speeds in the 2 - 20 knot range we can provide an analysis of comparative performance with a view to further optimising the choice

of rig and ballast. This may take more or less time depending on the degree of finesse required - to be charged for as appropriate.

The attachment of the No 1 headsail boom is made to an eye tied to a piece of cord which is attached to the bottom of the hull in the bow. The cord is placed in a tube to keep the hull watertight. We need to have knowledge of the rig height you will use in order to place the tube correctly at the completion stage.

The attachment for the headsail boom of lower rigs is by way of the headsail boom swivel, item 120d.

If you want to order rigs please see our Rig Specification and Rig Order Form.

foils & ballast

In early 2003 we tested a new fin section and found it to be a marked improvement on previous designs. We revised the fin again in 2004 when another small improvement seemed possible. All new boats are fitted with the newest fin.

The carbon rudder is a deeper, narrower, version using the same aerofoil section.

The ballast is the longer and thinner design we have used since 1998.

specification and prices

Please see the our Marblehead Boat Specification and Boat Order Form.

ordering and payment

You can specify the boat you want by completing the Boat Order Form.

Confirm your order by sending us your copy of the Boat Order Form. This provides us with confirmation of what you have ordered. The specification of your boat can be altered at any time up to production time by submitting a revised Boat Order Form.

We have to buy the hulls in batches of 5 and we do not always have hulls in stock ready for us to work on. It may be a while before we order another batch of hulls so our normal practice is to take a £50 payment on submission of your Boat Order Form. This reserves your boat from the next batch.

If you are unsure of the final specification details it is worth getting in the queue and deciding the details later.

When we have the hulls here and start work on your boat we will normally take 50% of the total cost and the remainder including carriage when the boat is ready to send.

delivery

Please ask for current estimate of delivery date.

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