



the 2007 America's Cup groups, but Cup sailors are a conservative bunch; they liked the slick, but they couldn't come to terms with the mottled look of the finished surface...

In the meantime, Morrelli & Melvin and French multihull designers Christian Gouery and Kevin Gobin are actively experimenting with HullSpeed. Gouery has applied it on his new *Exojet* catamaran with which he is trying to set speed records. Gouery is also recommending the product to a group of Frenchmen who are trying to set land speed records. Finally, HullSpeed is being tested by several NASCAR teams. The implications for this product are mind-boggling and the first applications are in the A-Cat class!

Wave-piercing: the only game in town

The surface coat is not the only experimental aspect of Melvin's new A3 design. While he won three North Americans and a world championship with his A2 design, Melvin then re-evaluated the entire boat in search of a better all-round product. Significant changes included moving back both the main beam and the daggerboards, specifically to improve heavy air performance by keeping the bow up better through steep waves.

Both Pete Melvin and Peter Egner, the engineer behind the boat that Ashby is using and distributing, the 2006 *Flyer Mark 2*, are now certain of the advantages of 'upside-down' wave-piercing hulls. The upside-down hulls reduce pitching and with less freeboard than traditionally shaped hulls are also lighter. At 10kt, when the white caps come on, there is even less freeboard because as the boat loads up the hull volume is pressed harder into the water; with the bottom of the hull now mostly deeply immersed, there is no more plowing in and out of waves.

Glenn Ashby simplifies this wave-piercing technology: 'You have the power in the water where you need it with the upside-down hulls. Plus they give you an aerodynamic advantage as well as hydrodynamic. The boats are going through the air so quickly that you want to reduce the hull area. With less freeboard and less side surface area, you are not pushing the hull through the air, so the boat doesn't get blown around as much as the older boats.'

Remember, the A-Cat is a single-person catamaran that is half the weight of a *Tornado* and it goes the same speed upwind. These tinkerers, engineers and mad scientists in neoprene and lycra are on the cutting edge.

Given that the latest A-Cats can fly a hull in the barest of zephyrs, it also makes sense to configure the two hulls so that when the boat is resting in the water the hulls point slightly outward. This



ensures that the immersed hull will assume a more efficient orientation once the boat is heeling.

And the hydrodynamic wizardry doesn't stop there. The daggerboards now cant in the opposite direction of the hulls; slightly inward to grab extra lift from the leeward foil. Meanwhile, the negative cant of the weather foil helps limit leeway.

And A-Cat champions overlook no detail. Melvin, for instance, has been using computer-milled aluminium moulds to ensure that his foils are consistently fair with the thinnest possible trailing edges. Melvin also has prepreg carbon 3D-modelled rudder housings that are stronger and stiffer than earlier models built with wet laminates.

That wing

Ben Hall didn't invent the solid wing technology, though he is one of the first to make it a practical sailing solution at this scale. However, one who was in at the beginning, Dave Hubbard – who had developed the concept and applied it to the C-Cats in the 1980s and to Dennis Conner's winning America's Cup boat in 1988 – gave Hall a quick and comprehensive lesson on wing design and construction before Hall set about his A-Class creation.

Given his place of work, Hall could easily have used the most exotic materials for his wing, but chose instead to use leftovers from his shop carefully cut out using Hall Spars' CNC router. In fact, Hall estimates that his materials cost less than \$US2,500. Then, during 300 or so spare hours, Hall glued the wing together in his shop at home...

Given the complexities of measuring solid sail area, Hall's 29ft wing measured in at slightly less than the class maximum of 150ft², and weighed in heavier than standard at 52lb. However, when Hall weighed everything he took off when fitting the wing, standard rig, plus sail, battens, mainsheet system and so on, he found the comparable figure was some 46lb. Hall's boat is still at rule minimum and still carries correctors.

A standard A-Cat rig has traveller, mainsheet, outhaul, downhaul, rotation, over-rotation and diamond controls. There are only four controls for the slotted wing. Hall's wing has an upper and a lower element, each with a twist control. The wing has four controls: a 2:1 mainsheet, camber control (that adjusts flap angle from 0 to 35 degrees), twist for the main element and twist for the flap element. The wing sheets in particularly easily around the leeward mark when Hall can trim on with a single pull.

Reflecting on his week Hall says, 'I do know that my boat was the fastest downwind in heavy air. In one race I passed 35 boats after rounding the weather mark back in 80th... I overtook some boats to leeward, some to weather. It felt like an Indy Race, passing right and left on the track.'

However, in the short chop Hall's performance suffered because his boat pitched more due to the wing's higher centre of gravity. He also found the wing would stall easily in bad air on the startline.

A solid rig was first tried in the class in 1985 by Danny Goritski, but now Hall feels its time has come. When the A-Class reconvenes at next year's world championship, expect to see some more wings and much more expertise in their use. As Hall puts it, 'I have a good feeling that 2008 will be the year of the wing.' □