Striking out

Yoiche Yabe talks with talented young Japanese designer Akihiro Kanai about his new series-built GP33

Another new GP33 has been launched in Japan! This is the second example of the new class here following the launch last winter of the Nelson-Marek design *Century Fast* for another Japanese owner.

The latest Japanese GP33 was designed by emerging young Japanese talent Akihiro Kanai (*inset*). Kanai began his design career when he joined the Nippon Challenge technical team back in 1993. He had recently graduated from Stanford University with a Master's degree in aeronautics, having previously specialised in hydrodynamics at the renowned department of naval architecture at the University of Tokyo.

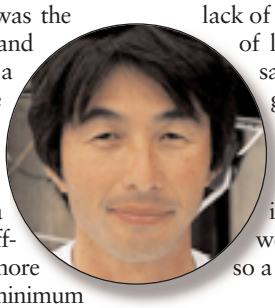
Kanai worked for the Nippon Challenge again in 2000, and continued his America's Cup involvement as a designer with GBR Challenge in 2003. However, his GP33 marks the first raceboat from Kanai's newly-established ACT studio. 'For our first racing yacht I wanted to present something new and exciting, both to Japanese sailors and also, of course, to the rest of the world!' Kanai says.

In 2006 the new Grand Prix box rules first drew Kanai's attention – along with interest from other young designers who recognised the benefits of a simple new system where more established offices would also have little in the way of data. He saw the potential of the three new GP classes, as they looked so much more exciting to sail compared to existing IMS and IRC cruiser-racers. While the GP42 would be too expensive for wide popularity in Japan, the GP33, he thought, would fit the market well with the prospect of building up a good-sized fleet. From the outset Kanai intended to pursue a series-build solution, to add to the boat's appeal by keeping a lid on costs.

Using in-house design tools including dynamic CFD technology, a VPP program, plus tank testing techniques that he had developed through his involvement in Cup projects, Kanai finalised the design and then started to build the first moulds using his own funds in April 2008. Taro Takahashi, his AC teammate, helped him with the structural engineering and experienced Japanese boatbuilder Tsuboi Yacht had also soon joined the project. Soon after the female moulds were finished, the contract for the first boat was signed in October 2008. Kanai's first GP33 – *Spank* – was launched in April 2009.

The ACT-GP33

The first thing to determine was the main material for the hull and deck. With the goal of creating a fleet the priority was to reduce building costs, so E-glass plus the infusion process were adopted for the sandwich structure. Since E-glass has a higher density – and lower stiffness – than carbon it became more of a challenge to hit the class minimum weight while still complying with the ABS structural rules. A preliminary structural study also demonstrated to us that we should be wary of aiming too light, that a slightly heavier but stiffer E-glass structure would outperform a 'skinnier' but softer alternative once on the water. Nevertheless, great attention has been paid to weight control throughout the build and each component was carefully weighed to ensure the correct final weight distribution.



Having considered the predominant racing conditions in Japan we decided to target the ACT-GP33 at around 8-12kt true wind, at which point the boat achieves its maximum optimum heel angle of 23°. The hull shape, appendage size/position and mast position were all also optimised for this condition using our VPP and dynamic CFD models, to account for changes in yaw balance as well as the continual trade-off between hydrodynamic stability and hull drag.

Hull

The hull shape was finalised by applying CFD simulations of various sailing conditions. This being such an important commission for a new office, more than 100 designs were explored. Our own CFD program has been steadily refined, with sailing forces being balanced using a VPP and the hull drag being calculated by modelling the adjacent simulated flow. Our final bow shape is interesting, it looks very fine, but the prismatic curve nevertheless indicates sufficient volume in the forward part of the hull for our target conditions (a fuller bow would be considered for a windier venue).

Our stern features considerable flare to maximise the use of crew weight while ensuring low wetted surface area and minimal wave drag at small angles of heel.

An aft chine was also considered. Our evaluations had shown our candidate design already achieving good downwind planing performance in over 15kt of breeze, but that upwind there could be a lack of stability due to the combination of light displacement and massive sail area; in such conditions a good chine can be effective in restoring adequate dynamic stability. However, for our target conditions this was felt less important than keeping heeled wetted surface to a minimum and so a chine was not adopted.

Appendages

Yaw balance is also a key factor when deciding upon the appendages, which we developed using our dynamic CFD model. Also taken account of was the rapid acceleration – and deceleration – of these boats, because of their light displacement; as a direct consequence leeway increases noticeably when tacking, or when sailing in difficult waves. The effective fin area was calculated in the static water condition and then modified – in other words, added to – when moving to the dynamic case. A hollow, relatively fat but high-aspect fin was eventually chosen.

The bulb shape was also designed using CFD simulation in which the fin and bulb were considered together, along with the critical fin/keel connection. When the bulb is considered in isolation, then a low CofG asymmetric bulb section generally shows greater drag than its symmetric counterpart, but once the fin is introduced the situation can reverse. However. the problem is still quite complex, even using the latest tools!

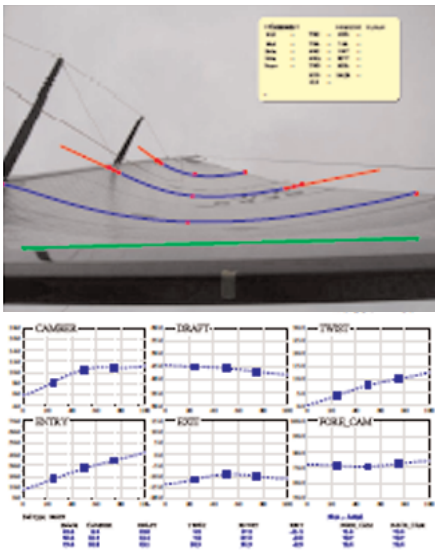
Our final bulb shape is indeed asymmetric, it showed slightly less drag than a symmetric bulb for our purposes and became significantly more efficient in the heeled condition.

The high-aspect carbon rudder is positioned relatively further forward than is perhaps conventional, dictated by the light displacement and the need to keep the blade immersed as much as possible.

Deck

Given the target wind range, the main aim with the deck design was to save weight.

***Below*: Akihiro Kanai's GP33 *Spank* – the high sail area/displacement balance is evidenced by the boat being fully powered up here in just 6-7kt TWS. For serious racers, the GP33 offers an extremely attractive mid-sized package, although relatively painful treatment of the boat's light displacement under IRC may mitigate against broader international popularity. *Lower left*: sail management output from Masanobu Katori's performance software**



There is only one winch on the cabin top, the bow hatch is a simple composite fabrication with no aluminum frame and a pair of simple tackles with rings control the jib sheeting. There are no headsail tracks.

Rig

The dimensions of the rig and sails are already almost one-design in the GP classes. The mast tube laminate was optimised to have as much stiffness as possible at the minimum weight. The side and backstay chainplates are laminated in a simple box form.

The sails are by North Sails Japan, who continue to advise the project. To speed up the tuning process we use software similar to the V5 America's Cup boats to manage the data. This software was developed by Masanobu Katori, a recent member of the technical team at Emirates Team New Zealand and now a partner in the ACT design studio.

Building the fleet

Following the launch of the first ACT-GP33, Kanai has received enquiries from all over Japan. The economic situation has, of course, not helped, but Kanai believes that by continuing efforts to make his new boat faster and just by winning as many races as possible, both his own new GP33 and the class itself will draw in sailors from Japan and elsewhere.

Tatsuya Wakinaga, the former Cup sailor who managed the first Japanese GP33, *Century Fast*, says, 'The box rule concept suits Japanese owners, who like to put some original ideas into their boats while still enjoying close racing. We have very active racing in the 33-35ft band, which here in Sagami Bay we call the "middle boat".

'This year we are inviting as many middle boat owners as we can to sail both *Century Fast* and *Spank*. I am certain that we will see more GP33s launched here in time for next season.' ❑