

Kelsall on Offshore Power Catamarans

The lessons we have learnt over 40 years of working with twin hulls are as follows:

- 1 Weight and the weight to length ratio is the main factor which determines the character of the boat to a greater extent than any other. A cat can carry the weight that it is designed to carry.
- 2 Windage is of much less concern unless powered for high speed.
- 3 The overall width is a variable we can play with within reasonable limits but it is not one with which to be too careless.
- 4 The ideal hull beam to length ratio, in considering drag only, varies with the speed at which the cat will normally cruise. However, this is not a factor to be decided on the basis of performance only.
- 5 The size and hence the cost and weight is determined by many factors. Length only, although it is always the first defining feature that we hear, is a relatively poor assessment of the true size.
- 6 Catamarans tend to be built heavier than the estimates and they tend to gain weight over the years. Unless weight is going to be in tight control throughout the life of the boat it behooves the designer to be on the generous side when it comes to allowances in calculating the final designed displacement.
- 7 There are many different situations and different results from variations from designed displacement. A cat that is above her designed weight is common. In many cases there is little to be concerned about but there are other cases where this can be very bad news indeed.
- 8 I have never found any disadvantages to cats which are floating above their lines.
- 9 Second accommodation levels can be remarkably uncomfortable while the lower level is fine.
- 10 Bridge-deck clearance is one of the most important to get right but no level is immune from slam. This is a lot more than just a level above the water. Too high produces some unattractive boats.
- 11 The use of steps in the hulls can be very efficient in achieving convenient interior layout as well as reducing the area of flat that might slam.
- 12 Bridge deck length is as equally important as height, particularly at the bows, but also aft.



KSS P60 –Note the low bow wave

Most of these factors apply equally to power and sail. For offshore power, the major points to consider are:

- 1 The power cat has no rig to support, but speed and momentum and higher cog dictate a similar order of stability.
- 2 The power cat is likely to spend more time at higher speeds.
- 3 The power cat can power directly into the waves.

We can accept some reduction of overall beam but caution against determining the overall beam on the basis of marina berth widths. The higher speeds can produce the situation where, due to the momentum, high stability is still very important.

At the higher speeds, a finer hull has slightly less drag and less wave making. However, the same argument applies as in the paragraph above. As in sailing design, the designer needs to look at what happens with all the weight is on one hull.

Higher speeds in normal conditions will keep the bows riding high. However, when powering into larger waves which require the craft to slow down, the situation is more similar to the sailing cat, where the bows are tending to bury as the boat comes off each wave. In powering directly into waves the bows will bury deeper and the slam is harder. The amount of reserve buoyancy plays an important roll at this moment.

As important is what other structure is likely to impact with the waves before the hulls lift. The bridge deck will hit and hit hard if allowed to. For this reason, I like to keep the bridge deck and the bridge-deck accommodation well back from the bows and higher than on sailing cats of similar size to provide the room for the waves that are thrown up, to pass without impacting on the boat's structure. There is also the situation where the speeds will be lower in order to increase the range, where some lift will be lost and digging the bows in will happen. I seem to be out of step with a number, if not most, other power cat designers on this point. However, I do know that my views are shared by a number of people who have made the ocean crossings.

A number of experiences on power cats recently has underlined the above lessons. Observing a variety of power cats from aboard a power cat in what I call lumpy conditions, every one would have benefited from longer hulls. For example, 15-25m cats, with hulls 2-3m longer at the bow or better still at both ends, the extra cost would be nominal but the extra ride comfort would be substantial. With few exceptions, the front end of bridge-decks were slamming regularly. The narrow cats, to suit the local marina berths, needed a strong hand to maintain balance on the second level, where those below were perfectly comfortable.

Slim Hulls

In the right place, slim hulls on light weight, power cats are superb. This we experienced on flat water on slim hulled river ferries. These craft glide along effortlessly. This is true from both on board and observing from the shore. There is very little wake, no lift, acceleration is quick and smooth and the accommodation is all at the one level. This is a good example, of where the maximum weight is a known factor, and the weight to length ratio is low. In this particular river situation, little reserve buoyancy is needed.

This brings me right back to item one. Weight/length - it is the key factor at almost every step along the design route, from basic displacement, to reserve buoyancy, to hull proportions, to height of COG. etc. Structure and equipment, fuel and water, payload, and all possible add ons in build or later and then a generous allowance for the unknowns is our approach. We must not lose track of the weight variations or change of trim either. The typical cat configuration and displacement requirements take them out of my lightweight category. Just making the hulls deeper to take the extra weight is not a solution that I am happy with for offshore. Design the accommodation etc., and then stretch the hulls out to be long and slim and not too deep and we are back to the 'superb'.

Variety

We see every possible combination taking to the water and of course for every possible use. It is very important that the designer defines the intent of the design. What works and provides the owner with what he is seeking of an inshore craft is very different to that needed by the serious offshore operator.

We have our own examples of power cats that are intended only for operation within sheltered waters. Too narrow, too high etc for serious off shore work.