POWER CATAMARANS:

Making the right choice

part two

by Peter Brady

In the last issue we looked how non-planing power cats have developed and the recent trends. In this issue we will look at the differences between inshore and offshore power cats and given the complexity of the subject, I have split the discussion into a third article for the next edition to look at where the future of non-planing power cats may lie.

So what is the difference between inshore and offshore non-planing power cats?

STRENGTH AND DURABILITY

It's ironic that we have a set of rules that are getting tighter by the day for commercial vessels defining virtually every component and feature in regards to design, strength and quality for its operating area and how far offshore they can go, yet there are minimal rules to govern and little guidance given to leisure boat buyers as to the suitability of boats on offer for different conditions. There are some ISO and CE standards that are quoted as being met, however these are more about manufacturing procedures rather than strength and features. Our experience over the last 23 years is that even commercial standards such as the old Australian USL Code and international codes such as Lloyd's and DNV are always one step behind what is happening on the ground, as even these bodies have not been able to collect enough historical data to date on such a fast moving design development as non-planing power cats. A great deal of the structural rules have by necessity been adapted from monohulls which means that in some areas they are inadequate and in others they are overkill, still they are slowly catching up with more emphasis on issues such as torsional strength. The history of sailing multihulls has been built around minimising weight as their performance is governed by their power-to-weight ratio in the same way as planing hulls are. The non-planing power catamaran is usually far less weight sensitive in regards to performance, so could be built a little more robustly without compromising performance, however it has still taken some time to work out what is required for not just strength, but durability. We have also found ourselves in a bit of a Catch-22 situation, because the better a sea boat we designed, the harder owners drove them in rough weather, so they needed to be even stronger. Strength is much easier to define in pure engineering terms as it uses loads or pressures to check how panels or beams perform in relation to a number of different stresses. Durability is a bit trickier to define as it is really a test of use and time and how the structure stands up to it. To better explain what I mean by this, I would estimate the average pleasure boat is used less than 30 hours per year, which equates to less than 450nm @ 15kts (I use 15kts as this is halfway between where most displacement or planing boats cruise). Most of this would be done on calm days as not too many people deliberately head out for a day cruise into heavy conditions, so the flexural cycles (when parts of the structure are loaded or twisted by lifting over or hitting waves) on the boats structure will be relatively light. A bareboat charter boat would be traveling around 200hrs a year @ less than 10kts which equates to 4.5 years of leisure use, with again relatively light flexural cycles as the boats are only allowed to operate in smooth waters and good weather, although they will get more damage from multiple and often inexperienced drivers. Now compare this with a long-range coastal or trans-ocean cruiser such as the last boat we launched that travels 4,500nm on its delivery trip in a couple of months through whatever conditions they encounter on the longer legs between ports or sheltered anchorages. This vessels structure will have been through the equivalent of 10 leisure boat years of use with some fairly severe flexural cycles in the first few months alone. Another of our power cats built to the USL Code and now 16 years old has reportedly been two and a half times around Australia through its life to date which could equate to at least 50 years of average leisure boat use of flexural cycles that at times would have been extreme in their nature for extended periods. This is the reason durability, which come from extra strength is required when long-range cruising, particularly at higher speeds, but it does come at an increased financial cost both in materials and labour that is sometimes hard to demonstrate.

While it is difficult for the layman to compare construction and engineering at a boat show, they can question the sales people on the suitability of the boat for offshore conditions, seek the designs history in relation to completed journeys, talk to owners of sister-ships or previous models and request answers as to the boats suitability and track record in writing. It is also reasonably easy to gauge the strength and suitability of safety components such as handrails by leaning on them and asking yourself, is this a safe height and would this support me or stop me going overboard if I lost my balance? Potential buyers can also examine the external and internal fittings such hinges and latches plus the fitout in general to get a fair idea of how robust and long lasting everything feels. If the boat has been built to last and go offshore, it will look and feel like it in its construction, equipment and features. The lighter built and equipped inshore boat will have a lower purchase price which is hard to go past at first, however the benefits of the more robustly built offshore boat come home when caught out in rough weather, knowing that your family and friends safety has not been compromised by your choice of boat.

OFFSHORE DESIGN FEATURES

Let's start at the bow: the charter or inland waterways boat will seldom ever go over 10 knots as they are either governed by charter regulations or low wash speed limits, so the better 'ride at speed' and drier decks created by the gradual

increase in buoyancy of raked bows are not as high priority. Plumb bows maximise waterline length which increases displacement speed for a defined overall length or horsepower, but they are not necessarily the best way to create a fast, comfortable, dry ride at sea. The yachting world has influenced the power catamarans swing to plumb bows even though there are many examples why raked bows are superior for power boats at sea. Now it will not be a surprise to anyone that I am not a fan of plumb bows let along ram bows as I have never pretended otherwise, but following are just three of the reasons why I am not alone in my thoughts:

The first of these are commercial ship designs that have in all their different configurations sacrificed graceful shear lines, low topsides and soft shapely transoms in their pursuit of gaining as much internal money making space as possible. They are prepared to go to sea in slab sided boxes if it makes an extra dollar, however the one common feature that all ships have retained is raked flared bows, regardless of how much room they lose and how expensive they are to build. Why? Because they work at sea.

The second example are warships: again they are basically a gun platform, yet if you look at the evolution of their bows from when the steam turbine was introduced in the late 1800's and the dramatic increase in speed it provided, there was a change from ram bows to more and more heavily raked bows the faster the warships went. Why? Because it is very hard to fire a gun accurately when you are plunging into large seas that are sweeping down the decks with solid water and it is also hard to maintain machinery when it is constantly under salt water. The only deviation from raked flared bows by all the navies in the world has been on experimental types looking for a more stealthy profile to deflect radar detection.

The third example is the offshore racing powerboat: these are planing hulls so any unnecessary structure is detrimental to their power-to-weight ratio and therefore speed, as is extra windage, yet all offshore racing power boats still feature raked bows.

Just because we are designing power catamarans rather than monohulls doesn't mean that all the accumulated knowledge learnt through experience should be thrown out the window as the sea is still the sea, regardless if you are on one or two hulls.

Whilst on the subject of bows, non-planing power cats have already developed a design feature during their short history that is pretty much unique to them – the bow chine or step. Because non-planing power cat hulls are so fine and they slice through rather than climb over the water, they form a fine bow wave that rises vertically rather than spreading sideways. At displacement speeds this fine vertical wave has no effect, but as soon as you push above this speed, the water gets sucked up the bows (particularly plumb bows) and onto the deck as a fine spray, making the foredeck a very wet place to be. Most early non-planing power cats including my own and converted sailing cats were retro-fitted with chines to turn this fine spray down, but now virtually all non-planing power cats are designed with the bow chine or step from day one.

The next point of difference between inshore and offshore power cats is the foredeck. Whilst it is recognised that trampolines or netting foredecks reduce weight on a sailing cat, there is no logical reason to have them on a true offshore power cat that is designed to go faster than displacement speeds, as they will not stand up to being driven at speed into head seas for any length of time and will only make the bow area wet and difficult to stand on, particularly for less than physically able folk. Starting the wingdeck farther aft will save some weight, but the increased entry angle of the wingdeck will not create gradual lift nor provide the cushioning effect of the gently curved entry that starts further forward.

Moving up and aft, the deck and cabin design are again a giveaway as to the boats intended use. Front cockpits and large opening front doors are not ideal if punching into head seas for any length of time. Even the steep cross seas created by the tide ripping around the tips of islands in protected areas like the Whitsundays would test these features as you get plenty of water across the foredeck that could fill the front cockpit faster than it could drain, setting up for the next wave to land on board as the bow sits lower with the extra weight.

A low flybridge front and sides look sleek at anchor, however they offer very little protection from both the wind and spray offshore and we have been in plenty of conditions where waves have slapped up onto the sides of a fully glassed in flybridge, let alone a low sided open one. There is a world of difference between driving a boat out in the open on a sunny day for a couple of hours and undertaking overnight passages in regards to how much protection from the elements is required. Given the length of the Australian coastline and the variety of conditions encountered on it, protection from the sun, sea and wind are a must for anyone contemplating cruising it.

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ENGINE LOCATION AND SET UPS

While it may be acceptable (just, in my opinion) to place the engines under the aft beds in a sailing cat where the intention is to have the engine running the least possible time, it is not realistic in a true power cat with any kind of passage making intentions. Not only would it be unacceptably hot and noisy to sleep literally on top of a hard running engine for any length of time, but any fuel or exhaust leaks would ruin the fit out and could be dangerous to a sleeping crew member. Maintenance would be a nightmare with the possibility of an oil or fuel spill when changing filters and eventually the smell would permeate the cabin making it an unpleasant place to be.

Engine rooms need to be isolated from the accommodation and set up in such a way that critical components such as stern glands, fuel filters and salt water strainers can not only be reached easily, but can also be serviced while at sea. Two engines in separate compartments and with individual fuel and cooling systems do provide a high degree of safety, however they are not infallible and there is a big difference in being a maximum of 20 miles from help in smooth waters and being offshore in rough conditions. If a bareboat charter boat has a mechanical problem such as a blocked fuel filter, they drop anchor and radio for help, however this is not a luxury generally available when coastal cruising, so systems such as dual switchable fuel filters should be standard on offshore boats. Access to the engine rooms is also important particularly at sea where a wave on board swamping the engineroom could compound an already serious situation. We usually try and have two separate entrances to the engineroom with one of these either internal or inside of high coamings so the engines can be checked at sea without opening up the possibility of swamping and the other being a deck hatch for maintenance or component removal in port. I sometimes run with only one hatch on the back deck, but only when I believe the aft deck is high enough off the water, there is a physical barrier like a step to stop water from washing in and the engine is not placed directly under the hatch. Single access engine hatches right in the aft corners of open transoms are not a desirable feature on a boat with any offshore cruising pretensions, nor are enginerooms with no room to work around the engines at sea. If something is going to come loose or leak, it is much more likely to do so at sea than by the wharf, and when it does, it needs to be fixed regardless of the conditions, so sensibly laid out, well-lit and ventilated enginerooms are a must, as is storage for spares and tools.

FIT OUTS

First of all let's start by acknowledging that post GFC we have all had to look at and reduce wherever possible the costs of building boats to stay in business and deciding what is a critical detail is not always easy. I know it is cheaper to build a square corner, particularly in laminates, but I believe this detail is not acceptable in any kind of boat and is bordering on negligent in a vessel that realistically intends to go offshore. Regardless of how good a sea boat you are on, monohull or multi there will be the odd tumble at sea and when it happens, there is a world of difference in the damage done to flesh and bone between a soft timber edge or a sharp square corner of laminate. **It is the builder's duty of care to see that they do everything to minimise the potential for serious accidents.** Sharp, hard edged corners have never been part of boat interiors, regardless of size or type to date, yet we are seeing them creep into fitouts and in particular on power cats under the guise of 'arty' design: do not be fooled, they are just bad design. Caravans may get away with this type of fitout, however people only move about in them when they are parked and stable, unlike boats which never stop moving, even at anchor. While on the subject of safety, handrails around the interior are important on any kind of boat, but particularly on an offshore cruiser. Wide open spaces feel great at the marina or boat show and power cats usually have plenty of them, however these spaces still need to be crossed safely in the dark and at sea, so somewhere to grab onto is still important around the edges of these spaces.

STORAGE AND LOAD CARRYING ABILITY

If you are weekending or on board for a couple of days then storage is not critical as guests usually only bring an overnight bag and the boat is back to a port every couple of days, so spares and tools are not an issue either. When cruising any longer than this, storage and load carrying ability become a higher priority as clothes, bedding, food, pots, pans, spares and tools all need a safe storage space and as they are all weight, the boat needs to be able to carry this weight safely. By safely I mean both structurally and without upsetting the boats trim to a point where it affects its seaworthiness.

HELM STATIONS

Not only do helm stations need to be practical, they need to be comfortable and ergonomically correct. On some boats though, they almost seem like an afterthought and again are generally a reflection of the boats intended usage. Having lots of flashy electronics that you cannot see or reach from both a seated or standing position doesn't make much sense. Having the engine controls in a position where you cannot easily stand behind them or get to them quickly is also wrong, because when docking a cat, you only use the controls, not the helm. You want to both be able to see every corner of the boat if possible and move quickly if needed and you cannot do either of these things when sitting down. Given that the port-to-port passing rule is universal in boats, I am always surprised to see helm stations on the starboard side of any boat let alone power cats with their extra beam, as it makes judging distances when passing another boat in tight channels so much harder.

EQUIPMENT

If your cruising plans do not take you far away from where your cutting edge electrics or electronics were purchased and installed, then you will probably have great pleasure in showing everyone how you can run the whole boat from your laptop, tablet or phone. If however you wish to venture further afield and particularly to places that do not have the facilities or expertise to repair and maintain complicated electrics and electronics, then I would strongly advise against purchasing this type of equipment or a boat fitted with them. We have learnt from experience there is nothing more frustrating for an owner than being stuck in a port with a system breakdown that no local can repair. When long-range coastal or offshore cruising, the boat needs to be set up with the K.I.S.S. principle with a backup system for all important equipment on the boat, even when it comes to cooking and refrigeration.

If you have an electric cook top, fit a gas barbecue as this gives you two systems of cooking should one fail. If you have a 240v eutectic fridge freezer, have another system that is either 12 or 24 volt in case the genset fails. To back up the genset, carry a small portable generator which at the very least will power the battery charger so you can run the DC systems and some of the AC through the inverter. Most boats carry some outboard fuel, so carrying a petrol genset that runs off the same fuel shouldn't be an issue. Just put the genset out in the cockpit on some soft coverings so its feet don't damage the deck, make sure the exhaust fumes are going overboard and plug the gensets output into the shore power plug and at least the food and fish in the freezer won't be lost.

Do not link all your electronics and alarms through a master system however tempting it sounds, as one goes down all go down. Even though it seems old fashioned, keep some separation in your navigation equipment even if it is just a separate back up GPS (with separate aerial so aerial problems don't take out both GPS's) and sounder. Whilst they are getting harder to find these days, mechanically injected diesels may be considered a little dirtier in their exhaust emissions, in a marine environment they are much hardier. Every port regardless of the country you are in has a mechanic or handyman who will be able to fix them, or at least tell what's wrong without needing computer diagnostics experience or equipment. Sellers of equipment such as digital electrical systems make it sound such a benefit to run everything from a computer screen – until the computer or the programming plays up and then nothing works. After all, what is so hard about flicking a light switch that you need to computerise it? You should check each cabin to see if the lights are off at the same time as you check the portholes are closed and that no water is running before you leave the boat, not just look at your laptop or tablet. Yes, wiring running from a circuit breaker board is heavier than a communications cable, but the labour to run them is the same and I can tell you from experience which is the more reliable system and the easier to deal with if something goes wrong.

IF YOU HAVE AN ELECTRIC COOK TOP, FIT A GAS BARBECUE AS THIS GIVES YOU TWO SYSTEMS OF COOKING SHOULD ONE FAIL.

CONCLUSION

So, when evaluating non-planing power catamarans today, it is important to both compare apples with apples, but also to understand that there are horses for courses. Before purchasing, think long and hard on how you want to use the vessel both in the short and long term. If you are happy to potter in protected waters like the Broadwater, Sydney Harbour or the Pittwater and never intend going further than 20 or so miles from port and you plan to stay under 10 knots and only cruise in daylight hours like the charter boats, then the high internal volume inshore type may be perfectly adequate. It has all the same power catamaran advantages of large flat entertaining areas, stability, manoeuvrability, shallow draft and mechanical safety from twin engines and multiple watertight compartments. It will also have a larger interior volume in the hulls which makes it feel very appealing at boat shows. If however you have any thoughts or plans to cruise the greater Australian coastline or even passagemake between offshore cruising grounds, then I have a feeling that you will be disappointed with the inshore orientated high volume semi-displacement power catamarans performance, range and suitability and unfortunately, this often leads to being disillusioned by non-planing power cats in general.

Most people understand that we have city cars and off roaders for a reason, it is just a matter of applying the same logic to boats where the right choice is even more important because you can't just sit by the side of the road waiting for help to come if you make the wrong choice.