THE PATHFINDER ‘M’ RANGE

A BLEND OF ONGOING DEVELOPMENT AND EXPANSION OF THE RANGE

I story **PETER BRADY**

One of the greatest advantages of being a designer-builder is that the drawings are the guidelines or framework for what becomes the finished product rather than the definitive prescription. Ideas develop while the boat is under construction and the styling gets more refined because I am looking at the lines every day both on paper and in the flesh.

Throughout design history, the sheer or deck line has been the defining mark of a designer’s skill as well as setting the designs style. Famous designers of the early 20th Century stated that they often spent at least a day just on the sheer line alone when drawing large yachts and it showed in what they created. Some designers start from a style, then try to fit in the rest of the design around it. I tend to start with a style in mind but set out all the other components so I know they will work, then come back and refine the style to wrap around the structure and layout. I have always favoured the sweeping sheer line that is sometimes called the powder horn style for my power cats, as it looks balanced with a raked bow and is practical because it provides both a dry foredeck and more headroom in the forward accommodation and with its lowest point being around 75-80% of the boat’s length aft, it makes the aft deck bulwarks a good working height. I am not absolutely sure where it first developed, however it seemed to emerge in 1930’s fast commuter launches in the USA, it was then seen in some launches and faster fishing boats of the 1950’s, became more defined in game fishing boats of the 1960’s onward and today it is a signature of picnic boats and common on all types of power boats. With both the Offshore 45 and the 41 Sedan, I started with a straight sheer in the original drawings as I was establishing how I would build them in combination with the DECKIT System. However I have now modified both of them to the powder horn style, because the panels created with the system were more flexible than I had first anticipated. In this ongoing design process I’ve also made numerous small detail changes on the internal layout of the Offshore 45 while working through all the survey requirements which are far more complex under the NSCV Rules that are now governed by AMSA at a national level than they were under the old USL Code at state level. As is usual with custom and semi-custom boatbuilding, the clients have also added equipment like air-conditioning, watermaker, dive compressor, dishwasher and extra electronics to the original specifications and so I have had to work these into design and construction with a tweak here and there. Again this is the advantage of being a designer-builder and can make these changes whilst still being in full control of the structural and weight considerations that go with them.

I have also already modified the 41 Sedan’s interior to meet the client’s request for an extra single bed in one of the forward cabins and the change in the sheer line meant I was able to raise the internal floors in the mid-section, providing more floor width. With a bit more shuffling I have also been able to increase the size of the water tanks and the fuel tanks capacity has risen from 1,800L total to 2,400L without affecting the trim between empty and full load. The extra fuel will really pay off for her owners on the longer legs between Lakes Entrance and Darwin by being able to maintain a higher cruising speed or in not having to purchase fuel from remote places which is always much more expensive.

Offshore 45 original straight sheer.

Offshore 45 revised powder horn sheer.

With the Offshore 45 close to launching, we have now started to expand the Pathfinder ‘M’ range even further with the introduction of the Offshore 52 and the development of the 52 platform for a number of commercial applications. The 52 hull platform was designed with a number of roles in mind and has a 1.1m wider overall beam plus wider and deeper hulls, whereas my earlier production boats like the Scimitar 1010 and the Brava range were designed as pleasure boats. They made fine dive boats, sports fishing boats and in the case of the Brava 45 an excellent fisheries patrol boat, but they were adapted to these roles rather than it being part of the original design brief. By designing a new hull up to the chines from scratch I was able to incorporate the experience learned from similar sized vessels like the 52ft *Bathurst* and the 49ft *Donna Rose* and combine this with the ability to build modular deck and cabin structures using the DECKIT System.

41 Sedan original sheer.

41 Sedan revised sheer.

COMMERCIAL MARKETS WHERE THE DISPLANING POWER CATAMARAN WOULD BE PERFECTLY SUITED

1: Light to Medium Commercial boats

I have designed and built a number of displaning power cats over the last 20 years for what I call the light to medium (10-20m) commercial boat market as well as undertaking a number of preliminary studies on inter-island ferries for South Pacific nations. These vessels are required to act as effectively a village bus, delivering people, supplies and even small animals out to the many islands that make up nations such as Fiji. As they are working in open ocean conditions, these inter-island ferries need to be a different type of vessel than the City Cats on the Brisbane River, ferries in and around Moreton Bay or around the Whitsunday Islands. To date, the role of the smaller ocean going village bus (bigger catamaran ferries are starting to come into service on the larger tourist routes) has been undertaken by displacement monohulls, however everyone we have worked with could see the advantages of the displaning catamaran type with its high cruising speed and load carrying ability. Smaller planing type cats are not always economical for these roles as the fuel they burn for the load they carry can make them unviable plus the lighter weight construction that they require to maintain their planing power to weight ratio means they are easily damaged and harder to maintain. Planing type hulls generally require lighter yet higher horsepower engines which these days means higher tech rail injection along with cleaner fuel and state-of-the art service facilities to keep them running that are not always available in many of the island groups. As the displaning power cat is not so weight sensitive, they can be fitted with the older style engines with mechanical fuel pumps which in turn are far more tolerant to fuel quality, making them a more practical match to the operating environment.

To inter-island ferry operators, the step up in cruising speed from a displacement monohull to a displaning power cat would be like the jump from horse and cart to the first trucks in terms of being able to deliver more payload faster. For example a trip of 50nm would take 6.5 hours each way at 7.5kts in a displacement monohull, meaning that it would most likely have to leave and come home in the dark if unloading time is taken into consideration, adding considerably to the risk factor in reef strewn waters. The displaning power cat running at 16kts could make the round trip in just over seven hours (including an hour for unloading) increasing safety, or making two trips a day possible. By my estimates, the displacement monohull would be running around 150hp for its 7.5kts cruising speed which would use around 30ltph. The displaning power cat would be using around twice the fuel at 16kts, so its fuel consumption would be around the same as the monohull for the trip, but it would complete it in less than half the time. This increased speed would allow the cat to run around a string of islands in the same day and with its increased beam, it would also be able to carry more passengers in greater comfort and space. Its widely spaced twin props makes it more manoeuvrable and the cats two shallow draft hulls, each with multiple watertight compartments and full length keels to protect the stern gear, would also be safer.

These same advantages would also be available to any commercial people carrying applications such as eco-tourism and marine research with vessels like *Whales in Paradise* proving to be both people friendly with their stability and very economical to run.

2: Commercial Fishing boats

To demonstrate the potential fuel savings of the displaning power catamaran over conventional planing or semi-displacement monohulls, I calculated that a displaning power cat in the form of a crayfishing boat of around 15m in length operating for 1,000 hrs a year at an average speed of 17kts could save 60,000 litres of fuel per annum which when extrapolated out, means a 20 boat fleet of planing boats converting to displaning power cats could potentially save 1.2m litres of fuel per annum and over the whole West Coast crayfish fleet of 235 boats in 2014 (mostly planing types as large distances need to be travelled) this fuel saving could be in the order of 14 million litres per annum. When you expand this to the whole of

Australia crayfishing fleet of approx. 400 boats, even if 25% (a great many southern crayfish boats are still displacement types) were to convert to displaning power catamarans, there is the potential saving of 9,500,000 litres of imported fuel per annum just in the crayfishing fleets alone. If you then consider the reef fishing fleet, abalone fleet, gill netters, long liners, dive boats, whale watch boats and a multitude of other maritime activities such as fisheries patrol, rescue services and police boats, the savings to the country of imported fuel could be staggering. Given the figures we used for the range of long-range cruisers in the article published in the 142nd edition of *Multihull World*, there is no reason to believe that my round bilge displaning power cats would not show close to the same degree of fuel savings over the hard chine power cats as well as monohulls.

for longer lengths of time, yet has the sprint speed to quickly get to a trouble spot if needed.

Organisations such VMR use 26kts as the speed required to be considered a first responder and we have proven that 440hp each side will achieve this fully loaded in a 52 footer, so 480+hp will achieve this comfortably, yet the vessel would only be sipping 10.5ltph combined at 8kts and 67ltph combined at 17kts. So not only does the displaning power cat have the unique combination of range and speed, but it can be operated at the speed of the skippers choosing to match the conditions or operational requirements without having the on-the-plane or off-the-plane difference in handling, seakeeping and fuel economy dilemma of the planing boat. Because it swings large propellers slowly, the displaning power catamaran is also a very capable tow boat with high pulling power at low speed and excellent manoeuvrability and would make a very stable platform when conducting searches and rescues. The Queensland DPI's fisheries patrol boat *Peter Finglas* is a modified Brava 45 and carries a 5m RIB capable of well over 30kts for interception work, so a 52ft version would be capable of carrying and launching up to a 7m RIB comfortably. *Peter Finglas* has successfully operated for 10 years now, but it was a huge learning curve at the time because there was nothing to base its layout on. It was a millimetre tight design with five bunks in three cabins, galley, lounge and office area and the electronics and mechanical systems were comprehensive to say the least. The in-house designed and built hydraulic extending cradle enabled a RIB that was supposed to weigh just over 500kg and ended up closer 1,000kg to steam into the back of the boat in up to 2m seas, which it did first time out. The difference in fore and aft trim created by the RIB's weight being on or off the back deck was managed by using high capacity pumps to fill seawater ballast tanks that replicated the RIB's weight. That then had a secondary beneficial effect because as the Brava hulls were so easily driven, when the RIB nosed into the cradle, it pushed the Brava away so the ballast tanks were left full to weigh the back end down, decrease the ramp angle and slow the Brava's momentum until the RIB was back in its cradle. The ballast tanks were then were pumped out to provide the correct trim. The Pathfinder 52 Patrol is over 2m longer and the overall beam is 1.1m's wider than the Brava and with a far greater carrying capacity, will be able to undertake the same type of role a lot further offshore with ease and in comfort.

Peter Finglas is a good example of the displaning power catamarans suitability for patrol and search and rescue functions.

3: Search, Rescue and Patrol vessels

Again, this is almost the perfect application for the displaning power catamaran with its unique combination of range and high cruising speed, letting the rescue or patrol boat sit comfortably out at sea

CONSTRUCTION OF COMMERCIAL BOATS

For some reason a train of thought has developed that seems to believe that only aluminium is suitable for commercial catamarans because it is tougher than FRP and easier to repair. I think it comes partly from the belief that any metal is inherently stronger than all other materials and that it will be cheaper to build. Aluminium is cheaper to build if you do not fill, fair or paint it, nor require any fit out or insulation. If you do however, it can become far more expensive than composites as they often virtually build three boats to get one. What do I mean by this?

1. You first have to construct the aluminium boat.
2. To fair an aluminium boat, it is not uncommon to put as much epoxy resin in the form of filler on to the vessel as you would if you laminated the outer skin of a FRP boat.
3. To get the thermal and sound insulation of a cored FRP boat it is then necessary to line the aluminium boat with effectively another boat on the inside.

Even if the aluminium boat is left un-faired before painting and with no lining, it will still be heavier than the composite boat in the first place and lose another 10-20% of its internal space in framing.

Is the aluminium boat tougher and longer lasting? No in fact it will have nowhere near the potential life of a composite boat due to its lower resistance to flexure cycles and therefore fatigue, as well as the potential for corrosion and electrolysis. We had a classic example of aluminium's weaknesses earlier this year when *Whales in Paradise*, the very first P.A.C.K. boat we built in 1998 happened to be out on the hard stand alongside an aluminium bay ferry and a bay tourist boat of all around the same length. Over her 19 year life span, *Whales in Paradise* has been lengthened and another viewing deck added, yet she is still in very good condition particularly considering that she was built as a prototype for the building system, now carries a third more passengers than she was originally designed for and works over the Southport Bar during the whale watching season. In comparison, one of the aluminium boats beside her was built around the same time as *Whales In Paradise*, however the other aluminium ferry was just over 10 years old and both of them were having extensive areas of plate cut out and replaced under the wingdeck and on the inside of their hulls. They both looked pretty beaten up as they were not filled and faired when they were built and had taken on that 'hungry dog' look that plate boats get with age and stress.

Is the aluminium boat easier to repair? Not by a long shot! To repair an aluminium hull requires better than average welding skills and equipment and the welding should be carried out in a dry area sheltered from the wind. Even the best weld in aluminium is only considered 80% of the strength of the plate so you can imagine how this figure drops in less than ideal conditions with a less skilled welder and older fatigued plate and of course there is always the potential for fire on the inside of the boat from the insulation or fit out when welding.

In comparison, to repair a FRP boat, you can get away with hand tools if there is no power available, most competent handymen could fashion a fibreglass patch that would get you home with quantity rather than quality if the cosmetics are not important and the repair could even be carried out underwater with more specialised resins if required.

You can make the aluminium boat last longer by building it with thicker plate or decreasing the panel sizes even more so there will be less flexure in the panels, however this will make the boat heavier to build and therefore less fuel efficient, making the boat more expensive to build and operate.

We are now seeing a shift to composites for all sorts of structures that were traditionally metal including, train, truck and bus bodies, aircraft, architectural structures and ever larger boats so there is no reason why this trend will not cross over too small to medium commercial power cats as well.

By developing the DECKIT modular construction system in conjunction with our multi-dimensional hull mould we believe we can now offer similar build costs to an aluminium boat but with better cosmetics, a quieter and cooler hull with more internal room. The fact that it is lighter and round bilge rather than most plate boats hard chine type hull means it will be more economical to run and have a longer working life. These are all advantages that should appeal to any commercial operator as they are as much about saving money as comfort and they should equally appeal to government bodies for the same reasons.

THE OFFSHORE 52

This larger offshore model is designed as a long-range trans-ocean cruiser that trades off the upper station of the Pilothouse model for a simpler structure, fit out and more fuel capacity, therefore a more economical build cost with a longer range. By removing the weight of the upper station and carrying the higher saloon-galley-drive station floor further aft, I have been able to increase the fuel capacity to 6,000lt which will provide a range of over 4,000nm at 8.2kts, 1,890nm at 14kts, and 1,400nm at 17kts with a 10% reserve backed up by a sprint speed of 26kts when powered by 2 x 440hp engines to avoid unfavourable weather. As torque and propeller efficiency are the key to mid-teens cruising fuel efficiency, dropping the sprint speed to 23kts lowers the horsepower requirements with the 225hp John Deere 6068 or the 330hp Cummins 6BT- 5.9 suitable options if we stick with the K.I.S.S. principle of mechanically injected diesels. If you are happy to cruise in displacement mode, then 2 x 100hp engines will give you a cruise speed of around 10kts, however given that the labour to fit the different engines

is essentially the same, I think it would be a shame to forego the safety aspect of the displaning cruise speed to avoid unfavourable weather or tidal situations on bars.

I have long advocated the use of domestic type dining and lounging furniture in power cats as it not only reduces the build time and therefore cost, but it makes the interior so much more flexible in how it is used. The smaller the boat, the harder it is to include 'off the shelf furniture' as the dining-lounging area is usually one and the same, as well as doubling as both a storage area or the wall and ceiling of the cabin below. The large open plan wheelhouse of a power cat like the Offshore 52 however is the perfect candidate where it could be used as there is already plenty of storage and the galley-saloon-drive station floor is all on one level above the mid cabins. With only the galley, drive station and stairwells permanently in one position, the rest of this area can be arranged furniture-wise in whatever way the clients want depending on how many guests are on board, what direction the sun is coming from or what time of day it is. This flexibility also allows the area to be totally re-configured, depending on how the boat is being used from fishing trips with the boys, child friendly family day trips and more sophisticated dinner parties – all without compromise as the furniture can be easily moved around to the required configuration or a different set all together could be brought on board from home.

Will the furniture fly around in heavy weather? There is a possibility in really extreme conditions, but it is very simple to set tie down points in the floor for this, however it has been our experience that well designed displaning power cats have such a soft motion that the furniture just sits where you put it 99% of the time.

The accommodation plan I have drawn for the Offshore 52 is very similar to the Pilothouse version with the full width master cabin and en-suite forward at bridgedeck height and a mid-cabin with en-suite in each hull. It would be very easy to split the forward area in half like *Rehab* to provide two queen-double cabins, or it could be arranged with a smaller master cabin and bunk room alongside that doubled as a crew cabin should you wish to relax completely and take professionals to run the boat. The mid cabins are based on the cabin layout on the Pilothouse version, however the port side has its bedroom aft and en-suite forward with the starboard hull arranged the opposite way around so the stairs to both cabins from the saloon-galley are offset.

In many ways the Offshore 52 is the epitome of the vision designers in this part of the world such as the late Lock Crowther, Malcolm Tennant and myself held for the displaning or high speed displacement power cats as Malcolm called them when we began the type's development in the early 90's. That vision centred around a catamaran platform that uses a long waterline and slim hulls in combination with a simple, spacious uncluttered layout to provide comfort, seaworthiness, range and a high cruising speed with comparatively small engines to deliver a viable long-range cruising alternative to the yacht. In the case of the Offshore 52 the vision is still the same, but I have used more traditional power boat styling which I believe is one of the reasons that more people are coming across to displaning power catamarans.

Whales in Paradise demonstrates the ability of composite boats to stand up to the rigors of commercial operation having been in continuous service for nearly 20 years.