NEWS FROM THE SHED IN SEPTEMBER

Fishing boat's comprehensive structural framing.

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Progress on the Pathfinder 45 commercial fishing boat is moving steadily with all bulkheads, ringframes, fore and aft partitions and floors now in and the deck is being fitted. On most power catamarans designed as pleasure boats the aft deck is much shorter and the loads are more spread out and on a monohull workboat, the deck is supported by the hull structure underneath it. On a catamaran workboat like this vessel that has a long, wide aft deck with no hull underneath the middle of it, the supporting structure across the wingdeck and down into the hulls has to be very carefully considered. The ability of the CVD ride control features to let a power catamaran maintain high cruising speeds when loaded in rough conditions can be a double edged sword as the structural integrity of the vessel must be equal to the task. As the photo shows, I have used a comprehensive grid system of structural members to create an egg crate effect, with horizontal box girders to meet the torsional rigidity required by Lloyds Construction Rules as well as distributing the weight of a large (but hopefully full) refrigerated deck box. The fore and aft partitions that form part of this cell structure also work in combination with the aft V pod moulded into the wingdeck, forming a 450mm deep longitudinal beam from the aft wheelhouse bulkhead to the aft beam, resisting any bending loads that deck weight could put on the vessels structure. These fore and aft stringers are then continued under the wheelhouse floor and through the forward sections as anchor locker and deck locker walls, with this forward area also supported underneath by the two deep chined V pods that form part of the CVD ride control features. All these structural members when combined with the decks and wheelhouse floor create a series of deep I-beams with large flanges top and bottom tying all components of the structure together.

The decks and cabin will be built using my modular DECKIT construction system so it's a little hard to track for interested parties watching the boat being built as it appears to go in fits and starts with a lot of work in the background, then large jumps in visual progress. The vessels minimal fit out will also make it very different to the majority of our previous projects where the hull was the quick part followed by a luxury fit out, along with comprehensive mechanical, electrical and plumbing systems which were complex and time consuming to install In comparison, this vessel is pretty much the hull, decks, wheelhouse and four berths along with simple, rugged and reliable mechanical components, so it is a quite different mind-set than usual for everyone in the shed, but we are all enjoying the challenge.

The biggest individual cost component on this boat besides the construction will be the Furuno electronics using the WASSP Multibeam sounder technology. WASSP technology is a New Zealand invention which will provide the owner with an 'underwater survey standard' bottom picture – a critical component when looking for new fishing grounds or other potential scientific and research charter work on the reef. In 1980 when I was rebuilding and modernising the fishing boat *Jean*, her owner asked me to fit a sonar, which at that time was a huge investment for a young fisherman and the first in the Otago fishing fleet. When asked why he was making this investment, he explained to me that he believed the technology would give him a jump in learning where the safe and profitable fishing grounds were, equivalent to the experience that older fishermen gained over a lifetimes fishing when losing equipment and money. My brother Ron successfully followed that same path, always buying the best quality sounder he could afford, then using the better technology to work grounds that most thought had been fished out.

As this build progresses, I've been doing more research for the potential of this type of multi-purpose work platform and it appears that we are not the only ones thinking along these lines. In Western Australia, at least one of the recently launched rock lobster (crayfish) boats has been designed and built with the same thought process, because as commercial fishing becomes more regulated and catches are defined by a quota, then the time span that boats are engaged in one type of fishery are shortening. This means a very expensive asset can be left sitting for long periods of time which is not economically sensible unless the fishery is extremely profitable, nor is it good for electronics or complex mechanical systems. On the other hand this down time provides an opportunity to explore other fishing options or to operate the vessel in a different commercial mode, hence the importance of setting the boat up right from the design stage to accommodate these options. One of the potential operating modes in WA is servicing the offshore gas and oil rigs along with scientific research and eco-tourism. On the east coast, dive charter, servicing islands and resorts on the reef along with eco-tourism, scientific research and even more future oriented functions like pollution clean-up are options.

I have been commenting in my last few articles how the world goes around in circles at times and this

happened again recently when I was asked to look at making some alterations to provide wheelchair access on the Gold Coast based whale watching boat *Mahi Mahi*. The timing was perfect as she is very close in layout to the vessel we are currently building, which confirms not only the platforms versatility to undertake many roles, but also the displaning hull forms efficiency along with the durability of the composite construction. *Mahi Mahi* (originally called *Dolphin Wild*) was my second generation of hull design following on from the Scimitar 1010 and in fact in 1998 her cabin, flybridge

and foredeck were built using the Scimitar moulds. She was the first modular boat we built using the P.A.C.K. System with vacuum bagged cores and vinylester resin and given that she operates over the Southport Bar and has been lengthened and fitted with an upper deck to carry substantially more passengers, the structure has well and truly stood the test of time. According to her skipper, *Mahi Mahi* still returns excellent performance and economy from what is relatively small horsepower for the load she carries, and having been fitted with bulbous bows to balance the extra length aft and a number of other semi-CVD ride control features, is still a very good sea boat.

Perfect timing for the fishing boat project has also been the feedback we have been getting from the owners of *Cee-Em*, the Pathfinder 41 Sedan launched last November and she has already clocked up 400 hours on her engines in less than a year. Her time at sea so far includes Brisbane south to the owners home base in Lakes Entrance, back north again cruising the reef on her way to Bowen and now returning to Brisbane on her way south to Lakes Entrance in time for Christmas. The fuel figures they have documented emphatically demonstrate the displaning hull type's unique combination of economy and performance. When comparing her fuel usage with the fuel figures of the original Brava 42, we found that they are virtually identical throughout the speed range on both boats. The first Brava was powered by the 190hp version of the Yanmar 4LHA-DTP producing 190shp using slightly higher ratio gearboxes, whilst Cee-Em has the STP 240shp version of the same engine. The original Brava 42 had less fuel and water capacity, but did have the additional windage of a flybridge when comparing the two, however *Cee-Em's* higher topsides to match her double floored wing deck structure with integral fuel tanks went some way towards cancelling out the extra windage of the flybridge. *Cee-Em's* hulls have an extra 70mm of hull beam however the extra torque of the 240hp engines at cruise speed balances this out with both recording 37 litres per hour total fuel burn at 15kts.

We have a refurb project underway alongside (well actually physically in front) of the new build that also has many similarities to the fishing boat as she is an earlier design of mine, so is more minimal and in tune with the original purist displaning or high speed displacement philosophy. The *Paul Robert* is a near sistership of *Shilo* the first Leopard Power Cat we built and at 11m (37ft) was built by Glyn Evans, another expat New Zealand boatbuilder. Anyone who knows Glyn would recognise that his natural hand skills in many trade disciplines are second to none, as is his dedication to doing things right. His ability to develop by eye or from a sketch projects as diverse as custom motor bikes, cars and trikes through to tree house bars and other left field projects is amazing and is now what most would call 'old school'. *Paul Robert* is powered by two locally marinised 96hp Nissan diesels, giving the vessel a top speed of 20kts, cruising economically at 15kts, and over the 14 years of time on the water has averaged 25lt per hour in total, which is exceptional for a boat of this size. By keeping the boat minimal but still very nicely fitted out, the combination of lighter weight, narrower waterline and the flat torque curve of the naturally aspirated Nissans made it easier to optimise the propellers design for maximum efficiency right across the rev range.

When I look back on the 27 years I have been developing my displaning hull form, it has become harder to maintain the performance and economy of the earlier boats, because the market demands more luxury and comfort in the same size vessel. It is a tribute to the displaning hull type's unique efficiency when loaded that we are still close to those early boats figures, even on much heavier and therefore wider hulled vessels of the same size today. The temptation as a designer to follow fashion is ever present and can be more financially rewarding, however choosing a path and sticking to it also has its advantages and good design doesn't suddenly become bad design overnight, just because fashions change. By sticking with a hull shape that is recognisably the same from the day I started and only making incremental changes, plus having a steady stream of feedback from the owners on such a variety of sizes and styles based on this hull shape, I have been able to build the type of data base that only comes with experience.

When Malcolm Tennant proclaimed that his CS (canoe stern) hull type was the most efficient hull form, most designers accepted this claim as fact and copied the shape, with some even stating that with tank testing they had proven it was the best. It still bemuses me to this day that no one else asked the critical question: how could Malcolm or other designers know the CS type was more efficient unless it was tested against another hull design like mine of exactly the same length? He and the other designers who blindly followed his lead couldn't, but I do know after discussions with propeller manufacturers, they were prepared to state (without giving away any confidential information) that my designs performance in respect to their propeller calculations were as good if not better than other designers. This information I believe is more important than tank testing as it is correlated from real time testing, not just using resistance curves

Paul Robert undergoing a refurb.

measured in a tank, and takes into account features like the effect sea keeping has on performance and economy. Having compared all the published figures for power catamarans during my career and looked at how other hull shapes have evolved, I believe the best of both my displaning type and Malcolm's CS type are probably similar in their resistance with each type having a small advantage at one end or the other of the speed curve. But having also observed many of the CS type being retro-fitted with side plates on their flat aft area to prevent air being sucked down into the propeller (ventilation or cavitation) I am confident that my displaning type has superior flow characteristics on to the propellers. I've also spoken to a number of professional skippers that have undertaken long voyages in both my boats the CS type as well as other power cats with no keels and am confident that my hull type with its deeper keel aft has superior directional stability in following seas than other types. I believe that the reason the CS type became popular was that it was easier to draw and build, whereas my hull shape with its built down keel requires more skill and a better eye to build as the shape is more complex.

We also are preparing to test the displaning type's versatility even further, along with the ability of our variable dimension moulding system when building cost effective prototypes on the trailerable power cat project we have been working on with Justin Clark. I had planned right from the start to use a moulded section from our topsides for the prototype, however I considered a number of options for the bottom shape. Obviously being outboard powered it didn't need as deep a keel to protect the props, but it would still benefit from having some kind of keel to enhance directional stability and to protect the bottom when running on and off the trailer. After considering the other options I couldn't find any advantages in any of them over a modified version of what I have spent so long developing and so I started to look at how the hydrostatics worked if I used a section of my existing moulded hull shape with the keel reduced in depth. Not only did the numbers work, but it also made the construction a lot simpler and now, we don't have to create another join between the topsides and the bottom. Justin was not planning to fit huge horsepower outboards, so he was more than happy to run with the principles of displaning and as he is already actively involved in R&D projects on a daily basis himself, understood the value when starting a prototype from some already known values. The use of my existing bottom shape instead of the round bilge planing hulls I had been considering required a different topside style to retain headroom aft, however this also worked to our advantage as it simplified the deck construction and allowed us to look at a better way of incorporating a solid cabin top that the hulls and decks could slide under when on the trailer. There is no doubt that this boat is a design challenge on many fronts, which is also why it hasn't been successfully undertaken to date, but to my mind it is no different than when I first designed the Campa Cat in 1992 or the the Scimitar 1010 in 1995, because in both cases, no one had designed anything like them either. This time around the big difference is that Justin has the complimentary skills on the trailer design and construction that I did not have when developing the Campa Cat and being a manufacturing engineer, has had extensive experience with R&D projects with the ability to make whatever metal components are needed.