



SFM 22m Wave-piercing Catamaran Ferry



Design Objectives

1. To design a simple and efficient Fast Ferry with good economy, maneuverability and speed with the versatility to serve various roles.
 2. To achieve 1st. class passenger comfort in all but the roughest of sea conditions.
 3. To minimize environmental damage.
- a. A small vessel with minimal weight will significantly reduce the wash of the vessel. b. A light more efficient vessel will use less power and produce fewer emissions.

Background

University qualifications in Science, Computer Science and Engineering (Naval Architecture) combined with experience in various design offices gives us great confidence in our Ferry Designs. We take great pride in the high level of performance that our designers achieve. We are orientated toward the project goals set in conjunction with both the builder and operator.

Structural design of complex vessels such as 60m Trimarans and 90m Wave Piercing Catamarans have left us with a legacy of design tools and techniques that allows us to quickly optimize our structures and target our project goals.

Tank testing as well as trials analysis of various projects gives us the confidence that we are offering extremely slippery hull shapes to our clients.

Arrangement

- The General Arrangement works around very simple structural concepts. The fin bridge at frame 17 has incredible strength because of its shape and location. Aft the combination of the transverse bulwark and cabin is equally efficient and strong. With the major structural issues of catamaran design well sorted we are free to make other scantlings lighter and more efficient. It also gives those who sail on her confidence in the incredible strength of the design.
- The wheelhouse is placed well forward with its floor is only 250 mm above the fore deck to enhance the sleek styling.
- The Main Saloon features well spaced seating modules with 850 mm pitch and 550 mm width.
- The layout incorporates continuous longitudinal girders on both decks. A very open NO-pillar main cabin is achieved through careful structural design of the roof girders and frames.
- The fore deck access allows passengers safe and easy access to the spectacular views from the fore deck.
- Machinery is kept well aft to keep noise and vibration away from the main cabin. Research into engine mounting, drive train and sound insulation systems will minimize noise and vibration. The generator sets are placed aft of the main engines

Hull Design

This design is a '2 nd Generation WPC'. When compared to older 1st generation designs significant design differences are evident.

The demi-hulls are long with the longitudinal center of buoyancy (lcb) well aft and of minimal wetted surface area. Over the past 9 years we have been developing hull designs in conjunction with Meat Tasmania. The longer hulls give us great improvements in sea keeping and in resistance. The lcb aft allows us to maximize demi-hull length and still achieve level trim for a given General Arrangement incorporating passenger spaces aft for more comfort. Hulls with a more conventional lcb position can achieve slightly better resistance for the same length but the increased length obtained by having the lcb aft more than compensates for this. When it comes to resistance there is no substitute for length in these vessels.

The center bow tunnel shape forward have also undergone significant development. The tunnel height increases as you move forward from frame 16. The center bow has more volume low down through the introduction of a 20° "V" and chine. In smaller waves the center bow stays clear and the wave piercing bows do the work. In larger waves as soon as the center bow touches the water it helps the vessel ride over the offending wave. The increased bow and tunnel heights allow these 2nd generation WPC", to safely cruise smoothly through larger seas without slamming. The topside styling allows us to achieve a sleek low profile despite the significant bow height.

This 22 m WPC maneuvers and handles well in all conditions. It features conventional props with mini skews built from the stem tube. Full skews make vessels too directionally stable and catamarans without skews broach too easily in following seas. With mini skews the boat responds well to helm adjustments and tracks well downwind.

Structure

Simple structures with well-defined load paths are always the lightest and strongest. It is a myth that adding structural weight increases strength. More often than not it creates a weak point around where the weight was added.

Every tonne of weight that the vessel does not carry saves fuel cost. It also enables a smaller main propulsion engine to be chosen which is cheaper to buy and to maintain. By investing design resources into a comprehensive structural design program we can achieve significant weight savings and achieve a stronger boat. By applying our Finite Element Analysis (FEA) methods on these smaller vessels we achieve designs that are both lighter and stronger.

The jaw design on Wave Piercing Catamarans is critical. I generation WPC designs have knuckled jaws with heavy plate inserts. They need to be continually surveyed for fatigue cracks and repaired. The new generation WPC has an organically shaped jaw with minimal stress concentration and therefore is stronger and structurally reliable.

Summary

This design aggressively sets new standards for style, economy and overall efficiency whilst maintaining inherent simplicity.

