

Commentary on the CMAL catamaran from retired naval architect Euan Haig. Through his career, Mr Haig was responsible for managing large parts of vessel procurement for the MOD, overseeing the construction of several series of military ships.

Dear Joe,

You kindly referred CMAL's initial design of a catamaran for the Islay route to me for comment. (11th February)

This is clearly a very first sketch so the level of maturity is low. Ship design is an iterative process in which validity is tested at every stage as the design gathers maturity. A new initial design based on a previous successful build starts with some validity that should improve at every subsequent cycle.

In this case the designer starts from the basis of not having produced a previous design for a catamaran, successful or otherwise. Among other base material he has no measured displacement or weight groups to draw upon for a catamaran design. The CMAL team does not have a record of recent successful design for monohulls - 801/802 have been in build for about seven years, even basin trials have not yet been attempted, and short cables invalidate previous weight and stability predictions. It is difficult to regard CMAL as a successful design house. This initial design for a catamaran starts with low validity.

My general impression is that this early design is very much a catamaranised version of a CalMac monohull. One of the great benefits of a catamaran is that it provides excellent deck area for vehicles in vessel with high stability, intact or damaged. The twin hulls can be designed for minimal resistance with great benefit to engine size, and with great freedom of choice of propulsors.

The vessel's prime purpose is to carry vehicles and passengers yet CMAL's initial design discards these advantages in its prime rôle by using deck width for ancillary compartments, some of which are unnecessary. A lot of volume is given over to crew accommodation and facilities, such as a gym and a laundry. There is no evidence of critical review of requirements or facilities to remove those that do not contribute to the vessel's purpose or utility. That omission is a serious defect of the procurement process as a whole. Opportunities to start with a clean sheet of paper are rare and CMAL is throwing it away.

The hulls' shapes are possibly more resistful than necessary. The operating speed (15.7kt) is at the point in where wave-making resistance starts to dominate skin friction resistance in hulls of this length. It would be worth while to investigate measures to reduce wave-making resistance such as bulbous bows and extending the displacement hull to the Aft Perpendicular instead of a skeg. The addition of displacement forward and aft might enable the hull's beam to be reduced with finer lines, so reducing resistance. There is a kink in the graph of Power vs Speed showing a small negative inflexion at about 15kt. Displacement vessels NEVER have a reduction in resistance hence power as speed increases. Offering such a graph displays that the method of predicting power and speed is defective. A student of Naval Architecture would have to display rapid learning in an early tutorial if he wished to get his degree.

Scottish waters are not the worst in world for severe weather, wind, and sea state but conditions can be bad enough to require ships to be designed for them. This initial design betrays a lack of consideration of these aspects. The route from Kennacraig to Islay is as exposed to rough seas as any sea area in Scotland. PENTALINA's vehicle deck is 4m above LWL and rarely cancels sailings. But the underside of the CMAL vehicle deck is only 1.55m above the Deep WL so slamming will occur often and sea state will often oblige service cancellation. PENTALINA's u/s of vehicle deck is 4m above LWL in a more demanding sea area, in which she is rarely obliged to cancel. The flatness of the structure will not help.

The low height of u/s of vehicle deck above LWL alone makes CMAL's design unfit for purpose and unworthy of development.

As already stated, if a design starts with good data, a good concept and firm attachment to realism then subsequent iterations should increase validity and the evidence of it. CMAL's initial design is not a valid starting point and is unlikely to lead to a successful vessel if developed. Its data is not of a quality that supports comparison with credible designs based on previous designs actually built and in service. The comparison being offered is between an imaginary catamaran whose design has low validity compared with real catamarans you can stand on and take to sea. A pig in a poke.

Yours sincerely,

Euan C M Haig C Eng, FRINA, RCNC