OWN DESIGN AND CONSTRUCTION OF A STEEL HULL UTILITY BAOT FOR OFFSHORE SERVICE

By Capt Ranjith Weerasinghe

At a very young age, perhaps below 10 years, I have seen craftsmen from my neighbouring village of fisher folk turning out wooden canoes out of tree trunks on the road side mainly out of “Mara” trees; a common sight on the roadside. After carefully crafting a smooth canoe, a timber catamaran upper hull is mounted on it. I remember the craftsmen affix hundreds of old one cent coins made of copper on to the boat bottom, which my little village pals explained reverently, were a ritual to protect the boat from evil. Later on, my schooling at Galle made the visits to my village less frequent; and that too during the school holidays, losing sight of these craftsmen. Over the years, I saw less and less of such boat building by the roadside. In recent times, FRP boat building has become common practice, as can be seen along the Sri Lankan coastal belt.

At the age of 12, I made a small wooden boat out of a simple piece of light plank; 6 inches in length and about 2 inches wide. I made a simple propeller out of tin plate and fixed it on to the boat through a ball point pen stern tube, mounted at an angle, through which ran a rubber band for winding the propeller. Another piece of wood stood as a mast on the deck, and one end of the rubber band was held by a winding handle loosely fixed through this mast. By just holding the propeller with one hand and winding the handle, the propeller is ready to unwind as soon as the boat is shipped in the water. There was a little round pond in the compound of my boarding house, the smallness of which forced me to make the boat go around the pond for the available winding, making it necessary to have a turning device. Thus I made a little wooden rudder to hang at the end of the hull by a single nail, which made it possible to turn the rudder to a required angle so that it made a perfect round trip around the pond.

For the 12 year old boy, it was a wonderful creation, which I enjoyed more than anything else at that time. I also learned that changing the angle of the propeller to the horizontal hull plank changed the speed (or the efficiency) of my little boat. So did the changes to the length and breadth of the hulls, which I subsequently tried. I honestly knew nothing technical about propulsion or the steering of boats and ships, but the experiment with my little boat never faded away from my memory. It was only years later when I joined Lanka Kalyani as a Cadet, that for the first time, I came to know a little bit of technical aspects of boats and ships.

Yet, it was only when I was at Royal Melbourne Institute of Technology doing the subject of “Ships Structure and Survey & Engineering” for Masters, that I really did my own study of the basics of Naval Architecture. I came to know the experiments of young William Froud, after whom the Froud’s number is named; to realize the reasons for the various characteristics I experienced with my little boat. All those studies, coupled with my own interests in displacement craft; would have perhaps given my lecturer, the Head of the Marine Department of RMIT ‘some courage’ to appoint me as a teacher of the same subject – for the next four years. Among many things, I learnt that copper cladding of ship’s bottom hulls acted as a protection against marine growth. My village folk’s ritual of fixing one cent copper coins on the boat bottom was a story I used to relate later on as a teacher to both Aussie and foreign marine students of RMIT. Slow release of cupric acid is said to work against the formation of barnacles.

Being in the business of offshore marine service during the last 20 years; with ‘hands on’ experience in managing tugs, barges and supply boat operations in Colombo harbour, supplemented by my own studies over the 15 years of sailing , my childhood passion for making toy boats developed into a keen interest in building a real boat for my own business operation. So, I embarked on the project of building a steel hull boat; a “first” time feat by any mariner or a private company in this country. The commercial aspects dictated the type and details of a boat with higher utility value, for a boat to be employed in the offshore ship service which can be summarized as follows;

1. The Boat to be a multipurpose utility boat used in the offshore services;
    a. Capable of carrying provisions spares, stores, lubes etc., and personnel.
    b. Capable of being used as a small tug for towing and pushing small crafts
    c. Capable of utilizing the boat for hydrographic survey purposes

2. The design and construction of the boat is given due regard to following operational aspects ;
    a. Boat is to be used in open coastal waters from a port, often going alongside both other vessels at anchor and offshore structures
    b. Small enough to be economical in speed and consumption, but big enough and suitably powered for the full load, and stable enough for safe operations in sea conditions prevalent in coastal proximity of ports.
    c. Lower grade manning levels; such as 1 Coxwain and 1 ERA, with totally unmanned machinery room, having all indicators in the wheel house.

We set out in the following chronological order:

1 Identifying the physical dimensions and compartmentation
2 Developing basic Construction Plans and stability considerations
3 Steel Fabrication of the hull and superstructure

4 Complete protective coatings inside and outside
5 Machinery and equipment

The boat is only 26 ft in length with 8 ½ft beam and 5 ½ ft depth; with 4 compartments, namely forepeak, engine room, cargo hold, steering gear compartment. The V shaped bottom Hull is of 6mm MS plates, whilst the super structures are of 4-5mm plates, all chemically pickled to remove mill-scale. Weldable Sigma universal primer is coated before fabrication. The entire boat is protective coated with Sigma recommended paints. The underwater hull is also fitted with Zinc anodes for cathodic protection.

The entire deck edge around the boat is reinforced with U channel to fit in heavy duty rubber fender. The raised foredeck has a 'tug type' bow shape and the balance is a continuous main deck. The cabin -superstructure which is mounted on a deck elevated 15" above the main deck over the E/R length (giving E/R sufficient head room), is divided to have an air conditioned wheel house fwd, with 6 passenger seating capacity and an open jeep type 6 passenger area behind, with a removable canopy. The E/R access hatch is located under the seats in this area on which deck the E/R main lid is bolted on for repair access. The E/R air vents leading to the roof deck are fitted with wind activated turbine vents. Deck fittings include bollards, air vents and railings.

The Cargo hold extending between the E/R aft bulkhead and steering room fwd bulkhead has a 6ft x 5 ½ ft opening and a depth of 5 ft. with heavy wooden flooring at the inner bottom. A heavy duty steel hatch cover provides additional space for deck loads. The area forward, in the hatch under deck, will be utilized for a small deep freezer so that Ship Chandlers can store frozen items in advance, for a timely supply to ships on arrival. Along the length of cargo holds runs two wing tanks, half of which are separated as 1000ltr fuel tanks and the balance remain as reserve buoyancy tanks. All compartments are fully water tight, and the buoyancy provided by any two compartments is sufficient to keep the boat afloat even if others are bilged.

The 120HP Engine is a Detroit Diesel GM 4-71 fully refitted engine, with Twin Disc gear box. A stainless steel propeller shaft and a 4 blade 26" Bronze propeller through heavy duty stern tube with bronze bushing and grease coupling at aft end, and housing for gland packing at fwd end, and a screw down grease pump completes the propulsion arrangement made by us. 24V DC power is supplied by batteries. A 5KW generator coupled to the main engine will power the 220V deep freezer and any other necessary equipment.

Many Japanese automobile parts, which are freely available in the market, are used innovatively and economically. Air conditioning is achieved by an auto air conditioning system installed with an AC compressor coupled to the engine. A 'truck type' dash board with steering column and fully insulated upholstery with adjustable seats gives a utility truck appearance and comforts in the cabin. The hydraulically operated rudder is activated by a hydraulic helm pump, fitted horizontally under the cabin deck, coupled to the vertical steering column, through a direction changing gear box. The electrical controls are just like in a truck, with the same switches around the steering wheel and a dashboard used for navigation lights, deck lights, wiper, horn, windscreen washer, horn etc. The RPM, temperature, oil pressure of the engine and gear box, battery charging, fuel level etc., are also displayed by the indicators built into the dashboard. Two sliding doors, made of stainless steel with sliding windows, are fitted with van door mechanism to fit nicely into the door recess providing access to the cabin from each side.

The pictures show the progress of the building at the time of writing this.