

Design, Construction and Prototype Testing of FRP Boats for Reservoir Fishing

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Scarcity of the traditional boat building material viz, wood forces the designer to find an alternate material for the construction of fishing boats. Fiberglass Reinforced Plastic (FRP) is emerging as a suitable material in this field, especially for small crafts and reservoir boats. The design of a 4.57 m L_{OA} FRP boat was prepared at the Central Institute of Fisheries Technology for gillnet fishing operations in reservoirs. This boat was designed with three seat-cum-buoyancy tanks and a forward chamber. Two rings in the aft and a towing hook in the forward were provided for pulling the boat to the shore. A pair of oar locks were also fitted for rowing the boat. The aft is designed to fit a 15 hp outboard motor. Two numbers of this boat were designed and constructed and the weight of each boat is 220 kg. The hull laminate consists of one layer of CSM300, three layers of CSM450 and one layer of WR 610. The outside hull is applied with a gel coat and colour pigment for getting finer finish. The frames are made of two layers of CSM450 and the frame spacing is 380 mm. The boats powered with 15 hp outboard motors, were tested for performance in the Hirakud reservoir (Burla, Orissa). The boats were found to be watertight, stable, strong and convenient for fishing in reservoirs.

Key words : FRP boats, mould, hull, reservoir fishing, gillnetting, Hirakud reservoir.

Hirakud reservoir in Orissa came into existence by damming the confluence of the rivers Mahanadi and Ib, at Hirakud which is about 20 km from Sambalpur town. These rivers originate from Shihava and Ramgad hills respectively in Raipur Districts in Madhya Pradesh. The catchment area of the two rivers is 31,200 km² in Madhya Pradesh and that above Sambalpur is 20,320 km². The principal tributaries of Mahanadi in Madhya Pradesh are Seonath, Jonk, Hasdo, Ong

and Tel. A number of seasonal rain fed streams locally known as *nullahi* also feed the reservoir, the important ones among them being Ramadega, Badge and Saldhia which empty into the reservoir in the middle reaches. This is the largest reservoir in the country with a shoreline of 643.6 km, but its depth is comparatively less (Khan *et al.*, 1992).

The displaced families in this area due to the construction of the dam have

settled along the banks of the reservoir. Most of the families belong to tribal communities and are mainly engaged in cultivation of land and during the spare time, they carry out fishing. The fishing boats employed are locally known as *dungis* which are plank built canoes made of *rengal* (*Shorea robusta*), 'biga' (*Pterocarpus marsupium*), 'Mohul' (*Madhuca longifolia*), 'Mango' (*Mangifera indica*), etc. Among the most commonly used wood is 'Rengal' or 'Sal'. The dimensions of these crafts range from 5.50 to 9.50 m in length to 0.43 to 1.20 m in breadth. The Burla Research Centre of the Central Institute of Fisheries Technology (CIFT) introduced wooden mechanised boats of 9.10 m length and flat bottom boats of 4.5 m length made of plywood with fiberglass sheathing for conducting experimental fishing.

Materials and methods

The scarcity and increase in the cost of boat building quality wood poses problem for the designer and the builder. Fiberglass reinforced plastic (FRP) emerged as a solution for this problem for all types of small crafts. This material has many advantages such as lightweight, corrosion resistance, longer life, faster construction, low maintenance etc. The cost of a single boat constructed in FRP will be more than that of a comparable size wooden boat. The cost can be reduced and brought down to the level of wooden boat by constructing a minimum of three boats from the same mould. The low maintenance increases the operating period of the FRP boats. Hence a 4.57m L_{OA} FRP boat was designed in CIFT to operate gillnet and long lines in the Hirakud reservoir in Orissa.

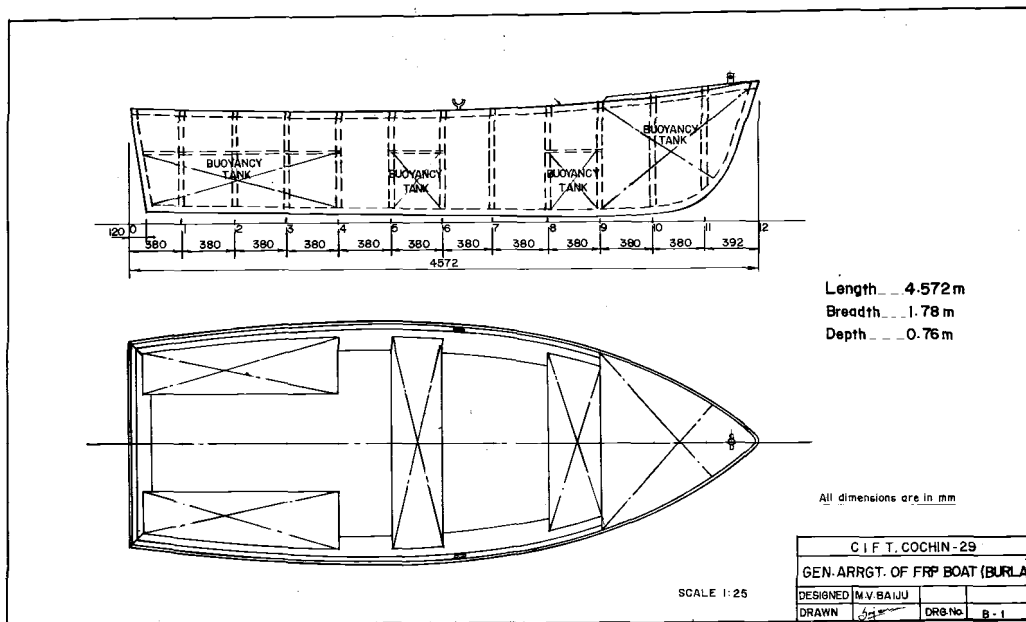


Fig 1 : General arrangements of 4.57 m L_{OA} FRP boat for reservoir fishing.



Fig 2 : Preparation of mould



Fig 3 : Finished hull

The main dimensions of this boat were:

L_{OA} : 4.57 m
Breadth : 1.78 m
Depth : 0.76 m

This is an open boat with a pair of seats in the aft, one in the middle and a short one in the forward. All seats are made watertight buoyancy chambers. The bottom construction is sandwich type to make it very strong and to give a flat

floor. This craft has sufficient space for the storage of gillnet and long lines in the middle. The aft is designed to fit an outboard motor of 15 hp. Two stainless steel rings are provided in the aft and a towing post made in stainless steel in the forward for pulling the boat to the shore and mooring. A pair of oarlocks is provided in the middle. The general arrangement of the boat is shown in Fig. 1

The hull design is made based on Lloyds Register of Shipping (Anon.

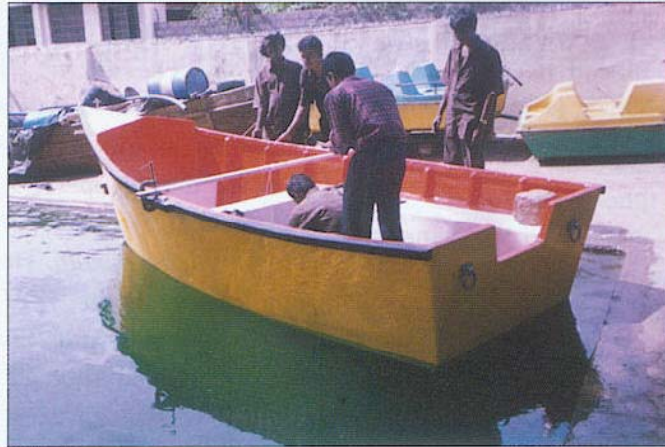


Fig 4 : Stability evaluation in testing tank.



Fig 5 : Gill netting operation in Hirakud reservoir.

1982). The seats and inner partitions are made of marine grade plywood and sheathed in FRP. Two numbers of crafts were constructed from this design. The construction was done using marine grade polyester resin, glass (approved by IRS), marine grade plywood, etc.

The mould of the boat is made in FRP as seen in Fig. 2. The hull lay-up consists of seven layers of fiberglass using WR 610 (Woven Rowing), CSM 300 (Chopped Strand Mat 300) and

CSM450. The weight of the hull bottom laminate is 3320 g.m^{-2} , weight of keel laminate is 6030 g.m^{-2} . The hull is transversely framed at a spacing of 380mm. Hollow top-hat section type frames are made from two layers of CSM450. The forward deck is made of marine grade plywood and laminated with 1950 g.m^{-2} of glass. Marine grade plywood supported with well seasoned hardwood is used for the construction of the seats. All the seats are covered with

two layers of CSM 300 and the top is finished with non-skid material. An all round wooden fender is also provided. Fig. 3 shows the hull moulding process.

The total time taken for the construction of the mould and the complete moulding of the two boat hulls with all fittings was 40 days. M/s Karnataka Boats, Bangalore, undertook the construction. The cost of construction of each boat weighing 220 kg was Rs. 93,250.

Results and discussion

On completion of the construction, both the boats were floated in the testing tank of the boatyard and the water tightness, strength and stability were tested (Fig. 4). The boat was found to be watertight, strong and stable. The 15 hp outboard motor was fitted in the boats

and conducted the trial run in the Hirakud reservoir. The boats were tested for fishing operations by operating monofilament gill net (Fig. 5). The catch obtained during operations consisted of *Eutropiichthys vacha*, *Silonia silondia* and *Mystus seenghala*. The monofilament long-lines caught *Mystus gulio*, *Glossogobius* sp. and *Rita chrysea*. Both the boats proved to be good for reservoir fishing.

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References

- Anon (1982) *Rules and Regulations for the Construction of Yachts and Small Crafts*, Lloyds Register of Shipping, London.
- Khan, A.A., Percy Dawson & Varghese, M.D. (1992) *Fishing in Impounded Waters - A Case Study in Hirakud Reservoir, Orissa*, CIFT, Cochin.