

A NOTE ON THE METHOD OF RECONDITIONING UNSERVICEABLE STEEL OTTER-DOORS WITH FIBREGLASS SHEATHING

"Otter-doors" or "Otter boards" form one of the important fishing gear accessories and are in regular use in all trawling operations. Otter-doors regulate the mouth opening of the trawl net and as such successful trawling operations, to a great extent, depend on their size, weight, shape and behaviour under actual tow. The doors are usually made to calculated weights either of hard-wood with iron frame and fittings or fabricated entirely out of mild-steel plates and rods. While wooden doors suffer heavy damages and natural deterioration due to organic decay, steel doors rapidly wear out due to sea-water corrosion. Deteriorating steel plates not only lose mechanical strength but also get perforated as a result of corrosion and become unfit for any further use unless plates are renewed from time to time. The initial investment on steel otter-doors are considerably high; so also their maintenance as well as subsequent repairs. A pair of otter boards made of 3 mm thick mild steel plates (120 cm × 90 cm × 3 mm of 52 kg; Rs. 500/pair) is estimated to last, under constant use, two fishing seasons of 8 months each.

Considering the present scarcity and restricted supply of mild steel, the high initial investment on the steel otter-doors and their high rates of corrosion under use in a tropical marine environment (6 mils and above per year), a suitable remedial measure has been worked out at the Central Institute of Fisheries Technology which has brought to light the possibility of reconditioning the corroded steel otter-doors with layers of fibreglass reinforced plastics (FRP). Such a procedure adopted and tried under prototype studies has resulted in considerable saving and salvaging of unserviceable steel doors. The versatility of fibreglass sheathing in protecting the wooden hulls of fishing

boats from damages is well known now. (Balasubramanyan, 1967, 1971 a, b)

The following are the specifications for the materials required in connection with the sheathing operations of steel otter doors.

Glass fibre: F 100 Fibreglass ('A' type) chopped strand mat 450 g/m² or 1½ oz/ft²

Thermosetting resin. Isophthalic polyester resin or the general purpose resin.

Accelerator: Cobalt naphthenate or cobalt octoate

Catalyst: Methyl ethyl ketone peroxide

Acetone: for cleansing purposes, paint brushes, plastic containers, pair of tailoring scissors and metal rollers are the other ancillary materials essential during the work. (FRP sheathing involves very delicate handling of chemicals and as such necessary precautions have to be taken strictly as per manufacturer's directions.)

Before actually starting the sheathing work, the total area and shape of the surface have to be detailed out and the chopped strand mat of fibreglass has to be tailored and cut to shape. Polyester resin amounting to about two times the weight of the glass mat may be necessary which in turn has to be activated by adding 1% of Cobalt naphthenate or Cobalt octoate and 1% of Methyl ethyl ketone peroxide which will set to gel within 45 minutes at 30°C and RH 76%. (Balasubramanyan, 1971 c). For easy and convenient handling, mixing of 1 kg lot of resin at a time is recommended which will facilitate working with it for nearly 45 minutes at a stretch without undergoing gelation.

Hand lay-up process was adopted for the sheathing job throughout in the following manner.

- (1) Remove all mil-scale and rust either by sand blasting, mild chipping or wire brushing. If perforated, beat up and level surface.

- (2) Remove oil, grease, moisture, if any, by thorough scrubbing and cleaning with suitable solvents. Keep the surface dry and clean. The proper adhesion of FRP to the metallic surface depends entirely on the surface preparation.
- (3) Perforated areas on the board have to be patched up from both sides using resin-mat resin combination before full sheathing is attempted. This may be done by fixing resin-wetted faces of glass fibre mat together sandwiching the corroded steel plate in between. Allow the patch work to dry.
- (4) The entire area to be sheathed may be fully wetted with a generous coat of activated isophthalic resin or a general purpose gel coat. When the coating is still tacky, lay up the first layer of fibreglass chopped strand mat or fibreglass woven roving that had been cut to size already. Use some more activated resin and with a paint brush and metal roller press the sheathing on the steel surface for obtaining uniform adhesion. All the corners, crevices and bends have to be worked with glass fibre and resin. No metal surface should be left without the sheathing. Avoid air bubbles and void spaces on the sheathing. If they are there, break them up and rebuild those areas and press it down with a roller. When the first layer is tacky but not fully dry, build up the second layer using the mat and resin. If any colour scheme is needed, special quality predispersed colour pigments can be put to use with the finishing top coat. After two weeks of post curing, the boards can be commissioned for use. If the FRP bonding is not uniform and is imperfect, water may get in between the sheathing and the metal through surface cracks and

cause delamination of the sheathing as well as corrosion of the steel plates which has to be carefully looked into.

FRP sheathing not only provides extra strength to the corroded plates but gives them a further lease of active life. The external sheathing is tough, rigid and impervious to the effects of salt water and is unaffected either under constant or intermittent immersion or alternate wetting and drying. The sheathing provides adequate impact resistance but when dragged over coarse sand and hard rocky bed, sign of gradual wearing is possible due to surface abrasion. As long as the inner steel core is not exposed to seawater or external damages, the boards can be put to further use. In case of delamination or surface damages, it is enough that the sheathing is renewed only in the affected areas. Using 2 layers of FRP chopped strand mat as specified above, protection through such a sheathing works to less than Rs. 4/- per square foot besides assuring many years of trouble free rough and tough use out of condemned steel otter boards.

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Central Institute of Fisheries Technology,
 Craft & Gear wing, Cochin-5.

R. BALASUBRAMANYAN.

FISHERY TECHNOLOGY