

## Hull Maintenance of Fishing Boats

Dr. A. G. Gopalakrishna Pillai

Sr. Scientist

The mechanised fishing boats operating in the sea, which is an aggressive environment, need protection against onslaught of marine corrosion, marine fouling and fungal deterioration. The forces that causes deterioration of material are also constantly acting in nature and the main concern is to evolve technically feasible and economically viable methods to arrest them. Apart from the high capital investment on the development and expansion of fishing boats, money and time are spent annually on its proper maintenance so as to obtain a prolonged trouble free life and uninterrupted service from them.

In the tropical waters of India, the damages caused by marine borers and foulers, to the unprotected wooden hulls of fishing boats are very high. Marine fouling organisms settling in large numbers on the underwater portion of the hull increase the frictional resistance with a constant reduction in the normal speed of the vessel. Marine borers attack the unprotected wooden planks of the hull by boring deep into them and weakening them. Biological deterioration or degradation of wood of the boat is caused by wood inhabiting fungi. Wood decaying due to fungus infection will gradually become soft, light, spongy, inflammable and emit a mucky and unpleasant odour. Many protective measures to ward off or to minimise this menace are highlighted here as a result of the research and development work of the Institute.

Fungal decay of wood can be prevented by using decay resistant heartwood for construction and avoiding sapwood. Seasoned wood also are to be used. Infected wood should be avoided in construction. All water should be kept out and all the seams are to be well caulked. Painting in bolt holes and in seams before they are caulked is helpful. Painting inside the hull planks may be avoided, allowing the

hull planks to breathe. Suitable commercial wood preservation like pentachlorophnol (5%), CCA (7 1/2%) Pentaphene tar (2 brush coat), Arsenical creosote or Copper creosote (2 brush coat) may be used at the time of construction and repeated periodically while in use. While employing these preservatives, the manufacturers instructions should be followed.

Marine fouling and marine corrosion on fishing boats are two economically important problem. Copper, the toxic heavy metal is used in the form of cold rolled sheet for the protection of wooden hull against foulers and borers, very effectively. The indigenous resources of copper being very much limited and the cost being very high, Central Institute of Fisheries Technology has introduced aluminium alloy sheets (2 - 5% magnesium) in place of copper sheets for sheathing the wooden structure.

The unprotected metallic sheathing will wear out rapidly due to marine corrosion. Hull sheathing is prone to quick damage due to abrasion and running on the ground. The fishing boats should be hauled ashore atleast once in a year for purposes of probable repairs, renewals and maintenance. Under monsoon weather conditions, fishing is mostly irregular and suspended. This time is most suitable for boat owners to attend the maintenance of the boat hull, machinery and fishing gear so that the boat is brought to thoroughly good condition. It is also not possible to check and attend to the underwater hull repair when the boat is a float. The recommended maintenance schedule to fishing boat is as follows:

#### **1. Hull below water line.**

Always use suitable rail and trolley system for hauling the boat ashore for annual repairs. Before hauling is attempted, make the boat as light and safe as possible by removing mast, derricks and other heavy items. The tank may be emptied.

2. Once the boat is on shore, make it sit on perfect and strong chokes and supports.
3. The boat should be kept off the ground sufficiently high to permit free air movement underneath as well as in and around. The boat should also be protected against direct sun and rain.
4. Remove all marine fouling organisms settled on the hull by applying a jet stream of water through a hose. A sharp metal scraper can be used when the fouling complex is still wet. Once they dry up, it is rather difficult to scrap them off the hull.
5. Examine the hull sheathing (copper, or aluminium or fibre glass) particularly at the stem, bilge area, keel and rudder. If the hull has been leaking before, the sheathing has to be removed at such places. The seams and joints have to be recaulked and properly filled with "white- putty" if found necessary. If there is any marine-borer holes on the hull planking below water line, fill them with suitable wooden plugs or any good standard seaming compound. If the damages are great, it is advisable to replace such wooden members in full without fail.

If the caulking material has been eaten away at the seams of the hull planks, better renew them in the conventional manner using treated cotton threads and fill up with suitable seaming compound like "White putty" or CNSL (Cashew nuts shell liquid) resin or chandrus - chalk- fish oil combination or special polyester seaming compound.

Before the hull sheathing is replaced or renewed, the surface should receive generous coat of thick coal tar or its derivatives like creosote oil. In between the coated wooden hull and the metal sheathing a thick layer of lining or insulation of tar-felt underlay is recommended. The metal sheathing (copper or aluminium

alloy) of a recommended standard in suitable lengths will have to be firmly fixed on to the hull over the insulation. Only recommended type and quality of metal fastenings have to be used. It is essential not to allow any voids in between the sheathing and the insulation. Adequate over-lapping is essential. The sheathing should be extended 15 to 22 cm. above the fully loaded water line, both forward and aft. For copper sheathing work, use only copper tacks, but not any other metal fastenings like iron, galvanised iron or aluminium. It is recommended to use 20 SWG or 22 SWG aluminium magnesium alloy of zero temper, 1/4 hardness with 2 to 5% magnesium (Aluminium M 57S or HAL 5052 or HAL 5088). For aluminium hull sheathing use exclusively aluminium - alloy tacks. Aluminium - tacks are considered to be the best for permanently fixing the sheets to the hull. But if aluminium tacks are not available, aluminium wood screws can also be used. For fixing aluminium wood screws predrilling is necessary. Care should be taken to use the drill bits of proper diameter. The screws may break if the predrilled holes are small and the screw will not hold if the holes are big. Utmost care should be taken to see that the depth of the countersinking does not exceed a particular limit. If it is too much the sheathing may come off over the screw heads. The screws should be fixed 3" apart both horizontally and vertically. In no case copper, brass or metallic fastenings other than aluminium should be used.

## 6. Anodes

Use electrolytic zinc of purity 99.95% conforming the IS:209 or tertiary aluminium anode free from mercury. It is important that zinc should be free from iron. Care should be taken to fix the anodes as per recommended procedures.

## 7. Paints and Painting Schedule

### I) Etching primer

The etching primer may be single pack or double pack. The two pack components supplied in separate containers are to be mixed as per the ratio prescribed by the

manufacturers just prior to use. The mixed material is to be used immediately as the pot life is only 1 & 1/2 - 2 hours. This primer is only for new aluminium surfaces.

ii) Zinc chromate

This is an excellent corrosion inhibiting primer, specially recommended for aluminium surfaces. The primer hard dries in 12 hours

iii) Antifouling paint

This is a toxic paint, the effectiveness of which is normally 9 - 12 months.

iv) Painting schedule:

Apply one coat of wash primer/etch primer if the aluminium is new one. Otherwise sander the surfaces of the aluminium sheet so as to remove the sharp and rough edges of screw heads and to provide a rough surface to hold the paint and give a coat of etching primer. Steel wire brushing is not recommended. Then apply two coats of zinc chromate primer and allow to dry. This is for the prevention of corrosion. Over this apply a coat of antifouling paint for prevention of fouling. The antifouling paint should be applied 6 to 12 hours before launching of the boat. Do not apply antifouling paint directly on the aluminium surface.

In order to enhance the corrosion resistance of the inside surface of the aluminium sheathing, it is necessary to paint both sides of the aluminium sheathing. The used coating of etching wash primer followed by two coats of zinc chromate primer should be given to the inside surface also as is being done on the outside surface. Antifouling paint is to be given on the outside surface that comes in contact with seawater.

If proper painting schedule is adopted and the anodes are installed, there can not be any adverse effects in the regions of the hull where different metals come in close proximity. Annual dry docking, cleaning and painting of the underwater surfaces should be strictly observed.

### **Hull above water**

Scrape off all old paint on the outside hull, thoroughly clean and allow it to dry. Renewed planks, etc. should receive one or two coats of good quality primer. When the paint become tack-free and dry give two coats of good enamel paint of any desired colour. It is advisable not to resort to any painting inside the hull as it would slow down the drying of the wet wood particularly at the bilges, frames etc. The inside of the hull should receive copious flow of fresh air through ventilators and deck cowls. Periodical application of commercial fungicides in the inside of the hull will protect the wood from fungus.

Fish hold must be clean, dry and free from any contamination. The hold must be maintained in a most hygienic condition with the frequent application of recommended disinfectants.

Leaky decks are also responsible for the rapid deterioration of the internal timber structure. Check the deck plank, caulking compound etc and renew it if necessary.

### **Machinery**

The main engine, gear, dynamo, battery, water pumps, fuel pumps and lighting system should all be in a perfect condition.

All ferrous structures should be thoroughly chipped, brushed and cleaned to remove rust and mild scale. Apply rust inhibitive primers like coal tar, zinc chromate etc and over them good quality finishing paints. Painting should be done at regular interval to control corrosion. Special care should be given to freshwater tanks and fuel oil tanks.

Check all the fastenings and all assembly points for slackness and corrosion. Highly corroded fastenings should be replaced. Bimetallic contacts have to be carefully avoided through proper insulation and painting.

Quadrant, rudder assembly, connecting chains, steering wheels etc have to be checked and should be in order. Engine alignment and gear have to be checked immediately after launching.

Cathodic protection through sacrificial anodes installed on the hull at appropriate places can check galvanic corrosion. Over protection through excess of anodes and their improper installation are always harmful.

### **Miscellaneous**

All life saving appliances of approved standards specified by mercantile Marine Department are made available on board. First aid kit is a must on board. Crew members should be competent as per norms. The vessel should have proper insurance coverage and should possess valid license for operation from respective Port or Harbour.