The FAO 6.2 meter V-Bottom Boat: Construction, Operation, and Applicability to Fishery Development

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ABSTRACT

The United Nations Food and Agriculture Organization's (FAO) 6.2 m inboard powered boat was constructed in marine plywood according to directions provided with the design. An 8 bhp single cylinder marine diesel engine (Yanmar model 1GM10; propeller: 3 blade, 36.6 cm diameter, 25.4 cm pitch) was installed in the completed hull. Sea trials were conducted in Rhode Island Sound, USA. The building instructions were followed initially; as hull construction proceeded we departed from recommended procedures. More "traditional" approaches to marine plywood, small boat construction would have produced a hull in a shorter period of time. Various difficulties were encountered; the most significant were that (a) the lines provided by FAO yield a hull which is difficult to plate and (b), after powering, the completed boat required ballast forward to bring the vessel down to the designed water line. The completed boat proved lively but sea-kindly and economical to operate. At a 6 kt cruising speed, under "good to average" sea surface conditions, fuel consumption was 1.2 l/hr. This type boat is probably best suited to trolling, line fishing, or trap fishing on a small scale. The difficulties of introducing a small, fuel-efficient inboard craft, such as the FAO 6.2 m design, into a fishery development setting are discussed.

KEYWORDS: boat, FAO, technology, small-scale, fishing

INTRODUCTION

In 1974 the Food and Agriculture Organization of the United Nations (FAO) published a portfolio of small V-bottom fishing boat designs suitable for plank-on-frame or plywood construction (Gulbrandsen, 1974). The FAO portfolio included detailed building instructions. We built and powered one of the designs, the 6.2 m boat, in order to evaluate FAO's procedures and the in-water performance of the vessel. In this article we summarize our experience with the construction, powering, and in-water evaluation, and we present some impressions of appropriate marine technology development issues which have derived from our experience. Design and construction particulars are presented elsewhere; in addition to a construction procedure, the FAO design portfolio (Gulbrandsen, 1974) provides materials lists, dimensions (offsets), and powering suggestions. An illustrated description of the hull construction in marine plywood and a lines drawing are presented elsewhere (Recksiek, 1985; on request from the first author).

CONSTRUCTION

We elected to build the 6.2 m V-bottom boat hull using plywood planking according to FAO instructions. Epoxy resin (Gougeon Brothers, 1979) was used to seal and fasten the hull since a serviceable, low maintenance vessel was desired upon completion of the project.

The FAO instructions differed from "traditional" (*e.g.*, Witt and Hankinson, 1978; Chapelle, 1969; Soucher, 1974) plywood boat construction in a few respects. Presumably this was to make the construction easier. Traditional plywood construction more or less follows the following sequence:

1. assemble permanent frames, stem, and transom;
2. set up frames, stem, and transom on a leveled strongback and fair as necessary;
3. attach chines, sheer clamps, intermediate longitudinals, and keelson, fairing all as necessary;
4. plate the faired structure.

The FAO sequence called for setting up half the frames, applying longitudinal members, and then completing the framing by inserting intermediate frames. We followed the FAO instructions, but we found that following them added much extra work (because the longitudinals did not "lie flat" to accommodate a straight frame member).

After the hull was framed and faired, the side plating was attached; the pieces were butted together, and butt blocks were used. The bottom was impossible to plate using sheets. Compound bends existed in the bow so the hull had to be "planked" in a more or less traditional manner (using plywood cut in strips). The plywood "planks" were scarphed together for added strength. Thus the hull bottom forward should be redesigned so as to accept plywood (or, sheet plywood should not be used to plate the hull as it is presently designed).

After plating the hull, we essentially abandoned the FAO instructions and followed our instincts or "traditional" guides (Witt and Hankinson, 1978; Chapelle, 1969; Soucher, 1974). We fabricated the deadwood with a hole for the propeller shaft already in place (so we did not have to bore one). Installation of engine beds, floor boards, foredeck, afterdeck, rudder, etc. was according to contemporary practice.

In the completed hull, we installed an 8 bhp Yanmar™ (model 1GM10) single cylinder diesel engine connected to a three-blade, 36.6 cm diameter, 25.4 cm pitch propeller. When launched, the vessel, with power plant aboard floated above her designed water line forward; 70 kg ballast seemed to be the approximate amount required to lower the bow. At a 6 kt cruising speed, fuel consumption is 1.2 l/hr under "good to average" sea conditions.

We completed the FAO 6.2 m V-bottom boat as a sport fisherman. The vessel is comfortable and sea-kindly under a variety of conditions, and performance is what one would expect for a displacement hull of this general type. The boat rides a mooring well without shearing about in heavy winds. We emphasize that our experience with this vessel so far has been favorable based upon operations in the waters of Narragansett Bay, Rhode Island and in the coastal waters of Rhode Island Sound; we have no information on how this vessel may perform under "extreme" conditions. We have not loaded this vessel as it might be with pots or fish in a commercial setting.

APPLICABILITY TO FISHERY DEVELOPMENT

This design appears to satisfy requirements for a fuel-efficient, small fishing boat required to operate under a variety of sea conditions. It is not suitable for beaching or operations in shoal waters. Since the hull has considerable dead rise and flare in the sides, it probably does not have enough initial stability to be an efficient trawler; large fish pots would be more easily handled on a vessel with more initial stability. For the same reason, it would not be a good boat for supporting diving. The hull should be suitable for line fishing (hand line and long line), slow trolling, or trap fishing on a small scale; gillnetting should be workable in some fisheries.

While this vessel was probably designed for a small scale fishery development setting, we urge prospective builders to proceed cautiously. In our experience, the published building instructions, when followed to the letter, required more work than would have other methods. The hull is difficult to plate with plywood as it is designed, and ballast is required. We realized that few small scale fishery settings exist where wood/epoxy construction would be economically sound, but because of the plating problems, it would have been quite difficult to get as strong a hull without the resins. Since the diesel engine represents an expensive, imported component, perhaps building the hull using (imported) C-flex™ fiberglass reinforced plastic (FRP) construction technology or some similar "one-off" FRP technique would be cost effective in certain situations.

In view of the sudden rise in the price of fuel, this vessel and others like it at least provide an alternative to the ubiquitous but fuel hungry outboard. However, introducing new vessels into fishery development settings is complex. Introducing a power boat into some fisheries may simply tend to deplete local stocks (Vivekanandan, 1990; Johannes, 1984). For that matter, introducing any new vessel into a small scale fishery setting is no guarantee that local fishermen will accept it, even though the design may offer considerable advantages (apparent to the outsider; Cook, 1988). Gillet (1985), in *Small Is Difficult*, writes of the difficulties and subtleties of bringing boatbuilding ideas from the United Kingdom to South India. We can only conclude that identifying a setting where the FAO 6.2 m V-bottom boat would be "appropriate" is far from simple, yet accumulating experience with construction and performance is probably a useful exercise in deciding what may or may not work elsewhere in practice.

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