Small Fishing Boats for Areas Without Harbors

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If it were not for the tremendous advances tried and implemented by the aircraft industry over the decades, most of us would still be at home and our gracious hosts would be wistfully looking out over the waters from Cartagena. However, the aircraft industry tried and accepted new ideas and rejected old rules for the benefit of us all, and my intent here is to present something new to the fishing industry for the benefit of local fishermen and especially for those who live far away from cities and ports. I hope my ideas are heard with open minds, and are given a fair chance.

As fishing becomes a major source of protein and food, all aspects of fishing are becoming important. Most modern technology has been centered around larger vessels or areas with excellent shore-support facilities. We need only to point to the super sophisticated tuna seiners and compare them to local small boats to realize the vast gap existing within the industry. Yet there is readily available modern technology which can be used to upgrade small coastal fisheries.

Reports, some factual and some questionable, state that the effect of fishing on certain species in the open seas has depleted these stocks to dangerous levels. This has undoubtedly had much to do with the 200-mile conservation zone so many nations have established to protect the resources adjacent to their lands and to reserve these resources for their own people. There are programs underway to add to fishing fleets, such as those in the Dominican Republic, Panama, and Costa Rica, but little has been done to improve boat designs and equipment used by these boats, especially where they are to be used independent of shore-support facilities. This will change if open-sea species have been depleted to uneconomical numbers forcing a greater effort to be devoted to developing coastal fisheries everywhere.

We can seek out all kinds of reasons why this has not been done in the past, but rather than dwell on things which cannot be changed, my aim is to try to show what can be done to improve fishing in areas without supporting shore facilities or secure harbors. Fishing must be done by the local fishermen, and I can only offer ideas which will make their efforts simpler and more effective. In addition to new technology for boats, it is equally important to develop simple methods to preserve the catch, especially for warm, tropical waters.

One of the most important aspects to remember in upgrading tropical fisheries is that fishermen in remote areas are not familiar with modern machinery, gear, or equipment. Thus the total concept must be designed to be "idiot proof." While this may not sound "nice," it is not intended as an insult, nor to imply that the users are not intelligent. It just means that the whole must be made as failure-proof as humanly possible. We have seen too many bad examples

not to realize this is an absolute must if any effort in this direction is to have lasting benefit to the fishermen and their countries.

Simplicity and efficiency are the two most important facets to consider when no repairman can be called on the telephone. Thus the total concept must be considered from an autonomous angle, yet it must be acceptable from a direct practical point of view by the local fishermen as well as the government policy planners and economists who are usually far away from where the fishing activity is taking place. This may not be easy to do, but I will try it anyway.

The first step here is to persuade designers and builders to set aside their old and preconceived ideas. Just because something has been done in some manner before, does not mean it cannot be improved upon. As in the aircraft industry, we must advance on all fronts. When we attempt to design new boats with new concepts for largely uneducated and untrained people, the designs themselves must fulfill a host of requirements. They are all equally important because one weak point will destroy the whole concept we try to achieve. These requirements include safety, economy, practicality, handling ease, reliability, simple maintenance, and somehow we must also be able to produce boats which instill confidence in the users. In many small boats I have seen signs reading, "Oh God, thy Sea is so Big and my Boat is so Small." Without a boat which instills confidence we have nothing. In addition to all this, we must solve the problem of preventing the catch from spoiling. It all sounds like a formidable, even impossible task, yet with confidence, and by gathering existing data and technologies we can provide design of relative simplicity and efficiency with acceptable economic costs.

Unfortunately my profession, perhaps due to lack of any economic incentives, has not given this the input it has so generously given larger vessels. Fortunately I have visited many small fishing villages, most recently on the totally harborless Michoacan, Mexican Pacific coast. When there, I could observe the toil in handling small boats, hauling them onto the beaches, then back into the water, all at extreme effort. Sometimes the lack of manpower failed to save boats from being damaged or destroyed by nature's whims. Due to poor selection of motors and equipment, many boats were idle since the area lacked all shore service facilities. I am thankful to have been there and seen the problems firsthand, because without recognizing them clearly it would be impossible to solve them.

Most people seem to think that safety at sea comes with the size of the boat; the bigger it is, the safer it is supposed to be. This is not true because marine history has shown that even large ships often sink in storms where small boats have reached harbors in safety. And boats for harborless areas must, out of necessity, be small enough to be handled by local fishermen and their crews, especially for hauling them to safety before impending storms or for other reasons. In the past this has limited the boat sizes to approximately 6 m (20 feet) in length, but modern technologies can easily increase this to upwards of 9 m (30 ft).

We can learn from history. About 25 years FAO undertook a program in India to build fairly large wooden boats capable of using their own power to be hauled ashore, to unload catches and for safety reasons. The concept included an

anchored buoy off shore to which a cable was attached which in turn was anchored ashore. A returning fishing boat would lift this cable aboard, place it over rollers in such a way as to lead it to a gypsy mounted on the crankshaft of the engine. Special "landing wheels," two forward and two aft, were lowered with levers, and the boat's motor would then haul the boat ashore.

Whether this program was ever implemented I do not know, but with modern materials and hydraulics, such a task would be far easier today, and we can readily improve upon it. I will show how it can be done practically.

Fiberglass or reinforced plastic is perhaps the most suitable material today for small boats. We must remember that fiberglass in many respects is far more fragile than wood, and the molded hulls should be properly protected where they are subject to abrasion. If constructed properly, however, we can produce long lasting minimum maintenance boats. In addition we must remember that no excessive skills are needed to repair fiberglass boats should they require this due to an accident or long wear. The main advantages of fiberglass is that we are not bound to conventional shapes as are required with wood, plywood, steel, or aluminum, especially with economy in mind. It is very unfortunate that designers have not taken advantage of this flexibility, producing instead rather conventional hull forms with the relatively new material.

The design I visualize to solve the problems will take full advantage of this flexibility. While the 0.66 forward section of the hull is fairly conventional, the aft 0.33 differs radically from that which we have been accustomed to. On each side aft I have designed two husky-shaped skegs with a tunnel effect amidships (Fig. 1). Each of the skegs as well as the forward part of the keel on center would then be fitted with molded-in wheels to allow the boat to be rolled up on the beach with minimum effort, and with very little abrasion to the hull.

The wheels, fitted with recreational-type tread tires so as not to sink into the sand or mud, are abundantly and readily available. To avoid corrosion, the hubs could be made of fiberglass and tires filled with foam to eliminate the need for air. The tires would extend just a little under the keel and skegs and would thus not affect the performance detrimentally. Smaller boats could use golf cart tires to fit the size and weight of the boat. Such tires are now made in almost any size desired.

Small boats could easily be pulled ashore and launched by the crew in this manner, but the larger boats may need donkeys, burros, or tractors. Then, if the fishing boat is fitted with hydraulic fishing equipment, a simple three-way valve could divert the power to hydraulic motors fitted to the wheels and even fairly large boats could thus be "driven" up on the beaches using their own power (Fig. 1). Since the wheel housings would be molded as integral parts of the hulls, they would easily be kept watertight and would actually strengthen the overall molded shapes.

I recommend such boats be fitted with air-cooled diesels, in the larger sizes when over 7 m (23 ft), located about midships, fitted with short propeller shafts and with the propeller located between the skegs for full protection when beaching. The rudder would best be hung on the transom for easy removal and repair, requiring no costly stuffing boxes or so-called "dry-pipes." In this manner the boats could be hauled ashore stern first, ready for speedy launching.

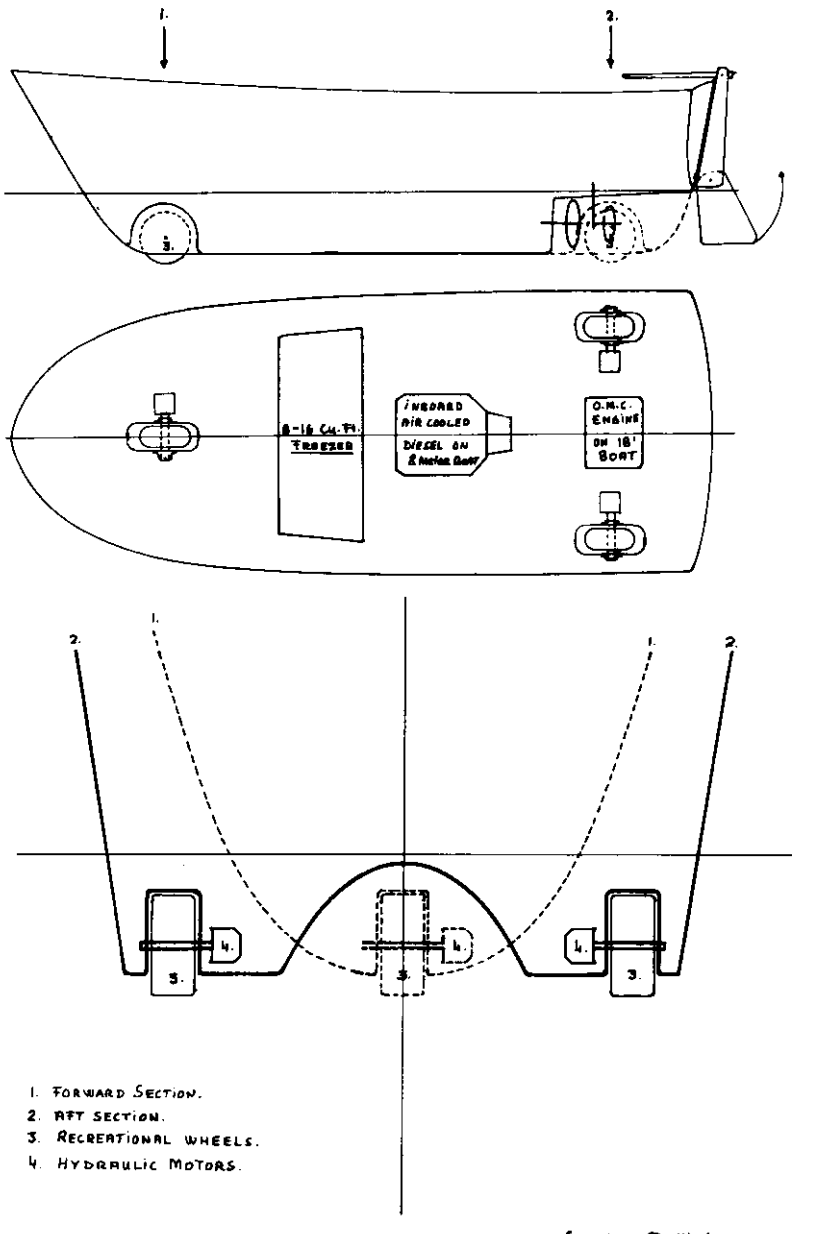

Figure 1. Lucander tunnel – hull design (upper figure: cross section; lower figure: plane view).

Smaller boats could be powered with the Outboard Marine Corporation's new S-Drive system which recently has been quite successfully used on small sailboats and cruisers. This new engine system would be far better, in my opinion, for commercial use than conventional outboard motors.

The twin-aft skeg design has added advantages in that it increases the boat's stability by trapping water between the skegs; therefore it enhances the fishing effectiveness and instills a sense of security for the crew. In addition, the skegs will add to the directional stability, keeping the boat on course even in a choppy following sea, thus minimizing broaching hazards. It thus becomes clear that in adopting, new, perhaps unconventional hull forms, we have in effect met the majority of the criteria set forth above. The twin-skeg three-point system has already been accepted for larger boats, both in the fishing and pleasure craft industries. One final advantage is that transportation on trucks, rail cars, or ship decks will be simple and require no special cradle supports.

This, in my opinion, solves most of the problems associated with the boat's safety, economy, practicality, handling ease, reliability, simple maintenance, and confidence by the users.

Hydraulic fishing equipment is now becoming more and more available even for small boats. Not long ago, I was part of a design effort for a combination gypsy and line puller for 8.8-m fishing boat now being built for the Dominican Republic. This system incorporates a so-called "power pack" which includes the hydraulic pump, liquid tank, control gauges, and filter, all in one fully self-contained package which enhances the installation while it virtually eliminates maintenance and is thus perfectly suitable for the types of fishing intended by the small boats. The same basic system can be used for all kinds of small boat fishing and is a very economical package, and; of course, this basic system could also be used to power the wheels of this type boat, thus working two ways without duplication of equipment and costs.

Finally, and I am sure this news will be welcome, I think I have a low cost and practical solution to the perennial problem of holding the catches against spoilage in areas without shoreside ice plants and freezers. This technology has been here for years, and I have known about it for years, but have never before thought about it in connection with small fishing boats.

Small sailboats and pleasure cruisers have always had the problem of keeping food in good condition. A relatively small American company, Adler and Barbour Services, Inc., has for over 20 years sold thousands of refrigeration/freezer units to the owners of small pleasure boats, and the same standard production units can readily be used on the small fishing boats we have discussed above.

The Adler and Barbour system uses a small engine belt-driven compressor which freezes a special brine solution in so-called hold-over eutetic boxes located in an insulated food compartment. A small 2 hp unit run for just 1.25 hr daily supplies enough "cold" to keep a 5 cu ft refrigerator and a 5 cu ft freezer for 24 hr. The same unit run just 0.75 hr can keep a 10 cu ft refrigerator cold for 24 hr. If fitted with several hold-over boxes and run continuously, Adler and Barbour's standard production units can keep seafood from spoiling for several days on small fishing boats with insulated holds.

The interesting part of this is that the cost for a complete self-contained system is lower than any other system known to me. These systems come fully ready for installation, are pre-charged and require minimum maintenance, just like the hydraulic "power pack" discussed earlier. After all, we have to remember that the average owner of a small sailboat knows as little about refrigeration as does a fisherman someplace on a remote coast. Thus, in both instances of auxiliary equipment, the words "idiot proof" come out again.

I believe I have covered the general aspects of small fishing boats for harborless areas. I thank you for this opportunity to present my ideas for the benefit of coastal fisheries.