

FRP boat boom in Tamil Nadu, India

Boatyards in Tamil Nadu, India, are humming with activity. The magic word in fisheries along the Coromandel coast today is FRP or fiberglass reinforced plastic. Kattumarams in FRP are fast-replacing the wooden versions which have dotted the coastline for centuries.

Kattumarams and vallams (canoes) have long been the backbone of traditional fisheries in the state. The kattumaram (“logs bound together” in Tamil) is made up of 5 to 7 logs of *Albizia* wood with tapering ends and tied together. Vallams are dugout boats often constructed with planks stitched to the sides. Both are ideal for the surf-beaten east coast of India. Centuries of evolution had led to craft considered near- perfect for their cost.

The 1980s saw a new trend – motorization of traditional craft – prompted by liberalization of imports and subsidies to promote marine fisheries. Dwindling fish catches in near-shore waters also made traditional crafts venture farther out. Result: kattumarams and canoes were fitted with outboard motors (OBM). Initially, OBMs were considered a boon for these primitive contraptions. But a mismatch between the kattumaram and the motor made fishers look for new hull material. The vibrations of the outboard motor impacted the wooden logs of the kattumaram – they often cracked and broke.

Around this time, Kerala fishermen were taking to FRP as a hull material. The sturdiness of FRP, and the lightness and speed of FRP boats, catalysed a switchover from wooden craft to FRP kattumarams and canoes in Kerala. Tamil Nadu fishermen too were finding wood problematic. Competition for wood from other industries, and deforestation – which led to

shortages and price escalation – made traditional crafts too expensive. Construction of new wooden kattumarams and vallams, and replacement of old vessels, was becoming increasingly difficult. The wood-FRP transition took place in Tamil Nadu almost a decade after that in Kerala.

By the mid-‘90s, FRP fishing boats had gained ground in Tamil Nadu. Many boatyards sprung up to produce kattumarams and canoes in FRP. Some statistics indicate that by 2004 about 70-75 per cent of the wooden kattumaram fleet in Tamil Nadu had been replaced by FRP.

What is FRP?

Fiberglass is made from extremely fine glass fibers. It is used as a reinforcing agent for many plastic products, the resulting composite material known as glass-reinforced plastic or fiber-reinforced plastic (FRP). It is popularly known just as fiberglass. By changing the chemical composition of the resins and by varying the reinforcements, one may change the properties of finished FRP to suit different applications.

FAO Fisheries Technical Paper 321 provides basic information and guidelines on FRP and its limitations in boat-building. It goes into some detail on the design, construction and planning of FRP boats.

Resins used in FRP

Polyester, epoxy and to a lesser extent vinyl resins are commonly used as the bases for resin systems in FRP composites. Both are essentially thermosetting resins with several advantages:

- (a) Relatively high strength/ weight ratio and rigidity as well as good electrical and thermal properties;
- (b) Virtually unlimited moulding sizes;
- (c) Ease of fabrication using a wide range of manufacturing techniques;
- (d) Low capital outlay, particularly for hand layout;
- (e) Possibility of one-off or few-off mouldings at reasonable cost;
- (f) Design versatility that allows combination with other materials, such as foams for buoyancy;
- (g) Resistance to a number of environmental influences, including water absorption, attack by a wide

Typical scene in an FRP boatyard today.



A day in a FRP boatyard

Kanathur lies on the outskirts of Chennai, facing the Bay of Bengal. Once a fishing hamlet, it is today a satellite township of Chennai. Son India is one of the most progressive FRP boatyards of Kanathur. Started in May 1992 with about 40 workers, the boatyard has so far produced more than 2 000 boats. They have been supplied to government agencies, fishermen and NGOs. The yard's production capacity is about 25 boats/ month.

The yard has four FRP and two stainless steel moulds, all designed by the yard. Their quality has improved with experience. During the last decade, the material for the mould has changed from wood to cement to FRP and steel.

The traditional fishing boats most in demand at the yard have the following dimensions:

Model 1: Length 18 - 27 ft, breadth 6.5 ft, height 2.5 ft.

Model 2: Length 26 - 32 ft, breadth 6 ft, height 3 - 3.5 ft.

The materials used to construct FRP boats include mat (including surface mat), roving (including woven roving), resins, catalyst (methyl ethyl ketone), accelerator (for gelling), pigments, acetone (for washing hands and brushes), filler material, wax (for surface polishing), modelling clay, releasing agent (poly vinyl alcohol), brushes and polyurethane foam.

Raw material for constructing the FRP boats is procured from shops in Chennai. As a standard norm, 3.8 kg of FRP material per sq. ft. is used. The approximate cost of construction of a 27 ft boat is estimated at Rs 65 000 (approx. US \$ 1 450). The expenditure on materials and labour is as follows:

Mat-23.0%, resin-31.5%, pigment-2.5%, gelcoat-5.5%, foam-10.5%, accessories-11.5%, labour-15.5%.

The boatyard increased its production capacity to about 45 boats/ month after the 26 December 2004 tsunami. Many old hands were recalled to assist the yard in meeting orders. A number of FRP boats damaged by the tsunami also came to the yard for repair. A couple of additional moulds were prepared to meet the demand.

Mr P Gandhirajan, proprietor of Son India and a pioneer in the manufacture of FRP boats in Tamil Nadu, says that at present there are no standard designs or norms for FRP boats and no mechanism for certification of FRP boatyards. Inexperienced

Mr P Gandhirajan of Son India Boatyard in Kanathur (right). FRP moulds of the boat yard, below – exterior and interior views.



people set up boatyards. What they turn out is, boats poor in design and quality and unsafe as well, giving FRP boatyards a bad name. He urges a regular monitoring and quality control mechanism to maintain the standard of these boats.

He adds that boatyards like his need training and skill upgradation, particularly in layering, application of resin, gel coating and foam preparation. He also calls for strong R & D inputs into the FRP boat industry.

range of chemicals, weathering and UV exposure;

(h) Virtually unlimited possibilities for surface finishing, including colouring to give a maintenance-free finish;

(i) Tolerance of a wide range of additives, including fire retardants.

FRP fishing boats have the following advantages and disadvantages:

Advantages

- Do not absorb water, hence no change in buoyancy.
- Light in weight, easy to handle, excellent surf-riding capacity, less energy required for navigation.
- Waterproof, non-corrosive, do not need drying.



Establishment of FRP boat-building units in Tamil Nadu

Districts	Number of FRP Units	
	Before Tsunami	After Tsunami
Chennai	-	2
Kanchipuram	2	5
Villupuram	5	5
Cuddalore	2	3
Nagapattinam	1	3
Kanyakumari	2	5
Tirunelveli	0	2
Pondicherry	1	2
Total	13	37

- Score over wooden crafts in durability, speed, loading capacity and maintenance.
- Raw material easily available, a good substitute for wood.
- Stronger than wood, more elegant and better-looking, permit complex constructions.

Disadvantages

- Higher initial cost. Fabrication needs special skills.
- Raw material, especially the resins, needs special storage.
- Low resistance to abrasion.

The tsunami of 26 December 2004 led to a huge leap in demand for

Mats for FRP boats (left). The layering process with mats (left below). Chemicals used and fabrication in process (below).



FRP boats. In Tamil Nadu, some 51 000 kattumarams, vallams and mechanised boats were destroyed or damaged, and more than 9 000 fishing craft in neighbouring Pondicherry,

But the tsunami was at once a big boost for the boat-building industry and for FRP. Overnight, existing boatyards increased their capacity and old hands were recalled. Many new yards materialised along the coast to make new boats and repair damaged boats. Backyard FRP boat manufacturers who produced two or three boats per month began to turn out more than 50.

During the Workshop on Post-Tsunami Revival of Fisheries sector and Rehabilitation of Fishing Communities held in Mahabalipuram on 6-7 February 2006, many experts commented adversely on the construction and safety measures in these newly constructed boats. It seemed that the boats were built to a price rather than to a standard. Scantling rules were grossly ignored and skin thickness appeared to be generally inadequate. The deck construction on many boats also appeared to be very weak. It was suggested that the vacant compartments in the boats should be filled with foam, otherwise serious accidents could take place. Apart from the flaws in the construction, the workers handle strong chemicals, paint and glue, and are in peril if they don't take proper precautions.

– M Paramasivam