Design Resource

Boat Making - Ernakulam, Kerala

Floating Vessel

by
Prof. Bibhudutta Baral, Divyadarshan C. S. and Manmi Dutta
NID Campus, Bengaluru

Source:
http://www.dsource.in/resource/boat-making-ernakulam-kerala

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Introduction

A Boat is a floating vessel which can be designed in any shape or size and plays a bigger role in the transportation of goods, humans and many more through waterways. It is mostly made up of plywood, wood, bamboo and fiber glass casting. Boats are categorized into many shapes and according to their shapes and floating properties each boat shape is given a name to denote it. Boat have a long history and various versions which were and are used throughout the world for the need of transportation, fishing, sports and sightseeing etc. Boat are constructed in various methods due to their planned requirement, locally available resources and age old traditions. Fishing boats are constructed keeping in mind the local conditions, sports boats includes ski boats, sailboats and pontoon boats whereas house boats are used for holidays or vacations to travel along the course of the river and enjoy the serenity of the place. Life boats are used for rescue and safety purpose and small boats are mainly used in transportation of goods to and fro from large ships. Surveyors has discovered many evidences of the existence of boat varying in size and model in the archaeological sites of the Indus valley civilization. In ancient times boats were often featured by a character's head projecting from the front of the boat. The oldest boats were the "Log boats" found by the Archaeological excavations dates from 7,000 to 10,000 years back. Boats are usually built of less sturdy materials as they don't have the need to survive the high wind and waves of the ocean but only floats on the rivers and lakes of the region. These boats are restricted in size according to the width and depth of the river as well as the height considering the bridges and their arrangements, made for the passengers to cross to the other end of the river. The boat is also used as a vessel which carries and transports people along with loads from one end of the river to the other and collects revenue in return.

Ernakulam the commercial district of Kerala, India is very eminent for its prehistoric monuments, shrines, churches, mosques. Ernakulam was the first "fully literate district" of India. The name Ernakulam was obtained from a Tamil word "erayanarkulam" which implies the heavenly place of Lord Shiva. In the year 1990, a boat manufacturing industry Matha Marines started their business of building ships and boats of all kinds. The company is owned by Mr. Joy Jacob, a qualified naval architect. This company has been well-equipped with infrastructural facility and has a decade of experience in the field of boat making. Matha marines are specialist in fiber glass construction of large and small boats and are also involved in customized designs ordered by the clients. The quality of materials and the products they render which is used in building of these boats have made them well in the region. Matha Marines efforts in their field has enable them to get the attention of reliable clients from all over India.

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The various parts of a traditional wooden boat are as follow:

- Bottom boards
- Centre (Thwart)
- Stem post
- Frame (Rib of the boat)
- Keel
- Rowlock

The various parts of a fibre glass boat are as follow:

- Hull (body of a boat)
- Bow (front of a boat)
- Port (left side of a boat)
- Starboard (right side of a boat)
- Stern (rear of a boat)
- Propeller (motor engine)

Resin is being applied on the fiberglass mat to remove the air bubble.

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The fiberglass boat tied in the shore.

Artisan is applying the paint on the mould.

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Fiber mats are being applied on the mould by the artisans.

Second coat of the resin solution is applied.

The outer surface of the boat is been cleaned by using waste cloth.

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Tools and Raw Materials

Following are the tools and raw materials used for the process of Boat Making:

•**Wood:** Huge planks of wood are used in building of the traditional boat.

• **Jute Threads:** Jute threads are used to hold the coconut coir in place.

• **Coconut Coir:** Coconut coir is used to fill up the drilled holes and gaps between planks.

• **Plastic Coir:** Plastic coir is used to tie coconut and jute coir together in position with the planks.

• **Propeller:** Propellers are used to create motion into thrust as well as push the boat forward.

• **Rudder Tube:** Rudder tube helps in sealing important parts of the boat.

• **Stern Tube:** Stern tube is a hollow tube which helps in lubrication of the oil.

• **Marine Couplings:** These couplings are used to protect the drive train of a boat.

• **Plywood:** Plywood is used in preparing the mold for the hull of the boat.

• **Jack Plane:** The jack plane helps the carpenter to slightly bevel the edge of the surface.

• **Life Jackets:** Life jackets are used for safety purposes of the customers.

• **Swim Rings:** Inflatable floating tube is also used for safety purpose.

• **C Clamps:** Adjustable clamps considering the nature of the work needed.

• **Paints:** Paints of various colours are used in painting the boats to give it an attractive appearance.

• **Brushes:** Brushes of various sizes are used to paint colours on the boats and design it.

• **Junior Hacksaw:** The junior hacksaw is used in cutting out the parts of the boat.

• **Drill Machine:** Drill machine is used to drill holes on the marked points.

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- **Hammers:** Hammers are used in hammering the nails.
- **Nails:** Nails are used to join both surfaces by hammering them onto the surface.
- **Measuring Tape:** Measuring Tape is used in measuring all the required sizes of the boat.
- **Thinner:** Thinner is used to dilute the oil based paints.
- **Wax Polish:** Wax polish is used in the boat to bring luster to the boats.
- **Cutter:** Cutter is used in cutting of the plastic coir and coconut coir.
- **Fiber Glass Mat:** Fiber glass is a strong lightweight material used for building boats.
- **Electric Driller:** Electric driller is used to drill the holes in the wooden planks.
- **Motor Engines:** Motor engines is used to acquire the force and sail firm on waters.
- **Resin Paste:** Chalk powder, resin and hardener are mixed in appropriate proportions to prepare the resin paste.

Brush: Brush is used for applying the solution of color, resin and chemicals accordingly.

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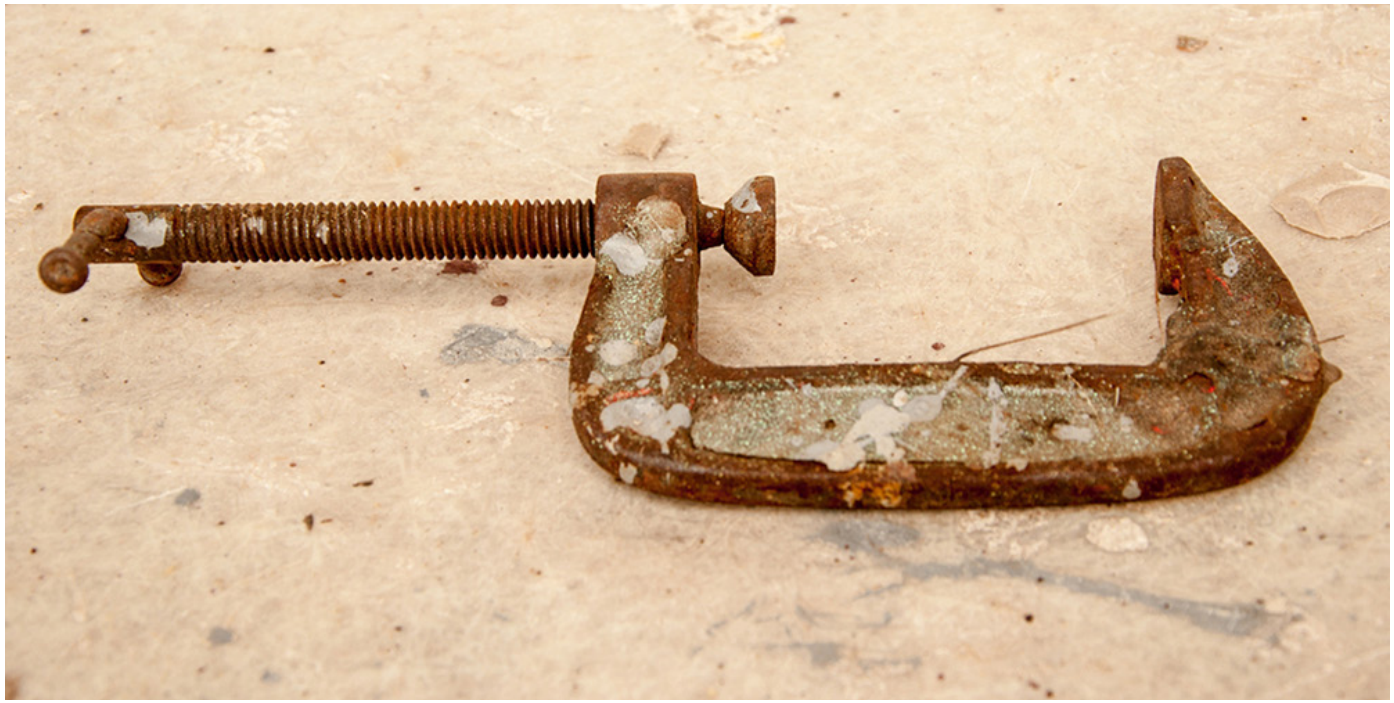
Chalk powder: Chalk powder is used by the artisans to over their hands before they start working with the chemicals.

Drilling machine and hammer: Drilling machine is used for making holes in boat for fitting the bolt. Hammer is used for nailing the nails.



C-clamp tool: This tool helps in holding two things together firmly.

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Thinner: Thinner is used in washing brushes and tools (patti blade).

Color pigment: Color pigment is added with the resin solution to beautify the boat.

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Wax polish: Wax polish acts like a releasing agent between the mould and cast.

Resin cans: Resin is the main ingredient of the fiber glass casting.

Acceletor chemical: This chemical is mixed with another chemical which reacts and hardens the solution faster.

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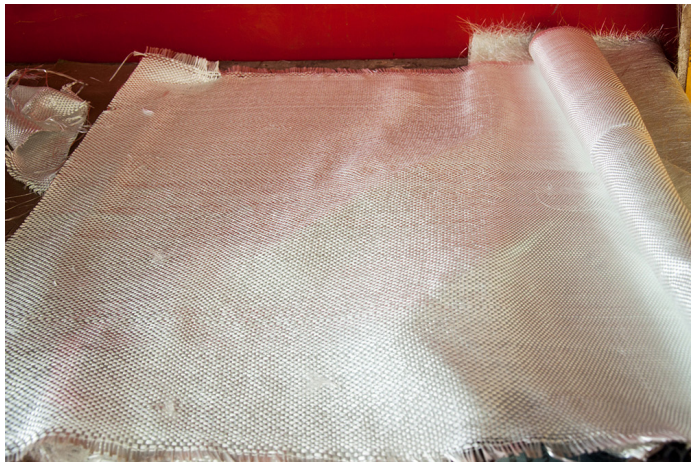
China fiberglass mat: This mat is used to strengthen the product like interiors of the boat.



Heat-treated fiberglass mat: This mat is used to strengthen the product like exteriors of the boat. Ex: Base of the boat.

Different kinds of patti blades: These patti blades are used in applying the solution evenly.

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Waste cloth: Waste cloth is used for wiping out the dirt before the wax is applied.

Boat engine: The boat runs with the help of the engine.

Measuring tape: Required in measuring the boat and its parts while building it.

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Hacksaw blade with blade holder: This blade is used in cutting the parts of the boat.

Dusting brush: Dusting brush is used for cleaning purpose.

Big size patti blade: This big size patti blade is used in applying the solution evenly on the big surfaces of the boat.

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Making Process

Traditional Boat Making

Fiberglass Boat Making

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Traditional Boat Making

The boats that are made traditionally, completely depend on quality, size and resistance of the wood used for building the boat. The knowledge of boat making is inherited from the ancestors of the local region and this tradition has been passed on from generation to generation. These boats are built mostly near river banks and boat building yards. Kerala has professional boat makers who has knowledge in building boats and their traditional method of building boats makes them finest boat builders amongst others.

The wood used for traditional boat making undergoes several stages of selection process before beginning the construction of the boat. The various process of constructing a traditional boat after the selection of the wood is listed below:

1. Planking
2. Bending
3. Joining
4. Sealing
5. Fastening
6. Coating

1. Planking:
After selection of a particular wood which is suitable for boat construction with the qualities of flexibility and durability in it, huge planks of the chosen wood are measured and marked for further cutting of the planks into required size and shapes. The hull is made stiff for long run. After the sizing of the planks are completed, then the workers arrange the planks sides in position facing each other and at the same time forming the required boat structure.

2. Bending:
The sized wooden planks are entirely coated with resin and heated so that the planks can be bent into the needed shapes. Each individual planks is shaped and bent to form the basic structure of the traditional boat. The planks are then accordingly arranged in position to form the bottom boards on a handmade wooden holder for support before starting the joining process. The inner part of the boat is divided into equal proportion with the help of small wooden planks to maintain the space and the sitting arrangement of the passengers.

3. Joining:
The individual crafted wooden planks are placed in adjacent position on a wooden holder to support it from falling. The bottom boards i.e. the inner part of the boat is prepared for the sealing process. The sides of wooden planks are firstly examined and then the drilling of the holes with the help of an electric driller is started. Each hole is drilled with a measured distance to maintain the standard measurement and positioned in an equal arrangement so that it can be easily leveled and parallel with the holes of the other plank.

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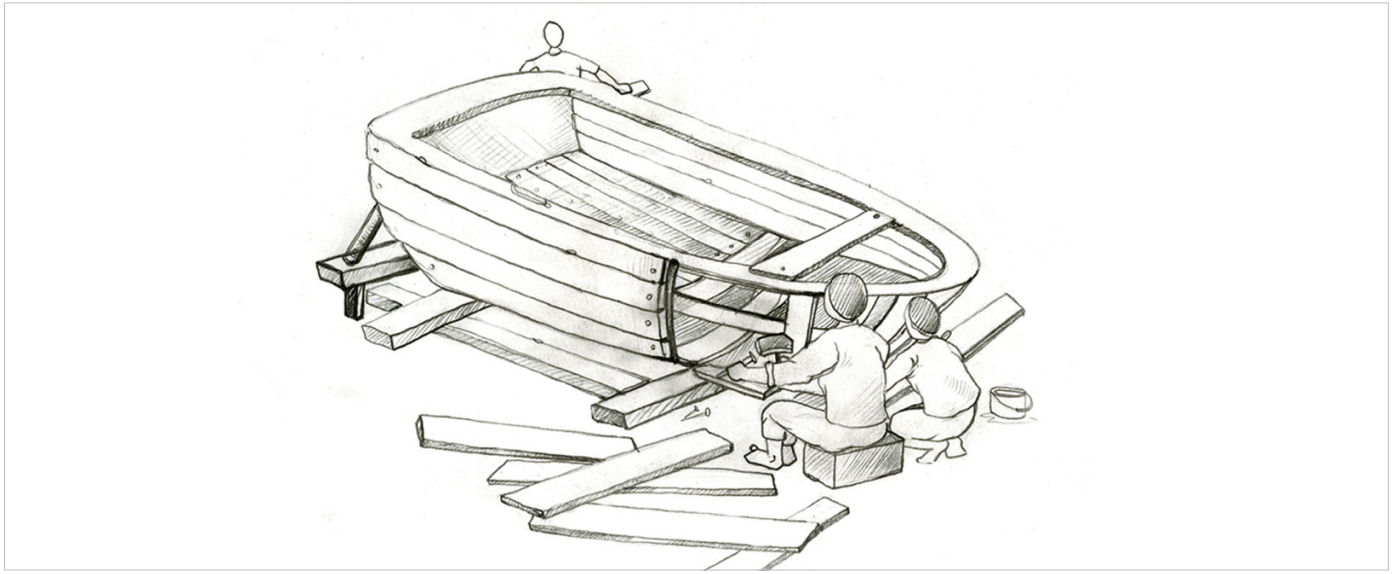
4. Sealing:
The sealing process includes sealing and filling of the gaps between two planks. After finishing the drilling of the holes in the required planks, the Jute threads and the coconut coir are assembled together are placed in between the gap of the two planks covering the holes and filling the gaps. The jute threads and the coconut coir when assembled together forms a bundle that fills the gaps. As the coconut coir resists saltwater, so it is most favorable coir used for the construction of boats by the workers.

5. Fastening:
In the fastening process the plastic coir is passed in through the drilled holes of the planks creating a criss cross pattern and again passing the plastic wire out of the holes with the help of a needle. The pattern created helps in holding the coconut coir and the jute threads in position and with the help of a wooden hammer, the stitched plastic coir is tightened and nails are hammered on it to fix the position and attach the two planks together. All the other planks are attached to one another by following the same process until the boat shape has been obtained by the carpenter.

6. Coating:
After completing the whole boat paints are applied as per need to the surface of the boats and some boats are just polished with wax to give the luster affect. These traditional boats of Kerala are locally known as "Vallam". These boats are mostly used by local people to transport small amount of goods as well as few passengers to the other part of the river bank.



Initially model of the boat is built out of wooden plank.

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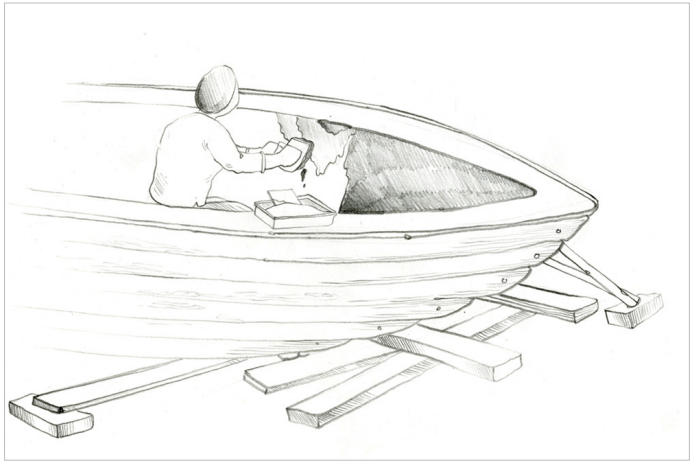
Wax is applied on the model to release the mould easily.

Later artisan dusts all over his hand with the chalk powder to protect himself from the chemicals.

The mixing of the resin, chemicals and color is done proportionately.



Then the solution of resin, chemical and color is applied on the mould as a first coat.

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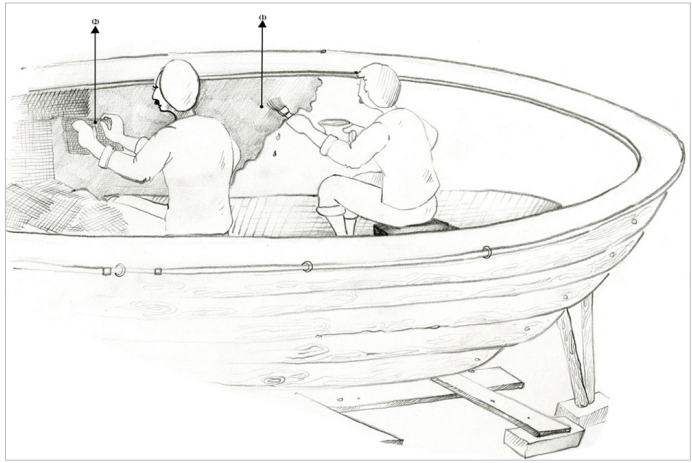
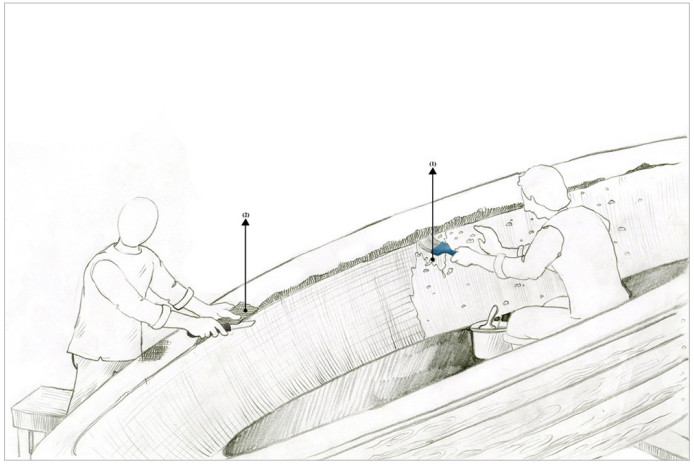
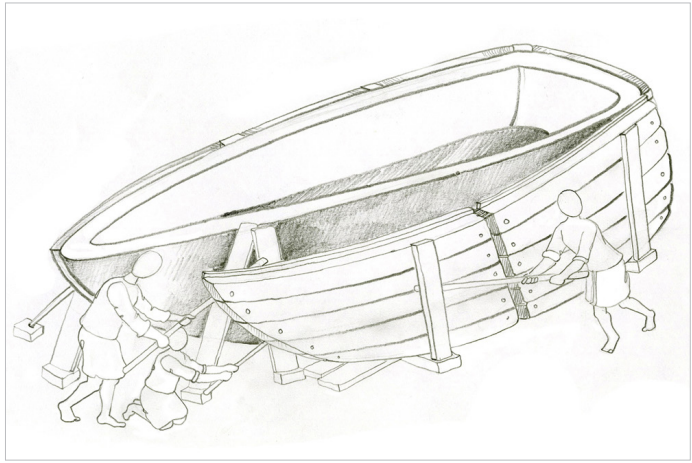


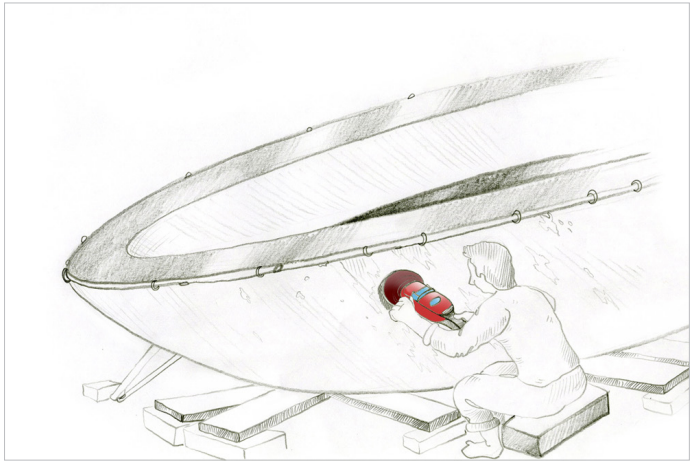
Second coat of resin solution is applied and after applying the second coat of resin, the fiber mats are stuck on it.



The air bubbles are removed by applying thin coat of resin with the help of brush and after the resin is dried to an extent the extras of the fiber mat is removed with the help of the blade.



The mould is then removed from the wooden model.



And then the final buffing of the mould is done to smoothen it.

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Fiberglass Boat Making

From centuries people have been building boats out of various materials and fiberglass is considered to be the most preferred medium out of all. Fiberglass is a term used for a unit of catalyst, hardener and resin mixed in appropriate proportions, later applied to fibermat placed on mould. Fiberglass is a strong lightweight material and is used for many products as well. Fiberglass components are much cheaper to buy. It is less brittle, weighs better when compared to other metals and can be moulded into complex shapes. Use of this fiberglass is mostly witnessed in aircraft, boats, automobiles, bath tubs, roofing, and external door skins. For this quality of strength fiberglass is most preferred in boat making, which is also called as fiberboat making.

The three major process that is carried out while building a fiberboat are:

1. Preparation of a mold
2. Fiber Casting
3. Polishing

1. Preparation of a Mold:
To start off building a fiberboat, the very preliminary step that is carried out is construction of a mold. The mold is built to form the structure for the final boat. The old is built with polyester, plaster of paris or of wood. The mold is supported with materials until they solidify. Molding includes two kinds- male mold and female mold. When building with a male mold, fibermat is placed over the mold's exterior surface and then soaked with liquid catalysed resin. Working with female mold, the fibermat is placed in mold's interiors and then soaked with resin. In both cases, multiple layers of fibermat are built and after all layers of resin has set up hard and cured, the solid part can be separated from the mold. With the male mold the laminate starts inside out, the outermost layer goes last, the exterior surface is polished to make it look nice and shiny afterwards. With a female mold, the outermost layer goes in first. The boat emerges from the mold neat and shiny if it is treated carefully and less work is done on exterior finish. The application of wax for master mold is a must before starting off with resin work. Production builders usually go for female mold.

2. Fiber Casting:
Once the mold is ready, clean and dry, it is coated with waxy agent before starting to laminate with resin and fibermat. All the necessary materials needed for the castings are placed nearby to avoid cluster and carry out smooth and flawlessness process. The first thing in the molding process is application of Gel coat. The color preferred is mixed along with the Gel coat and is applied on the mold with help of clean dry paint brushes. A thin coat of resin is mixed with colour pigment, as a very first layer during laminate so boats comes out mold as pre-painted. The resin begins as a liquid and solidifies after catalyst or hardener is added to it. This is a chemical reaction that cannot be half-done. Once the Gel coat cures the resin is mixed with catalyst and laminate begins.

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The amount of resin mixture depends on the size of the mold and casting required. Layers of resin and fibermat are applied on the mold and is left to cure for hours together. Once the laminate cures the casting, it is removed from the mold. One advantage of fiberglass construction is that it facilitates the creation of compound hull shapes. For the compound structures the castings are taken in parts and fixed together later with chalk and resin paste.

3. Polishing:
After completion of the whole boat model it is sanded and a smooth finish is obtained. Then two coats of oil based paints are applied to the entire boat for a long lasting appearance. The propellers and motor engines are fixed to the boats and all the minor fittings are ensured. It involves minimum twenty people to manufacture a fiberglass boat and it takes approximately 40-50days to complete the boat. A well-built and well maintained boats can last almost indefinitely.

Resin is mixed with the chemicals, color and it is applied as the first coat on the mother mould.

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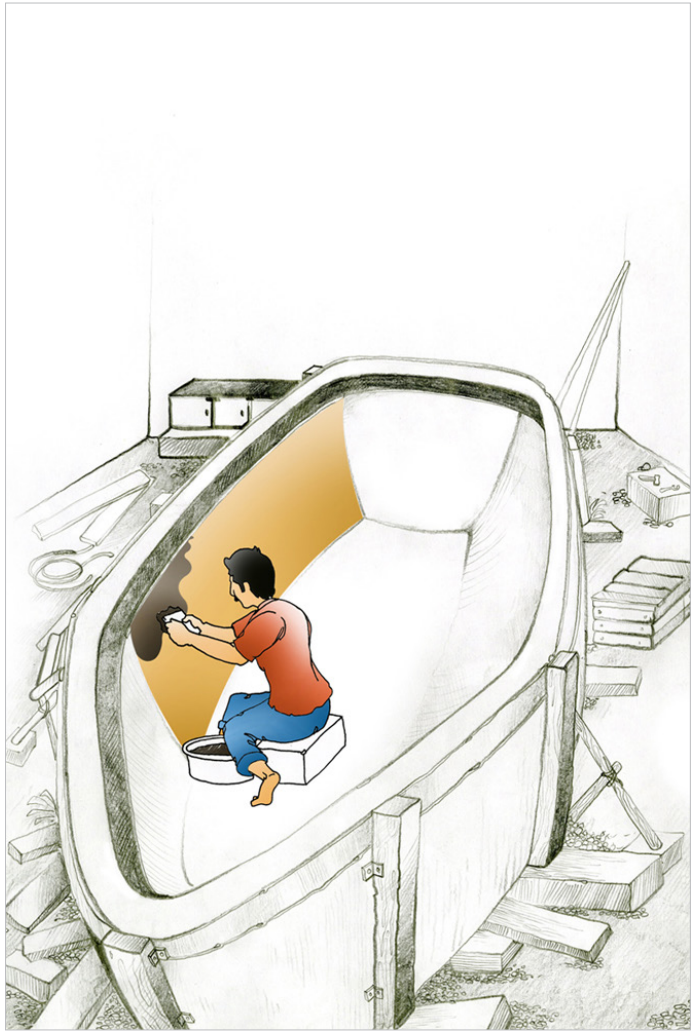
Wax is applied on the mother mould.



Second coat of the resin solution is applied on the mother mould.

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Then the fibermats are applied on the mother mould before the resin is dried.

Later the air bubbles are removed by applying thin coat of resin with the brush on the fibermat.

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Then the cast is released from the mother mould.

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After the resin is dried the extras of the fibermat is removed with the blade.

Refining of the casting is done by buffing.

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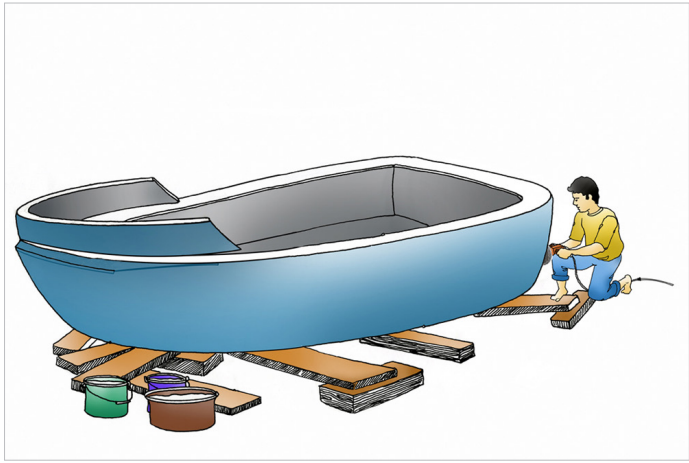
The multiple casts are joined with the help of the fibermat and resin solution with the help of the patti blade, which makes a complete boat.



Final buffing is made for the finishing appearance of the boat.

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Products

A wide variety of boats are manufactured, to name a few – speed launch, pedal boats, rowing boats, house boats, fishing boats, safari boats, tourist boats, container ships, luxury boats and many more. Each boat has its unique quality and differ from one another. The cost of each boat depends on the quality and the time consumed for its construction and also keeping in mind the facilities it provides as per the demand of the customers.

Fiberglass boat: Fiberglass boat stands unique when compared with other boats for its versatile type that inherent strength, weather resistant and light in weight.

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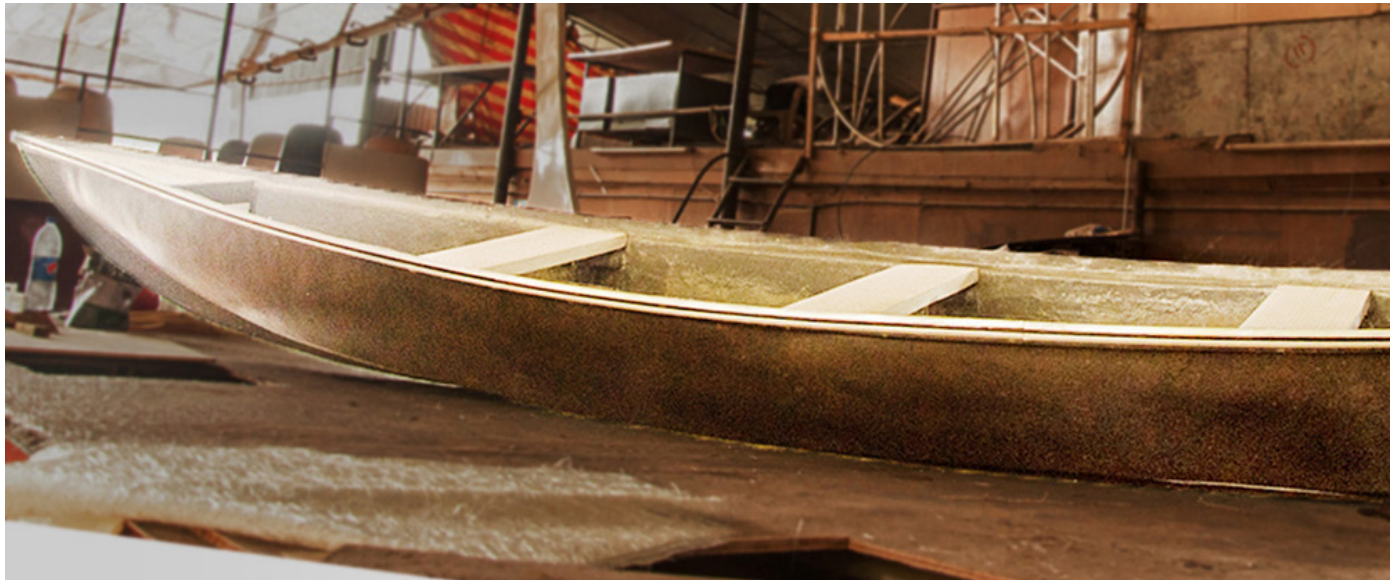
Rowing boat: Rowing boats are used for the transportation, recreation and also used for the sport of rowing/ racing competition.



Canoe boat: Canoe boat is often used for recreation purpose. They are very lightweight with open top and both the ends of the boat are pointed.

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Video

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Floating Vessel

by
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