BUILDING NOTES

These building notes are not a boat building course.

Our website features many tutorials and help files about the methods used to build this boat. In addition to the material freely available, we recommend the following books:

- Devlin's Boat Building
- Boat Building with Plywood by Glen-L
- Steward's Boat Building Manual
- The Gougeon Brothers on Boat Building

Those books are a good introduction to boat building in general. The building method described in the Devlin book is close to our method, but if there are any conflicts between their specifications and ours, you must respect ours.

We assume that the builder is familiar with the use of epoxy and fiberglass, is comfortable with reading blueprints, and that he has built at least one small boat with our technique. To refresh your memory about the use of fiberglass and epoxy, see the tutorials at our website or refer to the excellent System Three Epoxy book. On request, we include the Epoxy Book free with every epoxy kit order.

When planning the building of this boat, please do not try to solve every little "problem" from the start. Many apparent difficulties will disappear as the building progresses. It is important to have a clear idea of the complete building process, but it is not necessary to understand every detail before building the hull.

Important: All wood and plywood parts must be coated with epoxy resin.

CONTENTS

MATERIALS:

Do not change our scantlings. Our specifications will produce a strong boat.

Some assumptions were made to calculate the quantities:

- A 10 to 15% waste factor for all materials is included in the BOM.
- The resin use includes a complete coating (120 sq.ft./gal.) of the inside and outside of the hull but does not include the optional bottom fiberglassing.
- The resin calculation is based on a 50% glass content.
- Filler is cheap: buy too much of it.

BILL OF MATERIALS

Plywood, standard sheets 4x8' (122 x 244 cm)

- 6 mm (1/4") 2
- 12 mm (1/2") 1
- Mold Material 1

Fiberglass

- Biaxial tape 6 oz. 6" wide (400gr. 15 cm wide) 50 yards
- Woven fabric 9 oz. 50" wide (400gr. 125 cm wide) 2 yards

Resin:

MarinEpoxy	
Epoxy total	1.5 gallons (6 liters)

Not included:

- Battens for rub rail, spray rail, runners, paint etc.

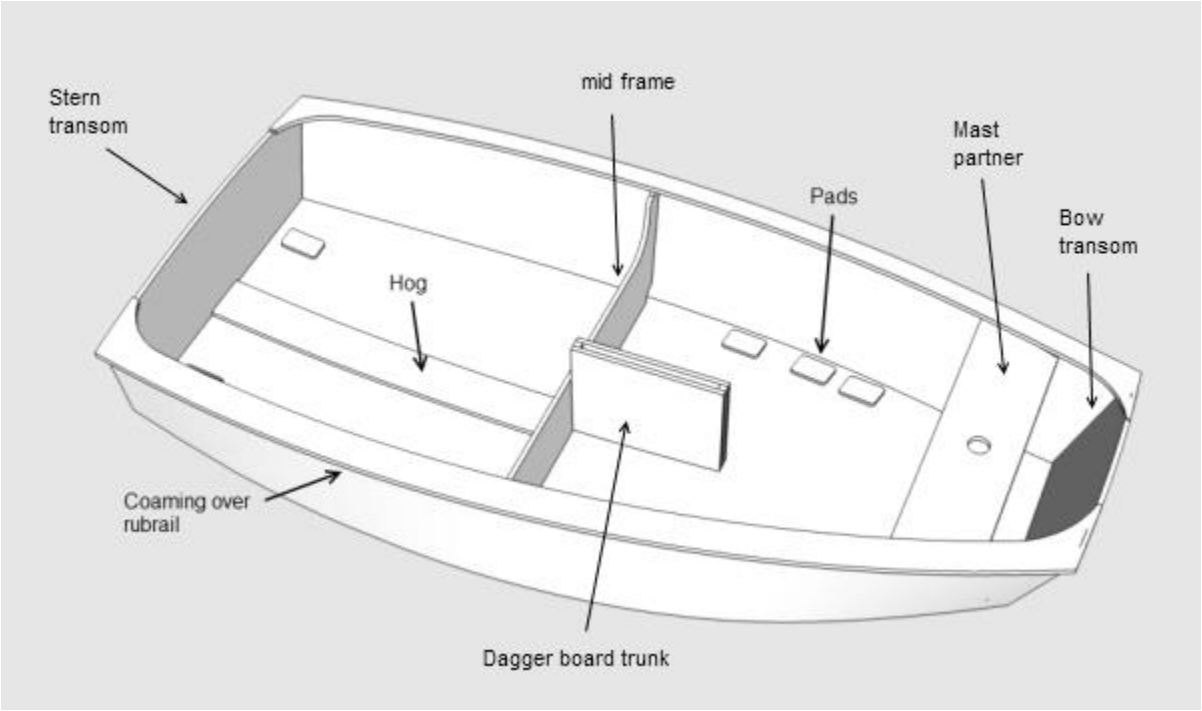
ASSEMBLY METHODS AND BUILDING SEQUENCE:

Stitch and Glue assembly (without the basket mold).
The Optimist kit can be assembled without a mold but to stay as close as possible to the IODA rules, the builder must pay attention to symmetry and use two temporary molds. If you deviate from the very exact rule measurements, your boat will sail just as well and be a perfect trainer or club racer, but it may not qualify to compete at the national level.

Our Club Racer is slightly different from the standard plywood Optimist:

- The bottom is fiberglassed while the IODA boat is not
- Our Club Racer has the "hog" in the center but not the ones on the sides. The "hog" is a longitudinal stiffener, a double plywood plank that goes from the transom to the mid frame.
- All other parts are identical or very close.

You will notice that the frames and molds have shallow notches on the bottom side. This is for the builders who want to build the boat exactly to the IODA specifications and use the three longitudinal stiffeners shown on the plans. We will not use the side stiffeners. Those parts are a remnant of the old plywood Optimist plans. Our plywood bottom is fiberglassed and stronger even without those parts. We keep the central one because it is a convenient backing plate for hardware: sheet and other fittings.
The hull goes together like any other stitch and glue boat: all hull skin panels are loosely stitched together; the inside frames are pushed inside to shape the hull; and the fiberglass seams are built. To properly shape the hull, our kit includes two temporary frames to install in the hull, one behind and one in front of the mid frame.
(Those frames are identical to the inside frames described in the basket mold method)
To position the inside parts correctly, we include the locater jig described in the basket mold method.



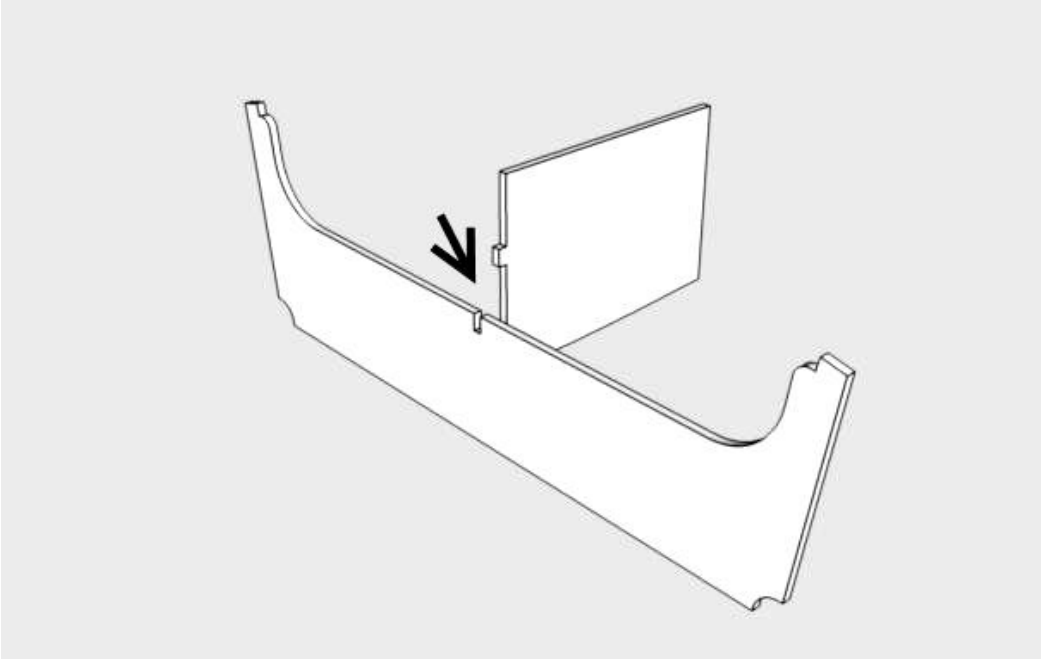
BUILDING SEQUENCE:

Step by step:

We will first assemble the dagger board trunk and the mast frame. Those parts must be ready to install in the hull later.

TRUNK:

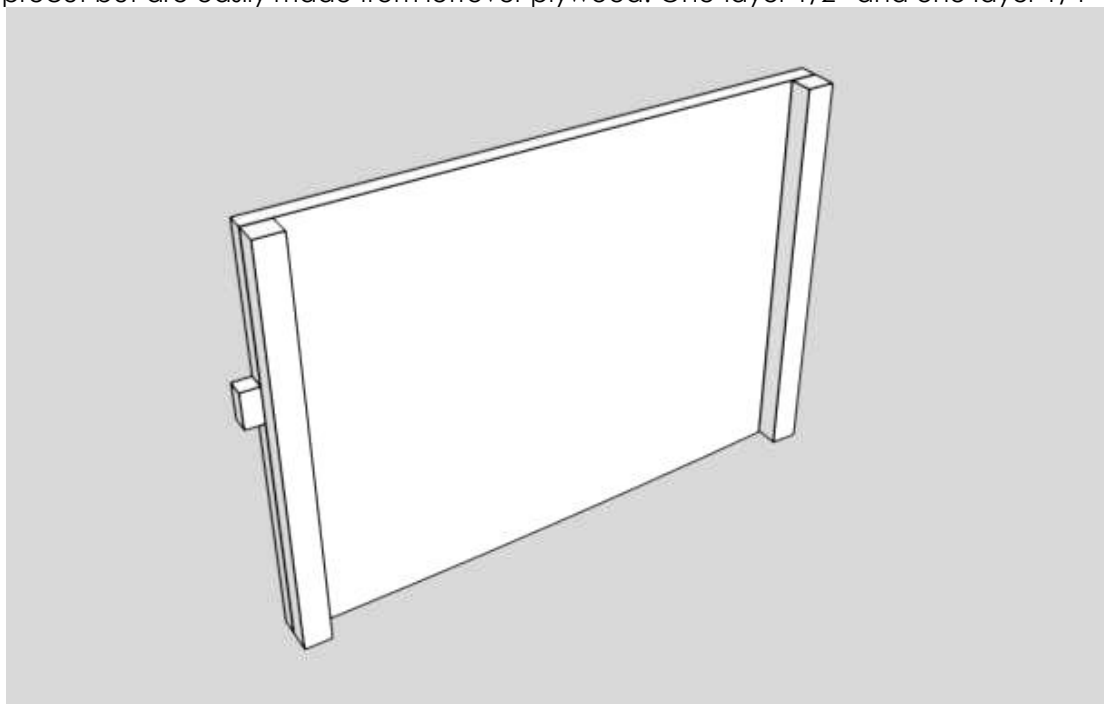
Start by checking the assembly of the port side of the dagger board trunk and the mid frame.
The port side is the one with a tab. The tab goes in the notch in the mid frame.
Do not glue those parts together. The notch may require some sanding.
The lower edge of the trunk should be flush with the frame at the bottom side.



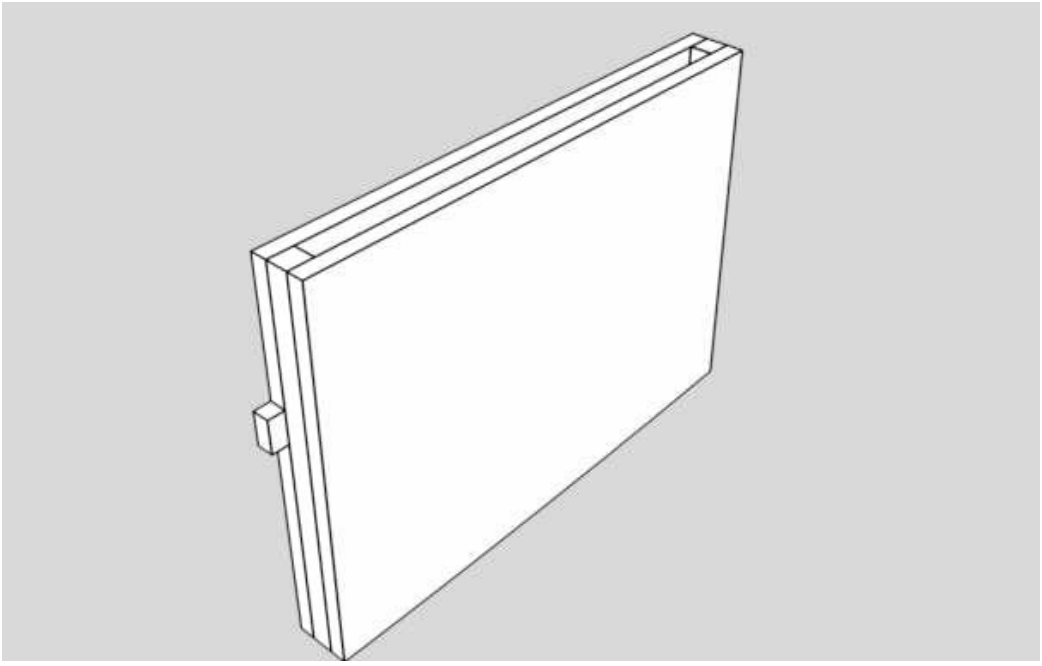
Once you are satisfied with the way the tab fits in the notch, disassemble the parts and put them aside.

TRUNK BOX:

Epoxy glue two cleats along the vertical edge of the port side of the trunk,
Those cleats (battens) have a 3/4" square section.
They are not precut but are easily made from leftover plywood. One-layer 1/2" and one layer 1/4" epoxy glued.



Epoxy glue the battens to the edge of the trunk side but not to the mid frame.
Epoxy glue the other side of the trunk to the cleats to form a box.



(Before assembly, all faces of the trunk must be coated with epoxy.)

Do not glue the trunk to the mid frame, we will do that later.

MAST FRAME:

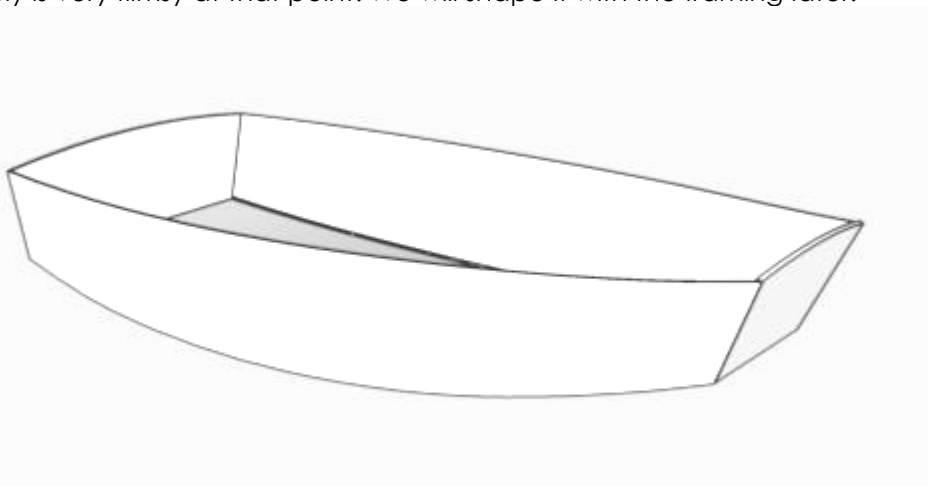
The mast frame assembly is made of the mast frame and the mast partner.

The partner sits on top of the frame. Edges are flush. The two parts are epoxy glued with a corner cleat.
The section of the cleat is unimportant: 1" square is fine or use leftover plywood as for the trunk.
Note that the cleat does extend all the way to the sides.
Pay attention to squareness when gluing the parts, the frame must be perpendicular to the partner.

Put the assembled parts aside and start on the hull.

HULL SHELL:

Assemble the hull shell. This means the bottom, side panels and transoms. Those parts are loosely stitched together, the assembly is very flimsy at that point. We will shape it with the framing later.



The sides and bottom are joined by loose stitches and barely touch at their edges. A 1/4" space is ideal, we will tighten the stitches later. (The stitching procedure is explained in our "Stitch and Glue 101" tutorial.) The two transoms are located between the sides and bottom. We use temporary screws (dry wall screws are perfect) to hold them together. As for the stitches, do not tighten the screws, screw them in just enough to have contact between the parts.

No epoxy is used at this point.

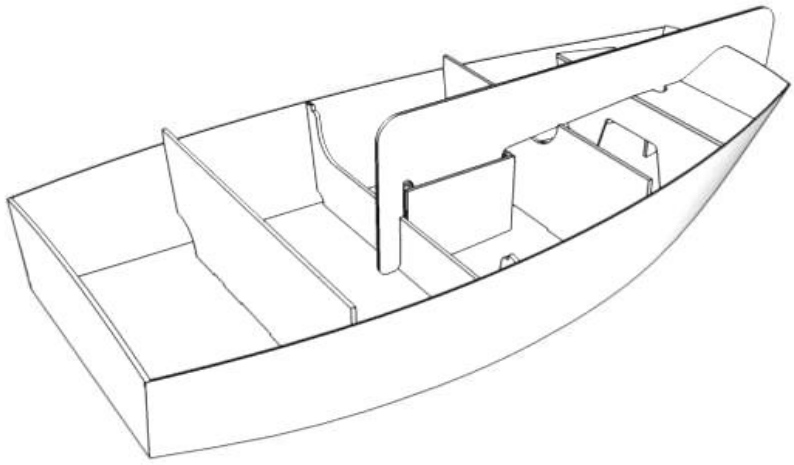
FRAMING:

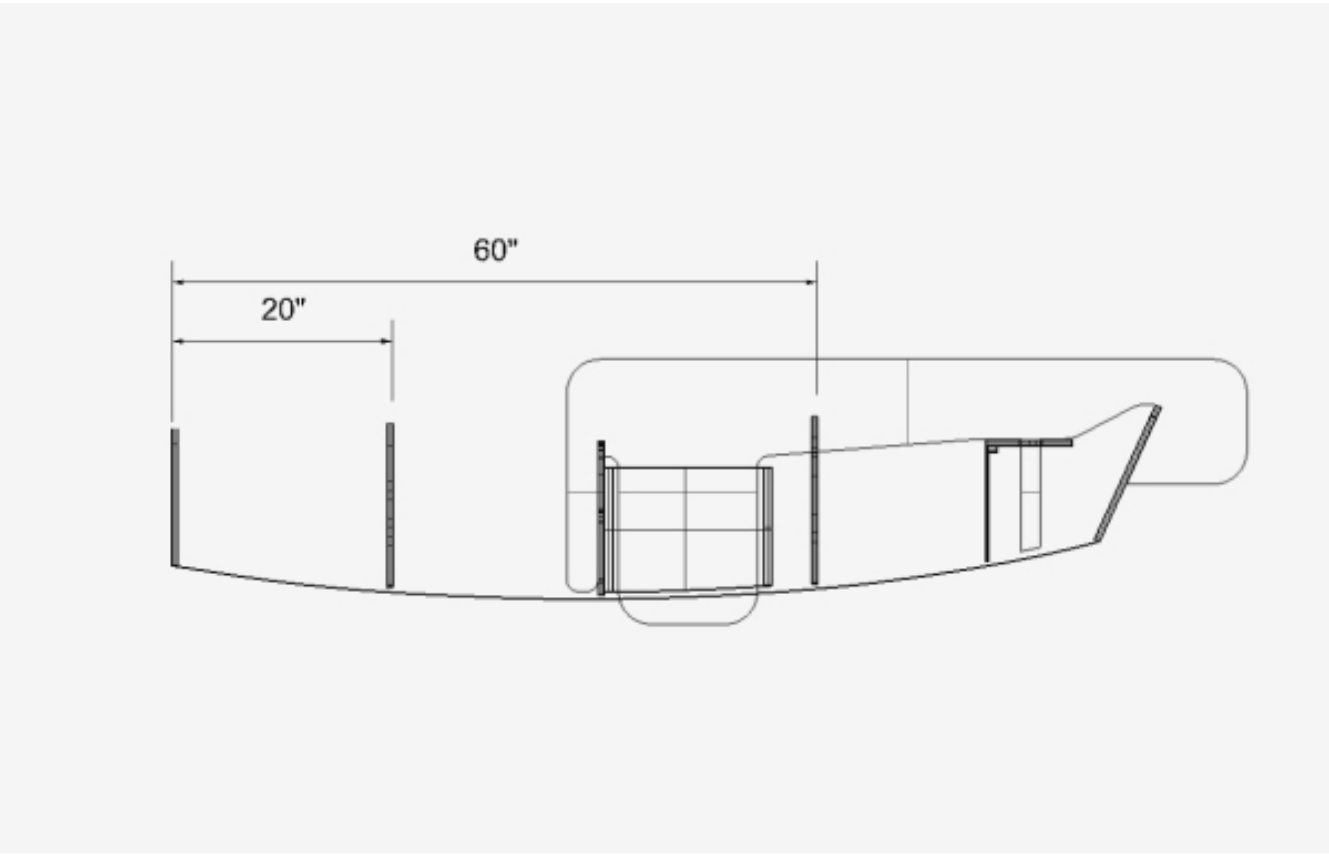
To give the hull it's correct shape, we will insert the frames and two molds.

The longitudinal piece is a jig used to precisely locate the dagger board trunk, mid frame and mast partner.

Across the hull, counting from the stern, we have:

- the transom
- a temporary particle board mold
- the mid frame and dagger board trunk
- a second temporary mold in front of the trunk
- the mast partner and the mast frame
- the bow stern

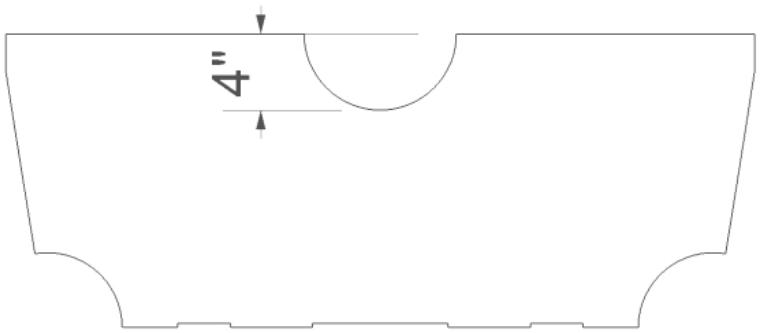




The locator grabs the bow stern and the mid frame, it also goes through the dagger board trunk

The locator does not locate the two temporary molds. Those must be set as above. The stern mold is at 20" from the transom, the bow one is at 60". Always measured from the outside face of the transom to the bow face of the molds. Great precision is not required.

Note that the bow mold shipped in the kit interferes with the locator. (The bow mold is the smallest one).
We must cut it to give clearance to the locator, as shown below:



The exact shape of the cut is unimportant.

Before assembly, cover the part of the locator that goes through the trunk with plastic. We do not want the locator to be welded in the hull by the excess epoxy seeping through the gap at the bottom of the dagger board trunk. The notches in the locator are tight, you may want to sand them for an easier fit. Just as you did for the mid frame, do a dry run: check the notches for an easy fit, sand if necessary.

For the inside framing, our preferred sequence is as follows:
The hull shell is loosely stitched together and lifted above the floor a few inches (set it on a couple blocks about 3" high).

- insert the two MDF molds at their approximate location. Given the bottom width, it's difficult to go wrong.
- Install mid frame with the dagger board box against it, with the trunk opening over the cut in the bottom.
- Install the mast partner assembly
- push the locator jig in place, through the dagger board trunk slot and through the hull, through the mast partner.
- Check all parts for squareness.
- Tighten the stitches if necessary, block the hull.

With all the molds and frames in place, we start building the inside seams of the hull only. Later, we will fiberglass the inside framing: frames and trunk. Follow the instructions in our tutorials: putty fillets then fiberglass seams.

You should build the inside chine seam in piece, full length. All molds and frames have cuts in the corners to give passage to the fiberglass tape.

Build all inside seams along the chines and around the transom. Let the epoxy cure overnight.

The next day, install the frames and dagger board trunk.
Build putty fillets and fiberglass seams all around the frames, mast partner and trunk.
The trunk is also epoxy glued to the mid frame.
Beware of excessive epoxy putty runs in the trunk.

Let the epoxy cure overnight, remove the locator and the temporary frames.
Before removing the locator, mark the position of the mast step.
Flip the hull.

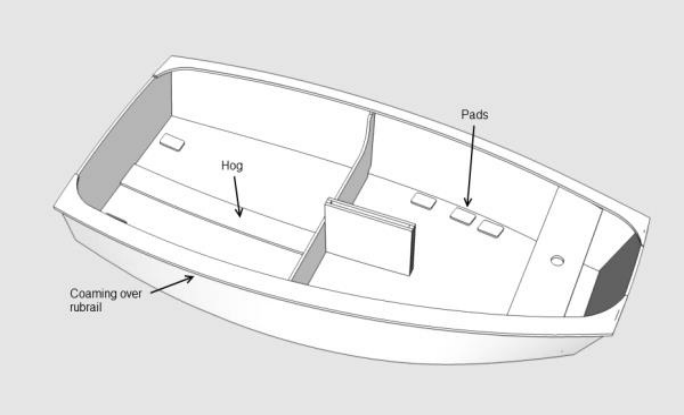
Clean the inside of the dagger board trunk. Remove temporary screws. Fill all gaps with epoxy putty.
Clean the edges of the dagger board trunk.
Build seams on the outside, all around. Fiberglass the bottom, sides and transom with wide fabric.
Let cure, flip the hull.

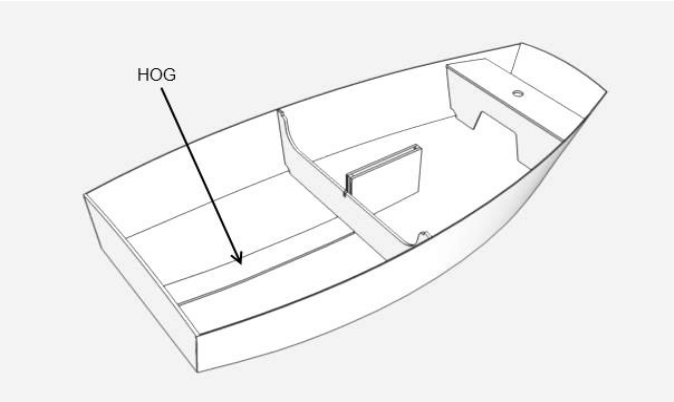
HULL INSIDE:

At this stage, please refer to the Optimist plans distributed by your local Optimist association. Those plans are free and available online. Do a search with "Optiworld" or "IODA" or go to "latitude2739.com".

If you plan to race the boat, follow the class rules as closely as possible. The hull shape produced by our kit conforms to the class rules if built with care.

We will start by installing the hog. The hog is made of two layers of plywood.

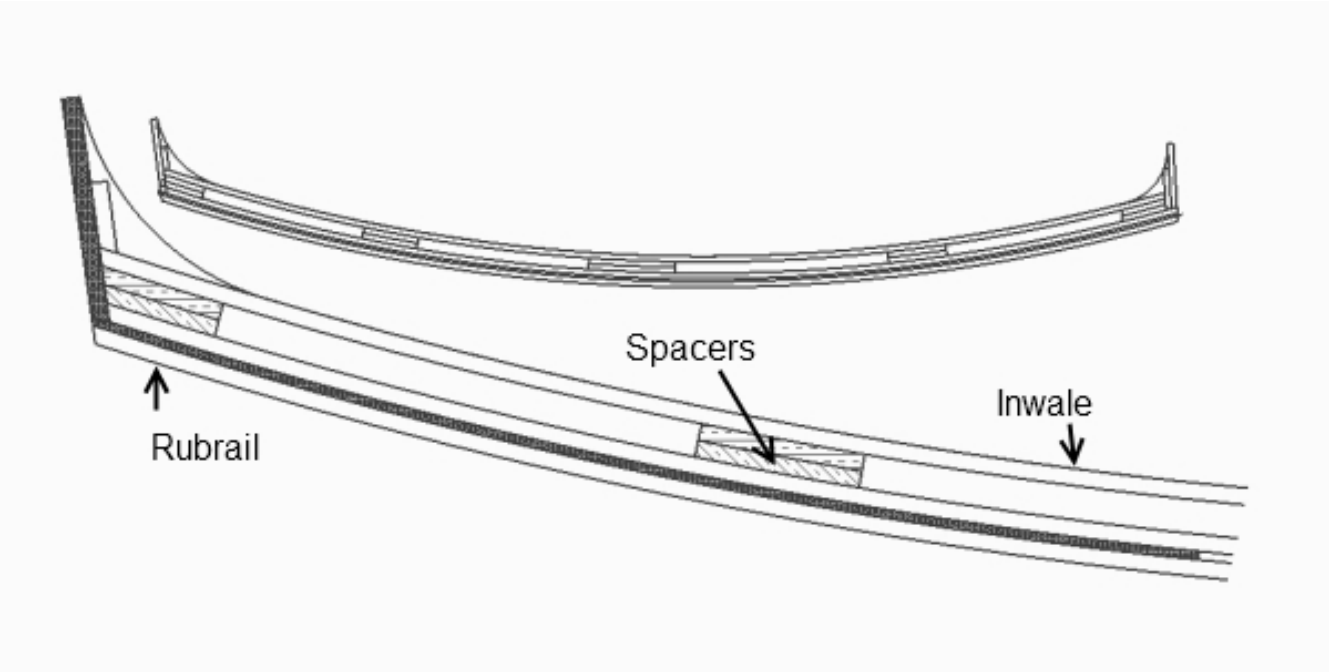




We recommend gluing one layer at a time. Each piece is a rectangle but the top one is slightly smaller. Glue the largest one down first, centered on the bottom. You can use weight or temporary screws to hold it in place while the epoxy cures. The exact location of the pads is unimportant for sailing purpose but is regulated by the class rules. If you plan to race, use the class rules document to locate your pads. You need pads forward of the mid frame to secure the buoyancy bags. There are also pads close to the transom for the stern bag. We don't use a pad for the sheet since we have a thick doubler there. The kit contains too many pads. You may want to use some as backing plates for the rudder fittings.

COAMING:

The coaming is the most complicated part of the boat! You should have it to satisfy the rules, but we see many Optimists with a simple rubrail instead of the elaborate coaming specified by the class rules.



The coaming itself is a long piece of plywood that cover the edge of the side panel. It is glued on top of the rubrail, inwale and spacers.

Start by building the rubrail.
The rubrail is in two pieces: one layer outside the side panel and one layer inside, glued along the edge. (Those are the long thin strips at the bottom of the 12 mm plywood). Epoxy glue using plenty of clamps. The next step is to install spacers every 12" glued to the inside of the rubrail. You need two layers. Inside of the spacers, glue one last long strip of plywood, it is named inwale on the drawing. After the epoxy cure, fit the coaming on top, epoxy glue it. It should completely cover the rubrail, spacers and inwale. Note the small block along the edge of the transom.

This completes the building of your hull kit.

HARDWARE AND RIGGING:

Fair the hull with epoxy fairing compounds, prime and paint.

The kit includes a precut rudder blade and dagger board. Many builders will buy those parts from one of the many Optimist part suppliers, but you can build your own rudder and dagger board from the kit. The top of the dagger board should be fitted with a handle and shock cord. Rudder fittings, spars and sails are available online from many different suppliers.

Most spar kits include a metallic mast step, fixed or adjustable. During the assembly, you located the mast center with the jig. Use that mark to center one of the pads, epoxy glue it to the bottom and fasten the mast step to it. If the mast step is larger or wider than the pads, use some left over 12 mm plywood to build a wooden wedge under the mast step. .

To get the boat ready to sail you need a complete rig, rudder, dagger board and the buoyancy bags.

CNC KIT CONTENTS:

- 2 sheets 6 mm plywood hull parts
- 1 sheet 12 mm plywood framing
- 1 sheet MDF: molds and locator jig

Sheet H1:
- bottom panel with dagger board slot
- coaming one side
- 1st layer of longitudinal stiffener (named hog on the Opti plans).

Sheet H2:
- 2 side panels
- mast frame
- coaming one side
- 2nd layer of longitudinal stiffener

Sheet H3: from top left corner, left to right, 1st row:
- dagger board side
- other dagger board side with locator notch
- bow transom (marotte)
- stern transom

2nd row:
- doublers for hardware
- rudder blade
- mast partner with pilot hole

3rd row:
- dagger board
- mid frame with notch for daggerboard trunk

bottom:
- strips for rubrail and coaming
- spacers for coaming

Rig and hardware are available as separate kits.

LAMINATION SCHEDULE

- All plywood must be coated with epoxy resin
- Inside hull seams (chines and around transom): one layer biaxial tape 6 oz. (woven tape 9 oz. 4" wide is an acceptable substitute).
- Inside framing, between frames and hull shell: one layer biaxial tape 6 oz. (woven tape 9 oz. 4" wide is an acceptable substitute).
- Dagger board trunk, between trunk and bottom, between trunk and mid frame: 2 layers biaxial tape 6 oz. (woven tape 9 oz. 4" wide is an acceptable substitute).
- Outside taping, all around transoms: one layer biaxial tape 6 oz. (woven tape 9 oz. 4" wide is an acceptable substitute).
- Bottom: one layer woven fabric 9 oz. overlapping all sides and transom minimum 6". The outside fiberglass does not go all the way up to the sheer.