

NOAH'S MARINE

K.I.S.S. FOR STRIPPERS



This guide is written for stapleless construction using bead & cove strips that are 7' 10" or less, however this technique can also be used for full length strip building with staples. It also attempts to answer questions based on feedback (why isn't my epoxy setting up) from over 40 years of supplying kits and boat building materials to customers. For more detailed information regarding specific kits, please visit the designers websites or consult your plans.

Table of Contents

Table of Contents	2
The Strong Back	3
Transferring the Paper Patterns to Plywood	4
Cutting the Mold Stations	4
Assembling and Fairing the Mold	5
Bending and Gluing the Stems	6
Materials	6
Instructions	6
Tools	7
Butt Joints	8
Stripping the Hull	8
Fairing and Sanding	11
Staining	12
Epoxy doo's and donut's	12
Fiberglassing	13
Turning the Hull	15
Fiberglassing the Inside	16
Gunwales, Decks, and Seats	17
Varnishing	17



The Strong Back

To get started, you will need 1 or 2 sheets of 5/8" plywood or MDF that are not warped. Do not use lumber as it may warp. Next step is to assemble a box beam that is 12" longer than the canoe. To do this, rip the plywood into 5 3/4" strips. Cut 4 $\frac{1}{4}$ " x 2' butt blocks and join the 8' pieces by gluing and screwing them with the butt blocks. Be sure to center the butt blocks so they are $\frac{3}{4}$ " from the edges. Ensure proper alignment by using the outside edge of an 8' plywood strip as a straight edge. Cut enough blocks of plywood 5 $\frac{3}{4}$ " x 4 $\frac{1}{4}$ " for end plates and every 2' of the beam.



Assemble 3 sides of the box with clamps, placing the butt blocks inside. Check that everything is straight and square, screw together. Screw the top on, again rechecking that everything is straight and square.

Support the strongback at a comfortable working height, use a spirit level and shims to level it in both directions The strongback should be level when assembling the mold stations, but can be moved later. Mark a centerline down the middle of the strong back, mark a point at the center of this line equidistant from the ends of the beam. starting at this point mark 12", or whatever intervals your plans specify, toward the ends of the beam. Use a square to mark lines perpendicular to these points. Screw a 2"x 2"x 5" pieces of wood to the strongback at each line. The block on one of the last stations should be screwed on the side toward the center of the strong back in case it needs to be removed when getting the canoe off the mold.

Transferring the Paper Patterns to Plywood

- 1. Before beginning, make sure the paper patterns are free from creases by ironing them flat.
- 2. Trace the largest ½ station onto thin cardboard using carbon paper. Put a framing square on the cardboard, aligning one edge with the centreline of the mold station and the other with the baseline. Clamp the cardboard to the bench and cut the straight center and base lines using a knife. Cut the curve with a knife or scissors.
- 3. Position the cardboard ¹/₂ station on the plywood or MDF sheet with the base on one edge of the plywood.. Place the framing square with one side on plywood and the vertical against the centreline of the ¹/₂ station and mark the centreline. Clamp or staple the cardboard in place and mark around its edge.
- 4. Flip the pattern over and position it against the marked centreline with the base at the plywood edge. Use the square to check that the center line is perpendicular to the base and mark around the edge for a complete station mold.
- 5. This method ensures that the base is square with the centreline, making setup on the strong back easier.

Cutting the Mold Stations

Cutting canoe stations is best done with a band saw, but a jigsaw can also be used as long as the blade is straight and square. When cutting, aim to stay as close as possible to the outside of the line. Do not cut below the line. Any high spots can be trimmed back to the line using a plane, ensuring that the edge is square with the face and not beveled or rounded. If a belt sander is available, it can be used to trim the station by clamping it on edge and squaring it to a table. After cutting and trimming, place the station on the paper pattern and make sure they match. There are two of each station except for the center station, so use the first one as a pattern for the second.

Assembling and Fairing the Mold

Use hot melt glue to position the stem molds on the centreline of the end station molds, screw together. Starting at one end, clamp the stations onto the strong back so the centrelines on the molds line up exactly with the centreline on the strong back. Check that the center lines on the mold stations are perpendicular to the base. Screw a baton on the top of the center station, check that the spacing between this station and the next is the same on the top and bottom. Screw in place.

When you have finished mounting the stations use a cedar strip as a baton to check for high and low spots. Moulds cut from paper patterns can have minor low and high spots due to paper instability and hand cutting. These can be evened out with a 30" fairing board made out of a 60 grit sanding belt and 1/4" plywood. Don't be too aggressive with the fairing board as this can change the shape of the canoe. Strips should only contact one edge of the mold stations.When finished, screw the molds in place and remove clamps.

If you are using CNC cut station molds, base, center lines and shapes will be exact so any low or high spots will be the result of not mounting the molds correctly on the strong back.

Take your time setting up and fairing the mold. If you have a funny looking mold you will have a funny looking boat.



Bending and Gluing the Stems

Materials

Plastic pipe (4 inches)	• Kettle (2)
• Rag	Large and Small clamps
Stem pieces	Packing tape or plastic
• Ероху	Colonial Silica or Arkthix
• 40 grit sandpaper	Brush for applying epoxy

Instructions

Make a steam box a foot longer than the stem pieces with 4" plastic pipe, set it on end over

the spout of a kettle. Put one set of stems at a time in the pipe, close the top with a rag. Steam for at least 1 hour. Pull the strips, stack, bend and clamp over the stem station. The wood will dry quickly when removed from the steam box, so have clamps ready and move fast. Leave clamped until dry, several hours, repeat for the other stem pieces.

A second kettle on standby helps in case the first runs dry!

Alternately seal one end of the pipe, insert the strips and pour boiling water into the pipe. Pull and bend after 2 hours.

Cover the stem mold with foil or packing tape to prevent sticking. Dense oily woods like ash do not glue well with epoxy, so sand the glue surfaces with 40 grit paper to rough it up. Brush a thin layer of unthickened mixed epoxy on the gluing surfaces, thicken the remaining mixed epoxy with colonial silica or Arkthix, brush on over the unthickened epoxy after about 10 minutes. Clamp in place over the stem mold. Do not over tighten the clamps as this will just squeeze out the adhesive. Have some small clamps ready to align the edges as the strips will slide around on wet epoxy. For soft woods such as pine or cedar just use thickened epoxy without the pre coat.

Tools

In addition to normal hand tools, the following will help get the job done:

Sander - Pretty much any sander except a belt sander will work, but you will be doing a lot of sanding, so a good sander will save time and help prevent backache. A 6" random orbit variable speed sander is standard in body shops, so a good selection of backing pads and papers are available. Try to get a medium backing pad with a wide tapered edge, as it will work for inside and outside curved surfaces. A soft interface pad will help when doing the finish sanding. Buy ALO lube body shop grade sandpaper, cheap paper will cost you more in the long run. See the fairing and sanding section for sanding tips.

Glue Gun - Get a variable temperature gun with a long tip, at lower temperature the glue will come out thicker and probably not burn your arm when it drips. Get the low tack sticks recommended for hobby/woodworking. Do a couple of test shots to make sure the glue

releases cleanly from the wood with a scraper or chisel.

Staple Gun - Recommend staple gun is an Arrow T-50 with 9/16 staples. Tape a piece of 1/16" cardboard or plastic to the bottom, just behind where the stable comes out. This will prevent the stable crown from digging into the wood and it will make it easier to remove with wire side cutters.



Clamps - Any small clamps you have will work, but one-handed ratchet and spring clamps are easiest to use for this project.

Scrapers - A straight edge for the outside. Curved edge shavehook or oval for the inside, to remove glue and high spots before sanding. Also have a fine file handy to keep the scrapers sharp.

Butt Joints

Butt 2 square-cut strips together in the cove of the last strip with Titebond glue. Put a clamp on the joint to keep it aligned. When you add the next strip on top, it will lock the joint in place. For faster stripping, put 2 drops of hot melt glue on a 2" piece of scrap strip, clamp on the back of the joint, and move on to the next strip. By the time you get back to the joint, you can remove



back together, you will have an exact match in color and grain. Anything under 7' 10" will ship at courier rates.

The cedar strips are just making a mold for the fiberglass skins. The fiberglass holds everything together and keeps the canoe shape so any length of strip, any kind of wood or even foam core will work. For a really light weight canoe try Corecell and carbon fiber.

the clamp. The backer strip will knock off with a chisel when you turn the hull. No need to join the strips before putting them on the mold.

If you are careful about matching the color of the wood at the joint, it will not be highly visible after fiberglass and varnish. Another option is to buy a full-length bundle of strips, we can cut the bundle into 2-3 shorter lengths. When you butt the strips



Stripping the Hull

Use metal foil or packing tape to cover the station mold edges. Do not use masking tape. Peel the tape off on the side facing the stems. This is where you will be tacking the strips to the

mold with hot melt glue. Use the glue on the side where the strip touches the mold. Do not fill the "V" on the other side as it will be harder to release when pulling the hull off the mold.

It is important that the first strip is full length in order to get a fair curve at the shear. Cut 45° angles on as many strips as necessary to get 2 full-length strips. Line the strips up on the edge of a bench to ensure they are straight. Glue and clamp the pieces together with a piece of wax paper underneath for release.



Use one staple to fasten the strip, cove side up, on the center station at the sheer. Allow the strip to follow a natural curve to the ends, fasten temporarily with spring clamps, measure up from the bottom of each stem to make sure the distances are equal. Staple or use hot glue to fasten this strip to the rest of the stations working out from the center. Do not force this strip to

follow the curve of the shear or the strip bend will be more extreme when you work up toward the bottom of the canoe. Fill any gap at the ends with shorter strips under the first strip.

For stapleless construction, cut 3" X 3" squares out of $\frac{1}{4}$ " plywood. Cut a $\frac{3}{6}$ " X 1 $\frac{1}{8}$ " slot $\frac{1}{2}$ " in from the one edge, cut a similar slot but $\frac{5}{6}$ " deep in the diagonally opposite corner. Round the inside corners of the slots slightly with a file.

Place the first short strip on the shear strip, mark the end inside the cove with a felt marker. Fill the cove with a thin bead of Titebond to the mark, seat the strip in the cove.





Place clamping jigs over the strip on the sides of the molds opposite the stem, press down into the lower strip cove and back into the mold, clamp in place. When the strip is seated and clamped, put one drop of hot melt glue in the corner on the back of the strip on the opposite side of the clamp.

Fit the next strip against the last, mark the end of this strip, and apply Titebond to the strip ends and cove. Clamp this strip with the clamping jigs, tap the end of this strip to seat into the joint. Use a damp cloth to remove excess Titebond. Clamp over the joint, covering the joint and some of the lower strip. Try to stagger joints so that you don't have one directly over another and at least 3" away from a mold station.



To start the next row of strips, remove the clamps at the end where you started, checking to make sure that the strip is tight to the mold. The hot glue takes about 10 minutes to dry hard. If you want to remove the clamp from the butt joint before the Titebond dries, put 2 drops of hot glue on a 2" piece of strip,

clamp behind the joint slightly overlapping the lower strip. You can also use this method if the strips do not want to align between stations. This will release cleanly with a chisel when you remove the canoe from the mold.

When you get up to the bottom of the canoe, the strip bend will be more severe and the hot melt glue may not be strong enough to hold the strip to the station mold.

One way to deal with this is to use a heat gun to pre-bend the strips. Clamp the strip at 2 stations where there is moderate bend. Use a clamp for a handle on the loose end. Heat, twist and bend to get the approximate shape needed. This works reasonably well on White Cedar and lighter Red, not so much on dark Red. If you have to really muscle the strips to get the bend you may have to use 2 or 3 at a time and leave them clamped until the Titebond dries. Another way to do the bottom is run straight strips out from the centerline of the mold

stations. This avoids a lot of the heavy bending particularly with shorter Canoes and Kayaks.

Fairing and Sanding

After finishing the planking, use a sharp, straight blade scraper to remove any glue or



sharp edges on the outside of the canoe. Alternatively, use a fairing board and 60 and 80 grit paper to level everything out. As mentioned in the TOOLS section, a 5" or 6" random orbit variable speed sander is best for this job. Do not use a belt sander.

For the initial rough sanding on the outside of the canoe, use 80 grit paper with a medium pad. Do not use the soft pad as the paper will just go over high spots instead of sanding them flat. The goal is to get everything to the same level, with no high or low spots. Keep the sander flat when sanding the outside of the hull to avoid creating divots. Move the sander in a circular motion and keep moving, do not stop in one place. Using the sander at a lower speed will give you more control. Use your hand to feel for bumps and dips. If the molds were set up properly,



there should not be any major highs or lows, but you can check this with the fairing baton.

When the outside is sanded fair and everything is smooth, fill any large gaps. Thin, shallow gaps between strips do not need to be filled, as these will be filled with resin when you do the fiberglass.

Cut a ³/₄" strip from a plastic body filler spreader. Add enough colloidal silica to 2 or 3 ounces of mixed epoxy so it will not run out of a gap. Add a small quantity of sanding dust to the mix for color. For white or light-coloured cedar, no added color is necessary. The color will be

darker when the epoxy dries. Use the ³/₄" spreader to fill larger gaps, scrape off any excess. If you have a lot of gaps or really enjoy sanding, use a wider, flexible spreader to fill the entire hull. When dry, sand with 80 grit to remove all surface epoxy. Finish with 220 grit and the soft interface pad if you have one.

Staining

Stain can be used to even out wood color, change it, or cover blemishes. Mohawk Ultra Stain is an alcohol-based wood stain available in a variety of colors, it works well under epoxy, and will not raise the grain like water-based stains. Do not use oil-based stains with epoxy. Fill, fair, and sand the hull to 220 grit, ensuring that all gaps between strips are filled, as the stain may not fill deeper voids. Remove dust with a vacuum and tack cloth. Do not wipe down with any liquid.

Wet a balled-up clean cotton cloth with the stain. Rub vertically then horizontally starting at one end, rewet the cloth as necessary. Try to avoid overlapping as much as possible. When dry, the color may appear uneven. This can be somewhat evened out by rubbing with a 3M Blending pad. A second coat will further even out the color. Subsequent coats will progressively darken the color. Starting with a light color Mohawk Stain such as Light Golden Oak or 'Light Red Mahogany' will allow you to darken gradually by adding more coats.

When finished staining, scrub with the blending paid, wipe down with a dry cotton cloth, and apply fiberglass directly over the stain. Do not allow water or solvent to touch the stain. I once ruined a perfect stain job on a 40' sailboat deck with a drop of sweat. This also applies to epoxy.

Making a test panel out of leftover strips will give you a guide on what the canoe will look like and the number of coats required.

Epoxy doo's and donut's

• Always measure epoxy accurately, don't guess. Graduated containers are faster and more accurate than pumps for mixing larger quantities.



- Avoid using epoxy below 10°C/50°F or above 30 C/90°F. Ideal working temperature is 20°C/70°F.
- Do not heat the epoxy, this will shorten pot life and make it very difficult to predict working time.
- Do not use epoxy and fiberglass when it is raining, even inside unless it is a heated shop. High humidity can cause epoxy blush and outgassing from the wood.
- Do not use epoxy 3 hours before sunset unless you are in a closed-in area. Dew will cause epoxy to blush.
- Do not use epoxy in direct sunlight.
- Do not continue using epoxy that is starting to gel or is getting warm.
- Clean up epoxy runs before it cures. It's a lot harder after.
- Wear gloves, removing wet epoxy usually requires Acetone. Cured epoxy comes off with your skin.
- Allergic reactions to epoxy are rare, but if you get a rash or have problems breathing, wear a carbon filter mask and cover exposed skin.

Fiberglassing

This ain't rocket science, the secret to successful fiberglass is organization. Have all the tools and supplies at hand. Have a plan!

If you want to apply a sealer coat of epoxy, just roll a thin coat with a 4" low pile foam roller, allow it to dry, and sand with 80 grit before fiberglassing. This step is not necessary as long as you follow the instructions below, but if you like sanding, go for it. Do not put fiberglass over wet or tacky resin as you will not be able to move the glass around to remove wrinkles.

The surface should be sanded to 220 grit. Vacuum the hull or wipe with a clean dry cloth to remove dust; do not wipe down with any kind of solvent or water. Cut 4 pieces of fiberglass on the bias, 4" wide, and a few inches longer than the canoe stem. These will cover the inside and outside stems.

Unroll the glass down the center of the canoe so it drapes evenly on both sides and at least 3" beyond both ends of the canoe. Use your hands to gently smooth the cloth from the center to

the ends; do not pull as it can separate the weave, which may show in the final finish. There may be some pleats down the sides, these will be worked out as resin is applied.



It is best to start in the morning as you will want to apply 3 coats of epoxy, one to wet out the fiberglass and 2 more to cover the weave. If you only do one coat, you will have to sand the next day, and the glass weave may show when you recoat.

Depending on temperature, you will have 10 to 20 minutes of pot life. This can be extended by pouring the mixed epoxy into a paint tray. Once spread on the fiberglass, you will have up to 1 hour before it starts to gel. If you have a helper, appoint them the designated mixer so you have freshly mixed epoxy when you need it, and someone to blame if it does not kick off. Start out with about 12 ounces and mix more as needed. If the mixed epoxy starts to gel or becomes warm, chuck it. **DO NOT** continue using epoxy that has already started to kick off.

Start in the middle of the canoe and work to one end. Use a 2" or 3" chip brush, start applying epoxy from the top and one side for 3 ' or 4' toward one end. Use one hand to smooth the dry cloth before wetting it out. Use a flexible plastic squeegee to move extra epoxy toward dry glass and fill dry spots. Apply enough pressure to move the epoxy, so there are no wet spots, but not so much that you are dragging epoxy out of the weave. If you can see white fiberglass, it is too dry. Go to the other side of the canoe and repeat until you get to the end.

Use scissors to cut the glass down the center to where the stem starts at the bottom. Pull one side of the glass over the stem, trim it flush, repeat for the other side. Do not take a beer break yet! Go back to the middle and finish the other end before the epoxy starts to gel. Add the bias-cut pieces over the stems by draping them from the deck up toward the bottom so the

glass is even on both sides. Use a dry brush to smooth the dry glass over the wet then add extra resin as needed. If you mess up and get wrinkles, don't try to fix it. Chuck the piece, smooth the wet glass, and try another piece. Beer now!.

When the first coat of epoxy starts to gel (roughly 2-3 hours), roll on another coat of epoxy, and repeat once more. When the epoxy/glass gets rubbery, you can trim the cloth overhang along the sheer with a razor knife. The next day, sand with a random orbit sander and 80 grit sandpaper. Epoxy gets harder with age, so it's best to do the initial sanding as soon as possible. Finish with 220 grit.

Turning the Hull

Before removing the hull from the mold, mark both sides of the center mold at the shear, and do the same for the second mold on either side of the center mold. The marks will be used to position spacers when the inside glass is done. Run the sander with 80 grit along the bottom edge of the first strip to remove the fiberglass sharp edges. If you are using hot glue to tack the strips to the stations, tap next to the molds with a rubber mallet to release the cedar strips

from the mold stations. Remove the first 1 or 2 stations from the inside if necessary. The hull at this point will be floppy but will be rigid when the inside is fiberglassed. Support the canoe right side up so it does not rock.

Use a chisel to knock off any backing pieces, and a curved scraper to remove glue. Use the random orbit sander with the medium pad and 80 grit to bring everything to the same level.



Keep the sander flat when possible but you will have to tip it on edge to get into turn of the



bilge. Be careful, the sander will cut faster on an angle. A safer alternative is to hand sand this area with a soft sanding block. Finish with 220 and the soft pad.

Cut a stick the exact width of the center station at the sheer and 2 more from the second molds over, put packing tape over the ends. Position the spacers at the shear of the canoe corresponding with the marks. Run a string line from end to end. Sight either side of the string to make sure everything is symmetrical, no twists. Remove the string and spacers. When you have finished the inside fiberglass, allow it to gel, but before it hardens, put the spacers back in so the canoe has the right shape when the epoxy cures.

Fiberglassing the Inside

Fill and sand gaps in the planking. Sand the shear and round the edges slightly so that dry fiberglass does not snag on the edge. Normally, only one coat of epoxy is used inside to leave a non-ski surface. Do not sand when cured, just scrub with clean water and a Scotchbrite pad before varnish is applied.

Fold the glass lengthwise and lay it in the bottom of the canoe, spreading it carefully towards the sides and ends. Place 4 or 5 small ziplock sandbags along the centerline to temporarily prevent the glass from sliding around. Spread the glass up the sides and over the shear, holding it in place with spring clamps or clothespins. Do not use tape as it will disturb the weave when removed. The glass should be slightly loose, ensuring there is enough where the bottom turns up into the sides.

Remove the sandbags then mix about 12 ounces of epoxy and pour a bead about 3' long down the center, being careful not to disturb the cloth. Spread it with a squeegee or brush toward the sides, smoothing wrinkles as you go. Mix another batch, use a brush to spread epoxy from the bottom up the sides. It works better if you brush at a 45° angle. Be careful not to lift the glass off at the turn of the bilge. Even out the resin with the squeegee.

At the end cut the remaining dry cloth down the middle, fold back one half, trim the other half with scissors so that it ends at the stem. Do the same for the other side. Install a piece of bias-cut glass so it overlaps the inside glass. When the resin gels, insert the spacers at the marks. You will have limited ability to change the shape when the resin cures.

Gunwales, Decks, and Seats

Gunwales can be either screwed or glued into place. Screwing gunwales allows you to remove the gunwale easily in case of damage, and gluing means you will probably never need to change them as there will be no weak spots caused by screw holes and no place for water to get in and cause rot.

To assemble scarfed gunwales from the shorty kits, cut 4 pieces of scrap lumber ³/₄" X ³/₄" about a foot long, and put packing tape on one side for release. Lay 3 gunwale pieces out on a flat surface, brush the joints with unthickened mixed epoxy, add Arkthix or Colloidal silica to the remaining epoxy. After about 10 minutes brush the thickened epoxy onto the joint. Assemble and clamp the joints with the scrap pieces on either side for support. You can clamp the joints without the support pieces, however, the extra pieces will guarantee proper alignment. Install the assembled gunwales on the canoe as normal.

Trim the outwales to length so they meet just past the ends of the canoe. Glue and clamp so the outwale is slightly lower than the sheer strip. If you do not have enough clamps, you can use screws from the inside. Remove screws and fill holes with epoxy before installing inwales. Mask the outside and inside of the hull about ¼" under the gunwales to catch runs. Remove excess epoxy, run your finger under the gunwales to make a small filet, and remove tape when the epoxy starts to get tacky. Trim the sheer strip so it is flush with the outwale. Dry fit the inwale to length shaping the ends to fit, and glue or screw flush with the outwale. Trim decks to fit and then glue in. Dry fit seats, yokes, and thwarts so they can be installed after the varnishing.

Varnishing

Epoxy will chalk and discolour after long exposure to the sun. You will need a minimum 3 coats of good UV Filter Marine Spar Varnish if the canoe is to be stored out of the sun, however, 5 or 6 coats would offer much better UV protection. Sand to 220 or 320 grit, vacuum dust, wipe down with a clean cotton cloth, dampened with water, allow to dry.

Dust is the enemy of a good varnish job. Vacuum dust from the area, wet down the floor with water for about 4 hours before varnishing, and if possible move the canoe away from the area where you were sanding. Wear a new paper suit with a hood or clean clothes, wipe down with a tack cloth just before varnishing. If you are working in a basement with limited air circulation, the varnish will take longer to dry and your wife is not going to be happy about the solvent smell. If you are outside, check the weather and finish your varnish job at least 3 hours before sunset. Do not apply epoxy or varnish in direct sun.

Apply varnish with a good brush in thin coats, cross brushing as you go. Use up to 5% thinner to help flow, do not over thin the first coats because you are going over epoxy, not bare wood. Most varnishes are 1 coat a day, sand with 220 or 320 grit between coats. This is because the first coats of Varnish over bare wood are used to fill the grain, no grain over epoxy so no need for all the sanding. Epifanes Wood Finish Gloss or Matt will allow one coat a day without sanding so you can skip 2 or 3 sanding sessions. Epifanes polyurethane and Bristol Finish Amber are UV resistant 2 part polyurethane clear coats that can be applied wet on wet up to 3 coats per day without sanding. They are also much harder than conventional varnish. The 2 parts apply well with a Euro type round end foam roller, tipped out with a foam brush.

Have fun and please send us photos of your creation!

