



Father and Son 101

Alex Zerphy steers while his father, Matt, casts for fish on Chesapeake Bay in their new sailing skiff, Odyssey, of their own design. The father-and-son project was as much a bonding experience as it was an experiment in boatbuilding.

A lack of experience didn't get in the way of this boatbuilding dream.

Boatbuilding is a test of Archimedes' Principle of buoyancy, but it also harnesses man's impulse to turn dreams into reality. For the father-and-son team of Matt and Alex Zerphy, the process of designing and building their first boat became much more than a self-guided excursion into Woodshop 101. The experience turned into a total immersion in a process filled with challenges and rewards, and as 12-year-old Alex put it: "The best part about building our sailboat was being with my dad!"

Matt, an ex-nuclear submarine officer with a degree in physics and no formal shipwright training whatsoever, teamed up with his son and turned their garage and a few handheld power tools into a makeshift boat shop. Perhaps the most impressive fact is that the Z&S (Zerphy and Son) team made their first cut on April 5 and launched their boat on June 15—of the same year! This despite the fact that Matt has a full-time career, and Alex couldn't dodge the homework requirements that come with being a full-

time student.

Unlike many boatbuilding projects, this one began without any plans. Matt and Alex developed the lines of their sailing skiff, and transferred them onto large sheets of 3/8-inch Sapele and Okoume plywood. Merging their own ideas with pictures of similar designs, they created a cardboard scale model of their versatile sailing skiff. Their intention was to create a boat that was easy to row and could double as a skiff for father-and-son fishing trips.

During the design process, the would-be naval architects scaled their model to match Alex's action figures, Darth Vader and Luke Skywalker. The plan was to use the figures to analyze rowing thwart positions, mast-step location, and centerboard slot, as well as the positioning to develop the sailplan and sheet-lead details. The Star Wars surrogates fit the model well, and made ergonomic simulation part of the design development process. Fortunately for the project, Matt and Alex got along much better than the father and son action figures.



Alex (left) and Matt set out in their newly constructed boat for an inaugural fishing trip. From paper design to floating reality, the entire project took less than 60 days. The boat was launched just in time to celebrate Father's Day.

IN THE GARAGE

By opting for a hard chine stitch-and-glue approach to boatbuilding, many arduous labor hours were removed from the equation. To ensure that the flat plywood hull bottom would have a symmetrical shape, the two used a simple curved template that could be flopped over to draw the cutting lines. One side of the hull bottom was traced, the template was flopped, and then the other side was traced.

Two wooden horses acted as the strong back (support for the hull), and by weighting the flat ply bottom in the middle, a desired amount of rocker was induced into the hull shape. The bottom and each side of the hull required two lengths of plywood, and these were joined with a screwed and glued butt block. Matt decided to use a butt joint instead of a scarf because it is a reliable joint that is easier for the novice builder.

The butt joints stiffened the hull slightly near the joint, but this was not a problem because the joints were deliberately located at nearly flat hull sections, not near the point of maximum beam where radius changes are more abrupt and the extra stiffness would have affected the curve. Though less high-tech than a scarf, the butt block joint was made with epoxy and offers the novice builder a durable and easy method to join a plank, strake, or panel. And by picking compatible grain patterns to join, the end result is quite acceptable.

The building technique that the Z&S team used is commonly referred to as “stitch and glue.” Using clamps for support, the Z&S team drilled holes diagonally through the bottom and side skins of the boat, and then used copper wire stitches to temporarily secure the plywood sheets. With neither a jig nor a strongback to stiffen the assembled parts, there’s a tendency for the evolving structure to twist on the centerline axis, and care must be taken to maintain its bilateral symmetry. Extra clamps can help tame the twist, and temporary athwartship members can be placed to coax the bottom and sides into the desired shape. Later in



1. Matt (left) and Alex (right) place the transom to be “stitched.”

2. With pre-cut fiberglass cloth tape ready, joints are puttied and the wires are tightened. The cloth is applied to the panel joints before the putty cures.

3. Epoxy resin is used to apply the cloth tape over the puttied panel joints.

the building process, laminated strips along the gunwale added more stiffness to the shape.

Once the sides, bottom, and transom had been wire-twisted (stitched) together and coaxed into symmetry, an epoxy filleting paste was mixed and applied to all the seams connecting them. Care was taken to maintain as smooth and even of a radius as possible.

The putty used began life as a batch of carefully measured and mixed resin. The mixture was dosed with a filleting blend of powder that thickens the resin to a sticky peanut butter-like consistency. By going slowly and lavishing careful attention to detail, Matt kept the putty where it belonged. His cosmetic approach to controlling the “bead” resulted in a smooth, uniform fillet, that when com-

bined with fiberglass tape, stiffened the assembly of large flat surfaces, turning them into the nucleus of a boat.

Matt decided to apply the fiberglass tape before the filleting putty had cured. Structurally speaking, this layer of fiberglass tape, bonded completely with the epoxy paste, helping to turn the sides, bottom, and transom into a one-piece monocoque hull. Once the fiberglass “tabbing” cured, athwartship members were bonded to support the rowing thwart, and the gunwales were glued in place adding additional support to the structure.

Soon, the skiff was ready to be turned over and have the exposed twisted copper wire stitches clipped, the chines slightly beveled and sanded smooth. Next a layer of fiberglass boat cloth was



1



2



3



4



5

1. Athwartship panels are tabbed into place to provide stiffness.

2. A scrap piece of 1" x 1" serves as an effective guide when drilling holes for pintles in the rudder.

3. Alex proudly displays two oversized sweeps that will provide horsepower.

4. The hull is inverted, the seams are faired, and the hull's exterior is sealed with fiberglass cloth and epoxy.

5. Coins are sealed in the mast step for good luck.

carefully bonded to the hull, using epoxy resin and a combination of roller, brush, and squeegee for the application process. The plywood was effectively encapsulated under the fiber-reinforced plastic (FRP) skin. By eliminating as much air bubble and void content as possible, the ability to maintain a bright finish was preserved.

The Z&S crew discovered that epoxy resin is a magnificent adhesive but a difficult material to control on a vertical surface. Matt, like every modern boatbuilder, quickly learned that it's much better to carefully control and spread resin during the layup process rather than slathering it on and later having to sand off all the hangs, beads, and curtains once it has turned rock solid.

Matt and Alex did a fine job coping with the art of epoxy application, but even so, they discovered how much time can be spent with a long-board, leveling the finish the old fashioned way. He and Alex wanted the satisfaction of building a boat with a bright finish. A light colored enamel might have reduced some of the time spent on cosmetics, but if you enjoy the process, why skimp on the fun?

CONCLUSION

Sharing the boatbuilding process with a child or a grandchild is like passing along an important piece of family

history. For many sailors, boatbuilding can be the ultimate do-it-yourself project. The skills derived pay off as extra dividends when it comes to repairs or fitting out projects aboard larger sailboats. The structural skills acquired while gluing, bonding, and laminating can be transferred to larger or smaller projects, and the best way to develop finishing skills is to practice on smaller surfaces such as a sailing dinghy or kayak.

The investment in power tools need only be minimal. Even with just an electric drill, saber saw, belt and orbital sanders, and a circular saw, you'll be ready for action. A simple array of hand tools will round out the shop needs: a couple of hand saws, a few chisels and a wet stone, a block plane, and a homeowner's tool box with a hammer, pliers, and screwdrivers will do. Clamps are always in too short supply, but creativity usually comes to the rescue.

If your first project intensifies the boatbuilding bug, there are catalog collections of designer-like hand tools, cordless wonders, and table saws that can increase your capability. A fringe benefit of the backyard boatyard is the new fleet of little boats that take shape, just the kind of craft that can interest kids in "messing around in boats" and perhaps help to keep a family sailing tradition alive. ▲

Kits, Bits, and Finish

Start from scratch or invest in a kit? The choice is yours.

Not quite ready to start a build-a-boat project from scratch? Chesapeake Light Craft has refined stitch-and-glue boatbuilding by offering complete ready-to-assemble kits. Each kit includes computer-cut plywood components, hardware, and all the other bits and pieces needed. The company is a one-stop source for plans, wood, resin, paint, tools, and technical advice. For the first time, boatbuilder CLC's support is as much a source of learning as it is materials.

CLC's well-illustrated step-by-step guides, plus classes for those interested in a hands-on learning experience, help novices quickly acquire key boatbuilding skills. At a recent Annapolis Boat Show, a CLC staffer quickly and efficiently assembled one of their multi-chine *Passagemaker* dinghies while attendees looked on. He demonstrated how to bend in the pre-cut panels, clamp them in place, and then secure them with drilled leads for the copper wire stitching that was twisted tight with a simple pair of pliers.

By alternating from side to side, he kept the hull from twisting out of shape, and once the wired seams had been filleted with a thick epoxy paste that was spread smooth with a tongue depressor, the geometry of the multiple strakes added considerable stiffness to the pram.

In addition to precut wood and clear instructions, CLC kits include the small hardware items that can be time-consuming to find or fabricate. Kits are more costly than buying plans and materials on your own, but the time savings derived from getting precut pieces can be worth the extra investment.

OTHER OPTIONS

Strip planking or lapstrake (clinker) construction is another building technique that is worth considering. It involves first building a jig or frame like structure over which each plank or strake will be bent into shape and fastened or epoxy glued. The jig can be used numerous times, and when multiple hulls are to be built, such

an approach makes even more sense. One of the values of this approach to boatbuilding is that it allows for a hull shape with a more rounded bilge. The downside is that the approach incorporates many more pieces, requiring additional time in order to maintain quality control in the fabrication process.

One of the most interesting approaches is found in the renaissance of wooden river craft such as the boats built by The Adirondack Guide Boat Co., a team of gifted boatbuilders who have worked to keep the legacy of J. Henry Rushton and Dwight Grant alive. Their guide boats can be rowed, paddled, or sailed, and the modern renditions of these century-plus-old craft are truly works of art. Not surprisingly, their price tag is commensurate with the workmanship.

Fortunately, the crew at Adirondack Guide Boats also recognizes the kit builders market and offers a \$3,500 DIY alternative to their \$15,000 15-footer. They also recognize the attributes of modern materials and offer a line of wood-trimmed molded fiberglass/Kevlar versions of their popular designs.

Regardless of the approach chosen, the amateur boatbuilder will learn the golden rules of epoxy bonding:

- Careful attention to detail trumps sanding rock-hard epoxy.
 - Mating surfaces should be clean, dry and well sanded.
 - Take a chemistry lab approach to measuring and mixing epoxy.
 - Protect eyes and hands, and leave no exposed skin.
 - Coat both surfaces and use a bonding filler not a fairing filler for filleting the seams.
 - Clamp, screw, stitch (tighten until an even bead of epoxy appears).
 - Do not over squeeze the joint (too little epoxy adds up to a weak joint)
 - Scrape off and wipe up excess epoxy (saves much sanding of cured epoxy).
 - Mix smaller batches of epoxy for greater control.
- Varnishing FRP-covered plywood re-



Precut strakes on a Chesapeake Light Craft are stitched together for bonding.

quires special attention. Extra care needs to be taken to keep gravity from having its way with excess resin.

A handy technique is to apply a carefully squeegeed laminating coat of epoxy resin, and after it has hardened and been scuffed with 80-grit sandpaper, apply a "fill" coat, taking care to keep it well spread and distributed evenly. When cured, the entire surface is sanded (80-120-150 grits) being careful not to cut the fiberglass cloth. If the cloth is damaged, it should be spot repaired with epoxy resin.

After the sanding is complete, it's time for several coats of varnish with good UV protection.

The bottom line is that epoxy is a miraculous adhesive and a superb laminating resin, but it's extremely vulnerable to UV degradation and on clear finishes, a spar varnish or polyurethane with good UV protection is essential.

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