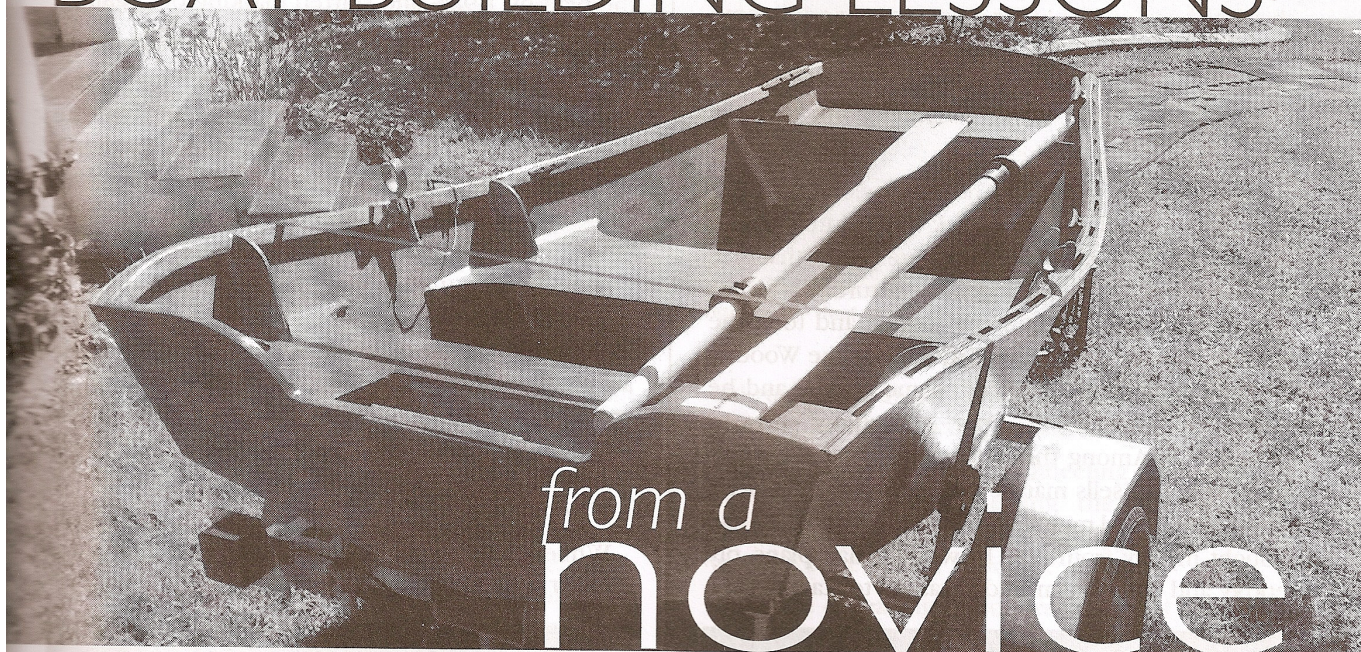


BOAT BUILDING LESSONS



from a
novice

THIS IS NEITHER INSTRUCTION NOR ADVICE. IT IS SIMPLY A LIST OF THE LESSONS I LEARNT from building my first boat. Some people will scoff at my ignorance, others will insist that I would know better if I read the instructions. I wrote down my lessons so I wouldn't forget them, and I offer them to other novices so that they won't be as much of a novice as I was.

by ALLAN CHARLTON

MY WIFE AND I DECIDED THAT WE'D like a trailer sailer. Something large enough for us to sleep in for one or maybe two nights, and small enough to tow to the many fabulous waterways in this country. Sort of like a caravan that floats. We'd also like it to be big enough to occasionally take our kids and their kids out for a day sail (though not all at once, of course).

After a few months of shopping around we decided that maybe we'd prefer to build one. That way it could be wood, our preferred material, and reasonably modern. But can we do it? My basic woodworking skills are probably adequate, but the backyards of this country are littered with failed

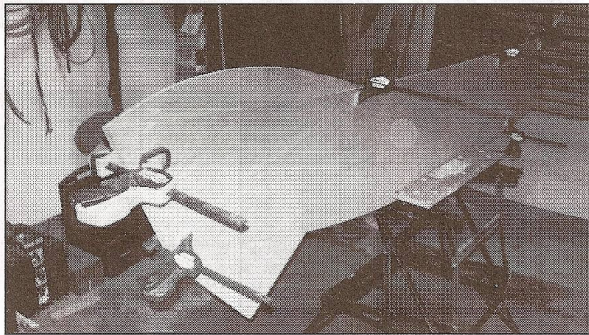
boatbuilding projects and I don't want to add another one. Maybe the stitch-and-glue technique would make boatbuilding simple enough for me. If so, a NIS23 would be perfect for us.

Lady Luck stepped in. The Sydney Heritage Fleet called for volunteers to compete in a Quick and Dirty Boatbuilding Competition in the 2008 Wooden Boat Festival so I put up my hand. Surely there will be a big crew and I can learn from them. There was a small crew, and I was in it. It gave me a very fast training course in stitch-and-glue and since we won the competition, I felt a bit more capable of taking on a small boatbuilding project.

I decided I should start by building a little pram dinghy, so I can learn a little more and get some experience before I commit myself to a couple of years of insanity. My wife agreed. Even if the project does no more than prove that I should stay away from boatbuilding, it's a good thing to do.

I went shopping for plans for a reasonably pretty pram dinghy of about eight feet, of stitch-and-glue construction. There are dozens available on the internet, of varying sizes and shapes. I bought three plans, and together we chose one from an American supplier. It's pretty, it is a recent version of a plan that has been available for many years, and it came from a large website, which I took to be an indicator of a large and therefore reliable design firm. What's more, they provided some how-to information by download.

Next, I needed materials. The plan specified 1220 x 2440 marine ply, so I went back to the internet and found a supplier advertising marine ply in that size quite close to my home. The next Saturday we paid them a visit, gave them some money, and took the ply home. I had met Dave Giddings at the Wooden Boat Show, where I gave him some money, and he delivered some Bote Cote and more how-to information. Among that information was the news that Dave also sells marine ply, and as you will see I could have saved myself considerable trouble if I had bought my ply from him. However, I had plans, ply, epoxy and enthusiasm, and I was set to start work.



Even though I checked carefully as I worked, it was soon obvious ...

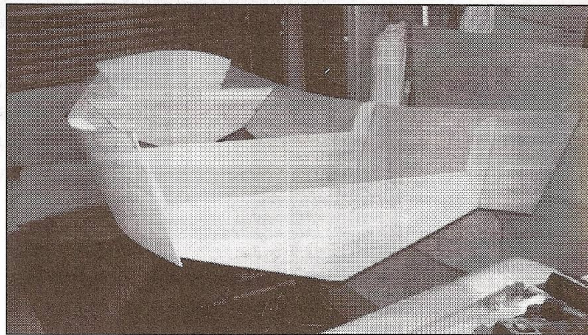
I started marking out the panels on the plywood and discovered that the plywood is not the size advertised on the website. It's 1200 x 2400, a tad under the promised size. I sent an email to the supplier, politely suggesting that he fix his website, but I didn't get a reply. I adjusted the dimensions on the plan by 1.98% and started marking out again.

Lesson 1: Carefully check the materials. Don't assume that what you get is what you asked for.

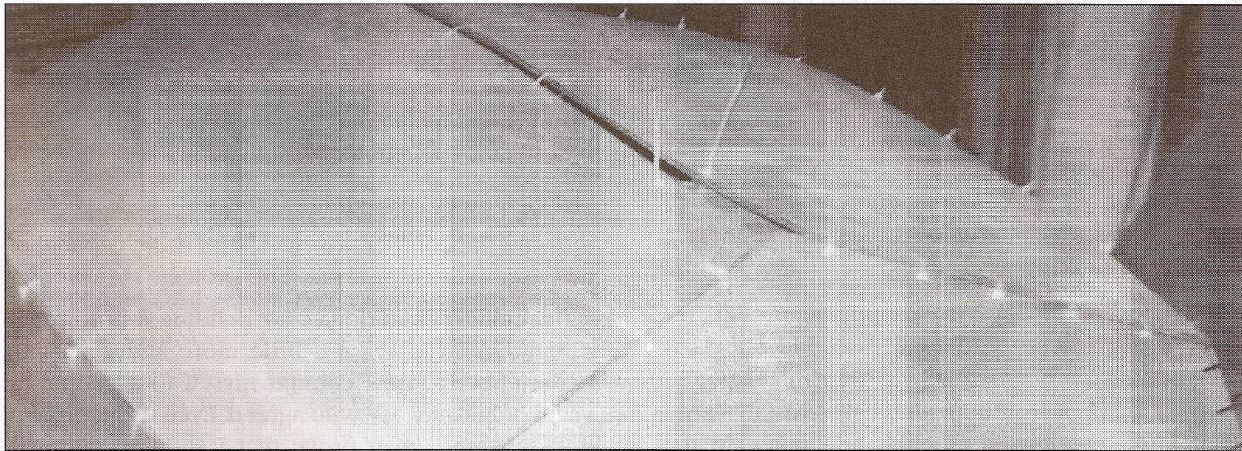
Having adjusted the plan so it would fit the plywood, I cut out the parts and found they didn't fit together as the plans said they would. I checked my measuring and cutting and sure enough, there are errors in the plans.

Lesson 2: Before you make a mark on that beautiful plywood, scale down your plans and make a model out of balsa or cardboard. If there's an error in the plans, the model will find it. The model does not have to be big or detailed, but it should be big enough to show up any problems. When the project is over, your children will have a toy to play with. I should have built a 1:5 model.

While I was struggling with that issue the little copper wire stitches kept breaking, so I re-stitched



... that the components would not fit properly.



A fault typical of following the plans without checking; the bottom panels did not meet at the transom. I chose to correct the error by flattening the transom a little rather than make it narrower.

it with nylon cable ties. I decided the white ones are a better choice than the black ones because they are closer to the colour of the epoxy.

Lesson 3: If you decide to use cable ties, use good quality ones. Cheap ones might be okay for holding wires in a bunch, but on boat panels they unzip themselves and cause more trouble than they're worth.

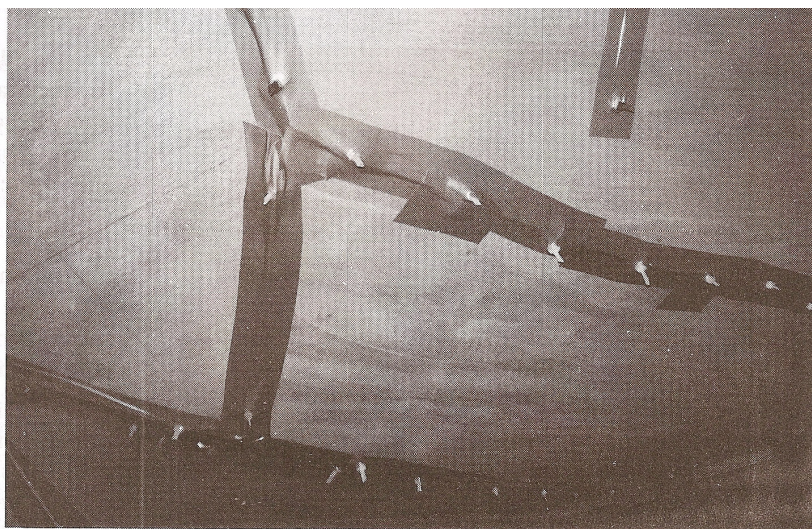
The next task was to tape the outside of the panel joints to catch leaks when the epoxy goes on. The tape to use is duct tape - heavy PVC tape about 50mm wide. It stretches like insulating tape, but sticks better, and it's cheap; mine cost only \$4.60 a roll, and I only needed about half a roll.

Lesson 4: Some hardware suppliers don't know the difference between duct tape and gaffer tape. Although gaffer tape is wonderful stuff, the reinforcing is a nuisance on curved seams. Duct tape is better in this application, and is less than half the price of gaffer tape.

So at last the little beast was all stitched together and ready for epoxy fillets. Dave Giddings had suggested that I paint the seam areas with epoxy first, then apply the fillets while the painted-on epoxy is still wet. The reasoning is that the unthickened epoxy will bond to the ply, and the thickened epoxy in the fillet will bond to the unthickened epoxy and provided that it all goes together wet-on-wet, it works like a charm. Dave also advised me to mix the epoxy in small batches so you're not hurrying to get a big job done before the pot goes hard. This was good advice for what is, after all, a training exercise.

Lesson 5: Work on small areas, one at a time, and be patient. And when you have finished each small section, walk away from it and let the epoxy cure. It sets in a few hours, but full curing takes longer, depending on the weather.

Almost every seam was awkward because it was at an awkward angle, or it was a long reach, or something. Because the boat has some vee in its bottom I put the boat on the floor to make it reasonably stable while I worked, but crouching and kneeling was not comfortable, in spite of the



When you get the right tape - duct tape - it works very well.

old rug on the floor. I modified some sawhorses to lift the project to a comfortable height.

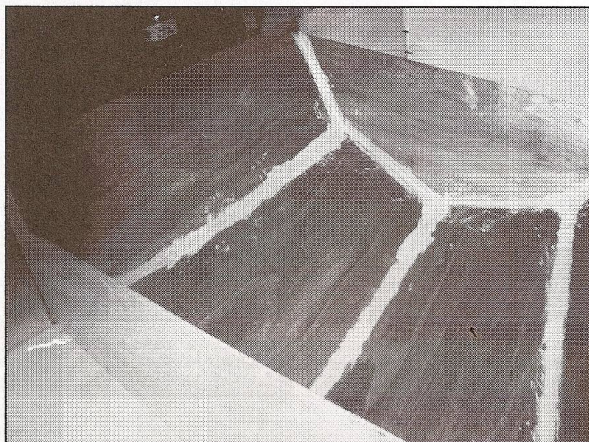
Lesson 6: Bending and kneeling takes the fun out of the project. Getting the job up to a comfortable height was well worth the effort. How would I cope with a 23 footer?

In spite of leaving the doors open and running a fan, my garage became quite stuffy after an hour or two. Working in there on a hot summer's day was uncomfortable.

Lesson 7: Although epoxy is not harmful to most people, that is not the only reason for good ventilation. You will sweat a lot, and your sweat will ruin wet epoxy. Ventilate your work area to give yourself some comfort and improve your quality control. And keep plenty of cold water on hand to rehydrate yourself and lower your core temperature.

So what is the best method for actually putting the thickened epoxy into the joints? I tried spooning it in with a tongue depressor (Dave supplied some with the Bote Cote) and I made a horrible mess. Next time I loaded it into a zip-top sandwich bag, cut the corner off, and piped the epoxy onto the seam just like piping icing onto a cake. It was easier and tidier, but still messy. I thickened my next batch a bit more and my next seams were still not good, but there was obvious improvement.

Lesson 8: When the instructions say to mix epoxy to the consistency of peanut butter they don't mean honey. Thicken the mix properly, but don't despair if you don't get it right first time. It will still do the job, but you will have more cleaning



My early attempts at working filled epoxy were not good. After some practice my work improved dramatically.

up to do. Be patient. This isn't rocket science, but it takes practice to get it right.

I have to say that epoxy can be the messiest brew I have worked with since finger painting in primary school. I learnt to wear disposable gloves and clothes that I could afford to throw away, and I put a big sheet of plastic under the boat. The end of a tongue depressor is just the right diameter for shaping the fillet, but I also tried a teaspoon – not the family silver, but cheap stainless steel ones from a supermarket. Plastic ones would probably be good, but my stainless steel ones fit the hand well and at 40c each they were not expensive. I also tried letting the mess settle for a while, then going back and smoothing the seams with a teaspoon dipped in acetone. That method won't suit everyone, but it helped tidy up a couple of my seams. With time and practice, my application technique improved.

The next job was to put fibreglass tape over the filleted joints, but before I could do that I had to let the epoxy cure properly and sand it smooth. That is when I discovered that you can't sand epoxy the way you would sand automotive body filler. Fully cured epoxy is very hard, and I used my random orbital sander with coarse sanding discs. I also bought a detail sander for getting into tight corners.

Lesson 9: Don't try to sand epoxy by hand, and don't use your chisels or plane on it unless you really enjoy sharpening them. Get a good random orbital sander and make friends with it.

I started to add up the cost. Including the oars, rowlocks and other hardware, I had spent \$1045.37. The weekend before I started on this project I saw a little fibreglass pram dinghy with oars for \$600 and an eight-foot inflatable for about \$1100. I reasoned that the difference between the cheap fibreglass boat and my \$1045.37 was the price of the training I'm getting from my project. Training is expensive no matter how it comes, and I'm sure that the training that my project was giving me could cost much more and still be good value.

By this time I had stripped the duct tape from the seams, cut away the protruding bits of the nylon cable ties and put thickened epoxy in the few places where it hadn't penetrated the joints properly. I now had a distinctly boat-shaped object that I could put in the water and it wouldn't sink. I got on with the sanding.

Lesson 10: Sanding is the worst part of building a boat, for three reasons. First, it's noisy and tiring. Second, you sweat a lot. Third, you and everything around you is covered in dust. It is essential that you attend to your ventilation and wear a dust mask. Take frequent breaks and drink lots of water. Although my two orbital sanders have dust bags, my faithful old vacuum cleaner was kept very busy. The good news is that as your skills improve you do less sanding.

When I finally finished sanding I started taping the inside joints, working on small sections. I cut the fibreglass tape to length for each of the joints I'd tape today, then mix the epoxy, apply a coat, lay down a length of tape, then wet the tape fully with a sort of gentle stippling motion. Wetting out the fibreglass tape by brushing did not work well for me because the tape moved. Later, I found more improvement by setting the tape properly into the wetted surface by hand and then wetting out with the brush. The stippling action helped me control the amount of epoxy (so it doesn't run everywhere) and enabled me to ease the tape into shape, but as I worked my brushing technique improved. Thirty eight millimetre brushes worked well for me until I realised how much better it is to use a roller.

Lesson 11: Even simple things can take time to learn, especially when the instructions apply to easy-to-reach flat sections and my boat is an awkward shape with no flat seams.

One day when sanding some fibreglass seams I covered myself in dust. I vacuumed the boat, then brushed the dust off my arms. It gave me a sharp

tingling sensation, and that's when I realised I was brushing tiny splinters into my skin. Just as well I was wearing a dust mask over my mouth and nose!

Lesson 12: Wash the dust off your skin. Better still, wear long pants and long sleeves, make sure you wear a dust mask and safety glasses, and take a shower immediately afterwards.

With the inside of the boat more or less complete, I turned it over to fibreglass the outside of the hull. I was impressed by how light the boat is. I put a layer of fibreglass cloth over the port side of the bottom and the side, overlapping the keel and the transoms for extra strength and the next day I was dismayed to find that my brush strokes are nowhere near as good as I thought they were. Sanding it smooth would take a lot of work. When I glassed the starboard side I put the epoxy on with a paint roller, laid the fibreglass cloth by hand, then wet it out with a special little ribbed metal roller that Dave Giddings had supplied.

Lesson 13: Unless you really enjoy sanding, use a roller to spread the epoxy and use that special little ribbed metal roller to wet out the fibreglass cloth and work it into shape. It's faster, easier,

generates less sweat, and leaves a better surface. It's a much better way to work.

The latter parts of this project were during the summer of 2009, during which some of my weekends were in the high 30s and low 40s. The day I brushed the epoxy onto the port side of the boat's bottom was particularly hot, and the epoxy pot life was very short. When I did the starboard side I put the epoxy hardener (not the resin) in the refrigerator overnight, thinking that the epoxy/hardener mixture would be a sensible temperature and improve the pot life. I was right. I didn't put the epoxy resin in the refrigerator because I read a warning that epoxy resin will granulate when it gets cold, and you restore it by warming it. On a hot day, that's a hassle I can do without.

Lesson 14: If you are expecting hot weather, cool the hardener in the refrigerator (not the freezer!).

With the bottom glassed, sanded and coated with resin, I turned the boat over again and got stuck into the fiddly bits inside. I tried another of Dave Gidding's suggestions and masked the joints with

BoatCraft Pacific

for
boatbuilding
materials

BEST PRODUCTS / BEST ADVICE / BEST VALUE

• Bote-Cote Marine Epoxy System • Epox-E-Glue • Purbond Singlepack Waterproof Adhesive • Cop-R-Bote Long Life Antifouling
• Aquacote Water Based High Performance Two Pack Epoxy and Polyurethane Boat Paints • Fibreglass and Carbon Reinforcements
• Silicone Bronze Bolts, Nails, Screws, Cu Nails Roves • Davey Bronze Boat Fittings • 304 & 316 Stainless Screws • Nidaplas and Coretech Composite Panels • Marine Plywoods • Canoe and Dinghy Precut Kits • Bote-Wood Kiri, WRC, Australian Cedar, Hoop Pine • Plans, Books, Periodicals

Buy Direct and Save from BoatCraft Major Distributors

BoatCraft Pacific : 46 Chetwynd St, Loganholme, Qld p: 07 3806 1944

Drive Marine Services : Sydney, NSW p: 02 9533 5470

Trend Timbers : Windsor, NSW p: 02 4577 5277

The Yacht Shop : Warrawong, NSW p: 02 4276 4220

Marine Timbers : 10 Rutherford St, Seaford, Melbourne, Vic p: 03 9775 0006

McDonald Marine : Melbourne, Vic p: 03 9696 5211

Frecheville-Heaney : Paynesville, Vic p: 03 5156 7085

Sails by Prior : Townsville, Qld p: 07 4772 7354

Cairns Coatings : Cairns, Qld p: 07 4041 3311

Plywood Plus : Hobart, Tas p: 03 6267 1434

The Fibreglass Shop : Hobart, Tas p: 03 6234 2689

Duck Flat Wooden Boats : Mt Barker, SA p: 08 8391 3988

Binks Marine : Somerton Park, Adelaide, SA p: 08 8294 6211

CaptSturtBoatSupplies : Goolwa, SA p: 08 8555 5150

NISboats : Mt Barker, SA 5251 p: 08 8391 3705

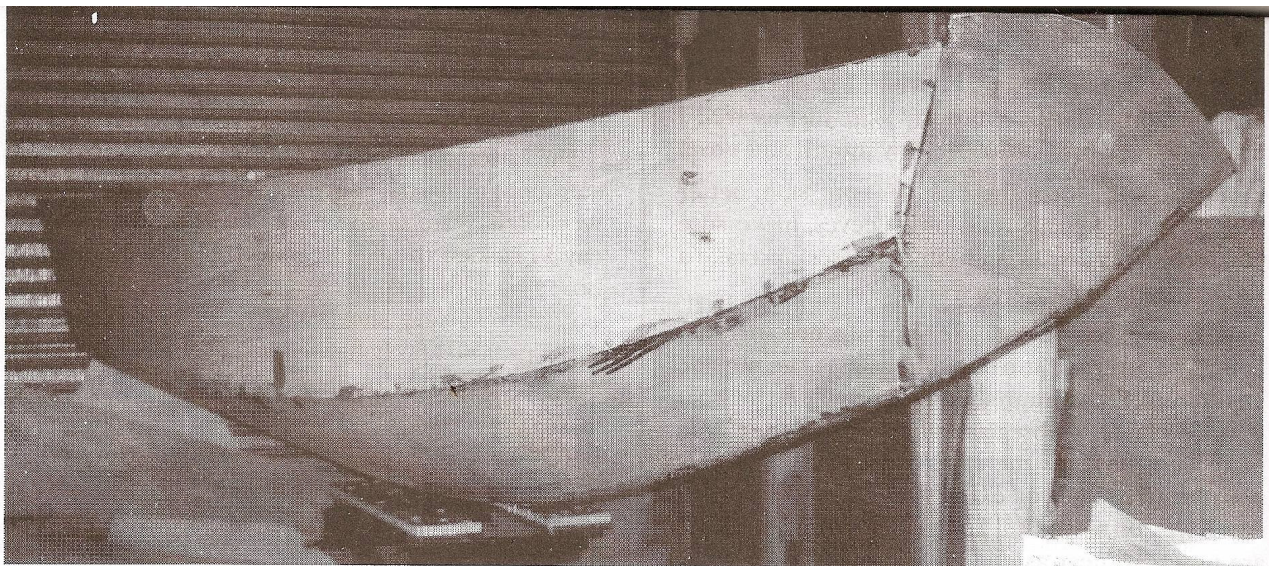
Boating Hardware : O'Connor, Perth WA p: 08 9337 9900

Sorensens : Perth, WA p: 08 9446 6159

Nautical Supplies : Winnellie, Darwin NT p: 08 8981 6651

Edithburg Surf & Tackle : Edithburg p: 08 8852 6161

www.boatcraft.com.au



The boat looked much better when the tape came off. This is when I realised the extent of the rocker and the vee. It's much more than I had expected.

masking tape before I applied the epoxy, then I stripped the tape off before the epoxy hardened. It gave me nice clean edges. What a shame I hadn't done that right from the start!

Lesson 15: To get nice clean seams, mask them with masking tape and clean up while the epoxy is still at the gel stage.

Among the fiddly jobs was a small set of changes at the stern. I extended the rear thwart back to the transom, but with a cutout section to make room for my little outboard. I boxed the sides and filled them with foam. While I was planning this I saw some advice Robert Ayliffe gave to the builders of NIS boats: mark carefully, but don't cut right up to the mark. Work up to it slowly, because it's easy to

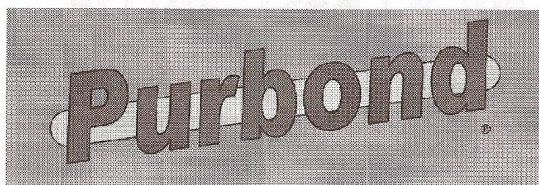
take a little more off, but impossible to put some back. If I had not followed his advice I would have had some poorly-fitting parts.

Lesson 16: Mark carefully, then work up to the mark, checking as you go.

At this stage I faced the issue of sanding tight corners where my sanders couldn't reach. One of the magazines suggested using a Dremel, but I found that unsatisfactorily slow. Flap sanders in a drill were much more successful. In a couple of places I used a piece of 15mm dowel with a scrap of coarse sanding disc glued on.

Lesson 17: Getting into tight corners can be a challenge. Sometimes you need to get creative about it.

When I came to fit the gunwhales, the plan simply said to cut two strips of 9mm plywood and glue them on. After considerable thought and a few good arguments I settled on using three strips of 12 x 12mm Tasmanian oak on each side. That gave me a strip 36mm deep and 12mm thick (plus the 6mm of the ply it's glued to) and a 9mm ply inwale, which I considered quite adequate for a boat this size. The difficulty was at the stern, where there is a sharpish curve that I didn't want to remove. I made a simple jig from a piece of scrap chipboard and a piece of scrap pine, and soaked the strips in my fish pond. They bent easily. Epoxy doesn't like wet wood so I was careful to dry them thoroughly in the sun before fitting them. They held their shape well and the epoxy took and held. When I made the inwale I kept imagining Robert Ayliffe's voice reminding me to take my time and work up to the mark. He's right.



Single Pack Waterproof Polyurethane adhesive.

Epoxy-E-Glue®

1:1 Full Strength Epoxy Adhesive.

BoatCraft Pacific®
Distributors throughout Australia
or call 07 3806 1944

Lesson 18: Wet wood bends quite easily. A gentle bend in light timber does not require a steamer.

All through my project I kept up my habit of buying my favourite boating magazines, all of which publish articles about various aspects of building and maintaining wooden boats. I also picked up some interesting material from the web. All this reading helped keep my interest up but more importantly they discussed the sort of work I was doing, often supporting the how-to advice I had from my suppliers, and sometimes disagreeing with them. For example, one piece says that every epoxy seam must be reinforced with fibreglass tape, while another says that you only need to tape seams that are in tension. It argues that seams that are in compression don't need reinforcement. That might well be true, but I taped all my seams.

Lesson 19: Read everything that comes your way, but don't expect it to be consistent. In the end it's your project and they are your decisions.

From time to time everyone suffers from FUD - fear, uncertainty and doubt. Where can you go for assistance? Everyone you speak to has an opinion, but some opinions can be safely ignored. I read stuff from Michael Storer, Robert Ayliffe, Rob Askew, Andrew Denman, other respected Australians, various writers in UK and US magazines, and a number of websites. I also spoke to Dave Giddings, the supplier of my Bote Cote. They were all very helpful, often without realising that they were answering my questions. I don't talk to the supplier of my plywood because there were problems with the ply and he is more interested in furniture than boats. Ultimately I knew that it was my boat and the decisions had to be mine, but decisions are more

comfortable when you have supporting information.

Lesson 20: Discuss your project with people you trust. The advice you get is pure gold. And read all the books and magazines you can lay your hands on.

Am I satisfied with the result of my labours? Yes. This was primarily a training project and it taught me a lot that I needed to know about stitch-and-glue boatbuilding. It also taught me that my woodworking skills are adequate and I could stay interested enough to keep working whenever I had spare time.

Although I could have bought a boat much cheaper, the lessons were worth much more than the dollars spent. Along the way my garage made a transition from being the car's bedroom to being a useful workshop and that's a nice bonus.

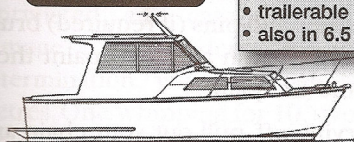
This project taught my wife and me much about the reality of building a bigger boat. She took a keen interest in the progress, the problems and the solutions, and helped with a range of tasks from time to time. It would have been much more difficult with a disinterested wife, and a large project would be impossible without wifely support. Maybe that's lesson 21.

There is still so much that I don't know, so many things that I've guessed at, and so many questions unanswered, that if someone were to run a weekend boatbuilding school close enough for me to get to, I'd sign up immediately. Unfortunately Duck Flat is a long way from my home in Sydney and they run their classes at times when I can't get away. There's a weekend boatbuilding school at Tweed Heads, but it's also too far to travel. What are the chances for a twice-a-year six-weekend boatbuilding course somewhere near Sydney? ■

BUILD-A-BOAT Plans Pty Ltd

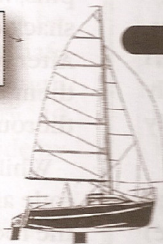
Many traditional and modern boat plans to choose from.
Over 600 designs have been collected over 60 years and most with full size patterns

Countdown 7m



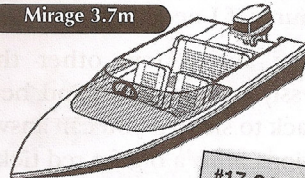
- economical family launch
- trailerable
- also in 6.5 and 5.8m

Rocket 5m



GREAT
SCHOOL
PROJECTS

Mirage 3.7m



PLYWOOD
AND MORE

#17 CATALOGUE
\$16 POSTED
400+ DESIGNS

PO Box 474, Brookvale 2100
or call Matt on 02 9938 4933