

Burcot Boats International Optimist Kit



How to Build an Optimist

How hard can it be, there's only five bits of wood; famous last words... The answer is, quite hard, if you want to build a boat that measures up to the very comprehensive regulations.

I started by ordering the plans of a "wood/epoxy" boat from IODA who are in Ireland but need to be paid in US Dollars! (\$56 which is about £30) They come with a book called "A Guide to building a wood epoxy Optimist" some of which is useful, but much of which is at best misleading, at worst plain wrong. Not that you can tell when you are setting out on the project.

The book suggests that you build the boat with a 12mm ply bottom and attach the sides to edge of the bottom, but as the plans have the bottom as 6mm the dimensions for the parts are different. How good an idea is it to have the instruction book building a different way to the plans? Anyway, having done a lot of correction to dimensions I redrew the plans using my trusty old 2D cad system that is so old no one has ever heard of it. This resulted in a number of drawings of all the parts which I took on disc to Cirrus laser cutters in Burgess Hill, together with the wood, which I had ordered from Robbins Timber in Bristol. I used their Robbins Elite which is Gaboon plywood at 6mm for most parts and 12mm for the bulkheads and the daggerboard, some parts needed to be 18mm so I planned to laminate some 12mm and some 6mm to get to 18mm. Of course wood is never the size it says it is and the 6mm turned out to be 7mm and the 12mm, 13mm, so the 18mm laminate is about 20mm !

I had used the services of laser cutting companies on many occasions before to cut metal components, but never wood, and I had never seen it being done. So I asked Cirrus nicely if I could watch the process, and they agreed. I actually ended up doing quite a bit more than just watching, and very interesting it was too. We got my dxf drawing files onto his computer, re-jigged the nesting (how the components are placed on the wood sheet for minimum wastage) and defined all the start and stop points and the lead-ins for the laser. If the laser starts on a finished edge you get a notch, so you start it cutting in a waste area and lead it in to the component edge. Once it is underway the process is impressively fast, and fantastically accurate, to within 0.1mm. The only problem with it is that it leaves the wood with a burned edge which then gets on your hands

and onto the face of the wood, needing cleaning up later.

So now I have a kit of parts. The only problem is that the edges are all square and some parts need to be chamfered to a variety of angles. If I was to do another one I would build this feature into the cutting and use a five axis cutter which could tilt the cut as it went.

In addition to all the actual boat parts, the other important bits you need to cut out are the "mould" parts. Not strictly a mould, but a pair of formers that hold the flat bottom of the boat, and the front and rear transoms in the correct place while the sides and bulkheads are fitted, together with two temporary bulkheads which are not glued in, and are later discarded. I made the mistake of cutting these temporary parts from 18mm chipboard which is very heavy and doesn't stay flat. Next time I would use cheap plywood, and fit more braces. To the formers is screwed a mould bottom which is held at the correct curve by the formers. The real boat bottom is then held down to that with some temporary nails or screws, the holes for which will need filling up later. The front and rear transoms I had already assembled from some layers of plywood so that the frames were already part of the panels. These are then tacked onto the mould and glued to the boat bottom.



Before all that it is imperative that you make sure that the former assembly is going to give you a hull that is the right size and shape. To do that many hours of studying the measurement form and the drawings are required. I drew the bottom datum line onto the formers and marked off all the measuring points on the line, then checked that the drop to the underside of the curved hull bottom former was correct. It was. Then I made

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up a long straight edge to draw the top datum line on to check the sheerline heights and widths from later.

Next, in go the mast thwart bulkhead, the midship bulkhead and the front and rear temporary frames. All of these need to be dead upright and held with some bracing until the sides go on. Fitting the sides is the most tricky bit. I trial fitted the sides several times, and then finally put the glue on. The sides were tacked in place with a few screws, more holes to fill, and some luggage straps lightly tensioned.



Now is the time to check that the top of the sides is within tolerance as it is quite easy to move it about a bit as it is only 6mm ply. If it is left until the gunwales or the rubbing strips are on it will be hard to move it. As they were ok, next thing to go on was the inner gunwale, made up from three strips of hardwood each side, the inner ones were from an Ash we felled in Burcot about 12 years ago, and the others were from some Beech from Kruzco in Dorchester. These need to be bent into place and clamped with as many clamps as I could find and small pads of scrap wood to stop the clamps denting the wood. So this is where it starts to take a lot of time, as each of these, and the outers, eight strips in all, need to be glued on one at a time and left to go off for 24 hours (eight days!)

The other time consuming part is to fill all the holes, imperfections in the wood, gaps in joints, and put in epoxy fillets. I built the daggerboard case on the bench, cut the bottom of it to the right angle, then cut the slot in the bottom of the boat and glued the case over it, so that the plywood of the bottom has the smallest possible hole in it. The booklet says that you should cut out the bottom so that the case goes right through it, but this seemed a weaker way to do it to me. The case

is glued to the midship bulkhead, and it has some framing braces between it and the inside of the bottom, and seems quite solid. I used some thin pieces of Beech around the top of the case but I am not quite happy with that bit yet. The other thing not to forget at this stage is to seal and varnish the inside of the daggerboard case before assembly. I forgot, and it is very tricky to do it afterwards.

Another slightly tricky bit was made trickier by me forgetting to cut in the corner braces to the inner gunwale tops before putting on the outer rubbing strips, so I had to rout the shape of the braces down into the gunwale tops avoiding the rubbing strips, which would have been easy if the strips had been put on after the braces. The only wooden part left to fit was now the mast thwart which needed to be cut to fit as there are no dimensions for it, apart from the fore to aft length, on the plans. I was going to leave cutting the mast hole until later as it is measured from the back of the boat. It was about now that I removed the temporary frames and took the hull out of the form mould for the first time.

It seemed to me that it might be a good idea to see if the hull was going to be the correct shape before starting to put the paint finishes onto it, so I contacted Don O'Donnell who is an official RYA Measurer, and arranged to take the boat over to his place in Wootton Bassett for him to measure. After a very pleasant afternoon with a tape measure, some jigs and several cups of tea, Don declared that it was all inside the tolerances.



After any corrections and holes are filled, the next bit is to start the painting processes. There is a lot of this! I had glued the boat together with West System epoxy, which you can use as a clear two part liquid for close joints and then add filler powder to it to make up a paste of any consistency

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you need to create fillets or put in joints that are not so tight. The results had been very good and strong. The instructions in the West System box say that you can use it without filler to coat bare wood and get a good finish, which is what I was going to do. Luckily I was advised against this, and I used SP Eposeal which is again a two part epoxy, but most importantly, it is very thin and the first couple of coats soak right into the wood. When it is set, in about 24 hours, the 'furry' grain of the wood is raised and can be sanded off to give a really nice dull finish. I gave it a further two coats to fill the grain, each 'coat' consisting of three coats each applied just after the previous one had gone tacky, then left to go completely hard and sanded before the next three layer coat. This leaves a very good base for the paint finish which I left in the capable hands of my good friend Marvin who runs TopGun, a paint shop specialising in Porsche and Ferrari body work. Here it was painted in some metallic blue left over from a local Formula One team's trucks, followed by a gloss clear coat.

The inside of the hull has had the same Eposeal primer/filler and then two coats of SP Ultravar epoxy varnish sanding between.



Both foils are from 12mm ply, the daggerboard is a simple rectangle, but the rudder is a more complex shape. The 'new' rudder shape having been only just published by IODA at the time, I was lucky not to build one to the old shape, as this will become unusable after March 2005. This was again redrawn on 2D CAD and this time it was cut on a CNC router by a woodworking friend. Both foils were shaped and chamfered to the drawing specs using a very old, and heavy! belt sander, and then sealed with Eposeal and varnished with Ultravar.

All the fittings came from Pinnel and Bax, where Scott Allen sorted out everything that was needed; buoyancy bags and straps, toe straps, mainsheet and blocks, painter (the regulation length is 8 metres, but this is too long for practical purposes on inland water, but you better have one anyway) mast step and thwart bearing, rudder pintles and pins, and some elastic to keep the daggerboard in place. P&B also supplied the sail and spars.

The difficult part of starting out on the paperwork trail is actually finding the beginning of the trail. For a while all the people I contacted said that I should start with someone else further back, and even now I don't think I did it quite correctly. The problem is that nobody builds their own Optimists any more. I would now say that that the place to start is with IOCA. (Area of confusion number 1; the overall world governing body for the class is IODA, International Optimist Dinghy Association, and the National body for the UK is IOCA International Optimist Class Association. The confusing part is that the word International is part of the boat name, "International Optimist", and not part of the designation of the organisation.) Steve Witty, Technical officer IOCA UK was able to supply the required ISAF sticker and a blank IODA Registration & Measurement Book. In this book is a builders fee receipt from IODA to say that you have paid (via IOCA) the International Class Fee, and gives you the number on the ISAF sticker which is to be stuck permanently on your boat. These cost £18. There is also a space for the RYA to validate the form once the boat has been measured. The rest of the book is the numerous pages of dimensions for the hull, sail, foils, and spars, all of which will have to be measured and comply. (Tip; make copies of these and use them to complete the measurement process, as each mistake made on the real ones has to signed off, then get the measurer to fill in the good originals at the end after any anomalies have been sorted out.) So the next step is to get the actual measuring done by a RYA approved measurer. I found Don O'Donnell who was happy to do it, and was very helpful with advice. Take as many bits of the boat with you as possible on the first trip, as everything will have to be measured in the end, and make sure you know where all the serial numbers for the manufactured parts are on the parts as these will need to be recorded. When the sail is stamped be careful to roll it back up with a rag or something over the stamp or the red ink will get all over the nice new sail! Make sure that the measurer has filled in every box and signed every box on every page before you leave.

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The Measurers fee will be in the region of £20, although they are able to charge £18 per hour (plus travel if you don't go to them) for this, but Don was more than generous with his time, and tea. The next things you need are from the RYA; a sail number and a Measurement Certificate. As I understand it the RYA Measurement Certificate certifies that the IODA Registration & Measurement Book is authentic and properly filled in, and that the measurements it contains are the correct ones. The sail number allocation costs £15 and the certificate is another £15. The completed IODA Registration & Measurement Book has to go to the RYA together with the fees (recorded delivery!) and they will send it back all stamped and filled in and signed. In order to take part in Optimist races you will have to join IOCA UK for £25 per year, and make sure the boat is insured, about £27 per year, and don't forget to keep the annual buoyancy test up to date. The total for paperwork then is £98.

So we now have a tidy new boat, called Skylark, that is measured and on the weight limit, all that Hannah and I have to do now is learn how to use it! It was not the cheapest or easiest way to get there, but it was a lot of fun, we met some very friendly and helpful people along the way, and I have the satisfaction of knowing that I actually could build a boat to the regs.

David Wedge
August 2004

