# Inside a Miracle

www.miracledinghy.org.uk


# Building a Miracle

# Brian Jones

Measurement Secretary
Miracle Association

# Building Miracle 4064

February 2016

The option to self build a wooden Miracle using pre-cut pieces has become available again. I have been working with two companies, one which produces sheets with most of the ply parts routed out and ready to snap off (It does not cover all the small rectangular jointing battens as these are easy to produce yourself, and it is not strictly a kit). The other company supplies all the hard and softwood timbers required, most to the correct size.

Along with handy lists of hard and softwoods required it aims to make building a boat from plans a quicker, easier, option. The final result will be a boat to the modern design built by yourself!!

**Costs:**

- £150 for the plans, building book and sail number
- £350 for CNC machining ply parts
- about £650 for the ply sheets
- about £600 for the hard and soft wood, including delivery
- About £1,000 for the mast, boom and rigging set (all shrouds and halyards)
- around £1000 for sails and covers
- then there are the fittings, sheets, epoxy glues and paint, plus trolley and trailer.

You may prefer to source all your own materials.

**Alternatives:**

- a part built wood hull at a stage of your choice from Butler Boats
- a FRP hull from Woodwind for you to fit out

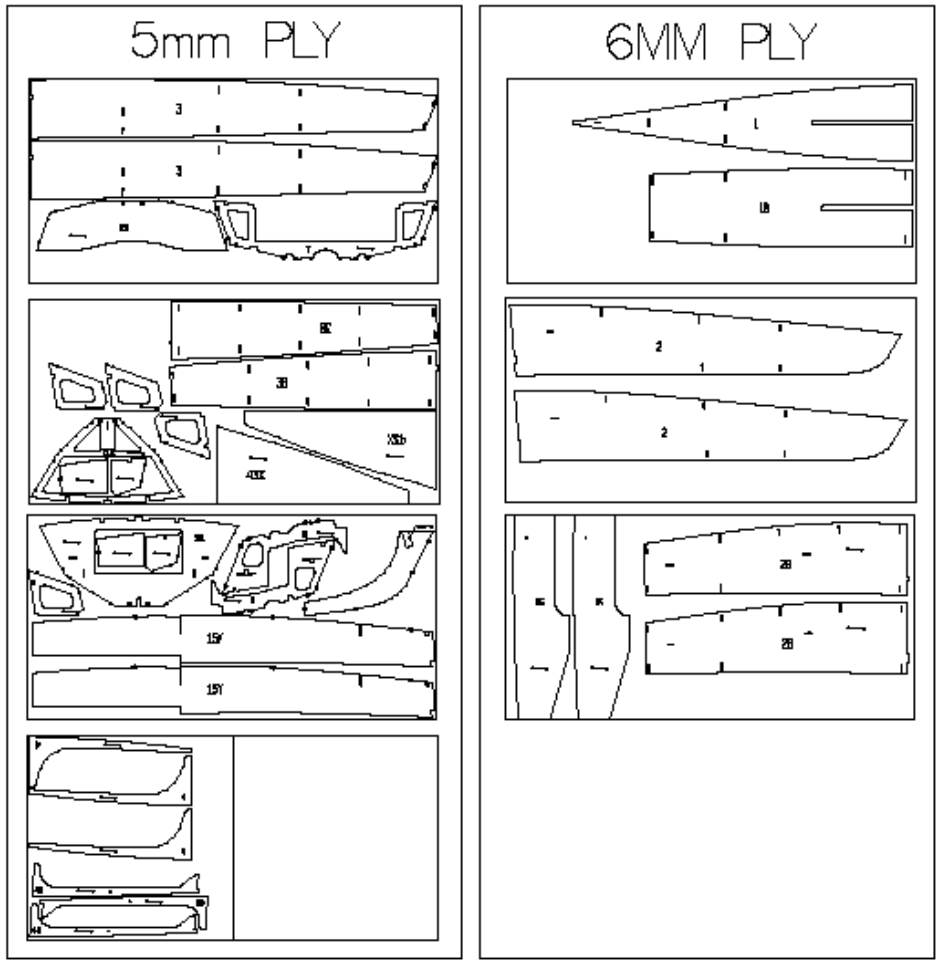
You can of course buy a fully fitted out new boat or a second hand boat.

**The build**

Once the parts were available I ordered a set so I could build a boat to trial the system out. As work progressed photographs were taken and reports published in the Miracle Association magazine. This booklet is based on those articles.



# Laser cut panels



The pre cut sheets of ply arrive and with a copy of the original building book the work begins

The ply sheets arrive, precut by router and are quickly and easily removed. I was amazed that within a couple of hours I had most of the parts ready to assemble. When I built 3838 it took me days to scale up the drawings onto ply sheets and cut out with a jig saw

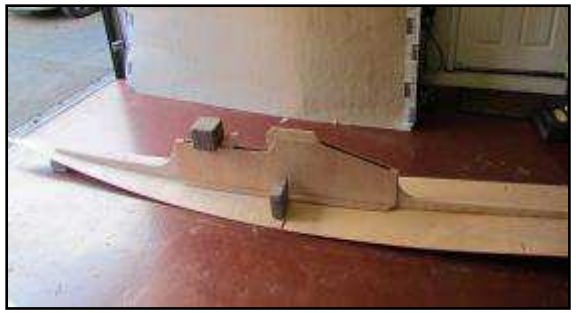
The next stage is making up battens from the scrap ply followed by lots of glueing to form the major parts of the hull



Then to save time and effort on fairing the hull at a later stage the edges are routed out to a shallow depth just sufficient to accept the tape

This is the most vital stage and entails carefully assembling the center case and the spines of the boat. Getting the rocker correct ensures the boat will perform and measure. Its actually not too difficult if you follow the instructions in the building book

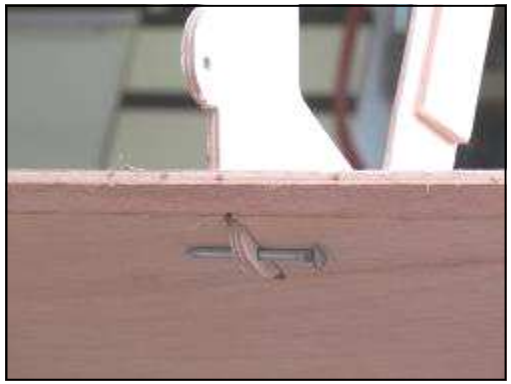
NB the spines are shown on the plans as 15mm ply, they come on the sheets as three 5 mm patterns which need to be glued together



Finally the whole assembly is glued to the floor panels.
I mounted it on a bench and working from below screwed it together first, took it apart, applied the epoxy glue, re-screwed it and place it on a level floor to set: ensuring that the measurements from the base line were correct

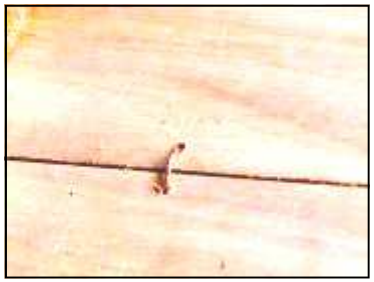
It won't be long now before I can add all the hull panels and she will begin to look like a Miracle

I have started to add the transom, bulkheads and place the floor panels.



Panels are clipped into place using the tab and slot method and held in position by sliding a nail through a predrilled hole in the tab

Panels are wired together to ensure a close fit, but these wires are later removed after the boat is spot welded using epoxy (John's good idea so you don't see the wires in the finished product—the building instructions say to tape over them)





Note the cross strut to hold the central bullheads in the correct position and to maintain the correct width for the centreboard slot (this will be removed at a later stage).

There are some measurement checks at this stage to ensure you have the boat square

Some floor battens are inserted and glued as they are easier to reach now

The bow is built up as if for the original design, but the top of the stem unit will need to be cut away to insert the central spinnaker shute (later when the hull is taped up and secure)

It took about half a day to carefully pin the side panels in place. Now she is starting to look like a boat

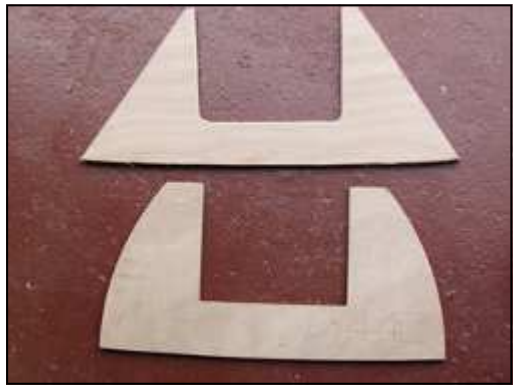
The hull is now taped and secure

Now we can cut away the stem prior to constructing the central spinnaker chute

The lower fore deck is installed in two halves resting on a central bearer (not in the plans). It comes slightly oversize and needs to be planed down



The components of the central chute can now be added, but oops Part 44Z is not exactly correct and I think I will have to add a bit of hardwood behind the mouth to provide a solid surface to screw the jib plate onto



I had to make a new part 44Z out of scrap ply - the drawings will be modified - but hey this is why I'm building this boat. Those who have purchased plans are being notified of errors as I find them (so far very few)

Finally a more satisfying stage as lots of stringers and bearers are glued in. The decks may soon be on!!!

I have now added some hardwood to the rear of the spinnaker chute to provide a solid base for the jib plate, with the whole assembly being designed to take the loading on the rigging

All deck stringers are now complete and the front tank has been epoxied into place, as you can see from the picture I am using the redesigned deck shape which is very easy to profile using the hull as a template

The thwart is constructed to the reverse curve design



Information on constructing a reverse curve thwart was originally given in the Miracle Association magazine of spring 2010 and a different boat was used for the photos. The instructions were also geared towards converting an existing boat:

Obtain four 1m lengths of thin (12mm) hardwood about 60mm wide

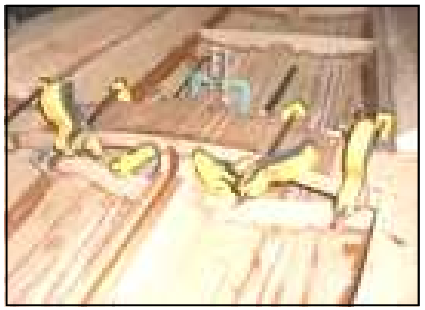
Modify the new ply seat cut outs so they have extensions for part of the thwart (see photo)

Extend the centre case ply upwards to place the new seat on shape and attach two lengths of the hardwood to form the base of the seat using epoxy glue

Cap with oversize ply, including a new centre section (it need not be “T” shaped as in the photo)

Trim off excess ply.

Add the two remaining hardwood strips as facing plates (they are shaped oversize).



Trim off excess wood.

Cardboard templates are made for the deck panels, these are then cut out from two sheets of Tiger striped sapele along with the seat tank tops

Small bulkheads for a half false floor are installed. As this is not in the plans, design and construction are via cardboard templates and a bit of trial and error!! The last boat I fitted a false floor to leaked so I am hoping for an improvement with this design.

The mast foot stays at the standard height by angling the floor inboard (makes it much simpler to measure!!!). It also seems to suit the profile well. This stiffens the boat but adds an extra 3kg to the overall weight and should reduce the amount of water sloshing around under certain conditions. It also provides a raised platform for younger crews to work from

The last two pictures show the false floor, integral seat tops and thwart ply in position but yet to be glued and trimmed

The whole interior has been coated with Eposeal 300, at last it is nearly time to fit all the decks

I did weigh the boat halfway through the above stages and it was on target although the keel has yet to be fitted which will add a bit



The decks are fitted using simple plywood clamps and wedges (nice and cheap) plus a few of the real things!

The centre of the foredeck is held in place with small screwed down blocks and a piece of scrap ply to simulate the other half. A 5mm gap will be left between the two deck halves to insert a white-wood strip in. Its not just decorative but has a very useful function of making a neat join!

The rear decks are clamped and weighted with bricks while the epoxy sets

The rear decks have been faired off and grab rails are glued into place neatly hiding the join between deck and side tanks. To avoid screwing or pinning them they are wedged with lengths of scrap wood



The keel is on and the filling and fairing are nearly complete (now I know why people send their boats to the paint shop!!). When done the top coat is applied, then its a quick turn over to varnish the decks and interior. All is now ready to start screwing the fittings on

Two boats built from the routed out ply parts were at the Miracle National Championships at Rutland in 2015. Brian and Yvonne Mumford's 4099 went on to win two races while 4064 was fitted out on the Saturday and rushed onto the water for the first race on Sunday. Needless to say there were a few teething problems during the week, but overall the boat sailed well and handled nicely.

The biggest problem with 4064 was a leak in the centreboard case which was impossible to locate during the week. It turned out to be situated in the forward spine/case sides area, possibly due to laminating the spine, or just faulty epoxying?

Further small leaks were discovered in the side tanks where decorative beading had been used between the decking. I think if the deck had been coated with SP 106 as well as Eposeal 300 prior to varnishing then these very small gaps would have been filled. All were rectified after the event.

It weighed in at 75 kg which was to be expected with the addition of the half false floor.

All in all a successful project where much was learnt. The viability of the part kit has been ratified and the results from 4099 prove you can build a very competitive boat yourself.