

# Cargo Proa Prototype

## Building Blog

### DECEMBER 2020#1

Time flies when you are having fun. Which I most certainly am. Got the toybox assembled, the ring frames in it and Yvon and Dong laid up the lid for infusing. Learnt some catch pot tricks and how to make a too small vac bag bigger. Surprisingly (to me), this was a success. Prepared the bulkhead infusion. Be interesting to see how/if these work. Turned the tender over to work on the bottom.

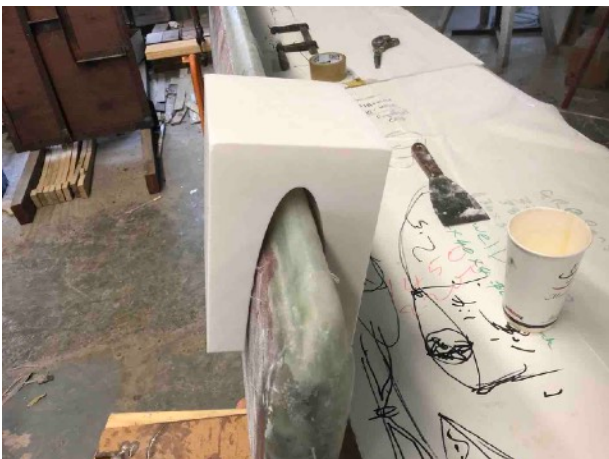
Rob R got the first rudder ready to join, Nakul CNC cut the frames for the stub mast mould and Sylvia 3d printed some sheaves for the model beam diagonal construction. Teguh set up and infused a 30mm sq x 300mm long sample containing 250 pieces of carbon tow. This is the likely laminate for the beam if carbon is used. One end worked, the other was dry in the middle. We will have another shot this week, with a different arrangement of fibres. He also built some of the tubes for stiffening the toybox edges and acting as hinge pins for the lid.

I spent most of it organising/running around not doing much, but spent the quiet time (6.30-8 am) before the troops arrived getting most of one hull of the tender ready for applying the copper/epoxy antifoul. This is definitely an early morning job as we are getting 30C+ days with hotter to come. Decided to keep the ww hull in the shed for a while to avoid anyone getting heatstroke. I also glued a stringer in the ww hull bottom to see how many would be needed to stiffen it up. Not as many as I thought and it is far easier and more pleasant than adding a floor to a round bilge hull. Also designed the steps, which will add more stiffening.

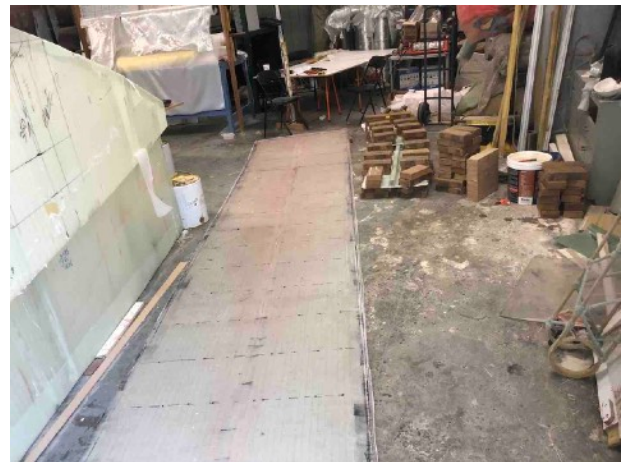
### DECEMBER 2020#2

Another busy week, the students are now good enough that we can use some more volunteers after Xmas when the next shipment of materials arrives.

The photos show:



The 3d printed mould for the rudder leading edge. This will be built in short sections which are sacrificial. Damage one section and it is easily replaced. The rudders should kick up before damaging the actual join.

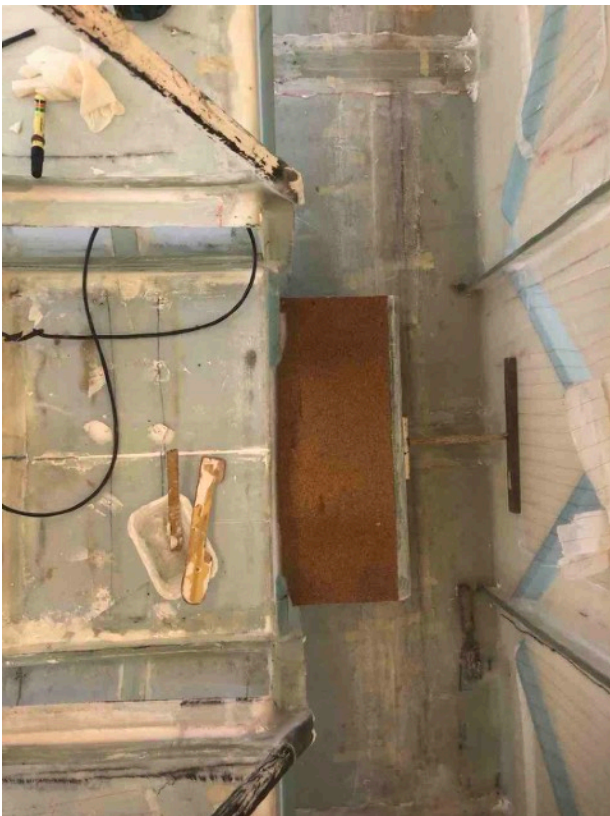


The bridgedeck panel with holes drilled for the strings that will support it. The aim is the benefits

of a tramp and a solid deck: impermeable to water upwards and dropped items downwards without the weight, cost, tension and build drawbacks. Of interest in the unrolled panel is the pink stain. Each time we infuse, I wonder where the first drop of resin to enter the laminate ends up. We added red dye to the first mix to see. It spreads out from the resin inlet, indicating that the first area to cure is that closest to the resin inlet, but excluding the spiral hose resin feed line. This implies that resin added towards the cure time will flow to the dry laminate, not get stopped by cured resin, which is great. Seems obvious now, but didn't before.



Coreless bulkheads. Bit more work and a little heavier than say 600 gsm either side of 20mm foam, but a lot stiffer and cheaper. The next ones will have half the laminate, and flanges on all sides for easy fitting in the lee hull.



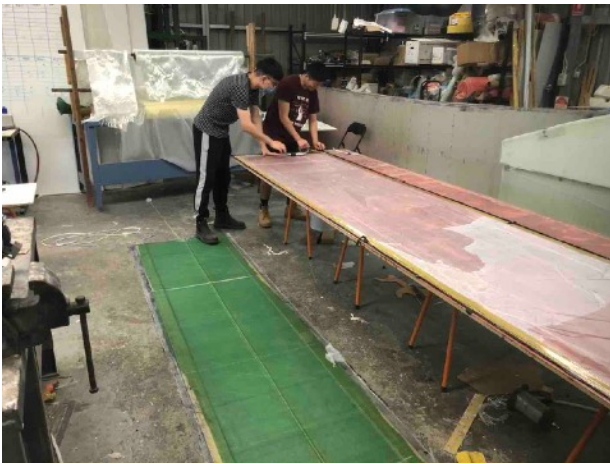
Cork cored step. I had a sample of cork which we infused to see how it went. Soaked up a lot of resin, but looks nice clear finished. The only non work boat part of the fit out until someone scratches it or drips paint on it. Also the only wood in the boat so far.



Cork step infused



Cork step folded



Lee hull bow panels: The volunteers arrive at 10 am, remove yesterday's panel, have an hour for lunch and lay up today's panel, which we infuse at 4 pm, go home at 5.30. Panels are 5.6m/19' x 0.8m/32", 8 layers thick, plus female joins on both sides. The surfaces are paint ready, no one needs gloves or suits, and assuming 1:2 resin:cloth, the waste is about 150 gsm/0.5oz per sq. If care is taken, the tacky tape and the plastic mould release sheet can be reused, despite me 'knowing' it was not possible and advising against it. The record so far is 3 infusions on the same tacky tape and plastic, and a large mouthful of humble pie for me.

room. We will be exploring the limits to this when we add some new shelves and frames to the galley and nav areas on the ww hull.

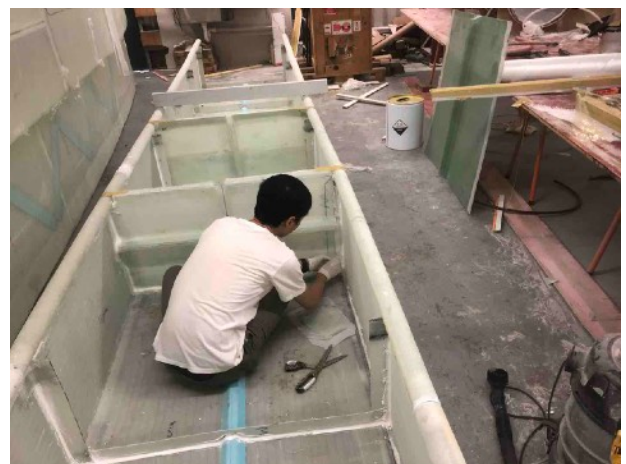
Access into the hull was not easy, so I lowered the top step. Much easier to get in and out, but a couple of day's work which may be unnecessary when we see how the deck and hatch work.



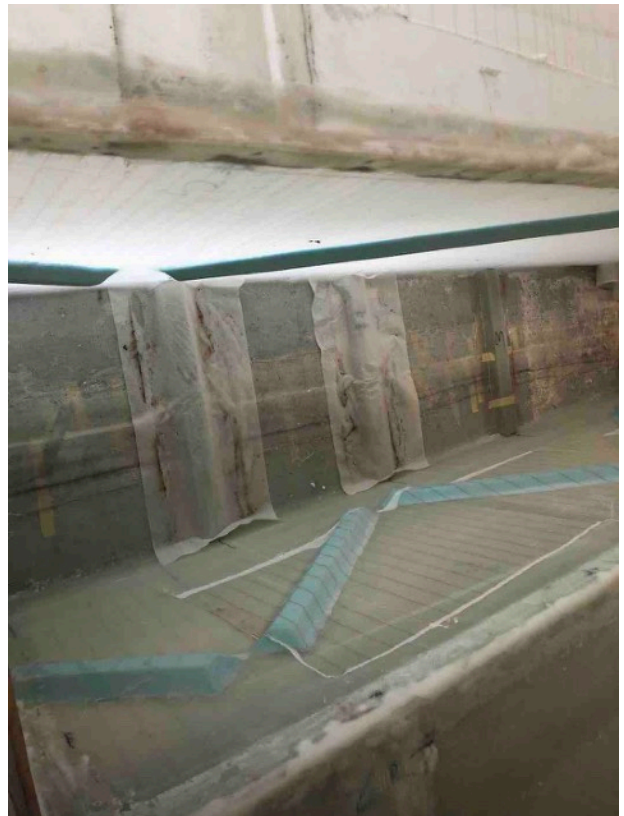
Half stub mast mould with pultruded carbon strips. Bit of a learning curve which will come in handy for the masts.



Ring frame edges: Ring frames are usually cored with a back filled edge and a minimum of 150mm/6" wide. We have halved this and put a rounded, solid tow edge on a non cored laminate. The result is a very stiff, strong frame that takes up less



Toy box bulkheads: The toybox has been much more work than I anticipated and I am still not sure it will be stiff/strong enough. Easy enough to add more laminate, but we are also looking at more radical solutions, similar to the bridge deck support. Assembly will be a lot of fun/brainstorming.



WW hull floor stringers: These will be included in the infusion in future. Possibly with non structural foam, but more likely hollow.

Toy box hinges: The edge stiffening tubes are used as hinge pins for the toy box covers.



Xmas party: Highlight of the week, put on by marvelous Martin, the UQ prof who made the build possible. We spent the morning tidying the shed, finding lost tools and throwing out stuff that 'might come in handy, sometime' and the afternoon eating pizzas and talking.