

Cargo Proa Prototype

Building Blog



SEPTEMBER #1

Load testing. Video [here](#).



4 to 1 pulleys on top



5 to 1 winch on bottom

SEPTEMBER #2 2021

You can't beat putting the big bits together to look like progress! It's certainly a rewarding feeling seeing the deck and toy box attachments coming along, but what is more satisfying is when design aspects that were left "for later" become finalized. The toy box and bridge deck attachments were in the "for later" list and are now becoming a reality. The rudder release attachment is also making progress as each new prototype redesign brings the concept closer to realization. Today we're having a day off as some of the test equipment in the shed is being utilized, but Tuesday will be a big toy box tow layup day.

Rob Rassy



Beam to hull bracing 1



Beam test mast pull rope



Beam to hull bracing 2



Deck mounts 2

SEPTEMBER #3 2021

We put the deck, toybox and tender in place this week. Solved several problems, discovered a couple of minor new ones.

Rassy got the rudders mounted and successfully tested as much as we could given the constraints of the blades not being in place and the hull sitting on the gravel. The breakthrough was the trip working on a low loaded line rather than a highly loaded one, which makes it far more usable. The test procedure involves ramming it as hard as I can with a 3m/10' piece of 200 x 50mm/ 8" x 2" hardwood. The first test, the lines were too tight and did not release so the full load was taken by the hull and case structure. No damage.

Hull lifting #2 was a limited success. We lifted the bow of the ww hull about 150mm/6" which showed as 4 kgs/9 lbs of pull on the winch handle, meaning 480 kgs/half a ton on the top of the mast. I could lift the other end of the ww hull (maybe 30 kgs/66 lbs) when the pulling rope (1,100 kgs breaking strain, reduced by ~50% due to the knot) broke.

There was no cracking or creaking, the loaded beam barely deflected length wise and the sides did not buckle, the lee hull barely twisted, nothing buckled or bent on the ww hull, the loaded mast bent maybe 100mms at the top. There was no damage from the hull dropping onto a piece of 100 x 50 timber. Successful enough to go sailing, given that the loads applied should never be seen in reality, although the toybox, tender, crew and fitout were not included so it was not a particularly complete test. Might try it again when everything is installed and I have some stronger string.

We redesigned and built a new wet out machine to allow single person operation, more control over resin content and easier cleaning. Result is we are using tow for a lot more applications.

After several false starts, I have built the components for the first wing section built (2 x moulded carbon ribs, fibreglass leading edge, temporary mast and the covering which is peel ply with glued batten pockets. This looks pretty good, but took longer than sewing. We will put it together this week and see where it leads.

Why a wing?

1) Cheaper and longer lasting than a sail, particularly the high tech sail the boat requires to perform to it's potential.

2) Able to be built with the same knowledge and

tools as the rest of the boat, which is important for remote building.

3) Easier to set up and reef. A halyard pulls it up, the 1:1 mainsheet induces the camber and controls the angle of incidence. Gravity lowers it and it is self stowing. There is no need for a traveller, cunningham, outhaul, reefing lines, lazy jacks or multipart mainsheet and winch.

4) Theoretically more efficient. Probably not against a high tech sail trimmed by an expert, but certainly better on a set and forget basis.

5) No need for the crew to access the lee hull in normal sailing, which is probably wishful thinking, but a good target to aim at.

6) Potential for self trimming with an added tail. This is not on the agenda, except to see what is possible down the track.



Deck mounts



Rudder mount evolution



Wing problems to solve:

Dimpling on the leading edge. We are using solid glass for this, which works if the wing telescopes.

Reefing. In theory, the wing can be left up and will auto align with the wind. This is too scary to contemplate leaving it up overnight, much scarier in a gale when the waves are throwing the boat and sail around. The solution is to make it telescope into 1.5m/5' high sections.

Asymmetry: Symmetric wings work, but lack grunt. Two symmetric wings acting independently (America's Cup etc) is too complex. Our solution is to warp a symmetric wing. This is not hard to do, but making it also telescope, light and reliable is. Doing this with a non rotating mast (rotating masts are more expensive and harder to build) is a challenge we have yet to fully meet, but there are plenty of ideas still to choose from. We shall see.

Weight: Not such a problem if it telescopes, but definitely something to consider.

Complexity: The inside of most wing rigs resembles a spaghetti factory, with most lines

needing continual adjusting. We are trying to avoid this.

