Cargo Proa Prototype

Building blog

December 2022

Boat progress has been a bit slow, but steady. We have reached our first set of UNDP targets and qualified for the 2nd tranche of money. Both good feelings. The boat is ready to launch to test the rig and rudders, but the launch has been delayed until we get the ramp fixed where the river has eroded it. This involves building a retaining wall and some back filling when the guys and gear have finished building the new 100 pig piggery.

Jobs off the to do list:

Installed one of the telescoping masts so we can test a third of the first wing (5 x 1.25m high panels). The mast telescoping arrangement needed work, and has been altered. Also built a stopper to prevent the top mast going through the bottom of the boat if something breaks.

Cockpit

Decided the fibreglass cockpit deck was a poor solution, so chopped most of it off and replaced it with net.

Completed the rudders, including the kick up mechanism and installation of the whipstaff. Will run the lines when it is ready to launch.

Made a crude textile clutch which works well for holding the top mast halyard, but may (will!) have some strength issues on bigger loads. I have some kevlar braid somewhere which will be much better.

Built a couple of wing camber inducers from carbon tow. Not sure they will work as the loads are not known for certain, but they are a good start. Added inspection hatches to the lee hull, experimenting with low cost ways to hold them on.

The sailmaker supplied a couple of test wing coverings which fit like a glove. He understood immediately what I was trying to do, and is enthusiastic about teaching the students to build crab claw sails as part of the UNDP funded 'sustainable, island suitable boat building course' we are running at CATD in the new year. The plan is to build PET foam/fibreglass versions of the Marshalls boats, with 2 side mounted kick up rudders, no leeboard and a track for the mast. The boats should last indefinitely, with no maintenance beyond house paint on the bits that are in the sun. No power tools, building jigs, nuts, bolts, screws, plywood, timber, very little metal, 2 measurements (length and width) per component and a 2:1 epoxy mix ratio suitable for use in 30C temperatures.

Each 3 month course will build 2 boats, including spars, rudders and sails, which will then be used to teach sailing and seamanship.

Feedback on this project is that the sailing mini cargo proas are great for fishing and non urgent freight and passengers, not so good in low wind areas, fast flowing rivers and narrow channels.

A low drag, small outboard motor boat would be a lot more suitable and a big improvement over the heavy fibreglass skiffs with their big gas guzzling motors. These will be built the same way as the mini cargo proas. An option will be to put a roof on them for shade and solar panels. These will power small outboard motors where the petrol power head has been replaced with an electric motor, reducing maintenance and eliminating fuel costs. A slightly larger version of these outboards is going on the cargo proa tender.

Some of the other things happening:

Spent a weekend at Beqa Island to chat with the islanders and check out the water and location as part of the never ending quest to improve the boats. Navigating to and from Beqa is going to be a challenge. There is only 1.5m/5′ to 2m/6.33′ of tide, but the land area grows considerably at low tide, and there are coral outcrops all over the place. The Navua river where we boarded the fibre has a wide bar. We touched on the way out, had a moderately exciting surf on the way back. Lots to think about to reduce the chances of strife. Fuel costs are killing the islands, the excitement about the cargo proa and mini cargo proa was quite gratifying.

Visited Rukua village to help with their 'clean up the village day'. Grubby, but it was educational talking to the villagers. They collect all their

rubbish, then take it to the mainland in outboard powered fibres/pangas/banana boats and pay $150 to truck it to the tip. Most of the load is air in cans, bottles and plastic containers.

I came back, googled can crushers and asked the welding teacher to build one, which he did. $US20 each from Amazon, could be a good earner for CATD if we sold one to each village in Fiji. A truck full of uncrushed cans costs money to take to the recyclers. A truck full of crushed cans and the village makes money.

Designed a plastic melter/press, to either make something useful (floors, paths, walls) from the scrap plastic or just melt it into blocks for easier and cheaper transport to the tip. I'm waiting for a 200 litre drum to build a prototype. A bonus of melting it is all the smelly stuff gets evaporated off.

Crushing glass bottles and jars is a no brainer. The result is effectively sand which can be tipped into the water, spread on an eroded beach or used in concrete. The prototype hand operated crusher is built from an old gas bottle. It is half built due partly to a measuring error (mine) and partly as the welding crew have been called on to build a jetty over the slip to access a 12m/40′ floating pontoon. This will replace Bau Landing as the terminus for the Leleuvia ferry. In true Fijian style, the jetty was built in a couple of weeks and covered with planks chainsawed from a couple of pine trees which were removed to make a flat area for the waiting room, which morphed into a coffee shop, probably made from a container CATD has. Instead of cutting up and hauling away the sunken sand barge at the bottom of the slip, the farm manager had the brilliant idea to use it as a foundation for the pilings. The floating pontoon will make working on the cargo proa in the water a lot easier. I love this place!

A year ago, Rukua village was gifted one of the 100 plywood camakous (18′ outrigger with crab claw rig) which were built and used for a TV reality show. They were built in a hurry, did not get much epoxy. A local group fixed a few of them to give to communities to encourage sailing and reduce fuel bills. The Rukua one is now more holes than plywood. I also spent a weekend at Leleuvia patching the original canoe, which was "properly built". I bought the outrigger back to CATD to repair some major rot. Got the outside prepped, but the smell of rot coming out the holes indicates it is an exercise in futility. Hopefully it will last until we can get them a mini cargo proa. Why anyone uses plywood in the tropics is a mystery to me.

Seta, the owner/skipper of the Drua dropped in for a look and a chat, offered me a sail from Leleuvia to Suva: 50 miles inside the outer reef. Interesting, knowledgable people and a nice coast, although navigation was a full time exercise. The boat was an eye opener. I arrived undecided, became a big fan regarding the suitability of this sort of project for cultural reasons. We were in a hurry so didn't get to shunt. Maybe next time, plus a charged phone to get some performance data. It certainly gets along and is the simplest boat of it's size I have seen. 4 wooden cleats tied on with poly twine and a large paddle for a rudder is the sum total of the deck gear. Huge fun and a nice break from boatbuilding.

https://www.facebook.com/seru.zara.1/videos/556271862566041

We had a meeting with Waste Recyclers Fiji, who have generously supplied us with 1,200 kgs of empty wine bottles which are waiting to be crushed and used in lieu of sand in our mud brick production. They also supplied 1,000 kgs of unsorted, uncleaned plastic to practice on and figure out a way to make cargo boxes, plastic roofing tiles, floor boards, and concrete rebar. Only 999 kgs of it left after the plastic melter/compactor's first trial which turned as much plastic sheet as I could carry into a 70mm deep, 150mm dia block. WRF set up a meeting with the Environment Minister to show him our waste plastic and glass solutions. I was invited to sit on a committee to discuss it further. The Nausori mayor was present, gave me a lift home. She is very keen on discussing a high speed electric ferry to Suva. Maybe once the shed is built.
Visits from the Aus and NZ High commissioners. Nice people, we will see what comes from it. Also visits from representatives of sundry other Pacific Islands, some donors and others looking to partner with us and a couple of film crews. I was in a sailing film shot at Leleuvia by a Canadian couple. We took them for a sail in the Camakou, I explained what it was all about.

I spent a couple of hours glassing the rusted out bottom of a freezer in our new on site supermarket (the only one between here and Nausori, 10 kms and several thousand people away). Not exactly state of the art boat building, but it saved buying a new freezer for several grand.

When it's raining (often), I play with the oven and scrap plastic. I melted and pressed some LDPE packaging plastic (I think it's LDPE, there's no mark on it) and pressed it into some 200 gsm pw glass. Worked a treat, the glass is transparent, indicating complete wet out/impregnation. The result is the same thickness and resin content (95% by weight) as hand laid 200 gsm fibreglass/epoxy. It is noticeably tougher as it bends without creasing or cracking and is impossible to tear by hand, unlike a single sheet of 200 gsm with epoxy. It was heated to 200C (less by the time I got it into the press) and 5 tonnes of pressure, a bit of a breakthrough for several recycling and waste disposal applications. I'm not sure how, or whether to use it for boat building, but have a couple of ideas to try when the PET foam arrives.
I also made a mould for pultruding plastic reinforced tow to make rods to replace steel rebar in mud brick and concrete construction. Failed miserably, so tried it as a compression mould. Better, but not viable for long lengths. An interesting learning curve. Next recycled plastic job is the cargo boxes.

Henrik, who I worked with in the Marshalls sent some pics of one of the mini cargo proas (scroll to Nov 5) in Aur atoll. They added the rudder to replace the paddle and put a cabin on the ww hull to stop the copra getting wet. Hopefully, Henrik gets some performance data while he is there.

It's getting warm and humid with sudden heavy rain showers as the cyclone/rainy season gets underway. My work day is slowly adjusting to 5 am-9 am on the boat, meetings, chores, lunch, office and snooze 'til 3, boat 'til dinner time. Not unpleasant once you get used to it.
CATD closes for Xmas, so I am going to Sydney for a couple of weeks. Steinar is already there. We both come back here in mid Jan. I'm looking forward to discussing boat ideas drawn in the sand on Manly beach with him. A cyclone while I'm away is likely, so I am doing what I can to make the boat safe. The big worry is the huge tree to the south west of the boat which, since the pine trees and hill were removed for the coffee shop is now exposed to sou'westers.

I got a small cut on my ankle which almost healed, then in the course of 2 days turned into a pretty messy superating open sore 50mm in diameter (pics on request ;-). Not an uncommon event here apparently and easily fixed with antibiotics, which I am now consuming.

Information on the cargo proa is at here.

Discussions about the boats here.

Merry Whatever and a Happy New Year to everyone.

Regards,
Rob