Liberum Kayak by Stephen von Muehlen, Benjamin Cohen, and Dylan Gauthier: A project of Mare Liberum.

Build This Kayak with Bamboo and Cable Ties.

The Free Seas/Mare Liberum is a free form publishing, bookbinding and waterfront art collection, based in the Gowanus, Brooklyn. Finding its root in centuries-old traditions of stove building and Coon, and modern stitch-and-ply construction methods, our make classic, classic, boat design approachable by novice builders.

Our latest project brings together classic, stretched canvas kayak and classic, bamboo/cable-tie hybrid framework with the goal of making quick and durable boats for everyone. You can print out the full-size templates and operate at your local copy center.

One project brings together classic stretched canvas kayak and classic bamboo/cable-tie hybrid framework with the goal of making quick and durable kayaks for everyone. You can print out the full-size templates and operate at your local copy center.

1. Harvest the bamboo.
Bamboo is an invasive species in much of North America that grows very quickly. You may have to be bold and ask around, but we have found that people are generally happy to let you harvest it and take it away if you ask nicely. There are many ways to select and prepare bamboo for use. You should look for a smooth, unblemished bamboo with a straight grain and minimal knots. Our recommendation is to harvest bamboo that is at least 6 feet long and 2 inches in diameter. You will need at least 10 pieces per boat. Expose to the sun for about two weeks before laying the bamboo.

2. Cut the pieces to length.
Pair your pieces of bamboo to the parts list in the Bill of Materials. Make sure that you have the pieces in girth and straight. The top, middle, and bottom stringers are matched to be about the same diameter and straightness. Peg no-tensioning the pieces to length, starting with the stringer pairs, the keel, and then the fore- and aft deck.

3. Cure the bamboo.
Use a prunus to cut the bamboo. This will prevent the drying and cracking of the bamboo. We have found that this gives better results if the bamboo is allowed to dry for a couple of weeks before curing. We have also found that if you let the bamboo dry for too long before cutting, it may become brittle. Be careful not to use too far or too much starch because the chambers between the rings may pop from the starch contm pression inside. It makes a loud noise and destroys your bamboo. You may even want to drill a small hole near the ring to let the steam out if this becomes an issue.

4. Cut Notches on the Fore and Aft deck, and both ends of the keel.
We recommend using a jig saw to do this. First, trace out a rectangle that is the thickness of the plywood and 3" deep in the middle of the bamboo. Make two cuts in the bamboo along the 3" lines. You can open up the cuts on the other side of the cut later, so only worry about getting the line right. Make sure that the cuts are parallel to the length of the bamboo. Re-cut on the opposite side of the cut. It's a little bit of a hack job, but it works. Make sure that when you are cutting the notches at both ends of the keel, they are aligned so that the stem and stern are symmetrical and that the natural curve in the bamboo is in the same place. I.e., you want the bottom to have a nice curve and the stem and stern to be straight up and down.

5. Attach the printed outlines of the frames to the plywood.
Using the printed outlines, cut out the frame pieces from the plywood. You can cut out the individual parts and match to smaller pieces of plywood if you prefer. Do not attempt permanent because you will need to remove the paper before sealing the plywood.

6. Cut the stem, stern and frames out of plywood.
Using the printed outlines, cut the frames to the frames frame. This is pretty toxic, so do it outside and use a respirator.

7. Sand and polyurethane (or paint) all the plywood parts. Do not forget to re-move the paper!

8. Attach the keel to the stem and stern.
Drill small holes in the Stem and Stern to pass the cable ties through. Make sure that the distance between the holes and the edge of the plywood are matched to the dimensions of the frame. You will make sure that the finished line is nicely aligned so that the paddle line is rationalizable to the contact surface between the bamboo and plywood and held in place with the grommet lines. Use 1/4" and 1/8" drill bit. Make sure that the square ends of the cable ties are pulled in against the plywood so that they will not stick out when the frame is assembled onto them. You will see what I mean later.

Attach the frames to the stem and stern with wood glue and screws. You will have to drill small holes in these frames for the cable ties so that you did for the connections between the stem and stems of the keel. Please make sure that the frames are oriented correctly. The bottom of the boat is actually flatter than the deck at Frames 2 and 5. We have made this mistake before ourselves.

10. Attach fore- and aft deck to the stem and stern.
Attach the frames to the stem and stern with wood glue and screws. You will have to drill small holes in these frames for the cable ties so that you did for the connections between the stem and stern and the keel. Please make sure that the frames are oriented correctly. The bottom of the boat is actually flatter than the deck at Frames 2 and 5. We have made this mistake before ourselves.

11. Attach the remaining frames to the keel using cable-ties.
Locate the remaining frames in the middle of the boat and work out to the decks. Fold the fabric back along the opening of the cockpit and along the seams at the fore- and aft deck. If the fabric does not have a fancy grommet tool, you may have to remove the fabric now to make these modifications. Glue with sheetrock mortar or a spray-shaped sheetrock that your bamboo. You may even want to drill a small hole near the ring to let the steam out if this becomes an issue.

12. Taper the ends of the stringers.
By drilling the bamboo stringers into place, you should be able to approximate the curve desired for a nice fit against the stem and stern. Make sure that the stringers terminate on the stem and stern at the small circles in the diagram mentioned earlier. These small circles with the stem and stern onto the stringer, and cut using the jig saw.

13. Attach the stringers.
Pre-drill 1/4 holes just beyond the points of contact for cable ties to pass through. Use the cable ties, attach the stringers in pairs. The shape of the keel is corrected by the bamboo in tension, it is important that you do this carefully-orientation that the keel lines straight and the frames remain perpendicular to the keel and parallel to each other. You will probably want to use a few pounds of tension on your stringers and try to keep them tight. Make sure that the cable ties are tight as you move them to the stem and stern. You will start to see that the stems in the bamboo may become quite high. Be careful.

The fabric should be cut to a size a bit larger than the boat, both in length and width. Remember that the fabric needs to be a circle around the hull. It is important is a circle around the hull. You can also make a small circle and then make another circle. This will result in a fair and true kayak. Begin cutting the fabric to shape, and hold them in place with the cable ties as shown. NOTE: Make sure that the fabric is oriented correctly. The bottom of the boat is actually flatter than the deck at Frames 2 and 5.

15. Loosely wrap and trim away spare fabric.
Without attaching it, you can start to cut away this fabric. As you go.

Staple a few times along the top, flat edge of the stem. Pull fairly tight, along the stern.

17. Trim the fabric from the cockpit, and fore- and aft deck.
The cockpit cut from frames 2 & 5 will still be open. Leave 4–6” of fabric so that it can be pulled tight and grommeted later. Leave the same along the fore- and aft deck.

18. Begin grommeting in the middle of the boat and work out to the decks.
Fold the fabric back along the opening of the cockpit and along the seams at the fore- and aft deck. If the fabric does not have a fancy grommet tool, you may have to remove the fabric now to make these modifications. Glue with sheetrock mortar or a spray-shaped sheetrock that you will want to use to hold the fabric in place. You may even want to drill a small hole near the ring to let the steam out if this becomes an issue.

19. Cut and where the deck meets the cockpit.
Remove the fabric in the stem and stern if you had to remove it. Now you can start to tighten the fabric by using the rope through the grommets and around the middle stringers inside the cockpit and between the grommets over the push along the fore- and aft deck. Pull tight and cut off.

20. Clean up the fabric at the stem and stern.
Beginning at the bottom of the boat and working towards the top, pull the fabric tight, tack the extra material neatly against the plywood under skin and attach it with staples or tacks. Make sure you are pulling out any gathering and that you are not too tight so that you do not pull the fabric in. Do this until you are happy with the look. You can winch the stem and stern with upholstery thread along the ridge. This looks nice and prevents the skin a bit when you bounce into things in the water and draw some heat around.

21. Wet the whole boat and let it dry.
Use a sprayer to get the whole boat a little wet. This will help to tighten it all up and get rid of any fibers that you couldn’t get out during the stretching.

22. Seal the fabric.
If you used canvas, print a little with an einde, water-based canvas. If you used muslin, 90% linen and 10% cotton. Simply have 3 screws found in the hardware section of any home improvement store. It is always a good idea to use a respirator.

23. Put in the floor.
Locate Frames 2 and 5! We have made this mistake before ourselves. The bottom of the boat is actually flatter than the deck at Frames 2 and 5.

24. Escape the trappings of land!