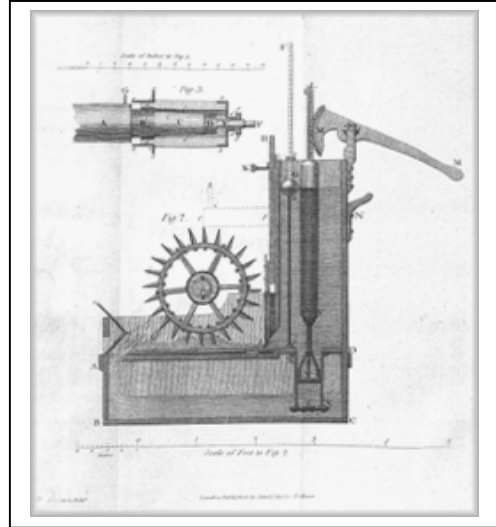


Building John Smeaton's Waterwheel Testing Device

Steven A. Walton

This version of John Smeaton's waterwheel testing setup from 1757 is designed to be built from one 4'x8' sheet of 3/4" plywood, some hardwood strips, and a pump (with or without more wood or PVC pipe). The competent woodworker should be able to build this tester in two weekends (exclusive of waterproofing)



Process

1. Layout your 4x8 sheet of plywood as is diagrammed in the attached plans, making sure that you leave the 1/8" gap between lines to account for the sawblade kerf.

2. When it is marked out (as shown to the right, figure 1, you should be able to lay it down (using a 2x4 to keep the plywood off the ground so that the circular saw clears the floor) and cut all the long lines, stopping just short of any perpendiculars. (Fig. 2). As you cut each long line, make sure that your saw cut is on the waste side of the line, so that all your pieces end up the correct dimensions.



3. Once the long cuts are made, make the cross cuts, either by plunging the circular saw through the plywood, or with a jigsaw. Finish all cuts with a small handsaw, making sure you do not nick into the good sections of the wood. Once you have made all the cuts, you should have all the pieces you will need to make the tester box (fig. 3).



Fig. 3

4. once you have all the pieces, you should prime them all, especially the edges, with a waterproof varnish. Spar Urethane or marine varnish is the best, but a high-quality water-based polyurethane will also work as long as the tester is drained when not in use. It is crucial to get all the edges well waterproofed to avoid the tester disintegrating with use. Put two or more coats on the pieces, letting them dry *thoroughly* between coats.

5. Once all your pieces are coated, you are ready to begin assembly. We found that the best way to do this was to mark out the screw-hole lines on the face pieces, mark screw-holes every 3 inches or so, and then pre-drill both the face pieces and into the edge pieces. This will ensure the plywood does not split when screws are driven in edgewise,

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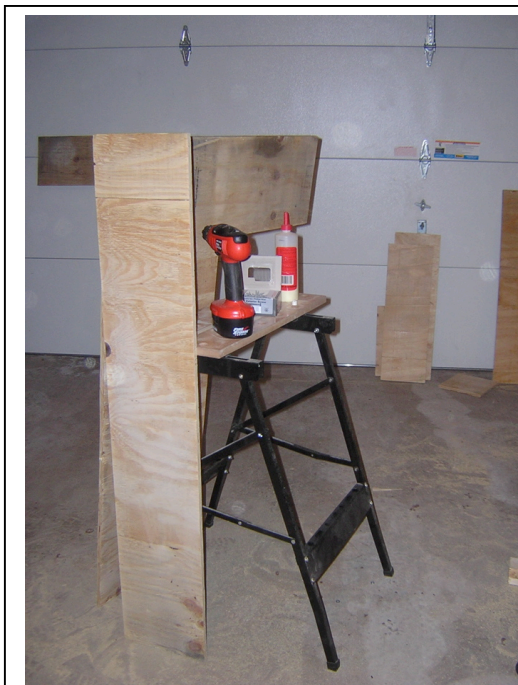


Fig. 4a



Fig. 4b

and also ensure proper alignment as you are gluing up.

6. begin by attaching the bottom [F] to one side [A]. We found that by standing the assembly up (Fig. 4a), the glue would drip down along the joint rather than across the face. Once the side and bottom are screwed and glued together, attach the tailpiece [H] to keep them square, glue and screw, and clamp overnight.

7. In the morning, you can attach the two headstock sides [D and E], again with screws and glue, (fig. 5) – note that there is a gap below the inside side of the headstock to let water from the reservoir into the headstock pump chamber.

8. Now lay the other side [B] on top, screwing and gluing it all together (Fig. 6). Allow to dry overnight.

8. When all parts are dry, use clear silicone bathroom tub caulking to caulk all insider corners to make the tester watertight.



[As you can tell, this project is in process – more to come]