



BUILDING A STEAM BOX

**** *Caution !! Working with steam is dangerous.* ****

Wear protective gloves to keep your hands and arms from being scalded and do not put your face near any opening where steam may escape and burn you.

The Basics

The size of your steam box needs to be as small as possible – just big enough to hold your workpiece. Larger steam boxes require a greater volume of steam to adequately heat them and will take longer to reach full temperature.

Your steam box needs to be tight, but not too tight. The hot steam needs to flow through the steam box not just into it. If your box is too tight, it will build up pressure and explode. If it is too loose, it will never reach temperature. The best way to get it right is to build it relatively tight, then drill vent holes as needed to prevent it from trapping too much pressure. If the box gets up to temperature and you feel built up pressure when opening the door or removing the end cap (or the cap pops off on its own), you need to make some vent holes.

A steam box can be made from PVC, plywood or hardwood. It just needs to be able to stand up to moisture and heat.

Your steam box needs to have some kind of support for your work pieces inside the box so that they are surrounded by steam, not just heated on one or two sides. Dowel rod works well and is relatively easy to install. Metal rods as supports may stain your work and would burn you more readily should you accidentally touch them.

Examples

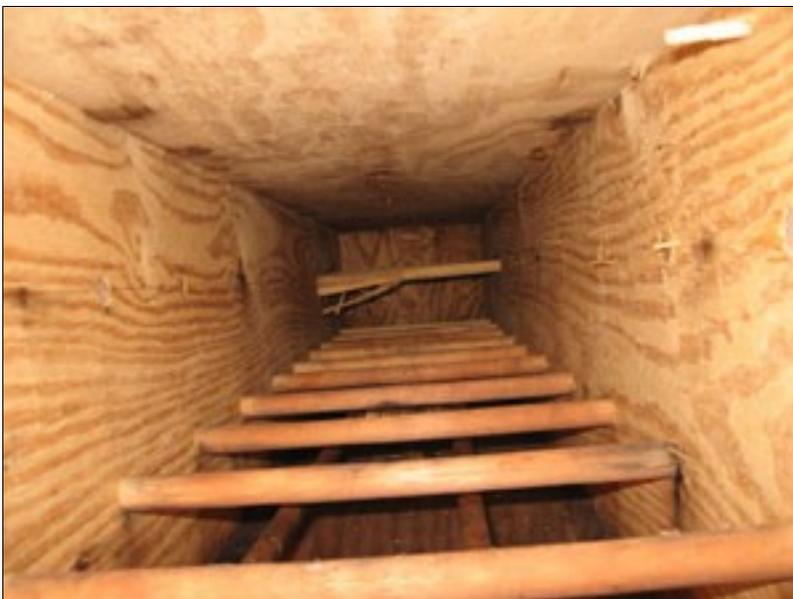
In our classes, we use two different styles of steam boxes. One style is a plywood box the other is a PVC tube.

Our biggest steam box is a 13-1/2" x 13-1/2" x 73" plywood box. It is very simple – butt joints and screws. The work pieces are held up on dowels that run across the center of the box. The steam goes into the box via a hole drilled into the end of the box. The hole accommodates the hose from the steam generator. It has a hinged door at one end with rubber weather stripping for a seal. It is big enough that we can steam chair parts for a class with ten students all at the same time. This box is clearly overkill for the home shop user, but the basics of its design can be scaled up or down to meet your needs. The interior volume is too big for one of our single 1500 watt portable steamers to heat up well enough, so we have to hook up two steamers. Also, all the wood mass of the box soaks up heat and thus the box takes almost two hours before the inside temperature gets to over 200°F.

Your plywood /wood box can be made from commonly available 1 x 6 material or 3/4" plywood. An interior dimension roughly 4"x 4" or 5"x 5" with a 3 to 5 foot length would be a workable volume to heat with the 1500 watt portable steamer we carry (at the time of this writing). More powerful steam generators will heat larger boxes. You could make a door opening with hinges and a latch, a sliding gate style door or use threaded inserts and T-handle knobs for securing a simple bulkhead style end cap. Rubber weather stripping can help seal a leaky door.



*It's not pretty, but hey - it's a steam box.
The center piece of hardware is a sash lock
that draws the door tight to help seal the box.*



*Inside view of the plywood steam box. Dowels
create a support rack for your parts
so steam will surround your work.*

The PVC style steam tube can be used for almost any steam bending project by using the appropriate size and length of schedule 40 PVC.

Pictured is a small steam tube made from a 36" long piece of 4" Schedule 40 PVC pipe. Like the larger box, it has dowels through the center to support the workpiece. The ends are closed with regular PVC slip caps. The caps are not glued on as a safety precaution. If the box starts to build up too much pressure, a cap will come off – releasing the pressure.

We use this steam box slightly tilted so that the water condensation will run to one end and drain out of the box. It is supported by a 2 x 4 (screwed to it) because the PVC would soften and sag after an extended period at 212°.

We used 1/4" dowels inside 1/4" holes about 6" apart. The dowels stick out slightly from the sides of PVC. When the steam starts to roll they swell and stay put just fine. When cold, the dowels can slip out of place so you can use sealant or a drop of glue to keep them permanently in place.



4" Schedule 40 PVC that is 36" long. (Shown with a meat thermometer inserted into a small hole at the top.)

Inside view of PVC steam tube. 1/4" dowel rods support your work inside the tube and let the steam surround the wood.



Other factors to consider:

The Earlex Steamer comes with a brass fitting for connecting to your homemade steam box or tube. The steamer hose has a fitting with female threads that connect to the male threads of the brass fitting.

This fitting has 1/4" male BSPP threads (British Pipe Standard). One end you will screw into your wood steam box / or PVC tube. We drilled a 1/2" hole into plywood and the fitting tapped into this hole pretty well. You can drill a test hole in scrap material first to check for a good fit and use another size hole if needed. Because the threads are British standard, it is doubtful you will find a fitting in the hardware store to mate them up with. So just drill an appropriate sized hole in your plywood or PVC that you can screw the fitting securely into. You can use Teflon tape if needed to help get a good seal.



The brass fitting screws into the end of your steam box or tube. This allows you to connect the hose on the Earlex steamer to your steam box or tube.

- ◆ Use a meat thermometer through an access vent hole to measure the temperature inside the box/tube. Aim to get as close to 212° F as you can. If you have a big project with a big steam box and can only get the temperature up to 200°, you still may be able to bend successfully. You could try to insulate the box and delivery hose to help boost the temperature.
- ◆ If you dimension your wood to size before steaming by riving it off a wood billet, the rate of cracks and failures when bending will be less than if your wood is cut to size with a saw. Since riving follows the grain more than sawing, the wood fibers are less likely to tear and fail when you bend the wood.
- ◆ The general rule when steaming is to cook the wood for one hour in the box for every 1" of thickness.
- ◆ Play it safe when working around steam. Use gloves. If you generate steam using an open flame (like a turkey fryer propane burner or other device), be very careful!
- ◆ Consult a book, DVD or online sources to find out more about how to do steam bending successfully.

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