

Bent Wood

Steam Bending Timber

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This document describes the process that is used to steam bend timber, such as the recurve bow or recurved war longbow.

In this document I will describe the basic process required for the steam bending of timber and, in particular, the bending jig.

Bent Wood background

Bending wood is a process of steaming the timber and then setting it into a frame or jig that applies the desired curve(s). The steamed timber is soft and the fibres are more flexible than dry timber. As the timber cools and dries, the applied curve is maintained by the piece.

Steaming is also used for the straightening of timber. I often have lames of timber for lamination that have a curve across the length of the piece, these pieces need to be steamed and held in a straightening jig until cool and dry so that when I am setting up the timber for lamination, the lames all meet nicely.



Figure 1 - Laminating/Straightening Jig - Detail



Figure 2 - Laminating/Straightening Jig

The first modern bentwood furniture appeared in the late 1800's by Michael Thonet, however, bending and straightening timber has been an activity of the ancient as well as modern man. Consider the Australian aboriginal spear; this is often made from the root

of a scrub species tree. The spear maker heats the root and bends it against a rock or his/her foot to straighten the shaft.

American Indians use the coal and hold technique for making basket rims, straightening timber, etc. And have been doing so since time immemorial.

Images from the medieval period depict bows with either a straight, more traditional appearance longbow, or as heavier bows with a slight recurve at the tip of the bow. This curvature is achieved through steaming the timber, bending it over a form and tying it down until the timber has adopted the curve (after cooling and drying). The recurve of the bow adds torsion to the bow and increases the forward thrust potential of the bow. It is possible to make bows from lighter material to achieve the same or higher bow poundage using a reflexive curve; it is also possible to make a much higher poundage bow by adding a reflexive curve to the same material as a longbow.

There are many methods for steaming and bending the timber ... this is just one of them.

Method

Getting Steamy

I use a 2400mm x 90mm PVC tube with screw caps at both ends. In the middle of the PVC tube, I have joined a Y-splitter and a reducer. The end caps have holes drilled in them to allow steam to vent from the PVC pipe. A heat resistant flexible pipe (approx. 50mm diameter) is attached to the reducer on the PVC pipe. The flexible pipe attaches to a 2 litre non-electric kettle. The steam produced by the kettle passes through the pipe and steams the timber. The amount of time that the timber should remain in the pipe while steaming depends on the density and type of timber. For most hardwoods, half an hour in the steam should do it. When the timber is removed from the PCV pipe, it should be quite flexible. Test the flexibility of your wood with a waster piece (that is, a piece that you don't mind breaking). You do have to work fairly quickly, as the timber will start to cool and become inflexible. **REMEMBER TO WEAR PROTECTIVE GLOVES ... the wood will be HOT!**



Figure 3 - Steaming Pipe

Getting Bendy

The jig that you use will be dictated by the form that you want to create. I have made a jig for putting a progressive curve into 25mm timber (my laminated stock); this jig is made from a piece of 150mm x 200mm x 40mm Tasmanian Oak. I cut the block into two pieces making up the inner and outer edge of the curve that I desired. Then I drilled 10 x 13mm holes through the upper and lower pieces of the form. The drilled holes accept 20 x 100mm x 12mm mild steel clamp pins that I had made by a local general engineering company (it cost me \$110.00) The pins are made so that the upper pin in the jig has a 7mm smooth bore drilled through while the lower pin has a 6mm threaded hole so that I can pass a 6mm bolt through the upper and into the lower pin, resulting in a series of 10 clamps along the length of the jig.

The steamed timber is placed into the jig and the 20 threaded bolts are wound down into the lower pins, this is done from the tight curve end of the jig first (as the timber needs to be the most flexible here). The loose end of the timber is pressed down while winding in the remaining bolts. The jig is tightened until the desired curve is achieved and then it is set aside so that the wood can cool in the jig.

When the timber is removed from the jig, it is cool and the impressed curve is permanent. It should be remembered that curves achieved in this way will loosen over a long period of time and may need to be re-bent at a later time. However, this happens over a very long period and the degree of return depends on the timber used.



Figure 4 - Bending Jig