

The first step in bending is called "floor tillering", for reasons which will become apparent. You put one bow tip on the floor, hold the upper end with one hand, and push against the handle with your other hand perhaps 1-2"...for some views you'll put the tip near your foot, for others you can put it well in back of you and push down - we'll go over fine points at the clinic.



What we're trying to do first is confirm that the bow gives slightly under reasonable pressure. If it is still "log-like" we'd reduce limb thickness further. What we don't want to see is stiff straight limbs with a bend right at the fade. Our pyramids were already dimensioned to provide a reasonable bend profile, but remember how we tried to avoid weakening the limb where it meets the handle? Now you'll discover how well you did. If your stave floor-bends most at the fade, you'll have to remove wood from the rest of the limb until the fade is again stronger than the rest. (Remember this point - taking too much off any one spot requires removing more elsewhere, resulting in a weaker drawing draw).



Next we want to see if both limbs bend the same. If you pull your elbow into your hip and use your body to push, you'll find it easier to apply consistent pressure, and be able to tell which limb bends more. If one limb is clearly weaker, you'll need to reduce the other's thickness. Some adventurous souls use power sanders to do this, but it is frighteningly easy to overdo - so with our limbs already cut close to final thickness, we'll stick to scraping and sanding. After each sanding/scraping session, exercise the bow 15-20 times to "work in" the change.



When you can push into the handle and see some curvature in each limb, and they each bend more or less the same, you'll be ready to move on.

Here's what we have at this point. The tips and handle are nicely lined up, but as a result of our heat-bending, the tips are "deflexed" (bent back in the "draw" direction) slightly. This is not a problem, as it was caused while bending the handle - not by a breakdown in wood resiliency called "set" caused by over stressing one particular section of wood. We'll be watching for this "set" while we tiller the bow, by checking how far the tips at rest have moved back from where they started.

At right, you can see the stave, together with the wood removed so far (bundled at left). On the bench are key tools we'll depend on from this point. The calipers are useful to confirm a steady taper from fade to tip, to identify thick points, and to help us keep the limbs even from side to side. There are two rasps, a half-round and a "farrier's" heavy duty rasp for fast wood removal. Behind the caliper is a flat cabinet scraper, which is very useful for removing small amounts of wood along the length of the limb. Behind the sanding block is a spokeshave called the "bowyer's edge", essentially a cabinet scraper in a handle. Last, but not least, a sanding block with high quality, sharp sandpaper (I use 3M), and a sandpaper cleaner to keep the sandpaper unclogged.



To go beyond floor tillering, we need something on the limb tips to hold a string. To reduce stress on the new bow, we start with a "long string", so that the bow is not under tension except when drawn.

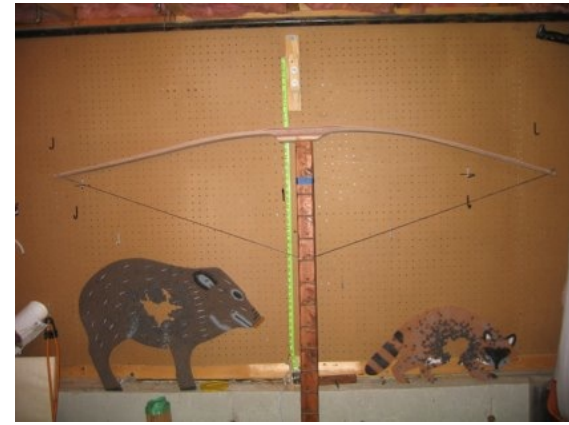
At left is a temporary nock, a small block of wood with grooves cut out to fit over a bow tip. It's tied on with artificial sinew, and provides an easy way to attach tillering strings before deciding exactly where the final string nocks will be.

You could also cut "pin nocks" into the ends as shown at right, a light-weight and efficient traditional design. Or use a small round file to create temporary string grooves, which can be replaced with fancier limb temps as the bow is finished. I often cut a groove into the back of the bow tip, then cut the tip off at a diagonal removing the temporary groove when formed tips are added.



Now work with the long ("tillering") string can begin. This special string is 6' long or more, with a loop on one end and a "bowyers knot" on the other so we can adjust the length to suit. We're going to put a slight pull on the bow, only slightly more than during floor tiller. This can be done in front of a mirror, on a fixed hook, or on a "Tillering Stick" such as that at right which holds the bow and has slots or posts to hold the pulled string. We want to see where the limbs are bending. The pictures here will give you an idea what we look for.

On the badly flawed example at right (since deceased), the stiff left limb is stressing the fade, and the right limb is showing a distinct kink (called a "hinge") about 1/3 limb length out. Hopefully none of our pyramids will start off this badly. You may see why we shouldn't strain these weak points further, before removing wood around them.



Another, less dramatic example at left: this one is slightly better but still shows significant differences between the stiffer left limb and the weaker right limb. It needs wood removed from the left mid-limb until at this same amount of pull, both limbs bend the same.

At right is a similar but better balanced bow, showing slightly more bend in the right (upper) limb. Changing the bend doesn't take much wood removal, towards the end perhaps 10 strokes with fresh sandpaper.



Remember that after each wood removal, the bow needs 15-20 pulls to "work in" the changes before the results will show. If you forget to work in each change, you'll probably take off too much wood before you notice the difference. We'll work the long string until the limbs bend evenly, smoothly, and far enough to "low brace" the bow for the first time. If you connect the bow tips at right, you'll see that this one is about there.



Here is another bow at its first “low brace”. We’ve adjusted the bowyer’s knot in our long string using to provide about 3” of brace height (between string and the handle, where your hand grips it). This may be 1”-2” shorter than your nock-to-nock length. Because the low brace leaves the limbs almost straight, it isn’t putting nearly as much strain on them as a normal brace will.

But because this bow isn’t worked to its final draw weight yet, it can be a lot tougher to string. Use leverage to help brace it. Here’s our new pyramid gripped in a pivoting vise, with one end fixed. I use this setup to avoid straining muscles, or the bow, unnecessarily.



At brace, now we check the alignment of the tips and the handle - our pyramid at left seems aligned well now. If not, we’d make changes before putting sideways strain on the limbs. Trimming the tips, or deepening nock notches on the side it’s bending toward will shift the pull of the string and sometimes correct the problem. Larger flaws can be resolved by heating and straightening again.

Working through these steps patiently will get you to the point shown at right - here’s our pyramid bow at 5.5” brace height. Checking the limbs for “tiller” (bowyers use that word a lot) is done by measuring the distance from the string to each limb, the same distance from center, I use 12”.

With “Positive Tiller” the string is farther from the “upper” limb. In this case, we’re “neutral”, 5 7/8” on both limbs. We’re not done, yet. The next step involves measuring and adjusting the draw weight to our needs.

