

Making the Native American Indian Flute.

General Notes: The wood you select is wide open really. I tend to like White cedar; Maple: Walnut: and Cherry however I have made them from teak, basswood , bacote,, bloodwood , and poplar. (Cedar dust can cause rashes, and breathing problems, and walnut can also.)

The size you need to begin with is determined by the core box bit you will use. You will need $\frac{1}{4}$ inch extra all around the bore diameter you select. So if you use a $\frac{7}{8}$ inch core bit then add $\frac{1}{2}$ inch more. The width of the wood then is $\frac{7}{8}$ (bit dia.) plus $\frac{1}{4}$ plus $\frac{1}{4}$ or 1 and $\frac{3}{8}$ total width. Because each half of the flute is routered in to $\frac{1}{2}$ the bit dia. The $\frac{7}{16}$ inch (half of $\frac{7}{8}$)depth plus the $\frac{1}{4}$ makes the wood a total of $\frac{11}{16}$ thick. A length of about 24 inches seems to work well. Upon completion most flutes in F# with $\frac{7}{8}$ inch bore will be 18 to 20 inches long approx.. You will need a Core Box Bit to fit your router. Some are $\frac{1}{4}$ shanks some are $\frac{3}{8}$ or even $\frac{1}{2}$ inch shanked. The Bit itself should be either a $\frac{7}{8}$ or 1 inch. I'm sure a $\frac{3}{4}$ would be just fine but I have not used such a small one. This bit is best borrowed and then you have it sharpened for the person in return for its use.. This will cost you maybe \$10.00 and some beer or root beer . To buy one will run \$35.00 to \$45.00.

Summary: a 1 inch core bit would then need two pieces $\frac{3}{4}$ thick X 1.50 wide.

A router table is important or a make shift stand with the router bit facing up will allow you to move the wood across the router bit. Some folks are pretty ingenious and could hold the wood flat on a work bench and make a sled for the router to sit in and you would slide the router over the wood versus sliding the wood over the bit. Your goal is to make two separate from one another channels in both pieces of wood so when the two are glued together you have equal and nice fitting halves.

With my bit set up in my router table and protruding up maybe $\frac{1}{4}$ inch I set my fence to router this channel right down the center of the flute blank. See diagram. A. You will stop along the path of the channel and lift the wood for $\frac{1}{2}$ inch then come back down again and router another 3 inch channel before stopping. Turn off the router or lift the wood off carefully.

In a nutshell...starting from the blow hole (mouth end) you have solid wood for 3 inches, then a slow air chamber of 3 inches, then a $\frac{1}{2}$ inch wall of solid wood again then the remaining bore chamber running right through to the end and out you go. To get all this you need to at some point lift the wood off the rotating bit then put it back down on to the revolving bit which wants to fling it if not held down. Use of safety devices such as feather boards etc. is helpful OR make a jig and clamp system to hold these wood blanks in place. A picture is worth a thousand words and I could show you a device I use. See drawing.

You should consider running a scrap blank ahead of your actual one each time for checking your depth and location.

If you have the luxury of a hand crank up type router or a plunge router you are lucky. I have until recently used a standard fixed base router. This is difficult to extend the bit out of in somewhat equal depths of cutting. You should only take 1/8 inch deep cuts each pass. As you get close to the final pass you could easily turn or push these fixed base routers to deep...thus the scrap piece we talked about earlier.

Note: the first few passes of the wood over the bit are not critical from the standpoint of being perfectly centered on your blanks. I run a pass or two and see once which way I need to reset my fence. If when I make my first pass I see I need to be one way or the other I move my fence, make another depth of cut and another pass and check again, you'll quickly see what I mean. If you haven't got the bit centered after running your scrap piece a few times its time to ask for help from above or a spouse???

You now have two matching halves. See drawing. Now drill, chisel, router, mill machine or whatever your skill/ tool level is and cut two rectangular holes as shown in drawing. These holes should be 1/4 inch to 5/16 inch X 1/2 inch. Centered on the blanks. Clamping needs to be carefully done so as not to dent the wood with the clamps. Use flat scrap wood to hold the blanks down for chiseling. NOTE: Remember to chisel your top half only. I've had students chisel both halves with sound holes in them!

Then you chisel with a 1/4 or 3/8 inch chisel that is extremely sharp a long bevel to these rectangular holes sort of like a ramp going down to a hole. Sand them well, so air turbulence of any sort is omitted. Sand also the 3 inch slow air chamber and the bore chamber as well. (keep off the flats of these halves as you need flat, flat, very flat, glueing surfaces.

Now your ready to assemble and glue your halves BUT first...one more thing to do and that is to finish the four bore, routed channels. I use shellac. It dries fast, sands easily and one coat melts into the next and so on. It isn't terribly durable or even water resistant but has worked for me. Use varnish if you like just keep the finish off of the flats to be glued. I use fresh shellac flakes and mix in the alcohol, dissolve then put on 3 coats in all. Any surface type finish will work...keep away from oil finishes, mineral oil, linseed oil etc.

Use most any adhesive you like. Some are great some not. I do not like the urethanes or gorilla glue as you get a foam which is difficult to clean up inside a deep hole and air turbulence on the inside of the bores is not good. I use titebond or elmers wood glue works well and white is better than yellow for light colored woods. Yellow is better for dark colored woods and is s better glue overall for wood.

Now is the secret...glue causes wood to slip and slide , also if you clamp to hard or use to many clamps you'll crush or crack the 1/4 inch walled chamber. So keep the clamps along the outside 3/8 of the wood and use light pressure. To keep the two halves in alignment I use a dowel about 12 inches long with a long metal eye

fastener in the end to place a strong string or shoe lace on..then I lay this in the long bore, put the two halves together and clamp. I should be able to pull out the dowel and push it back in if needed. This dowel has been sanded down on a lathe to be $1/64$ smaller than the core bit channel you routed. If you sanded or cut it too small you can wrap the dowel on each end with electrical tape or duct tape but it can not be larger than the bore because both halves will not seat tight. It is also possible to make thin wood washers of the diameter you need and place them into a few spots along the inside of the long bore channel, glue the halves together then break them out easily with a drill bit or steel rod or even a screwdriver. .

Glue has dried and you'll need to turn the instrument on the lathe. You'd like to maintain an $1/8$ inch wall to $3/16$ wall the whole length of the bore up to within 1.5 inches to the first true sound hole. Then you turn again the last three inches for the mouth piece. See drawing. Special cones are used on the big bore end as this end is the drive end of the flute. If you have a 4 jaw drive that is best.

Now chisel , router or mill a $1/32$ inch deep channel between the two sound holes. The air will travel from the slow air chamber through this channel and hit the true sound hole on the $1/32$ inch knife edge you left and with a piece of wood on top tied down with a leather lace you'll get your sound...You just have the $5/16$ to $3/8$ inch hole to drill from the mouth end through that 3inches of solid wood and into the slow air chamber.

The rest requires to much explanation and will probably require a one on one meeting. My # for questions is 608-487-3285. Joe

