

HOW I TURN LONG, THIN SPINDLES

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Turning long, thin spindles can be a challenge. The shaft can flex, chatter, and vibrate causing lots of problems and perhaps even breaking. These notes are to show the way I usually turn thin spindles.

I use turning a magic wand as the example but much of the same applies to other relatively long, thin spindles such as conductor's batons.

This photo has a few examples, in Cedar, Purpleheart, Dogwood, and Cherry. The one on the bottom is the one I did for this tutorial. As an example, I made it thinner than usual which was more of a challenge. I also didn't spend much with detail or making it look well balanced.

The second one from the bottom is a finished Dogwood wand before the support is removed.



The biggest problem: how to keep the wood from vibrating, chattering and possibly breaking while turning.

Wood selection and preparation

Start with good wood. Pick a blank with the grain running as straight as possible along the axis. Grain at an angle, figured or burl'd, knots, punky, spalted, lots of wormholes, and such can make the shaft weaker and it can flex more easily and break. I usually use a blank about 1" or so square and 13" to 15" long.

For magic wands I usually remove some of the wood at the shaft as shown in a later photo. This saves a lot of time since I don't have so much to turn away on the lathe. It also gives me lots of cool strips of wood to give to the kids!

Holding the blank

How the blank is held is important. If held between centers, you have two end pivot points and the wood can easily flex between them and cause many problems. If one end is held tightly in a chuck and the other in a center, the first 1/3 to 1/2 is restrained from flexing and the whole thing is a lot stiffer.

I don't actually hold it in a chuck but use a jam chuck. I turn a short #2 morse taper on one end then jam that into the headstock spindle. This has several advantages: First, it eliminates the chuck and rotating jaws and gives more working room at the end. Second, I can turn longer shafts on a smaller

lathe, for example, when I take a mini lathe to make magic wands at a public demo. (I make up blanks ahead of time on a bigger lathe.) Third, a real advantage is the piece can be removed from the lathe and returned with perfect registration, something not easy or even possible with a chuck.

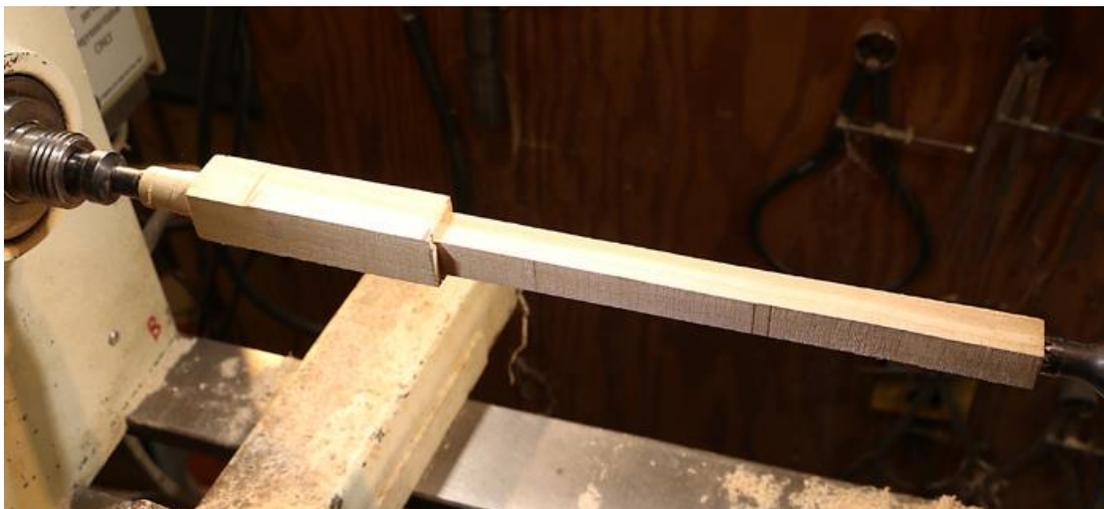
I made a small gauge from a piece of brass which lets me make a perfect taper every time. Without a gauge size the taper with calipers at two points. After turning the taper, I always use a parting tool to cut a small relief between the high and low ends which lets it seat better in case the taper is not perfect.



Getting ready to turn

For this exercise I picked a Black Cherry blank from my stash of wand blanks.

These two photos show the blank, first with the morse taper cut, then with it jammed into the lathe spindle. Bring up the tailstock to seat it firmly then release a little. Too much force on the tailstock can cause problems such as bending and splitting when the shaft gets thin.





Think about the design - end, handle, transition, shaft, and tip. For small children avoid points.

Tools

Skew chisel, small roughing gouge, spindle gouge for handle detail. A spindle gouge can be a problem on the thin shaft since a small vibration can make the wood ride up over the tip and cause a catch. A skew is better since the flat bevel supports the edge. A small roughing gouge would be my second choice, acts a bit like a curved skew.

Tools should be very sharp. I usually hone and strop on leather.

Turning

I turn at a high speed, usually 2500-3000 RPM or so. The inertia from the rotating mass tends to make the shaft vibrate less. Also, for the best finish off the tool spins very fast and cut very slowly.

Make everything round and for a magic wand, rough out the handle. The handle can be finish-cut and even sanded first but I usually like to wait until I develop the transition between the handle and shaft.



Begin tapering and shaping the shaft. I generally use a skew chisel for this. A small roughing gouge will also work. As the shaft gets thinner the fun begins.



When it starts to get thin the shaft will probably start to vibrate and chatter during the cut or it may even vibrate on its own without even touching it.

Strategies for handling the vibration.

- Tools and cut

First, I do not do what I saw on a YouTube video - sand to size with 80 grit paper. Yikes. I rarely use sandpaper coarser than 320 or 400 grit. However, if you have not yet developed spindle turning skills, the 80-grit gouge may be the only option for now.

Make light cuts with very sharp tools. I almost always use a sharp skew for thin shafts. I like a 1/2" skew but a larger one works fine. Note that a 40-45 deg grind on a skew might not cut as well but is more "forgiving" than a 25-30 deg angle.

The skew can support the wood with a wider bevel than a spindle gouge and the straight edge is more forgiving.

A roughing gouge will also work. It's kind of like a curved skew.

Sometimes loosening the pressure from the tailstock helps if you have it too tight. Sometimes tightening it a bit helps - experiment.

- Support

A steady rest is traditionally used for longer spindles. This doesn't work well here since it gets in the way. Also, most steady rests won't close enough to support a thin spindle.

I use the "left hand steady rest" method - I can't turn these without it. I rest my left arm on top or against the headstock and cradle the spindle lightly with my left hand. (This is perfectly safe. Don't

wear long sleeves.) I use my left thumb to lightly support and guide the tip of the skew. This provides excellent fine control. The fingers curve around and provide support for the cut.



This, of course, requires holding the tool with the right hand only. I grip very near the tip and support the end of the handle by forcing it against the underside of my forearm. This supports the tool well.

Note that as the tool is moved along the shaft, the left hand has to move with it. The pressure needed for support is very light if the cut is very light. As Richard Raffan said, if the wood gets hot from friction on your hand, you are using too much force with the tool!

- Tailstock pressure

Sometimes the shaft will want to vibrate even when supported with the hand. As before, I try either tightening or loosening the pressure from the tailstock.

Then I try different things to see what works the best. Sometimes I will switch to another tool, say a skew with a different angle. Sometimes reversing the direction of the cut will make a big difference.



When working on the left end, I might support the right end by crossing my hand over the tool.



I have had some very thin shafts vibrate regardless of what I did. I don't worry about it too much when shaping but it's horrible when doing the finish cuts. Instead of resorting to sandpaper, I use a small cabinet scraper.



- Tap to fix

One oddity: if you do happen to put sudden force on the side of the shaft perhaps with a catch or some enthusiastic turning (or a careless bump), it may knock a bow in the shaft which wants to stay. However, this can usually be fixed. I simply use the tool handle to tap the shaft several times in the middle while it is spinning. Usually after several strikes it will hit just right and knock it straight again. If necessary, release a little tailstock pressure first. Some woods are worse about this. It's not often a problem but a good thing to know.

Sanding and finishing

I sand with the lathe running and then turned off. Before moving to a finer grit, I sand with the grain to remove any scratches from that paper. Be careful not to round over and soften crisp detail.

After the shaft is done I finish turning the handle then apply a finish on the lathe, usually Mylands shellac-based friction polish. Remember the shaft is fragile so to avoid side pressure just squeeze the finishing cloth around the shaft. I always use a small piece of cloth for safety, although with thin spindles like this the shaft will break harmlessly long before you rip your fingers off with a large cloth.



I like to use beeswax to finish cedar wands, applied with the lathe running and melted into the surface with friction from a small piece of cloth.

Texturing

If texturing, be sure to support to prevent bending. I sometimes use a star wheel texturing tool.



Other things that work well are burning a line with a fine wire, distressing with a pointed tool, and carving.

Finishing up

I cut off the tip with the skew, then thin and saw off at the handle. If the end is broken off, you risk pulling out fibers and causing damage that cannot be fixed easily. I sand and finish the ends by hand.



Here is the end result. Done in a rush, nothing spectacular, but I hope this explains my technique.



The possible variations are infinite. Multi-axis handles are fun, both two and three axis.

Sometimes I make a wand in two parts, turning the handle and shaft separately and gluing the halves together using a small tenon. A three-part wand can have a contrasting bead or detail between the handle and the shaft or a handle made from several parts or segments.



Have fun!

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