



TURN *the* KNOB

Mike Peace

Making your own turned door and drawer pulls can add a special element to hand-made furniture or cabinet projects. Perhaps you want to replace a missing or damaged knob to an old piece of furniture. Sure, you can buy wooden knobs commercially, but where is the fun in that? And most store-bought wooden knobs are rather bland with limited wood choices. Turning your own knobs and pulls allows you to add unique character to a project by customizing shapes and using special woods, such as exotics.

Facegrain vs. endgrain

You can turn knobs and pulls in facegrain or endgrain orientation. Each has advantages and disadvantages. With facegrain, or sidegrain orientation, the grain of the wood is perpendicular to the lathe bed. Endgrain knobs are turned with the grain parallel to the lathe bed, as in typical spindle projects. Some important considerations:

- An advantage of a facegrain knob is that you can orient the grain to match the grain direction in the furniture. You also get a more consistent color match with facegrain

since endgrain has a tendency to absorb more dye or finish, which can darken the appearance.

- Screw threads hold better in facegrain than in endgrain, so consider how you want to mount your finished knob to a furniture project when choosing a grain orientation.
- Endgrain knobs are a good choice when you need a smaller knob mounted with a tenon that fits into a hole. Be sure to size the tenon to fit its intended hole.
- Since screw threads do not hold as well in endgrain, you can hold ►

Shopmade screw chucks

An easy way to mount knobs, pulls, and other small items on the lathe is with a screw chuck. There are commercially available screw chucks, as well as screws that can be held in a scroll chuck, but you can also make your own version (*Photo a*). It works simply by mounting a screw in one form or another to your lathe's spindle and then mounting your workpiece firmly onto that screw. Following are two kinds of screw chucks I have made and used successfully, but you can also make one from a scrap of wood with a tenon to fit in your scroll chuck.

Faceplate-mounted screw chuck

One method is to attach a piece of $\frac{3}{4}$ " (19mm) plywood to a small faceplate. Mount it to your lathe and turn it round. Drill a hole using a Jacobs chuck mounted in the tailstock with a drill bit sized to accept the screw you will be using. I use a fully threaded #10 metal screw, which I screw in from the back to extend about $\frac{1}{2}$ " (13mm) beyond the front face. Use the same size screw you will use to mount the knob to the furniture.

Add a thin plywood disk or hardwood block onto your screw chuck and turn a taper sized to match the bottom of your project. This makes it easier to take final shaping cuts near the base of the knob. You can use this taper as a visual reference to size your project without the need for calipers. This is a great technique for small production style projects like knobs.

Threaded block-mounted screw chuck

Another method of mounting a screw chuck is to use a hardwood block tapped to thread directly onto your lathe's spindle (*Photo b*). This way, you will not tie up a faceplate, and it leaves more room to get a gouge near the bottom of a knob. I make a lot of these wood-threaded screw chucks, as they come in handy for many small woodturning projects, such as boxes.

To make one, you'll need a spindle tap (available online and in most hardware stores) and a hardwood block. Tap the block with a thread cutting tap to match your lathe spindle. For example, if your lathe spindle has threads that are 1" (26mm) \times 8 tpi, use a spindle tap of that size so the block will thread on correctly.

Start with a piece of hardwood at least $1\frac{3}{8}$ " (35mm) thick and $2\frac{1}{4}$ " (57mm) square with the grain running perpendicular to the lathe bed when mounted. Drill a pilot hole with a Forstner bit $\frac{1}{8}$ " (3mm) smaller than the tap size ($\frac{7}{8}$ ", or 22mm for

a 1" lathe spindle). You can do this with a drill press but I find it easier to drill on the lathe with the block held in a scroll chuck (*Photo c*). Drill all the way through the block, but take care not to advance the drill bit too far and hit the inside of your chuck.

Keep the tap perpendicular to the face of the wood block when cutting the threads. I use the tailstock with a 60-degree cone—not to provide pressure, but to keep the tap aligned for the first few threads. You can use a wrench to turn the tap, but I find it easier to use the wooden tap handle I made by drilling a hole in a length of wood and cutting it square with a chisel to fit the square tang of the tap (*Photo d*). Turn the tap clockwise to cut the threads in the wood block. Back out the tap often to clear the wood shavings.

After cutting the threads, true the front surface of the block so it is flat. Use a square-end scraper or skew held flat to cut a slight recess about $\frac{3}{8}$ " (10mm) wider than your spindle and $\frac{1}{16}$ " (5mm) deep (*Photo e*). This recess allows your block to clear the unthreaded flat area on the spindle and register against the back of the spindle like a regular faceplate.

Remove the block from the chuck and drip thin cyanoacrylate (CA) glue on the wood threads. The glue, when cured, will strengthen the threads. After the glue has cured, thread the tap back through to clear any excess glue. Finally, apply a little paste wax to the threads.

Now screw your threaded block onto the lathe's spindle with your cut recess toward the headstock. True the other end of the block and glue on a piece of $\frac{3}{4}$ "- (19mm-) thick sacrificial hardwood. I use carpenter's glue and apply pressure with the tailstock until the glue has dried. This piece will hold the screw for your screw chuck. After the glue has cured, turn the entire assembly round with a bowl gouge. As you would for a faceplate-mounted screw chuck, drill a hole using a Jacobs chuck mounted in the tailstock to accept the screw you will be using. Drilling this way ensures the screw, and ultimately your workpiece, will be centered.

Mounting your workpiece

With these small shopmade screw chucks, you may need to secure the screw with a screwdriver from the back when mounting the work. Bring up the tailstock for support for as long as possible during the cutting. If you need a bit more support for the knob for cutting without the tailstock, add a couple drops of CA glue to the bottom of the blank. But be careful: too much CA and it may be difficult to remove the knob from the face of the screw chuck.



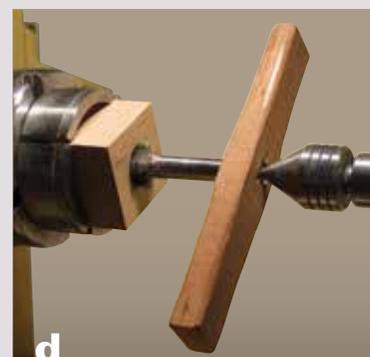
A faceplate-mounted screw chuck (left) and one mounted on a wood block threaded to fit the lathe's spindle. Notice the faceplate-mounted screw chuck has a plywood spacer that serves the same purpose as the raised taper on the threaded block version. It serves as a sizing reference (like a pen bushing on a mandrel) when turning the base of a knob and provides clearance for shaping the bottom section of a knob.



A shopmade screw chuck assembly threaded directly onto the lathe's spindle.



To make a threaded block, start by drilling a hole $\frac{1}{8}$ " smaller than your lathe's spindle diameter.



Cutting threads in a hardwood block with a spindle tap.



Cut a small recess at the face of the block so it will seat properly when screwed onto the lathe's spindle.



1 Proper direction of cut for the smoothest surface when the workpiece is mounted in facegrain orientation.



2 Take light cuts with a spindle gouge with the flute facing the 2 o'clock position, cutting from small to large diameter if the workpiece is mounted in facegrain orientation.



3 Shape the bottom of the knob with the flute facing about 10 o'clock, again taking light cuts from small to large diameter.

to cutting the outside profile of a typical facegrain bowl. Cut from low to high when cutting the shank of the knob to slice along the fibers. This prevents the tearout you will likely get if you cut the wrong direction into endgrain. To cut the cove, take light cuts from small to large diameter (*Photo 2*). To shape the left side of the cove and the knob's base, use a similar cut—from small to large diameter (*Photo 3*).

Most commercial wooden knobs have a threaded insert for mounting on furniture. But you can easily fasten a facegrain-oriented knob with a screw from the back. You may need to hand sand away some of the fibers pulled up by the screw after removing the knob from the screw chuck. Mount the knob onto your furniture project using a screw the same size as the one used on your screw chuck.

Turning endgrain knobs

Photo 4 shows the correct cutting direction when turning a knob in endgrain orientation. Unlike the cutting direction of facegrain knobs, make your cuts with the grain by cutting from larger to smaller diameter.

Instead of turning one knob at a time, another option with endgrain knobs is to rough turn several at once between centers (*Photo 5*). To finish the face, you will need to mount the roughed blank in a chuck or collet (*Photo 6*).

an endgrain knob in a chuck with small jaws. Use a screw chuck for mounting facegrain knobs (*see sidebar information on making your own screw chucks*).

- With a facegrain knob, the short grain can make the shank vulnerable to splitting if turned too thin. Keep the shank at least $\frac{3}{8}$ " (16mm) in diameter at the thinnest part. An endgrain knob can be thinner at the base because of the strong grain running through it.

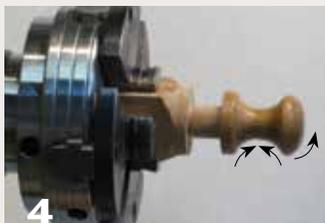
Turning facegrain knobs

Start with facegrain blanks about 1" (25mm) thick and 1 $\frac{3}{8}$ " (35mm) square. Mark the center and drill an appropriate-sized hole to fit your screw chuck using a drill press. After screwing the blank all the way onto the screw chuck, rough it round using a small bowl gouge, taking light cuts

to keep from stripping the threads. Cut in from each end to avoid chipping. Because this is a small blank, you can safely turn at higher speeds, about 2,000 rpm and faster after the blank is round.

I typically bring up the tailstock for support when roughing. My live center can provide support without leaving an indentation. If using a cup live center, remove the center pin to prevent causing an indent that will take some effort to remove. Avoid over tightening the tailstock, which will leave a deep ring indentation. If it does, consider it a "design opportunity" and accentuate the ring by making it into a V-groove.

Photo 1 shows the correct direction of cut when the workpiece is mounted in facegrain orientation. On the face, or end of the knob, cut from the center out, similar



4 You can mount a blank in a scroll chuck for turning an endgrain knob. Note the direction of cut for endgrain is from large to small diameter.



5 You can rough several endgrain knobs at once between centers.



6 You can hold an endgrain knob that you started between centers in a drill chuck. Finish shaping by taking light cuts from large to small diameter.



7 Use a shopmade V-block to safely cut a slot for a wedge at the bandsaw.

Traditional Shaker knobs frequently used a wedge in the tenon for mounting to furniture. To safely bandsaw a slot in the tenon or to separate multiple knobs roughed on one blank, hold the knob (or blank) securely in a V-block (*Photo 7*). This will reduce the chance of the workpiece rolling into the blade and causing an accident. To mount the knob onto a furniture door or drawer, insert the slotted tenon through the hole in the furniture, then drive a thin wedge into the slot from the back to tighten the fit.

Design considerations

Experiment with different shapes. Search the Internet to find pictures for inspiration. Add embellishments such as V-grooves, a tiny bead, a dished center, or a contrasting insert (*see sidebar*). If you have to make a large number of identical knobs, such as for a set of kitchen cabinets, a simpler design is easier to reproduce than a more complex one. But as long as you keep the diameter and height of the knobs the same, they will tend to look similar.

Finishing

Sand the knob carefully so as to not round over any crisp details. You may want to use the same finish as the furniture item to which you will attach the pull. With some exotic woods like ebony, buffing and a coat of wax might be all you need. ■

Mike Peace enjoys a wide variety of turning, from ornaments to hollow forms. He is active in several AAW chapters and enjoys teaching and demonstrating in the Atlanta area. You can see pictures of Mike's work and his previously published woodturning articles at MikePeacewoodturning.blogspot.com.

Adding decorative inserts



You might want to add a contrasting insert into the end of your knobs to add interest. Inserts can be of bone, vegetable ivory, or a contrasting wood species. You can easily use a plug cutter to create an insert of a contrasting wood (*Photo a*). The $\frac{3}{8}$ " (10mm) size works well for a typical sized knob. Or simply turn a small dowel from an exotic wood and part off short sections for inserts.

After turning the knob, drill a hole the size of the planned insert about $\frac{3}{32}$ " (2mm) deep (*Photo b*). Turn the insert to the diameter of your hole with a very slight chamfer for a snug fit at the top when glued in. Part it off at least $\frac{1}{32}$ " (1mm) longer than your hole depth so you can do minor shaping and final sanding after it is glued into the knob. I use medium viscosity CA to glue in the insert (*Photo c*). Shape

the final insert profile. I usually use a small square-end scraper for bone, vegetable ivory, and end-grain wood. Use a spindle gouge when shaping facegrain inserts made with a plug cutter.

Tagua palm nuts are very hard, resembling elephant ivory, and have been used as a source of vegetable ivory since the late 1800s. First, flatten one side of the nut on a belt sander and mount on a glue block with CA glue. Taking light cuts, turn to a cylinder to match the predrilled hole in your knob and carefully part off with a thin parting tool. *Photo d* shows a partially turned Tagua nut mounted on a threaded glue block.

I have also used "bovine ivory" (a soup bone boiled to remove the meat scraps) as a decorative insert. Use a hacksaw to cut the bone into short rectangular strips and glue into a snug hole in a block for turning (*Photo e*). I find a small, sharp scraper works better than a gouge to shape bone (*Photo f*). Wear dust protection, as bone dust can be hazardous.



a A plug cutter is a simple way to make decorative insert material.



b Using a Jacobs chuck in the tailstock, drill a recess in the end of the knob to accept the insert material.



c The insert material should initially stand proud of the knob surface so it can be turned and sanded flush later.



d A Tagua nut is a good source of vegetable ivory, suitable for a decorative insert.



e Gluing a section of bone into a snug fitting hole drilled into a scrap block is an easy way to mount the material on the lathe for turning.



f Use a scraper when shaping bone on the lathe and protect your lungs from the dust.