Introduction

I was flipping through the pages of a Penn State Industries catalog when I noticed that they had coffee grinder kits. And they were round. Figuring that I could get rid of the noisy electric grinder I use to feed my caffeine addiction, I ordered a couple of kits. My original thought was to make an inverted bowl to fit over the coffee filter basket, but that would be almost sure to get me in trouble by leaving coffee grounds where ever it was set down. After a little more thinking I came up with a simple way to add a drawer, and I’m really happy with the results. It looks good, my wife likes it (picks up a color in the wallpaper), and it even grinds coffee. It’s simpler to do than it looks—if you and your lathe can make a salad bowl, you can do this.

Instructions

Glue-up

I made the coffee grinder using a combination of techniques for bandsawn boxes and turning. You will need two 6x6x2 or four 6x6x1 pieces of hardwood for this project. The faces of the blocks should be flat and smooth enough for good glue joints. If you elect to use four 6x6x1 pieces you should glue two of them together to make a 6x6x2 piece at this point.

First I laid out the stock for cutting. I found the center of each block by drawing corner-to-corner diagonals, then used a compass to draw the biggest circle that will fit, which was about 6 inches in diameter. I drew a line on the middle of the side grain face of one block to guide in resawing it. Then on the piece destined to be the drawer, I drew a circle 1½ inches less in diameter, about 4½ inches in diameter. Using a square, I drew lines tangent to the circle perpendicular to the end grain face of the block. Then I measured out ¼ inch from each line on the end grain face, and drew a new tangent to the circle from that point. These lines plus the back of the circle gave the cutting line for the drawer. This gives a drawer with the end grain as its face. The slightly angled sides let you shim the drawer in tightly for turning. While it might seem better to use side grain for the face of the drawer, this leads to much greater problems with tear out when turning.

I used a square and compass to layout lines for resawing one board and cutting out the drawer on the other board.

Next I bandsawed the pieces. If the edges of the piece to be resawn are square, you should be able to follow the cutting line without using a fence. The sawn faces will become the top and bottom of the grinder and will be cleaned up on the lathe, so other than not wasting too much stock you don’t have to worry excessively about the exactness of the cut. Then I cut out the drawer. Before gluing I cut a few shims from scrap veneer (you could also use very thinly resawn wood) and tested to make sure the drawer can be shimmed snugly before bottoming out in the drawer rim.

Ordinarily I like to use polyurethane glue for large faces of wood, but it’s really hard to clean up the foamy squeeze out inside the drawer. Instead I used a card to spread a thin coat of ordinary wood glue on the drawer rim piece and then clamped that together with the top and
bottom pieces. I let the assembly dry over night, as large gluing areas take longer to cure.

Clamping the body together. More clamps might have been better. C-Clamps would also work well, as any dents would be turned away.

An exploded isometric drawing showing how the pieces fit together to form the body.

Turning the Body

To prepare the body for turning, I found the center with corner-to-corner diagonal lines and drew the 6 inch circle. I drilled a clearance hole for a screw in the center of the piece and counter sunk it so that the screw head was about 3/8-inch below the surface. I reduced the thickness of the drawer by planning (sanding would work too) so that it would fit between the top and bottom in the drawer rim. I used a small piece of masking tape to hold the shims in place on the drawer and inserted the drawer. I clamped the drawer in tightly and drove a screw in to hold it all together. The screw hole will be turned away later.

The drawer, with shims, is held in the body snugly with clamps while a screw is driven in to hold it in place for turning. The screwdriver isn't held up by magic...that's a square drive screw.

Cutting the body round on the bandsaw.

There are several ways you could mount the body for turning, such as using a faceplate and waste block or mounting between centers to turn a chuck recess. I elected to mount the body on a faceplate to turn the bottom with a recess for my chuck since the coffee grinder mechanism is big enough to cover up the faceplate screw holes. I used a compass to draw a circle a little bigger than my faceplate on the top of the body to aid in centering the faceplate and then screwed the faceplate on.

Making sure the mechanism will cover the inner-most screw holes of my faceplate.

The faceplate is attached to the body. I mounted the faceplate on my lathe and cleaned up the bottom surface with a bowl gouge and shear scraper. I marked out a recess for my chuck and turned it about 1/8 inch deep—but how deep doesn’t matter a whole lot, use what makes you comfortable. I cleaned up the sides of the recess with a V-point scraper, but a parting gouge would work nicely too. At this point I sanded the bottom and applied a rubbing finish. Start with whatever grit paper you need to remove any tool marks and progress to finer grits. I used 120, 180, 280, and a 3-M 7448 non-woven pad. If you don’t use a shear scraper you’ll save time starting with 80 grit. Don’t let your ego in regards to grit choice get in the way of sanding efficiently. I applied a homemade French polish of linseed oil, shellac and alcohol with a rag. I keep the polish in an old dishwasher detergent bottle because it doesn’t dry up or spill disastrously if I leave the top up.
I've marked the recess for the chuck prior to turning. I didn't need the accuracy of calipers, but couldn't find my square.

Cutting the sides with a pointed scraper, an ancient but nice tool I inherited from my Dad. A parting tool would also work well.

After applying finish to the bottom, I took the body off the faceplate and mounted it in my four-jaw chuck. Now is when you have to decide what the body will look like. There are a few design constraints. Assuming it will actually be used to grind coffee the body has to have a fairly broad base for stability—you can’t taper it to a narrow base fashionable for a hollow vessel. The middle has to be left fairly close to full diameter to leave the drawer big enough to hold a pots worth of coffee grounds. And the top, of course, has to hold the grinder mechanism. I elected to turn a recess for the mechanism at the top, add a bead at the top and bottom of the body, and connect the beads with a continuous curve that reaches a maximum above center, about the two-thirds level.

First I skimmed the top with a bowl gouge, and then marked the diameter of the coffee mechanism. I started the recess for the mechanism with the bowl gouge, then cut the sides square with a parting tool. I did the same to start a recess for the protrusion at the bottom of the grinder mechanism, being careful not to cut so deeply that I would hit the screw holding the drawer in. Then I checked to make sure the mechanism would fit in the recess with a little wiggle room for wood movement.

Once the recess was turned to fit I used the bowl gouge to start shaping the top of the body. Remember with face grain turning, you turn from smaller to larger diameter on the outside. After I removed enough wood to allow for the bead I roughed it out with the bowl gouge and refined the shape and smoothed the surface with a pyramid point tool. The pyramid point tool is used as a shear scraper when doing this. After shaping the bead I returned to the bowl gouge to finish shaping the curve on top. Cut gently when you approach the drawer area to minimize tear out. If you do get tear out that won’t sand away all is not lost. Just use a knife to cut a small facet then sand and finish by hand after the body is off the lathe. I repeated the process for the bottom of the body, turning the bead and curve. Once I was satisfied with the shape of the curve I refined the surface with a shear scraper. To shear scrap you angle the cutting edge of the scraper about 45° instead of holding it flat. This is easier to do in a stable fashion with a scraper that has a round bottom, as it will be supported by the tool rest closer to where it is cutting. There is an article on my web site that will explain how to make such a shear scraper for $5 or so if you are interested. If you don’t have a shear scraper you can use the side of your bowl gouge as one, or simply sand a bit longer. The last step for the main part of the body is to sand the surface and apply polish.

Cutting the top curve with the bowl gouge. I'm cutting from smaller to larger diameter, and taking a fairly heavy cut as I'm nowhere near the final shape.

Using a shear scraper to refine and smooth the curve. Take only very light cuts.
It’s my article and I’ll show off if I want to...The wispy shavings produced by a sharp shear scraper.

Cutting the bottom curve with the bowl gouge.

Using a shearscraper to refine and smooth the bottom curve.

It remains to finish cutting the hole that lets the coffee grounds drop down into the drawer. There are several options here. If you’re using a really heavy-duty lathe with variable speed, you can simply remove the drawer, turn the speed way down, and turn the hole. Don’t try this with a mini-lathe, as the body will be seriously out of balance. You could also remove the drawer, remove the body from the chuck, and drill a 1½-inch hole with your drill press. What I did is to wrap the body tightly with a couple of layers of duct tape and then remove the screw. I turned the lathe on at a slow speed and cut the hole with a parting tool.

Checking the balance point of the drawer with a brad and string.

I removed the drawer from the faceplate and remounted it using my four-jaw chuck. I skimmed the top surface with a bowl gouge and shearscraper, then started hollowing out the drawer. On the inside of faceplate work you turn from larger to smaller diameter. Start near the middle and try to remove the same thickness of wood for the whole cut, like you were removing one layer of an onion at a time. After I was satisfied with the shape, depth, and size of the drawer recess I sanded it smooth. As the most food safe finish is no finish at all I didn’t apply finish to the inside of the drawer.

Using a bowl gouge to hollow the drawer. Here I’m cutting from larger to smaller diameter.

Turning the Drawer

The first step in turning the drawer is to find the balance point. To do this I balanced the drawer on a straight edge and eye-balled about where it balanced on the top of the drawer. I double-checked this by hanging the drawer by a string tied to a brad tapped in at my balance point. It hung with the top straight across, so I knew it was close enough. I used a compass to draw a circle centered on the balance point the diameter of my faceplate to aid in aligning it. After attaching the faceplate I mounted the drawer on the lathe and skimmed the bottom flat. Don’t remove too much here, or the drawer will rattle around in the body. Then I turned a recess for my chuck and sanded the bottom of the drawer.
Last I removed the drawer from the chuck and drilled a 3/8-inch hole to mount a knob. I drilled the hole using my drill press and a cross-vise which both held the drawer securely and make fine positioning easy. You could also use a hand-screw to clamp the drawer, or two boards and two C-clamps. You could also, of course, clamp the drawer in a bench vise and drill with a hand drill. This would be simpler and quicker, but do be careful. If you don’t get the angle and centering right it will be dreadfully obvious. An interesting variation on the design would be to turn a lip on the body to serve as both a design element and knob.

Turning Knobs

I certainly didn’t want to use the stained, non-matching knob that came with the mechanism, so I put the knob in a vise and cracked the knob to remove it. Then I cut the rod off about ½-inch above the handle.
Assembly

The Grinder Mechanism is designed to be mounted using two small nuts and bolts. I couldn’t mount it that way because they would interfere with opening the drawer. Instead, I placed the Mechanism on the body and marked the mounting holes with a pencil. Then I drilled holes with a #29 drill (you could substitute a 9/64 drill) and then tapped the holes with an 8-32 tap. I cut the bolts so they were about 5/8” long (an electrician’s cutter/crimper/stripper works well for this, if you don’t have one, thread the nut down past the cut, cut with most anything, then remove the nut to restore the threads). Then I put the Grinder Mechanism in place and screwed in the bolts. Make them snug, but not so tight as to strip out the wooden threads.

I mounted the drawer knob by putting a little wood glue in the hole drilled in the drawer and then pushing the knob in. I mounted the handle knob by measuring the rod and drilling a hole in the knob that was the same diameter. Then I put a drop of CA glue in the hole and pushed it on to the rod. Use just a little glue, as squeeze out here could keep the knob from rotating.

Finally I attached the handle to the Grinder Mechanism by removing the acorn nut on the end of the shaft, putting on the handle, and then replacing the acorn nut. The spring goes under the handle. You’re now ready to grind coffee beans. The grind is adjustable, but you’ll have to find the setting you like by trial and error. To adjust the grind, pull up the little U-shaped retainer under the spring, turn the flat nut (clockwise for finer, counter-clockwise for coarser), then release the retainer to lock the nut.

This drawing shows the major diameters if you want to reproduce my design. It would be hypocritical to suggest that you slavishly follow it, as it was produced after the turning.

Supply and Tool List

Tools
- Bowl Gouge
- Shear Scraper (optional)
- Parting Tool
- Spindle Gouge
- 8x32 Tap

Supplies

Materials
- Wood: 2 pieces 6x6x2 or 4 pieces 6x6x1
- 1 piece 1x1x6
- Sandpaper
- Finish

Me

The author, David Reed Smith, lives in Hampstead , Maryland with his family and a basement overfull of tools. His day job is taking X-Rays at a local hospital. He sells wooden tools for fiber crafts on the Internet to fund his tool fetish. He welcomes questions, comments, and suggestions by email at David@DavidReedSmith.com. “Real Soon” after publication this article, with extra pictures, will be available on my web site, www.DavidReedSmith.com.