

Turn a MULTIAXIS CHILI PEPPER BOX

Mark Knize



The origin of this idea is easy to pinpoint. At the AAW Symposium in Phoenix, 2014, I was especially taken by the offset-turned seed pods Neil Scobie demonstrated. As a part of the same trip, I was immersed in the New Mexico chili pepper culture. I put the two thoughts together and came up with the chili pepper box. We have chili peppers here in California, and I grow them in my own garden, but this time a vacation led me to create something new.

The boxes are turned on three axes, and there is some carving at the end of the process, not uncommon in contemporary woodturning. My intention was to make a stylized chili pepper, not a scale model of a specific pepper.

Getting started

The project starts with a dry wood blank $1\frac{7}{8}$ " (5cm) square and $7\frac{1}{2}$ " (19cm) long. One should use sound, crack-free and rot-free wood for this project. I like walnut, fruit woods, and olive wood when I can get crack-free wood in the suitable size. The pictured example is mesquite.

Find the center of the blank and mark two additional centers offset by $\frac{1}{2}$ " (13mm) (Photo 1). Mark the opposite end the same way. The ends of the piece are always parallel during the offset turning. If the wood has a particularly nice side that should be toward the top of the final box, the second center, labeled 2, should be toward that better side.

The turning is initiated by mounting the blank between centers using the true center of the blank, center 1. I like to use the crown-style drive center and live center, as that style distributes the pressure over a large area and the point doesn't enter the wood very far. I use the full length of the wood for the chili pepper box, so I don't want to damage the ends. Take the corners off the blank with a roughing gouge and, using a parting tool, form a tenon at each end to fit your chuck. It is important to make the tenon deep enough and of the correct diameter for your chuck to facilitate the hollowing of the box lid and bottom.

Use a thin parting tool to part the cylinder halfway through $2\frac{1}{2}$ " (6cm) from the one end. After stopping the lathe, I draw a pencil line across the parting tool kerf to help me align the wood grain later (Photo 2). Carefully complete the parting tool cut off the lathe, either by hand or on a bandsaw with the workpiece held safely, resulting in two cylinders.

Hollow the lid

I start with the box lid, the shorter of the two pieces, so I can later fit the bottom

Mark centers



Mark the true center and label it 1. Then add two other axis points $\frac{1}{2}$ " away, labeled 2 and 3. Do this on both ends of the blank.

Prepare the blank



Rough-turn the blank and turn tenons on both ends. Make a partial parting cut where the lid and bottom will be separated and finish the cut off the lathe. Make a reference mark for future alignment.

of the box to the finished lid. Drill the lid using a 1½" (29mm) Forstner bit to the depth of the head of the bit, ⅝" deep (16mm) (*Photo 3*). Drilling the lid ensures that the sides will be parallel, and parallel sides are half the battle for a good-fitting box lid. I use a small scraper to form a dome inside the top of the lid in order to remove the point made by the center of the drill bit (*Photo 4*).

Next, sand inside the top of the lid with 220- and then 320-grit abrasive, being careful not to touch the inside wall. I also sand the bottom of the lid with abrasive on a block of wood to make a perfectly flat bottom.

Hollow the box

The longer cylinder, soon to be the bottom part of the chili pepper, goes into the chuck for hollowing. I use a ⅞" (22mm) Forstner bit to drill a hole 1½" (41mm) deep (*Photo 5*). Complete the hollowing using a 1" (25mm) box core router bit mounted so it extends from the chuck 2" (5cm) (*Photo 6*). Advance the bit all the way in.

The box core bit, which leaves a consistent diameter and a beautifully rounded bottom of the hollowed area, should be used at a slow lathe speed and with a slow feed rate. If chattering starts, immediately stop the lathe, tighten the wood in the chuck, make sure the tailstock and Morse taper fittings are seated well, slow the lathe speed, and try again. The box core bit is only removing ⅛" (3mm) across the diameter. When the box core bit gets to the bottom of the hole, it is much closer to the headstock and always gives a chatter-free conclusion, despite scraping into endgrain. Alternatively, the Forstner-bit-drilled hole could be enlarged by hand with a strong and narrow scraper.

I sand the hole at a slow lathe speed with narrow strips of abrasive supported by my finger.

Fit the lid

Because this is a long piece of wood held at one end, I always support these next

Hollow the lid



The lid section is held in the chuck for hollowing with a Forstner bit. The interior of the lid is then refined with a scraper.

Hollow the box



The box body is also hollowed with a Forstner bit, then refined with a box core router bit.

Form the tenon



With tailstock support, reduce the diameter of the blank and form a tenon onto which the lid will fit snugly. Fine-tune the fit carefully with a skew held flat on the toolrest.

cuts with the tailstock. Conveniently, my crown live center fits the 1" hole, but a conventional cone center works well, too. I use a parting tool to remove wood for the over-fitting lid (*Photo 7*). Measure the depth of the lid and make a tenon almost as long as the lid interior. I believe a long tenon is easier to fit and appropriate for a box that lies on its side.

Because the lid was drilled with a 1½"-diameter drill bit and the bottom

hole is 1" diameter, I know I want the tenon's wall thickness to be ⅛" (1.6mm). It is a quick job to use a parting tool to get close to this wall thickness by eye. I then remove the tailstock and switch to a small skew chisel held flat on the toolrest to scrape the tenon (*Photo 8*), testing the fit until the lid has a snug friction fit. The fit will be made looser in a later step. ▶

Turn on axis 1



9 On the true center, create the rough shape of the pepper.

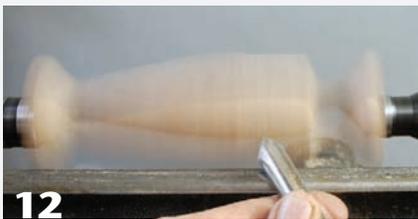


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Turn on axes 2 and 3



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Turning the piece on multiple axes creates “facets,” giving the pepper added dimension.



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Turn the pepper

Axis 1

The idea now is to fit the parts together tightly, turn them on three centers, carve and sand the exterior, and then do a final fitting of the lid. If the fit of the lid is a bit loose for the turning and carving, tape can be used to augment the fit when turning on centers 2 and 3. The compression of the wood between the two centers keeps even loose-fitting parts together when using center 1.

With the lid fitted to the box and the grain aligned according to the pencil

mark you made earlier, mount the piece between centers on the true center, 1.

Leaving the ends intact, turn the cylinder to a carrot shape between two discs about $\frac{1}{4}$ " (6mm) thick at the edge. I use a spindle gouge for these cuts. Begin at the lid end to make a cove at the top of the pepper shape that plunges abruptly to $\frac{1}{2}$ " diameter (Photo 9) and then smoothly making the curve of the stem.

The pointed tip of the pepper is also formed with a cove. The body of the pepper has a gradual curve starting at the joint of the two parts, tapering to

the end of the pepper to a diameter of about $\frac{3}{4}$ " (19mm) (shown toward the headstock in Photo 10) and sweeping upward to become the shape of the eventual curved and pointed tip.

I make a final cut with a skew chisel to improve the surface and save sanding effort later. At this stage, the overall shape should look like the piece in Photo 11. Now is the time to sand the top surface of the pepper.

Axis 2

Next I move the box to the centers marked 2. Both ends of the box should be moved in the same direction so the box turns parallel to the original axis. This is a good time to check that the toolrest is not in the way of the piece. The next cut, using a spindle gouge, will form the bottom of the pepper box as it lies on its side. About $\frac{3}{16}$ " (5mm) of the shadow line of the spinning box should be removed, parallel to the box's current shape, leaving the coves and disc-shaped ends untouched (Photo 12). Light cuts are in order here. Stop the

Trim the ends



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Draw on the ends where you would like to remove material, leaving a stem on one end and a curved tip on the other. Never cut a round object on the bandsaw without proper support; note the flat surface of the workpiece making contact with the bandsaw table.



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lathe and inspect. The flatter area where wood is being removed should be about 1¼" (32mm) wide (*Photo 13*). I usually take a final light cut with a skew chisel at this time on the convex box bottom, because this is the final surface. I also sand the box bottom to 320 grit, supporting the abrasive with a sanding block.

Axis 3

Move the box to the centers marked 3. These cuts form the top area of the box. Take a light cut parallel to the existing box shape and then stop and inspect. When I have removed wood to make a facet about 1½" (38mm) wide, I take more off toward the pointy end of the box, remembering how far down the hollow portion is. You can remove the box, remove the lid, and feel the wall thickness to determine how much more to remove to thin the pointy end of the chili pepper. The shape of the piece after all turning is shown in *Photo 14*.

Trimming the ends

Both ends of the chili pepper can be trimmed to rough shape on the bandsaw prior to carving, but be aware that cutting round forms on the bandsaw without proper support poses a safety hazard. It is important when using the bandsaw to have a flat area of the workpiece in contact with the bandsaw table, or hold the piece in a jig. Alternatively, you could use a handsaw to trim the ends.

The outline of the stem and pointy tip are shown from the top-view perspective in *Photo 15*. A cut is made on each side of the stem and tip. Then, from the side view, a single cut forms the outside curve (*Photo 16*).

Carving

I like to use a bullnose-shaped (radius cylinder) bit driven by a die grinder (*Photo 17*). Wearing a carving glove, I hold the piece firmly, paying careful attention to the rotation of the bit to ensure I am cutting "downhill" with respect to the wood grain. This helps me control the spinning bit. Refine the stem end, making it round and tapered to a smaller diameter away from the pepper.

Next, refine the pointed end of the pepper to give a flattened shape on side view. On the top, I carve a recess to simulate the concave areas seen on real peppers on the inside of a sharp bend. I then use a flame-shaped, fine-tooth carbide burr in a rotary tool to refine carved areas of the pepper box (*Photo 18*). On the stem, I try to get a final smooth-carved surface, as I do not sand the stem, believing the rough texture simulates an actual pepper stem and gives a nice contrast to the shiny pepper.

I sand by hand with 120-grit abrasive to remove the tool marks and then sand using grits from 180 to 400 on all surfaces but the stem. I prefer to leave the "corners" on the box that result from the offset turning, but these could be removed for a more rounded form, if preferred.

Final steps

The fit of the lid can now be loosened so it is easily removed but still has enough friction to keep it in place. I mount the pepper body (lower section) carefully on expanding pin jaws and use a freshly sharpened parting tool to make light cuts, stopping the lathe, removing the piece, and testing the fit (*Photo 19*).

I apply at least two coats of wipe-on polyurethane, allowing each coat to dry overnight. Finally, I buff everything but the stem with Tripoli. This finishing treatment results in a beautiful and pleasingly tactile piece. ■

Mark Knize, a former research scientist, is now a full-time sculptor in a variety of media. He is a member of the Bay Area Woodturners Association in California.

Carve the final shape



Carving burrs driven by rotary tools help refine and smooth the final pepper shape.

Adjust the lid fit



The box is mounted on expanding pin jaws to refine the tight fit of the lid. Use a sharp parting tool to lightly trim the tenon until you reach your desired fit.

JOURNAL ARCHIVE CONNECTION

For more on safely cutting round objects on the bandsaw, see Betty J. Scarpino's *AW* article, "A Jig for Cutting Round Objects" (vol 31, no 1, page 20). AAW members can access all past journal articles online at woodturner.org.

