Coopered Containers

Staved construction makes them handsome, light, and strong

BY PETER LUTZ

Photos, this page and opposite: Michael Pekovich

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Recently I've been exploring coopered forms. I find the shapes elegant, yet the woodworking involved is very approachable. Because all the coopered parts are edge-joined, the whole vessel goes together without mechanical joinery or hardware. And though coopered work is light and graceful, it's quite strong.

In the first half of this article, I'll explain the techniques I use for making coopered trays with vertical sides. You could make a set of three, as I did, or just one. In the second half I'll describe making a coopered basket whose sides are canted outward. There are formulas you can use to ascertain the angle for the appropriate compound bevel, but the technique I use for creating the splay removes the mathematical hurdle.

A trio of trays

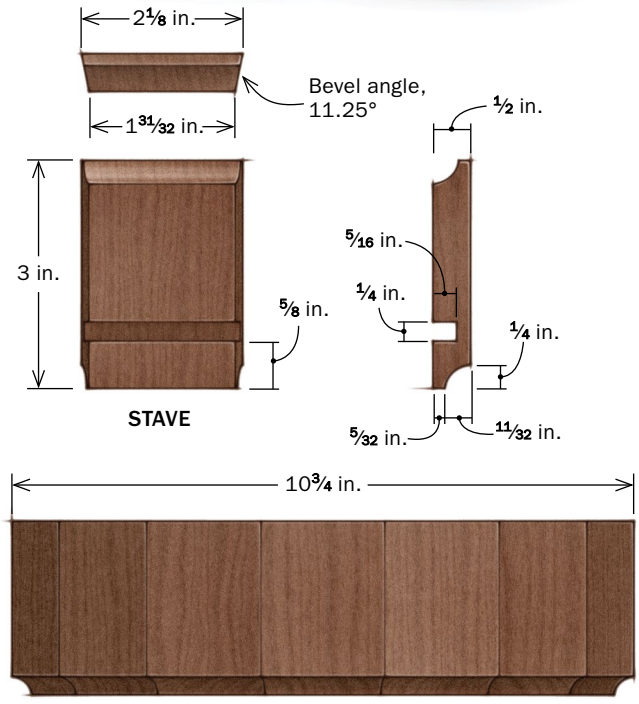
I designed the trays to be made in a batch of three partly because it would be safer and simpler to machine the staves in long blanks, then crosscut them after I had the bevels just right. Since I was going to have multiple trays, I decided to shape the top and bottom edges of the staves with coves—the top one inside, the bottom one outside—so the trays would stack neatly.

Stave making

Coopered containers have far more potential for cross-grain

Stacking trays

For a coopered form with vertical sides, determine the bevel angle by doubling the number of staves you want and dividing that into 360. Lutz's trays have 16 staves.



For safer machining, Lutz made stave blanks 10 in. long, beveled three staves at once, then cut them apart.

Coopered basket. *Lutz also makes a coopered basket with sides that splay outward. Go to p. 40 to see how he builds it. He uses a clever approach that you can apply to just about any splayed coopered form.*

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Stacking trays

MAKE THE STAVES

Quartersaw your staves. *To limit seasonal movement, Lutz cuts quartersawn staves, sometimes slicing them from flatsawn 12/4 or 16/4 stock.*

seasonal movement than traditional boxes, and this makes quartersawn stock the logical choice for the staves. I often make quartersawn stave blanks by sawing up thick flatsawn planks. Using 12/4 or 16/4 stock and taking ½-in. rips, I get very stable blanks, and the straight grain looks attractive in this application.

After milling the blanks, I rip them to about ⅛ in. over their final width. Then I crosscut the blanks to 10 in.—long enough to yield three 3-in. staves—and begin beveling at the tablesaw. To calculate the bevel angle, divide 360° by twice the number of staves you're using.

Digital assistant. *With so many staves in a vessel, dialing in the bevel angle is critical. Lutz uses a digital angle gauge at the tablesaw and the jointer. For safer machining, he does the beveling with the staves still in long blanks. Each long blank yields three staves.*

A whisker at the jointer. *With the fence set to the bevel angle, Lutz takes a very light jointer pass to create perfect glue joints.*

Since I wanted 16 staves, I divided 360° by 32 and arrived at a bevel angle of 11.25°.

The bevels have to be spot-on to bring your pieces together without gaps. Accuracy is especially important since any error will be compounded by both sides of each joint, a factor of 32. I find a digital angle gauge very useful. These tools are inexpensive (around $30 online and at hardware stores) and they're also highly accurate, up to 0.02°. I like the iGaging angle cube. It has magnets on

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three sides, which are helpful when setting blade angles.

After cutting the bevels at the tablesaw, I very lightly dress them at the jointer. You could skip the jointing (assuming the surface quality of your tablesawn bevels is excellent), but I do it to ensure the best possible glue joint. Using the digital angle gauge, I set the jointer's fence to the same 11.25° bevel angle and take a whisper-thin pass on each bevel.

Assembling the staves

Next, while keeping my setup on the jointer unchanged, I dry-fit the stave blanks. I lay all the pieces inside-face down and side by side, and stretch blue tape across them. I then coax the chain of taped-together pieces into a closed shape. I leave the last piece hinged outward and then try closing it like a door. If the remaining gap is too small to fit the final piece, I need to decrease the angle of the jointer fence. If the gap is bigger than the final piece, then I need to increase the jointer angle.

If necessary, I'll make a slight adjustment on the jointer and run both sides of all the pieces again, taking a pass of less

Fine-tune the staves

Adhesive hinge. *With the triple-length staves lined up, inside-face down, stretch painter's tape across them.*

Roll up the barrel. *Flip the taped staves over and then roll them up. Compounded by 32 bevel cuts, a very slight error will result in a misfit. Here the bevel angle needed to be decreased slightly.*

Tweak and re-roll. *After Lutz adjusts the jointer fence and lightly rejoints, the staves meet cleanly. He dials in the bevel angles while the staves are triple length so any necessary adjustments can be made simply and safely.*

Photos, except where noted: Jonathan Binzen

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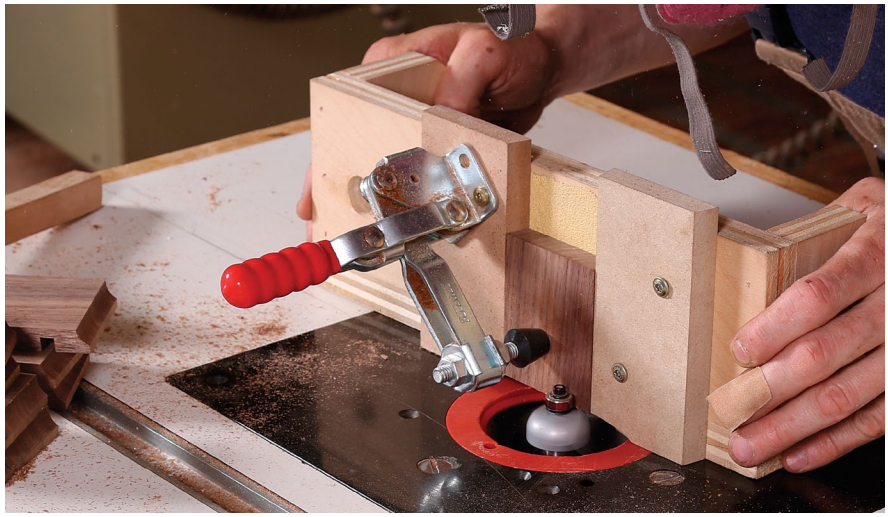
Stacking trays

SHAPE THE STAVES

From triple to single. *With the bevels perfected, crosscut the staves to final length, three per blank.*

Dado for the bottom. *Once cut to length, the staves each get dadoed to receive the bottom.*

Cove the staves. *Using a jig made for the purpose, Lutz coves both ends of each stave. To prevent tearout, he scores across the grain with a cutting gauge before routing, and he routs in a series of light passes. The mating coves let the trays stack securely.*



than 1/64 in. Usually, I'm close enough that I only need to adjust the angle on the jointer by about a tenth of a degree. I do this until the pieces come together with zero gaps.

Next I crosscut the staves to final length and cut the dado to receive the tray's bottom. Then I cut the coves at the top and bottom of each stave. To rout this profile safely and efficiently on such small parts, I made a jig that clamps the pieces in place and has beveled

Sizing the bottom. *With a set of staves dry-assembled and placed on a bottom blank, trace the facets of the inside perimeter.*

The cut line gets enlarged. *Make a spacer whose thickness is somewhat less than the depth of the dado for the bottom.*

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GLUE UP THE TRAY

Spread glue between the staves. *After pre-finishing, Lutz applies glue to the bevels but not the dado. Then he inserts the bottom and rolls up the staves around it.*

backer strips to reduce tearout. I used a ¼-in. radius cove bit and switched out its ½-in. bearing for a ⅜-in. one (Whiteside 1800 bit, B2 bearing).

When you've finished the coves, fit the bottom. Dry-assemble a ring of staves, place it on the bottom, and trace the interior perimeter of the ring. Remove the ring and use a spacer to draw a second line about 3/16 in. outside the first. The distance between the lines determines how much of the bottom will sit in the dado. I bandsaw to the outer line and smooth the cuts at the disk sander.

Clamp-free glue-up

With all the parts fitted, I sand and prefinish everything, then do the glue-up. I want the bottom to move freely, so I avoid getting glue in the dado. I use blue tape to hold the parts together, then bind the tray with 10 or more layers of stretch wrap until all the seams are pulled tight.

I clean up the squeeze-out, then apply a second coat of finish. Here I used Osmo Polyx-Oil, a nice, all-natural wipe-on finish that is food safe.

Peter Lutz's shop is in Fall River, Mass., at Smokestack Studios.

Stretchy clamping. *Blue tape provides the initial hinging and clamping action, but then Lutz circles the tray many times with stretch wrap, which exerts excellent clamping pressure.*

Open for cleanup. *After the assembly, Lutz removes glue squeeze-out with a chisel.*

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