

Build a Shaker Stool with Hand Tools

Make one in any size while honing your skills

BY CHRISTIAN BECKSVOORT



The Shakers designed and built a great variety of useful stools and benches. Most had through-mortise-and-tenon joints to prevent racking and help support the top. Some had central stretchers and a few had industrial metal-strap braces.

My favorite, for both looks and strength, adds four dovetailed corner braces to the through-tenons. This sturdy, versatile design can be sized for use as a footstool, a bench, or even as a side table. Maybe the best part is that it can be made using hand tools only.

I make this bench from $\frac{3}{4}$ -in.-thick white pine, with contrasting cherry or walnut wedges to help fasten the through-tenons. I'll show you how to build it using hand tools, but I'd suggest using a jointer and planer to flatten the stock and mill it to thickness (or you can start with stock that is premilled at the lumberyard). To

save time and increase accuracy, you might also use a tablesaw to cut parts to length and width. If you do mill the stock by hand, be sure to work both faces to make the parts a consistent thickness.

Through-tenons attach the legs

Start by making the legs. Each one has a pair of tenons at the top and a decorative arch sawn at the bottom. First use a compass to lay out the arch, which is about 2 in. high at its peak, and starts about $1\frac{1}{2}$ in. from each edge. Cut out the waste with a coping saw and smooth the surface with a file and sandpaper. Gluing or stapling a strip of sandpaper to the waste piece and sliding it back and forth works well to fair the shape and smooth the surface. Once the arch is done, turn to the tenons. To lay them out, use

Make the legs first



Arched cutout creates two feet. Stay close to the layout line with the coping saw, then fair the curve with sandpaper attached to the curved offcut.



Scribe the tenon length. Set a marking gauge to the thickness of the top and use it to create a baseline for the tenons on both faces and ends of each leg.

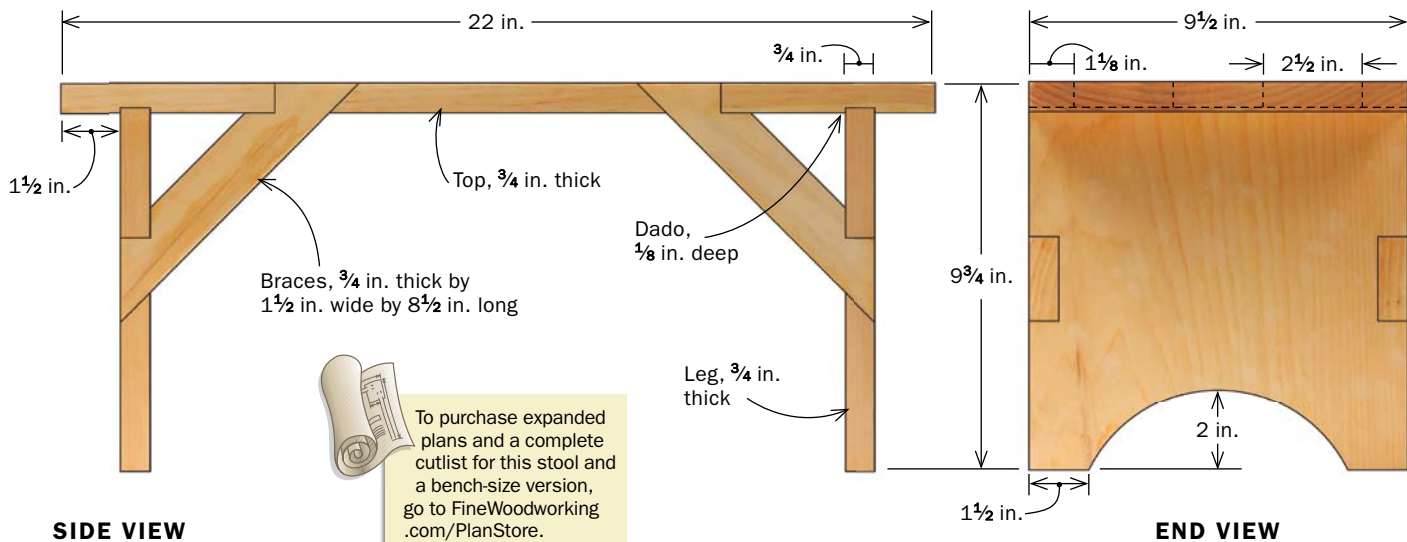


Then mark the width. Measure in from each edge to mark the width of each tenon. Use a square to carry the layout lines from each mark across the top edge and down to the baseline.

Saw the tenons. Use a dovetail saw to cut all four marks down to the scribe line before cutting the end shoulders as shown.



Chisel in between. Use a coping saw to remove the waste between the two tenons, then pare to the scribe lines with a wide chisel.



Mortise the top

SHALLOW DADOES FIRST

Scribe the edges.

Mark the dado's outer wall using a gauge set to $1\frac{1}{2}$ in. (right). Align the leg's face with this line and mark along the opposite face for the inner wall (far right). Mark the top this way, too, to start the mortise layout.



Excavate the edges.

First, use a marking knife to deepen the scribe lines on the bottom side of the top to about $\frac{1}{8}$ in. (right). Then make a series of angled cuts with a chisel (far right) to reveal the vertical wall created by the knife.



Clean between.

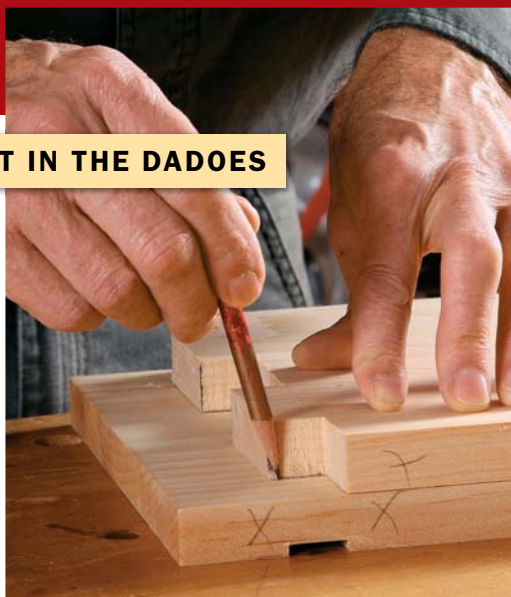
Angle the chisel, bevel down, to plow out the remaining waste and flatten the dado's bottom. A router plane also works well for this task.



MORTISES FIT IN THE DADOES

Lay out the ends.

Lay the leg flat on the top face, with the edges of the two pieces flush and the tenons resting between the lines you scribed earlier. Use a pencil to mark the ends of each mortise (top). To mark the mortises on the bottom face, place the tenon ends in the dado and use a square to align the two pieces (bottom).



Chop from both sides. Start from the underside, removing about half the waste. Then, to prevent blowout, flip the board and finish the mortise from the top. Check the walls with a straightedge, and test-fit the tenons.

a marking gauge to scribe the thickness of the top on both faces (because the tenons will sit in a dado, they will protrude from the top so you can plane them flush later). Then mark the tenon width on the top and both sides of each leg—at 1 in. and $3\frac{1}{4}$ in. from both sides. Cut the tenons and remove the waste as shown on p. 63. To keep track of the parts, mark the legs for their orientation in the finished piece: right leg, right side, left leg, left side.

Because the wide pine legs might cup, I seat them in a shallow dado in the top's underside. You can use the legs themselves to help lay out the dadoes and the mortises. Use a marking gauge to scribe a line $1\frac{1}{2}$ in. from each end above and below the top. Now place the leg on this line and knife along its edge to finish marking out the dado. Deepen the scribe lines on the underside to about $\frac{1}{8}$ in. using a sharp knife. Next, chisel out the bulk of the waste. You can flatten the bottom and get the dado to a consistent depth with careful chisel work, but a router plane is quicker.

Next, use a pencil to mark the tenon locations on the top and bottom face of the top. I lay the leg flat on the top so the tenons are directly over the scribe marks. Make sure that each piece is oriented correctly, and that the edges of the top and legs are flush.

Mark the tenon locations between the scribe marks, then flip the top and stand the tenons in the dado to mark their outlines.

When cutting the mortises, start by chopping vertically, setting the chisel's back flat against the dado wall as you chop along the length. Next, set your chisel in the middle of the waste area and, with the bevel down, make a series of angled cuts toward each scribe line to define the long mortise walls. To prevent blowout on the opposite side, chisel halfway through, then flip the piece and finish the work from the other side. Again, define the mortise walls first, being careful to stay within the scribe lines. When I'm done, I use a small square or the edge of a chisel to check for high points on the mortise walls. These should be pared down. Orient the legs and dry-fit them. Look for a snug fit that holds against gravity but doesn't require brute force to seat.

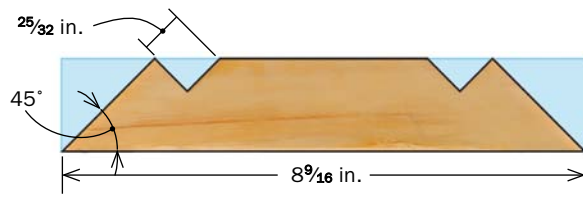
Corner braces add strength

Each corner brace is mortised into the leg and top, and notched to prevent racking even under heavy loads. With a dovetail saw, cut the brace stock to length with opposing 45° ends. Leave each about $\frac{1}{16}$ in. longer than finished length, so the ends can be

Make and fit the braces

Each brace gets two notches.

Miter the ends, then clamp the piece at an angle to cut a right-angle notch at each end. Cut each notch $\frac{1}{32}$ in. deeper than the thickness of the mating piece.



Mark the brace locations. Dry-fit the stool and rest each brace in place, flush with the inside edges of the assembly, to mark out for the mating notches. Carry the marks onto the faces of the pieces and then use a marking gauge to scribe a baseline for each notch.



planed flush after assembly. On the short edge of each piece, lay out a pair of 90° notches whose depth is $\frac{1}{32}$ in. greater than the thickness of the leg and top stock so the ends will stand proud for trimming. Cut out the notches as close to the lines as possible. I start the cut at the corner with a knife to give the saw some purchase. Afterward, pare with a sharp chisel. Each brace will fit perfectly in only one corner and in only one direction, so label each brace and its corresponding corner.

The next step is to mark and cut the notches that will house each brace. Reassemble the stool. Position a brace on one of the corners so that the horizontal cut at its top is flush with the underside of the stool's top, and the vertical cut at the bottom of the brace is flush with the inside edge of the leg. Mark the location of the brace at the edge of the top and edge of the leg. Then use a square and pencil to carry the layout lines onto both faces of the top and leg. Set a marking gauge to the thickness of the braces and scribe the depth of the notch between the pencil lines.

Use a dovetail saw to cut slightly inside the pencil lines down to the scribed depth mark. Disassemble the stool and use a coping saw to clear the waste between the sawkerfs, then pare to the layout lines. Dry-fit, adjust, and repeat with the other three corners.

Glue-up is simple

Hand-sand the underside of the top and the inner faces of the legs to remove any blemishes, dirt, or pencil marks. Saw a pair of full-depth kerfs about $\frac{3}{8}$ in. from the end of each tenon to accept the wedges. Now glue the legs into the top and the corner braces into their notches. Clamp as needed. While the clamps are on but the glue is still wet, glue and pound the hardwood wedges into place.

Once the glue is dry, the protruding tenons, wedges, and braces can be smoothed with a block plane. Sand all the edges, rounding the corners of the top slightly. Hand-sand the entire surface if desired, and wipe on the finish of your choice. □

Christian Becksvoort is a contributing editor.



Cut the notches. Saw down each pencil line to the baseline (left), and then remove the waste with a coping saw. Pare away any high spots with the chisel (above), test-fitting the brace as you go for a fully seated and snug fit.

Assembly and cleanup



Glue-up is easy. After sawing wedge kerfs in the tops of the tenons, apply glue to the tenons and bring the seat and legs together. Apply glue to the notches and seat the braces, tapping them home if needed.

Scaling up



The stool design is solid and functional in a variety of sizes. Becksvoort makes a bench version that is 11 in. deep by 40 in. wide by 18 in. tall. When building to larger scale, sketch the design until the overhang and foot arches please the eye. *Fine Woodworking* art director Michael Pekovich built the piece shown above (which has an overhang of 2 $\frac{3}{4}$ in., 4 $\frac{1}{2}$ -in.-high arches, and a bracket length of 11 $\frac{1}{2}$ in.) in white oak as an entryway seat.



Wedges ensure snug tenons. Cut the wedges from $\frac{1}{8}$ -in.-thick hardwood about 6 in. long. Use a chisel to taper them from 0 at the bottom to full thickness $\frac{3}{4}$ in. up. Cut off 1 in. and repeat three more times. Apply glue to both sides of the wedge and tap it into the kerf with a hammer. Trim with a saw when the glue dries.



Plane everything flush. The tenons will protrude $\frac{1}{8}$ in. or so and the braces a bit less. Use a block plane to level them (left) and to bring the edges flush, too (above).