

A Portable

Book Rack

Use a router template for perfect results

BY GREGORY PAOLINI

Years ago, while researching American Arts and Crafts designs, I took an immediate liking to Gustav Stickley's No. 74 book rack. It's shorter than most bookcases, with slats that form a V-shaped trough to hold books spine up. Its D-shaped handholds make it easy to move.

I've made a dozen racks based on that design, from small desktop versions to extra-tall ones that hold compact discs and DVDs. I've also modified Stickley's design. Simple through-tenons replace the wedged tenons. I added a second V-shaped trough in the middle to make the rack more functional, and I tapered the end panels, reflecting the look of the Roycroft designs that I favor. Despite the changes, the book rack retains its Arts and Crafts character. This version, made from quartersawn white oak, is sized to sit between a couple of Morris chairs.

Make the end panels and router template

Since the end panels are the focal point, you want boards with maximum figure. Use single wide boards if you have them, or edge-glue narrower boards.

While the panels are drying, make a router template from $\frac{1}{4}$ -in. medium-density fiberboard (MDF) or plywood, which you'll use to cut slots for the shelf mortises.

The template (see facing page) simplifies construction in several ways. It locates the shelf mortises, of course. And because I clamp the template to the inside face of one end piece and the outside face of the other, it ensures that the mortises will line up. When laying out the slots in the template, all you have to do is draw the dimensions for the $\frac{3}{4}$ -in.-thick shelves and cut a slot that wide. When using those slots to cut the through-mortises, use a bit and



V-SHELF TENONS

Tenons, ½ in. thick by 3¼ in. wide by 1 in. long

Chamfer, ⅞ in.

Sides, ¾ in. thick by 11½ in. wide by 29 in. tall

V-shelves, ¾ in. thick by 4 in. wide by 32 in. long

V-shelf mortise, ½ in. by 3¼ in.

Bottom shelf, ¾ in. thick by 10 in. wide by 32 in. long

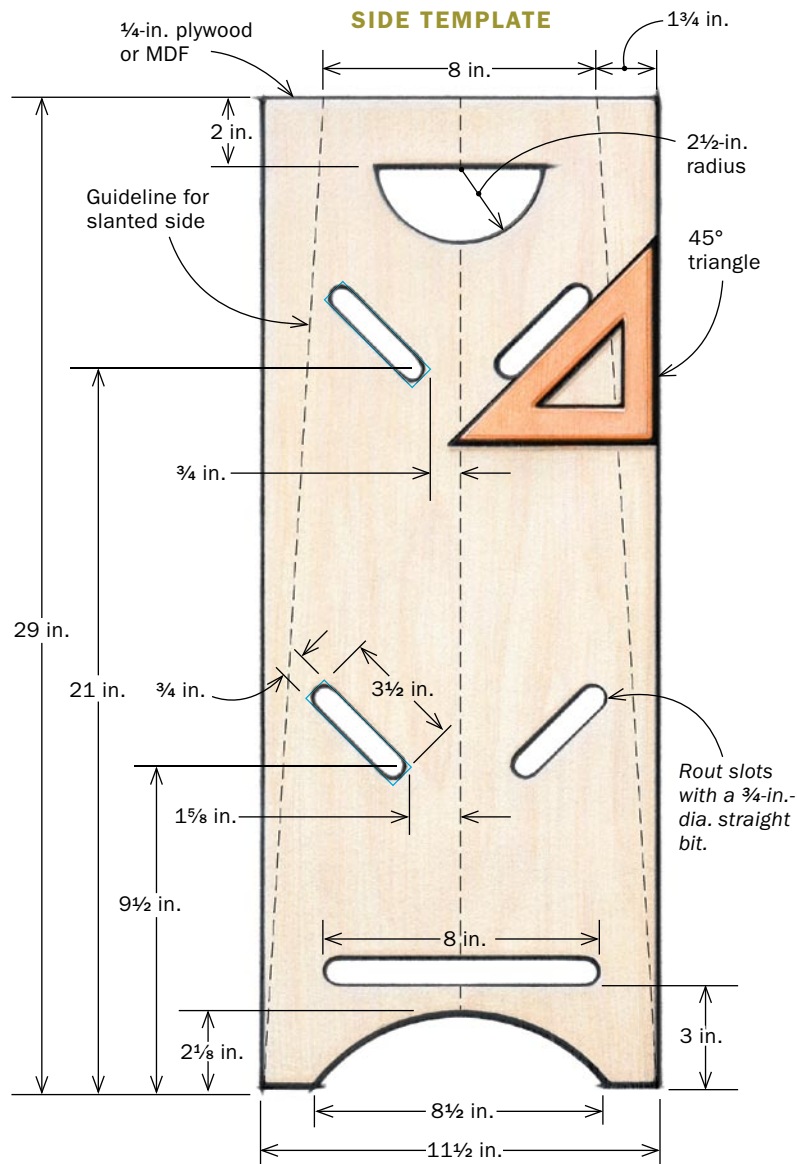
BOTTOM SHELF TENON

Bottom shelf mortise, ½ in. by 7¾ in.

Tenons, ½ in. thick by 7¾ in. wide by 1 in. long

Full-size plans for this book rack and other projects are available at FineWoodworking.com/PlanStore.

SIDE TEMPLATE



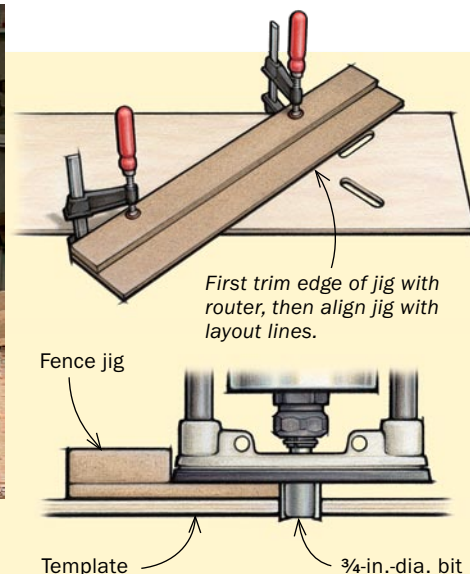
MAKING THE TEMPLATE

The ¾-in.-wide slots in the template will guide a router bushing for making the ½-in.-wide mortises in the workpieces.

Lay out the slots. Align the template and the triangle against a straightedge clamped to the bench to draw the shelf outlines.



Make the cutouts. Use a straight bit and a fence jig to cut the ¾-in. slots for the shelf mortises. Use a jigsaw for the other cutouts.

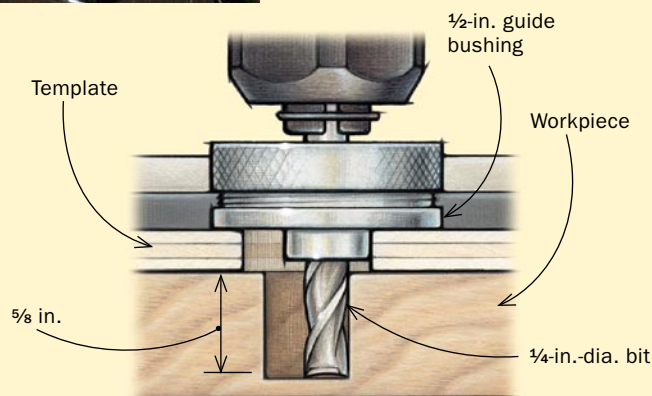


Secret to clean through-mortises

1 Rout to partial depth



Use a guide bushing for initial cuts. Clamp the template to the workpiece. Begin cutting the shelf mortises with a plunge router equipped with a 1/4-in.-dia. spiral upcut bit and a 1/2-in. guide bushing. Use the same setup to make the curved cutouts. Make these cuts only about 5/8 in. deep; don't cut through the work at this stage.



guide bushing. The offset between bit and bushing equals the width of the tenon shoulders. I get a mortise the right width, in the right location.

To avoid tearout when routing through-mortises, I work from one face toward the middle, without popping out the other side. So I rout the bulk of the mortises with the guide bushing, then use a flush-trimming bit from the other side to finish them cleanly.

Make the template 11 1/2 in. wide by 29 in. long. Draw the panel side tapers, handle, and lower arch. Then draw rectangles representing the full size of the ends of the narrow V-shelves and the wide bottom shelf. With

the template drawn, draw layout lines 1/4 in. from each end of the V-shelf rectangles. For the bottom shelf, draw layout lines 1 in. from the ends. These define the starting and stopping points for the shelf mortises. To cut the mortise slots, clamp a shopmade fence jig flush with the long side of each shelf outline and plunge cut from one line to the next with a router and a 3/4-in. bit. Cut out the handle and bottom arch with a jigsaw, then smooth the curves and clean up the sawmarks with sandpaper.

Online Extra

Watch Paolini demonstrate his router technique. For a video, go to FineWoodworking.com/extras.

Mill the oak and cut the mortises

Next, I mill all the oak shelves to size and cut the glued-up end panels to length. However, I

2 Drill, flip, and clean up



Starter holes for the next step. Drill a hole to allow the flush-trimming bit to enter the mortise. Start with a small pilot hole to locate the center. To prevent blowout, follow with a larger bit from the other side.

won't taper the panels until I've finished making all the cutouts with the router.

I make the mortises and cutouts on one panel at a time. Rather than clamping them together and cutting everything at once, I set up the template so that the panels are oriented as copies, not mirror images. In other words, the template goes on the outside face of the left-hand panel but on the inside face of the right-hand panel.

Register the template to the side and bottom of the end panel. You can use a long scrap of wood as a fence to help align the template with the side. Clamp the assembly to the bench and mark a small dot on the bottom of the right foot. You'll use that mark to reference how you laid out the panel.

Set up the router and bushing. The $\frac{3}{4}$ -in.-wide slots in the template will produce a $\frac{1}{2}$ -in.-wide mortise in the oak, using a $\frac{1}{4}$ -in. spiral bit and a $\frac{1}{2}$ -in. bushing. You could also use a $\frac{3}{8}$ -in. bit and a $\frac{5}{8}$ -in. bushing. However, the smaller bit leaves a tiny ridge dead-center in the groove, which comes in handy later on.

Rout the outlines for the D-shaped handle, the lower arch, and the shelf mortises in several passes. Don't cut all the way through. When the cuts are about $\frac{5}{8}$ in. deep, stop and remove the template. Use a jigsaw to remove most of the waste from the handle and the lower arch.

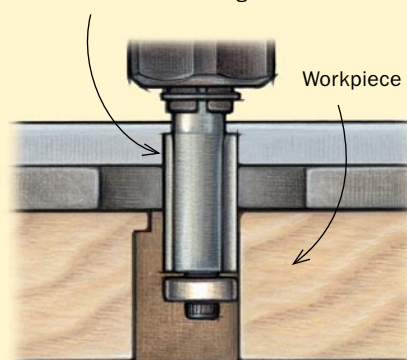
Drill a hole through each shelf mortise. This is where you can use that ridge left by the $\frac{1}{4}$ -in. bit. I like to use it to center a $\frac{1}{16}$ -in.-dia. pilot hole. Then I flip the panel over and enlarge the pilot hole with a $\frac{13}{32}$ -in. bit. This gives me a starting place for the router bit I use next.

Flip the panel over, and finish all the cuts with a $\frac{3}{8}$ -in. flush-trimming bit. I chuck the bit in a laminate trimmer. It's easy to control and lets me easily see what I'm doing.

These extra steps guarantee that you won't have any tearout. Square up the mortises with a chisel, working from each face toward the middle to avoid tearout. Finish the panels by tapering the sides on the bandsaw, cutting just to the waste side of the



$\frac{3}{8}$ -in.-dia. flush-trimming bit



Flip the work and finish with a flush-trimming bit. Finish the mortises and other cutouts with a $\frac{3}{8}$ -in. flush-trimming bit, working from the opposite face. To clean up the D-shaped handle and the cutout at the foot, cut away most of the waste with a jigsaw, then use the same bit to smooth the edge.



Square up the corners. Cut away the waste in the corners with a chisel. Chop about halfway down, then flip the work and finish by paring from the opposite face toward the center.

Cut tenons on the tablesaw



Define the shoulders. Use a combination blade to make the initial cuts for the tenon shoulders. Make these cuts about $\frac{1}{32}$ in. deeper than the tenon, to define the shoulders cleanly.

Finish with a dado set. Use a stacked dado set to cut away the waste on each tenon. Check the first tenon often against its mortise to creep up on the right blade height.



The result. You should have tenons with even shoulders, smooth cheeks, and a nice fit.



line. I clean up the cuts with a router, using my shopmade edge guide and a straight bit.

Cut the tenons on the tablesaw

The through-tenons on the shelves project $\frac{1}{4}$ in. from the side panels. They have narrow shoulders on their wide faces, and deep shoulders on the sides. The shoulders hide some imperfections and make glue-up much easier. I cut the tenons on the tablesaw, defining the shoulders with a combination blade to minimize tearout, then switching to a stacked dado set to finish.

You should purposely make the shoulder cuts a hair too deep, which prevents a ridge at the inside corner that you'd have to clean out later.

Trade the combination blade for a stacked dado set to finish the tenons. Cut the wide cheeks first. Set the blade low and raise it gradually through a series of cuts to sneak up on the proper tenon thickness. Test the fit after each cut. Once that first tenon fits the mortise just right, cut the rest. Follow the same procedure to cut all the short cheeks.

Next, chamfer the ends of the tenons. Mark a line $\frac{7}{32}$ in. from the ends, then plane to that line at roughly a 45° angle. Plane the long edges first, then plane the short edges.

Finally, soften the remaining sharp edges of the shelves and side panels with a $\frac{1}{4}$ -in. roundover bit in the router.

Fit and finish

Dry-fit the piece. The tenons should slip into their mortises with hand pressure. If you need a mallet, the joints are too tight and



Chamfer the tenon ends. Use a block plane to chamfer the portion of each tenon that will be proud of the side pieces, working to a layout line. To minimize tearout, plane the wide cheeks first, then the narrow ends.



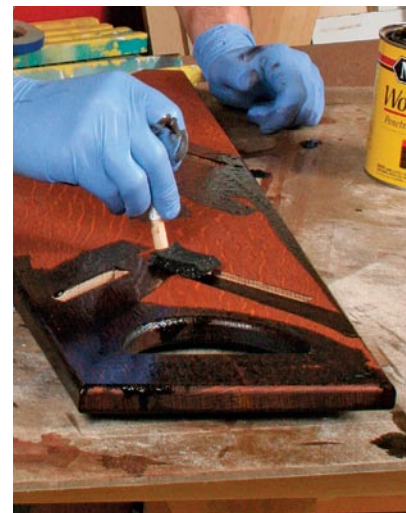
Fit, finish, and glue-up



Fine-tune the fit. The tenons should fit into the mortises with hand pressure. At the end, you may need to remove a small amount of excess with a coarse file (left) or a shoulder plane.



Dye, then stain. A brownish dye, followed by a darker oil stain, produces a finish that's very close to fumed oak. Mask the tenons to keep finish off glue surfaces (above). When applying the finish, work carefully to keep the stain out of the mortises (right).



you'll need to pare down the tenons with a shoulder plane or a coarse file.

Smooth the pieces with a random-orbit sander, finishing with P180-grit. Then hand-sand all the pieces with P180-grit paper, working with the grain, to minimize any sanding swirls.

I like to do some of the finishing before assembly, when the pieces are easy to handle. To keep finish off the tenons, I wrap them with 1/2-in. masking tape.

To simulate the look of ammonia-fumed oak, I follow Jeff Jewitt's technique for using dye and pigment stain ("Safe and Simple Arts and Crafts Finish," *FWW* #157). For a simpler finish, I like Minwax Early American 230 stain followed by clear shellac or varnish, which looks remarkably like one of Stickley's original finishes.

After the stain has dried, glue up the piece. If you get any squeeze-out, let it dry, then peel it off.

In keeping with the Arts and Crafts tradition, I use shellac as a topcoat. I typically brush on six or seven coats of Zinsser SealCoat thinned to a 1-lb. cut. After the shellac has cured, I rub out the piece with mineral oil and 0000 steel wool, giving the piece the satin sheen typical of this style of furniture. The finish should provide plenty of protection for a few generations of readers. □

Gregory Paolini makes Arts and Crafts furniture in Waynesville, N.C.



Glue, then shellac. To reduce squeezeout, put most of the glue on the tenons and only a dab in the mortises. When the glue has cured, apply several coats of thinned shellac. As a final step, rub out the finish.