

Build a Hayrake Table

Timber-frame joinery is a real pleasure

BY MICHAEL PEKOVICH



When it came time to make a new dining table, I knew I wanted it in the Arts and Crafts style, but I was also looking for a twist. For inspiration, I looked to the English countryside, the birthplace of the Arts and Crafts movement. What I found was a hayrake library table by Sidney Barnsley, one of the pioneers of English Arts and Crafts design. The table gets its name from the unique lower stretcher system, which splays out at the ends like a hayrake. I really like the table's massive timber-frame look, with its obvious through-tenons and heavy chamfers, and building it is a refreshing break from typical woodworking projects.

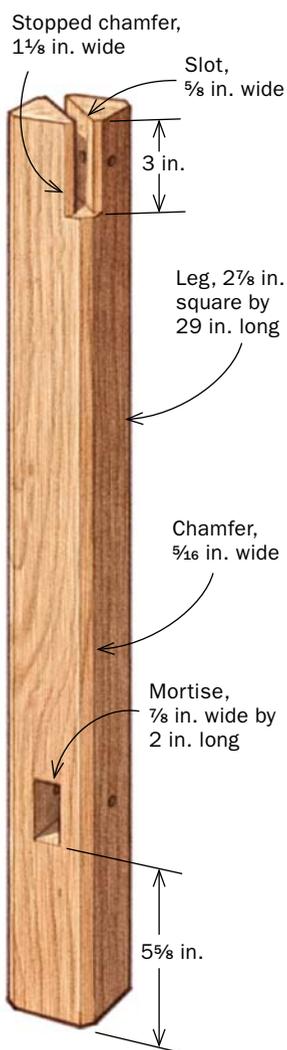
Another distinctive feature of the table, though it may not be apparent at first, is the orientation of the legs. They're at 45° instead of parallel to the edges of the tabletop. This makes the joinery to the hayrake stretcher simple—just a single through-mortise. Things get a little more interesting at the top. Each pair of legs is connected with end aprons that slot into their tops. This requires a slot cut diagonally across the top of the leg as well as a wider stopped chamfer. It looks like a tricky joint, but a bandsaw simplifies the task (see photos, this page).

How to get thick stock

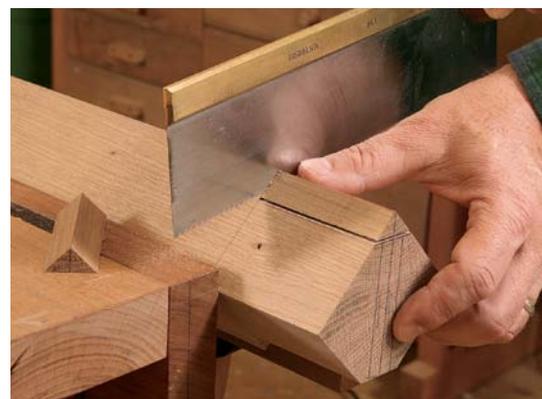
The base of this white-oak table requires 12/4 stock. If you can find it, buy riftsawn stock for straight grain lines on all the faces. If you can't find these massive planks,

Start with the legs

The through-mortise at the bottom is standard, so we'll focus on the diagonal joinery at the top.

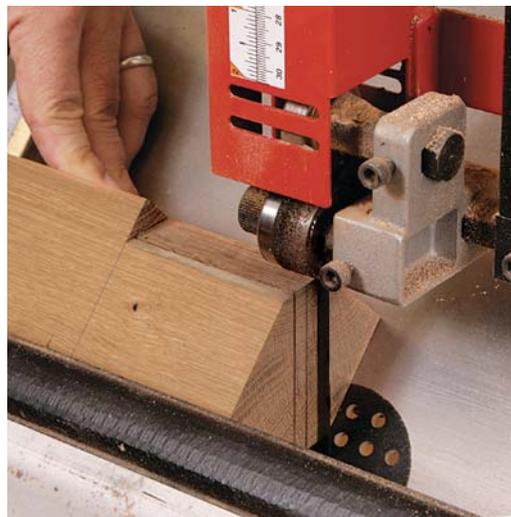


CUT THE STOPPED CHAMFER

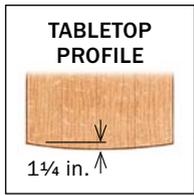


Bandsaw then handsaw. Tilt the bandsaw table to 45° and cut the flats (top). Clamp the leg in a vise and use a handsaw to cut the shoulders. Then clean up the sawn surfaces with a shoulder plane and chisel.

THEN THE SLOT



Saw, drill, chisel. With the bandsaw table still tilted to 45°, cut one side of the slot, rotate the leg, and cut the other side (left). This ensures a perfectly centered slot. Now make a 45° cradle to hold the leg, and drill a hole at the bottom of the saw cuts (center) to remove the waste. Finish up with a chisel (right).



Top, 1 1/8 in. thick by 36 in. wide by 76 in. long

End aprons, 1 1/8 in. thick by 3 in. wide by 34 in. long

Front and rear aprons, 1 1/8 in. thick by 3 in. wide by 57 1/2 in. long*

Leg, 2 7/8 in. square by 29 in. long

To purchase digital plans and a complete cutlist for this table and other projects, go to FineWoodworking.com/PlanStore.

Wedge

Peg, 3/8 in. dia.

Tenon, 1 1/8 in. sq. by 1 3/8 in. long

Y-stretcher, 2 in. wide by 2 1/4 in. high by 20 5/16 in. long*

Center stretcher, 2 in. wide by 2 1/4 in. high by 51 1/4 in. long*

End cap, 2 in. wide by 2 1/4 in. high

Tenon, 3/4 in. thick by 1 5/8 in. wide by 1 3/8 in. long

Tenon, 7/8 in. thick by 2 in. wide by 3 1/4 in. long

Mortise, 1 5/8 in. wide by 3/4 in. high

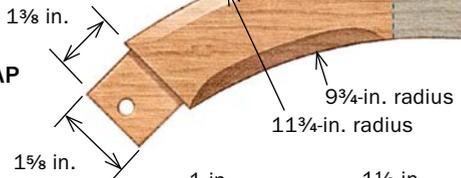
Stopped chamfers on stretcher parts, 3/8 in. wide

ANATOMY OF A HAYRAKE TABLE

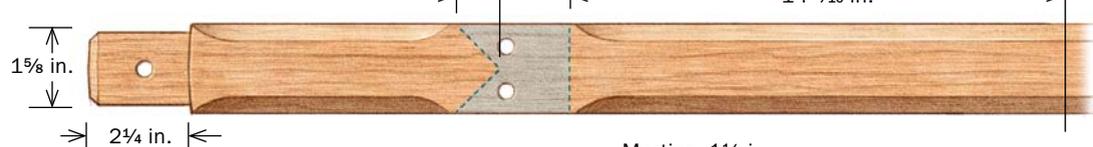
Thick stock, through-tenons, and heavy chamfers add timber-frame charm. Use rift-sawn stock for the legs and stretcher to get straight grain lines on all the faces of the parts.

***Note:** On dimensions marked with an asterisk, exact lengths of parts will be determined during the construction process.

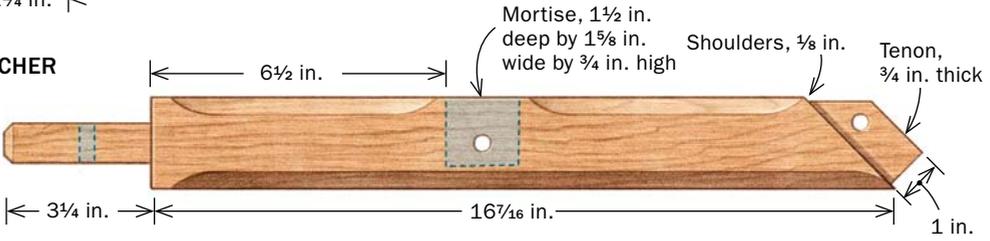
END CAP



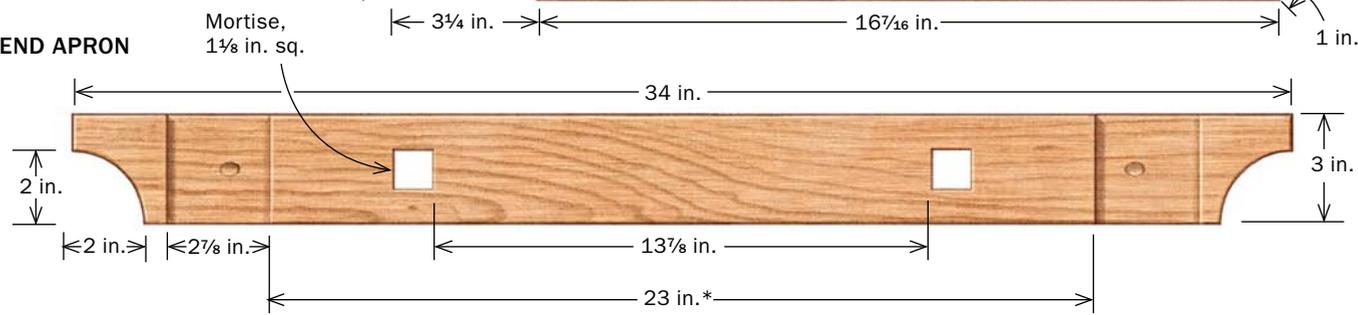
CENTER STRETCHER



Y-STRETCHER



END APRON

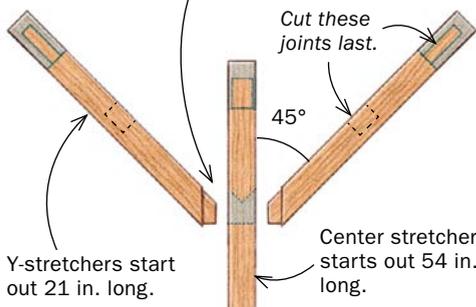


Tackle the hayrake stretcher

The stretcher array gives the table its farmhouse flair, but the angled stretchers and curved cap on each end also present the biggest joinery challenge of the project. Breaking down the construction into simple steps is the key to success.

1. JOIN THE Y

Leave the center stretcher and Y-stretchers long until after cutting the joinery that connects them.



MAKE THE ANGLED MORTISES

Start by cutting a through-mortise in the center stretcher. To create the 45° angled shoulders, clamp a 45° block in place (above) to use as a guide. Chop out a bit at a time until the chisel is resting on the block (right).



you can get by with 8/4. Here's how. Reduce the thickness of the hayrake stretcher parts just 1/8 in., to 17/8 in., and glue up the 27/8-in.-thick leg stock from two 1 1/2-in.-thick layers. Make sure the layers are flat-sawn so the glueline will be hidden in the straight grain lines on the edges. Mill all the parts to final width and thickness but leave all the stretcher pieces about 1 in. extralong at this point.

Now you can launch into the stocky joinery, walking in the footsteps of timber-framers past. The legs are the place to start. Cut out the stopped chamfer at the top of the leg, and then create the slot. When the lower mortise on the leg is complete, chamfer the corners on the tablesaw.

Rake section is easier than it looks

The lower stretcher system is where the fun begins. The curved and angled parts look daunting, but if you tackle the joinery one step at a time, it's really not that tough. The curved end cap actually simplifies the join-



NOW THE ANGLED TENONS

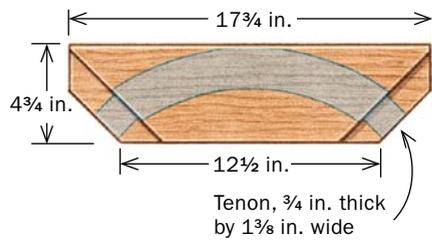
Leave the stretchers long and miter one end using an angle guide on a tablesaw sled (above). Install a dado blade and adjust your miter gauge so the end of the piece is flush with the rip fence, and cut the tenon (right). You'll have to readjust the gauge for the opposite face, but the rip fence can stay put. Last, trim a triangle off the end, to fit the angled mortise (far right). Once the angled end is done, cut the stretcher to length, tenon the opposite end, and finally cut the mortise for the end cap.



Hayrake stretcher *continued*

2. END CAP: CUT THE TENONS BEFORE THE CURVES

The end cap starts as a block with mitered ends. All of the joinery is cut at 45° angles, which the tablesaw and bandsaw handle easily.

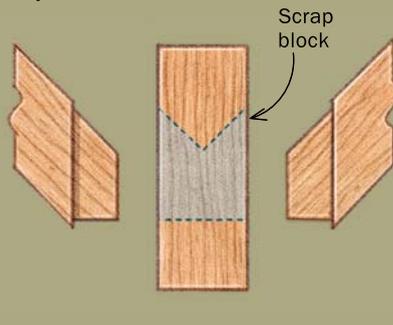


More angled shoulders. Start by mitering the ends of the end cap on the tablesaw using the same sled that you used for the Y-stretcher ends. This will ensure an exact angle match between all of the joints. Then cut the tenon cheeks with a dado blade as before (right).



SCRAP BLOCK IS THE SECRET

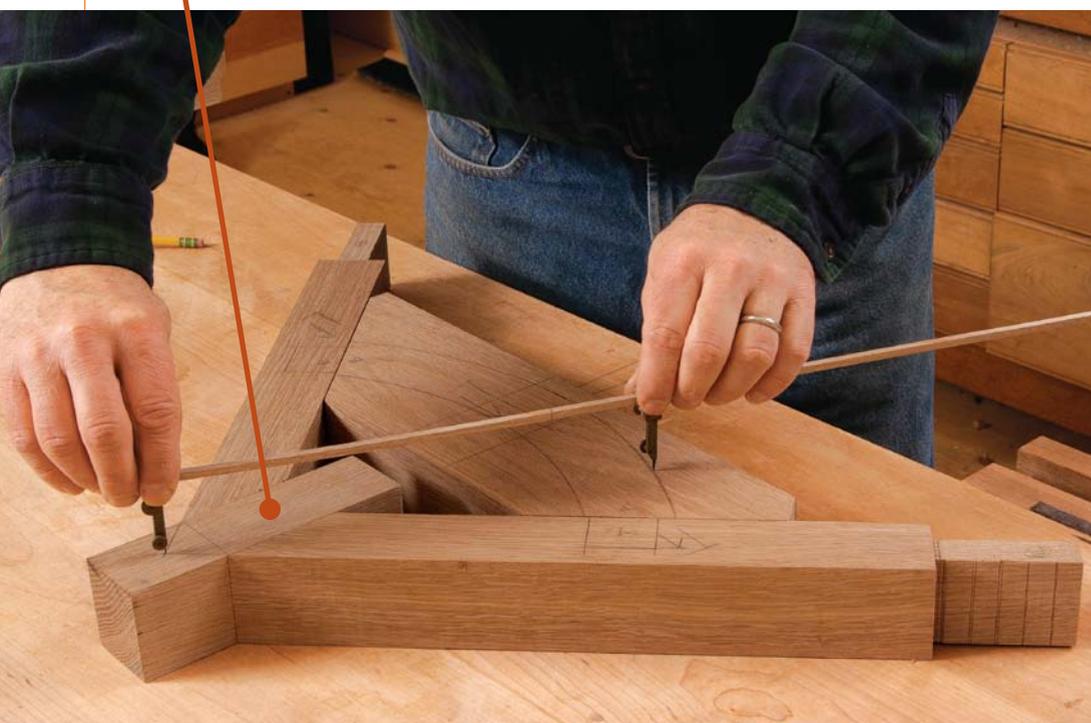
A mortised block allows you to assemble the Y-stretchers and mark the end-cap tenons and curve without the long center stretcher getting in the way.



Lay out the tenons. Dry-fit the Y-stretchers to a mortised scrap block. Then place the end cap over the stretchers, sliding it forward until its shoulders are snug. Use a square to mark the mortise locations on the ends of the tenons.



Cut the tenon ends on the bandsaw. Use a miter gauge to guide the workpiece, flipping it backward in its slot.



Now cut the curve. Dry-fit the end cap to the assembly and lay out its curves (left). After sawing out the center of the end cap so you can mortise for the center stretcher tenon, cut the curves on the bandsaw (above).

3. CENTER STRETCHER IS THE FINAL PIECE

With the end cap complete, you can use it to scribe the shoulders on the center rail and cut it to its final length. Leaving the center rail long until now is the key to a gap-free assembly.



Transfer the curve. To scribe the curved tenon shoulders, dry-fit the stretchers and clamp on blocks even with the end-cap mortises (left). This elevates the end cap and lets you align it with the mortises so you can scribe the shoulder accurately on the center rail (right). To mark the bottom, extend the scribe marks down the rail sides, flip the rail and align the end cap to the marks, and scribe.

Cut a square shoulder, then pare to fit. Cut the tenon with a dado blade, stopping short of the curved shoulder. Then use a chisel to pare to the scribe line.

tenon the ends to fit the leg mortises. While you're at it, bandsaw kerfs in the tenons for wedges. The last task is to cut the mortises that the end cap goes into.

How to handle the curved end cap

The final component of the hayrake stretcher is the end cap itself. Its construction is pretty simple because the joinery is cut while the stock is square.

Miter the ends of the end cap on the tablesaw, then tenon the ends. Set the end cap against a miter gauge and adjust the angle until the mitered end is flush with the rip fence, then cut the cheeks with a dado blade. Now locate the tenon ends using a scrap block as shown on the opposite page.

Next, you'll mortise for the center stretcher and cut the end cap to shape. Lay out the curves as shown, but bandsaw out some of the waste on the inside face to make mortising easier. Cut the curved profile on the bandsaw and clean up with a block plane and spokeshave. A spindle sander or sanding drum mounted in a drill press also works well for the inside face. With the end cap shaped, tenon the center stretcher and cut it to length (see photos above).

Drawbore pins replace clamps

It would be difficult to get clamps on this odd-shaped stretcher assembly for gluing. So, I created a self-clamping joint using drawbore pegs. It looks like a simple pegged joint, but the holes in the parts



All together now. All of the pieces come together at once, bit by bit. When fine-tuning the fit, keep in mind that the top face of the stretcher is most critical. Feel free to flip it to put the best side up.

are slightly offset so that when the peg is driven in, it pulls the joint together tightly. I also added wedges in most of the through-tenons. They add extra strength, and also close any visible gaps. I don't angle the mortises, but just kerf the tenons, drive in thin wedges, and trim them flush.

Smart methods for thick chamfers

The last task before assembly is to chamfer the parts. These chamfers were origi-

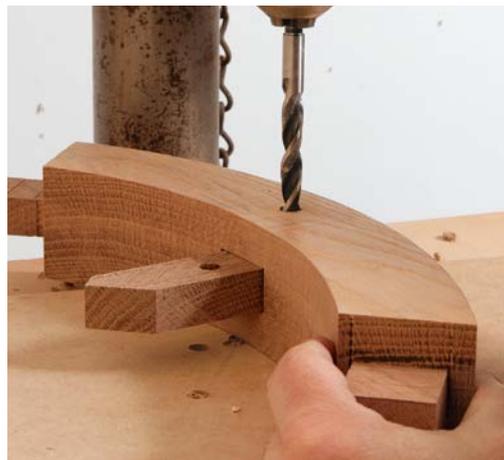
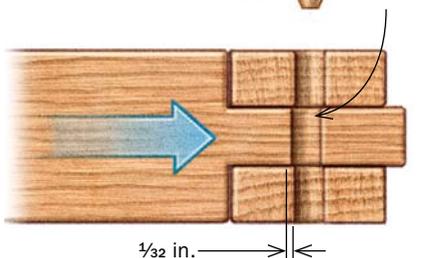
nally made by hand with a drawknife. I wanted to keep the handmade look, but I sped things up a bit by using a router for most of the work. The trick is to rout the chamfer, stop short of the end lines, and then use a chisel to finish it. This way, the chamfer flows smoothly from part to part.

I find it easiest to dry-fit the parts and rout the chamfers as a unit. I use a light touch and rout in the climb-cut direction to avoid tearout. As long as you don't take too heavy

Offset pins take the place of clamps

The angled and curved parts of the hayrake stretcher are nearly impossible to clamp for glue-up. Instead, drawbore pegs driven into intentionally misaligned holes pull the joints together tightly. It's a time-tested method for both assembling and reinforcing joinery.

By offsetting the tenon peg holes slightly toward the shoulder, the mortised joint will be drawn tight as the peg is driven in.



Drill through the mortised parts. Insert a scrap into the mortise to prevent blowout inside.

a pass, the router won't get away from you. Stay well away from intersections.

After routing the top and bottom faces of the stretcher assembly, mark the joint intersections and disassemble the parts. Use a chisel to complete the chamfer. Small irregularities are a good thing, but avoid chiseling deeper than the routed chamfer.

Get ready for glue-up

I make my own pegs, ripping stock to 3/8-in. square and then pounding it through a dowel plate (lie-nielsen.com). I cut the pegs long and taper the leading end with a pencil sharpener so that it can clear the offset holes. I lightly chamfer the top of the pegs because they are left slightly proud of the surface. To ensure a consistent peg height, I drill a shallow hole in the end grain of a scrap block and position it over the peg when driving it in.

Assembly begins by gluing up the hayrake stretcher (see photos, opposite). When both ends are assembled, flip the stretcher over and trim the bottoms of the pegs flush. With the stretcher glued up, dry-fit the legs and measure for the upper stretcher frame. Because of all the odd an-



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Mark and drill the tenon. With the holes drilled, dry-fit the parts again and insert the drill bit into each peg hole, giving it a twist to mark the center point (1). Disassemble the parts and mark a new center point 1/32 in. toward the shoulder of the tenon from the drill-bit mark (2). Insert a piece of scrap below the tenon to prevent blowout when drilling (3).



VIDEO WORKSHOP

Watch Pekovich build this table from start to finish in a members-only video at FineWoodworking.com/extras.

Assemble from the stretcher up



Glue up the hayrake stretcher. Wipe a thin coat of shellac on the end grain of the through-tenons to prevent glue from soaking in. Let it dry, then glue and assemble the parts one end at a time. Start the pegs in the hole and gradually drive them in until the joints are fully seated. Then drive them all the way home.



Assemble the rest of the base. Start by gluing the legs to the hayrake stretcher, but don't drive in the wedges just yet. Before you do that, it's important to install the upper aprons to help square up the entire assembly. Then drive wedges into the through-tenons in the legs, and peg the upper frame joints.

gles, it's better to take dimensions from the workpiece rather than a set of plans. Start by measuring between the legs to locate the bridle joints on the end aprons. Cut the bridle on the tablesaw with a dado blade. Then cut the corbel profiles on the ends and mortise for the front and rear aprons. Fit the end aprons in place and measure between them to determine the shoulder-to-shoulder length of the long aprons.

Tenon the long aprons, then rout slots for the wooden buttons that secure the top. Finally, glue up the apron frame and drive wedges into its through-tenons. Assemble the rest of the base as shown.

Keep the color light

English Arts and Crafts furniture tends to be lighter in color than Stickley-style furniture. So, even though I fumed the white oak with ammonia, I didn't fume it as long as I normally do, just a couple of hours. I also used the weaker janitorial-strength ammonia instead of the industrial-strength. The result was a nice golden tone. I warmed it up further by wiping on a thin coat of garnet shellac before finishing with Waterlox, a tung-oil-based wiping varnish. □

Michael Pekovich is the art director and a professional woodworker on weekends.



The top is attached with buttons. The tabletop won't be attached to the base until after finishing, but Pekovich pre-drills for the buttons now.