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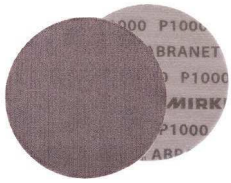

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Tables & Chairs

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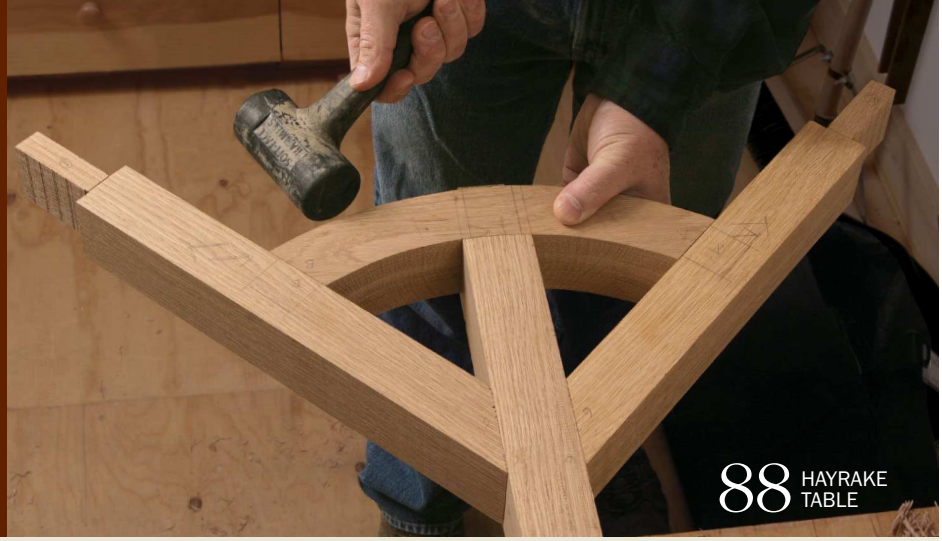

Dining Tables

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from the editor

THE STUFF OF OUR LIVES

Recently, I took a very unofficial survey. I asked woodworkers and non-woodworkers alike, "What is the most important piece of furniture in your life, and why?"

A good friend chose her coffee table, mostly because of its secret junk drawer. My mother favors the shoe-changing bench I built her because she thinks if she didn't have a place to sit for the task, she'd fall over daily. My running partner has an antique telephone chair she adores because it has been through decades with her. The children's book illustrator next door won't part with his kitchen table and chairs, not only because he grew up with them, but also because the table doubles as the workstation where he creates his artwork. For me, it's my Aunt Sophie's porch rocker. I sit in it nearly every afternoon waiting for my children to file out of the school bus. I love it.

Surprisingly, nobody said "I love my chest of drawers because it keeps my socks safe." In all these answers, a common theme prevailed: Tables and chairs of all kinds—hall tables, dining tables, coffee tables, side tables, benches, dining chairs, Adirondack chairs—are at the forefront of people's lives. Tables and chairs are everything: They are where we make memories, where we gather to nourish ourselves and each other, to celebrate, mourn, relax, discuss, work, play, and live.

Sentiment aside, from a woodworking standpoint tables and chairs also offer everything. There isn't a furniture style out there that doesn't include an inspirational table and chair. And when you explore beyond the traditional to create your own design, the prospects are unlimited. Constructing tables and chairs can be a challenge. But if you approach the process with patience, enthusiasm, and knowledge, success will be yours.

We created this special issue to help you build your next table or chair project. Whatever your woodworking skills, there is something here for you. Christian Becksvoort, Kevin Rodel, Michael Pekovich, and other experts will teach you how to design like a pro, keep your tabletops flat, compensate for wood movement, create a durable finish, work with curves and angles, and much more.

You bring the patience and enthusiasm, and we'll supply the inspiration and how-to.

—ANISSA KAPSALES
Editor, Tables and Chairs

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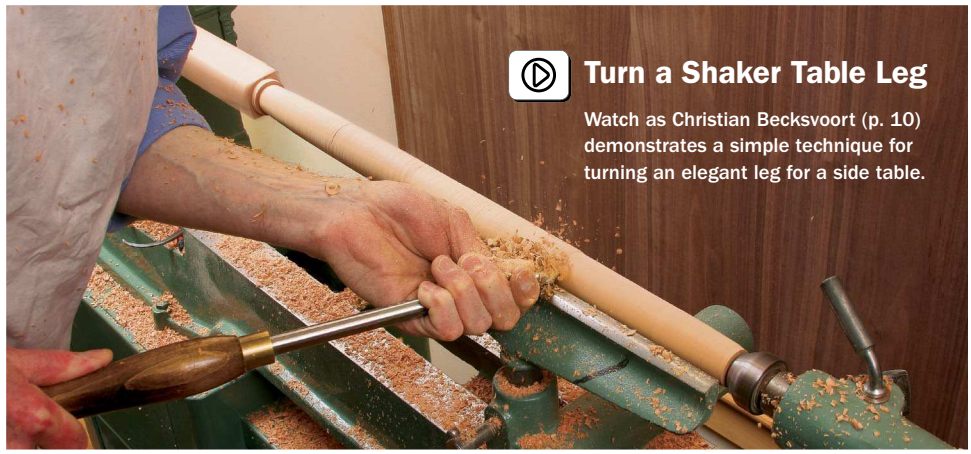
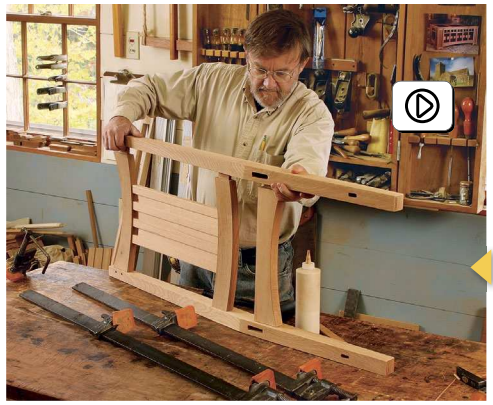


Turn a Shaker Table Leg

Watch as Christian Becksvoort (p. 10) demonstrates a simple technique for turning an elegant leg for a side table.

Weave a Danish-Cord Seat

Learn the ins and outs of this unique seat-weaving method (p. 64-65) in a video featuring Mark Edmundson.



Build an Arts and Crafts Chair

Watch veteran furniture maker Kevin Rodel as he assembles the components to create the distinctive back splat on his dining chair (p. 50).

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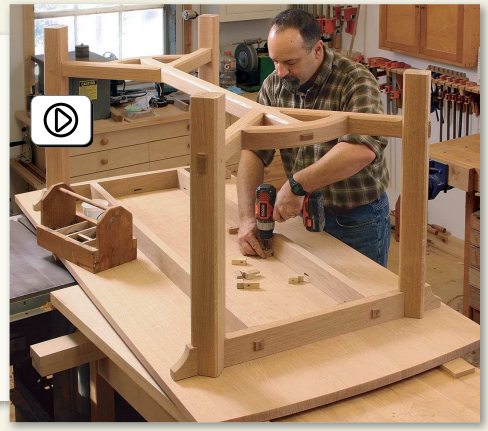
VIDEO WORKSHOP

Arts and Crafts Dining Table

The hayrake stretcher in this rustic table (p. 88), inspired by Sidney Barnsley, isn't as complicated as it looks. In this series, Michael Pekovich breaks construction into manageable steps. The workshop includes:

- **Tricks to simplify joinery on curved parts**
- **Tips on flattening wide boards with a narrow jointer**




MISC.
FIRST AID
Goddard's

Side Tables

Shaker Side Table

Two ways to tackle this classic piece

BY CHRISTIAN BECKSVOORT

Not long ago, a couple ordered a set of cherry side tables from me, one for each side of their pencil-post bed. I based the design on a Shaker side table from Canterbury, N.H., although virtually every other Shaker community had similar designs. As a surprise (I don't recommend this unless you are very familiar with your clients), I decided to make slightly different versions: one with square tapered legs, the other with turned tapered legs.

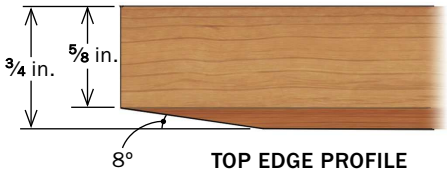
The overall design is a basic, timeless one that can move from bedroom to living room. But notice how the simple leg change alters the whole feel of the table. Tweaking the dimensions or shapes can make a big difference in the look of a piece of furniture. As far as difficulty goes, the table with tapered legs is a very good project to tackle if you're a beginner, and the one with turned legs adds a bit of a challenge. The rest of the construction is standard mortise-and-tenon joinery, a dovetailed top rail, and a dovetailed drawer. I start with the legs, move on to the joinery, add the drawer, and finish.

Tackle the joinery: mortises, tenons, and a dovetail

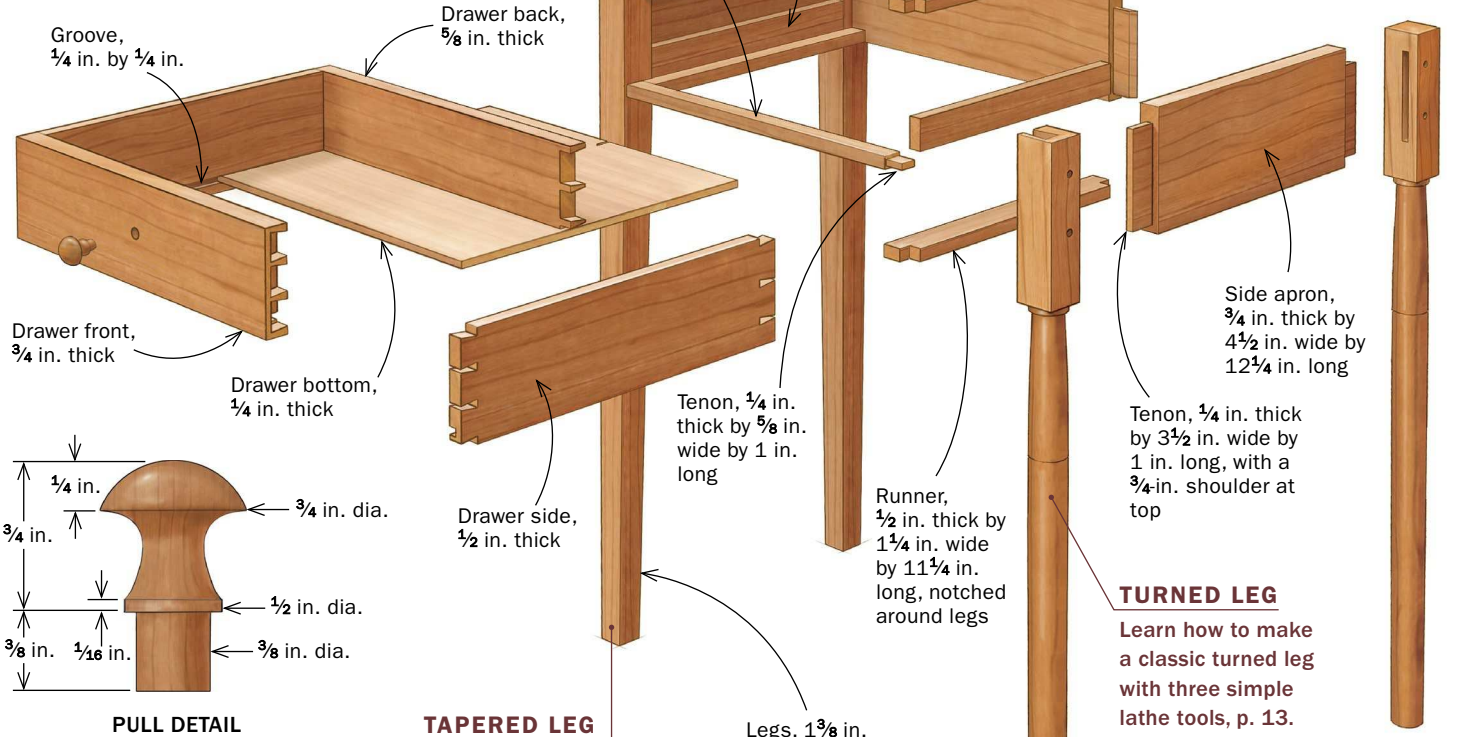
Once the legs are finished (see "2 options for legs," p. 12), the construction is the same for both tables. The first step is to add

Side table with drawer

This little table design, taken from the Enfield, N.H., Shakers, is rock solid, no matter which legs it stands on.



TOP EDGE PROFILE



PULL DETAIL

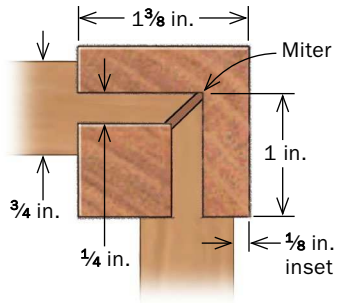
TAPERED LEG

A simple shopmade jig (p. 12) makes quick work of the tapered leg design.

TURNED LEG

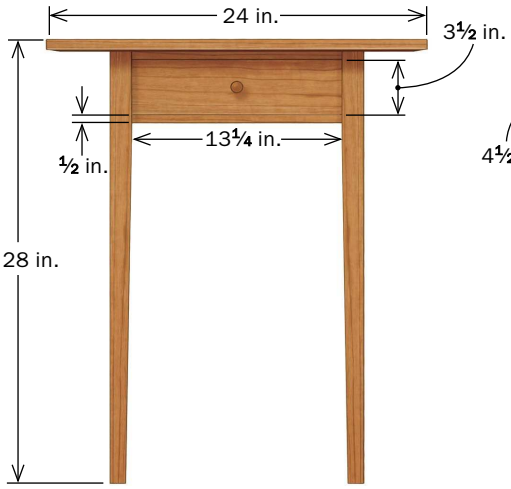
Learn how to make a classic turned leg with three simple lathe tools, p. 13.

To purchase expanded plans and a complete cutlist for these tables and other projects, go to FineWoodworking.com/PlanStore.

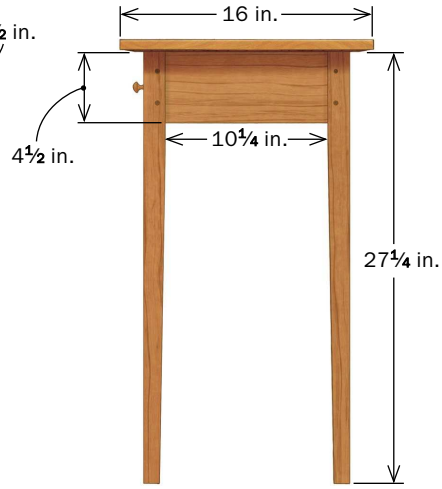


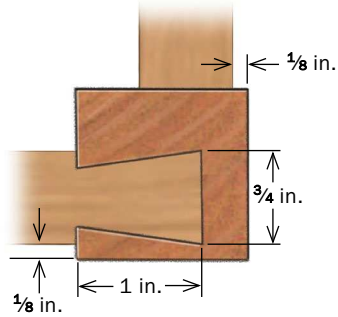
BACK LEG DETAIL

FRONT VIEW



SIDE VIEW



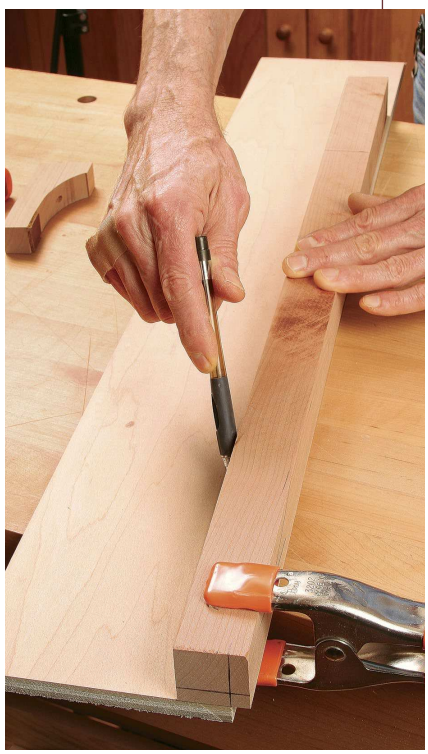


FRONT LEG DETAIL

Photo, facing page (top): Dennis Griggs; drawings: David Richards

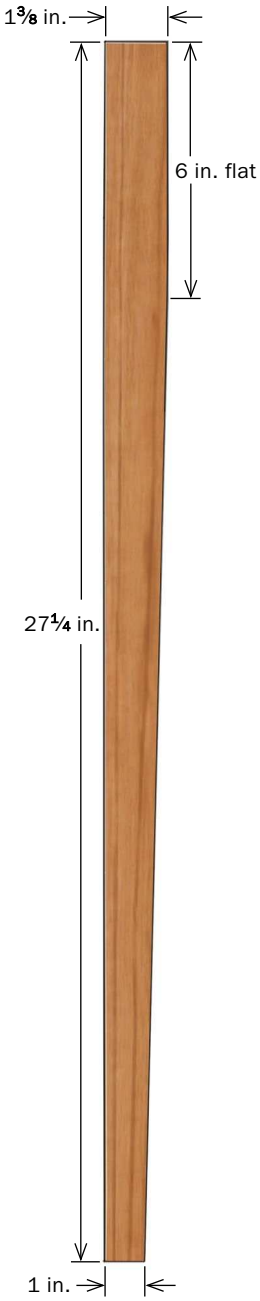
2 options for legs

When building tables, it's logical to start with the legs because they tie all the other parts together. Use a tapering jig on the tablesaw to taper the two inside faces, or turn the round legs on the lathe.



Use a leg to lay out the jig. *Then bandsaw the leg cutout on the top piece.*

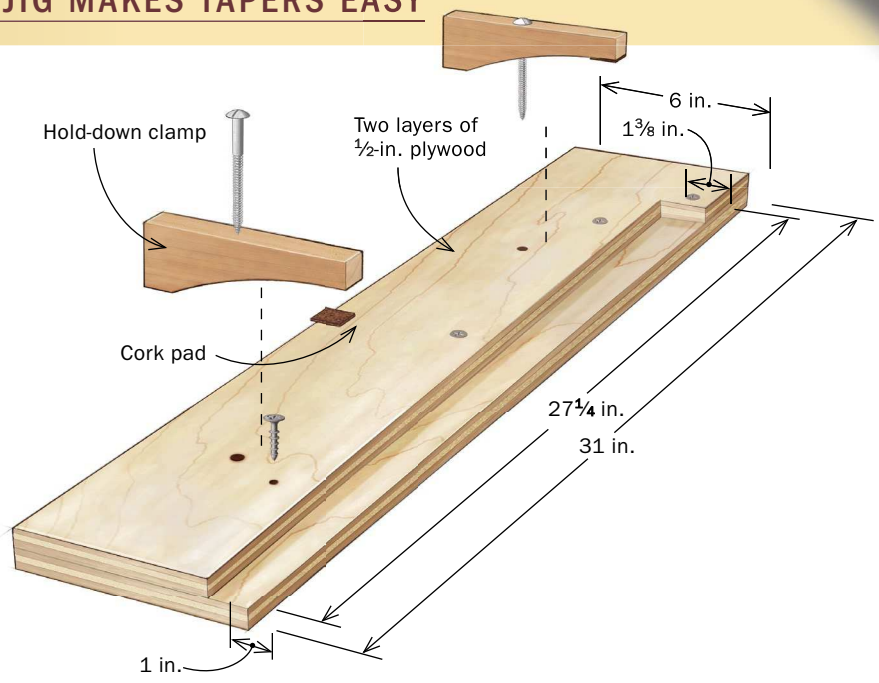
TAPERED LEG



The tapering jig to create these two-sided tapered legs is simple to make. Use a piece of plywood 4 in. to 6 in. wide and 3 in. to 4 in. longer than the leg. I mark the end of the leg to see the final dimensions and use those marks to position the leg on the plywood. Set the leg on the edge of the plywood with the portion to be tapered flush with the end and overhanging the edge. Then, trace around the leg and cut the leg area away freehand on the bandsaw. Once that's done, screw that piece of plywood to a base piece and add hold-down clamps to keep the leg stock secure as you run it through the tablesaw.

After cutting the first taper, turn the leg 90° in the jig and cut the second one. The final step is cleaning up the tapers with a sander.

A JIG MAKES TAPERS EASY



First taper. *With the leg in the jig and the rip fence set to the width of the jig, rip the taper on the first inside face of the leg.*

Second taper. *Turn the leg blank 90° in the jig and cut the taper on the second inside face.*

Photos, except where noted: Anissa Kapsales

Square to round. *Using a ½-in. gouge, start to turn the blank round from the line down. Turn it to its widest diameter (1¼ in.).*

Article Extra

Watch a video of Becksvoort turning this leg start to finish.

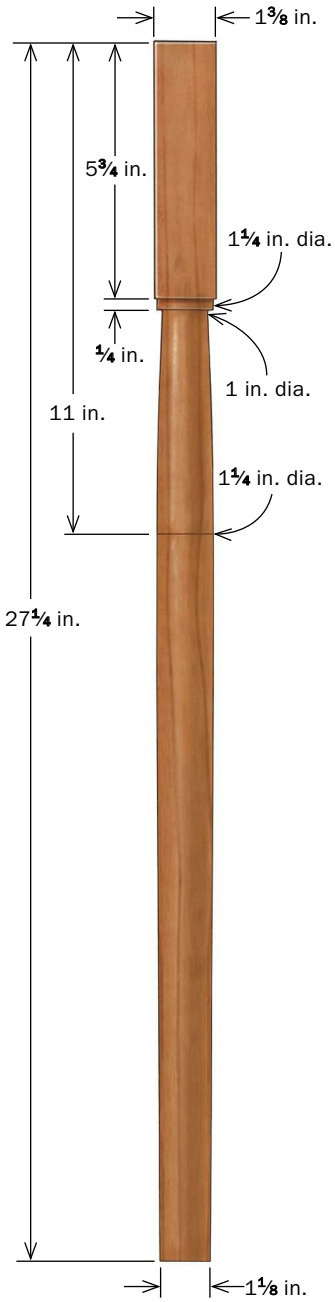
Define the transition point. *With a very sharp diamond-point scraper held on edge, carefully cut in at 90°, clearly defining the point where the square collar ends.*

Create a ¼-in. ring. *Still using the diamond-point scraper, establish the bottom part of the ring and cut in another ⅛ in. to bring the diameter down a bit more.*

Establish the maximum diameter. *Becksvoort uses a mortising chisel on edge to cut a thin line where the turned leg is at its widest point.*

Form the swell. *With a ½-in. gouge, start from below the transition ring and turn a gentle curve up to the thin line, and then taper down gently to the bottom of the leg.*

TURNED LEG



Although the turned legs aren't as easy as the tapered legs, the turning is pretty basic. There are a few points to keep in mind: the transition where the square top turns round, the ¼-in.-wide ring just under that, the maximum diameter, and the gentle taper down to the bottom of the leg.

Going from the square top portion to the round at a 90° angle is a little tricky, since a false move can knock off the corners. If you're not too secure on the lathe, you can start with 1⅝-in.-square stock, and size it to 1⅜ in. after turning to remove any tearout.

First, measure and mark the transition location on all four sides of the leg. Then begin turning with a ½-in. gouge as close to that point as possible. Next, with a diamond-point scraper held on edge, carefully cut in at 90°. Move the tool straight in to slice and clean up the shoulders, cutting in just deep enough to form a round. Now clean up the round ring to about 1¼ in. dia. Just under that, cut in another ⅛ in. to reduce the diameter. Mark down 5 in. and cut a thin line at the maximum diameter (1¼ in.). Then use the diamond-point tool to cut to the bottom. To form the swell taper, I use a gouge and turn from below the transition ring to the max point, then taper gently to the bottom. Finish with sandpaper and 0000 steel wool. Add a light bevel at the bottom. On all the legs (tapered and turned), I break square corners with 220-grit sandpaper.

Fast mortises

The basic mortise-and-tenon construction makes this an easy project to tackle. A drill press and chisel are all that's needed to create the mortises.

Waste away material on the drill press. *After the mortise locations are marked on the leg, use a fence clamped to the table to align a brad-point bit as you clear most of the mortise.*

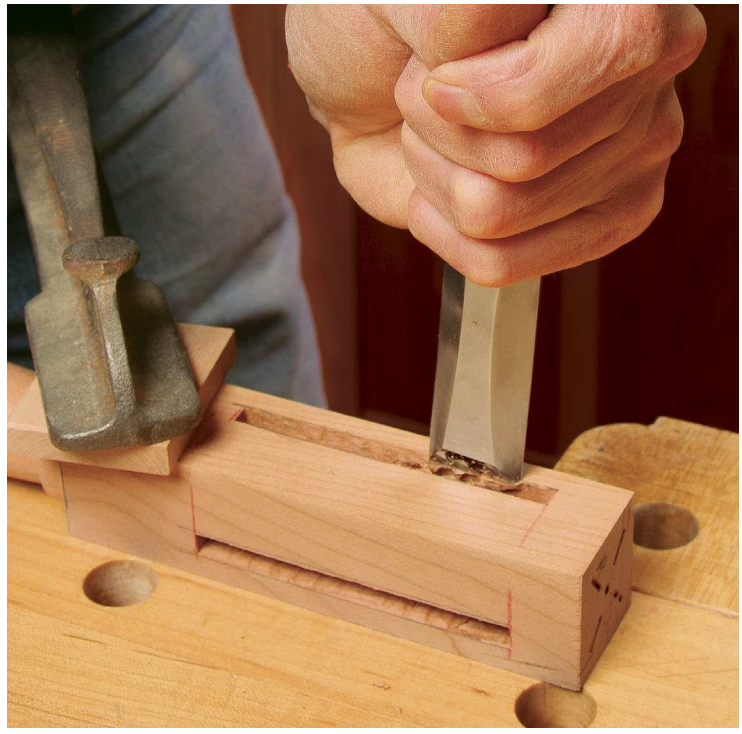
the side and back aprons and drawer rails to the legs. I start with the mortises for the back and side aprons and the rail below the drawer. Then I cut the tenons on all of those pieces. The rail above the drawer is dovetailed into the top of the leg, and I tackle that after the mortises and tenons.

Mortise the legs—I have a dedicated slot-mortiser for this job, but a drill press and mortising chisel also will work. After you lay out the locations for the mortises, waste away the majority of the material on the drill press with a brad-point bit. Then you can use chisels to clean up the edges and ends.

Tenon the aprons and lower front stretcher—I cut the apron tenons on the tablesaw using a dado blade. There are three different blade-height settings, one for each cheek and one for the top and bottom edges. By the way, the first cheek-cut height isn't critical; it's the second one that sets the final thickness and fit of the tenons. Also, on legs this small I try to maximize the length of the tenons, so I do end up mitering them.

I cut the lower front-rail tenons the same way as I cut the apron tenons. Then I use the shoulder-to-shoulder measurement of that piece to mark out the dovetail shoulders for the upper rail.

Dovetail the upper front rail to the legs—Once I have dry-fitted the three aprons and the bottom rail, I lay out the dovetails on both ends of the top rail, cut them with a handsaw, and refine them with a chisel. On the tablesaw, I skim a small rabbet on the underside of the dovetail, which creates a shoulder and helps locate the dovetail on the leg. Once that's done, use a knife to transfer the dovetails to the tops of the front legs. A small router with a ⅛-in. or ¼-in. bit takes out most of the waste material. Use a chisel to clean the corners.

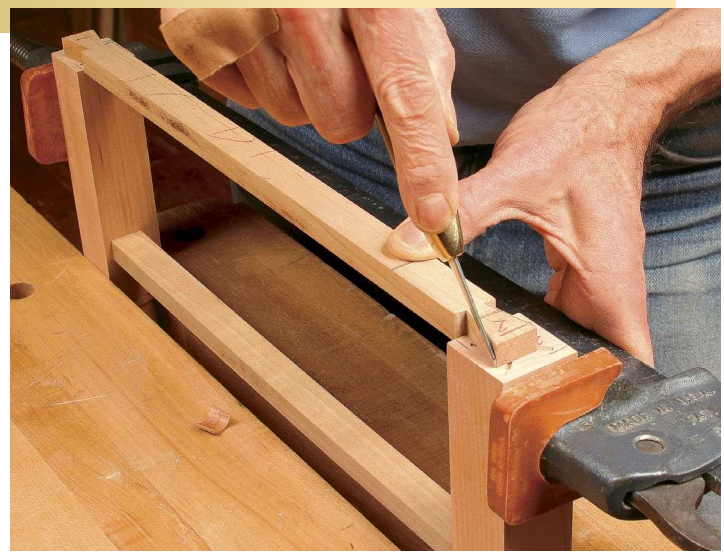


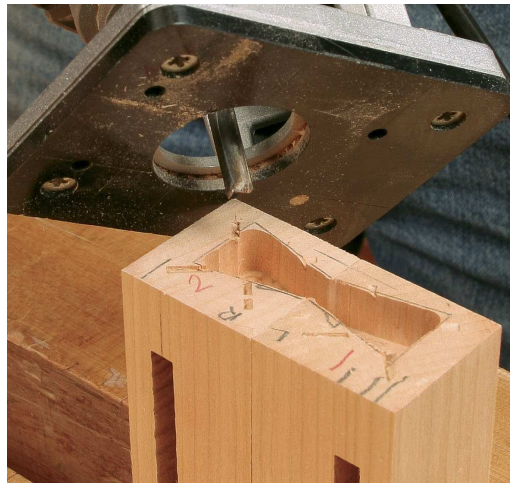
Clean up the mortises with chisels. *Mark the depth of the mortise on a mortising chisel. Starting at the ends of the mortise (left), tap the mortising chisel squarely in place. Finish by cleaning up the mortise walls with a regular bench chisel (above).*

Dovetailed rail adds strength

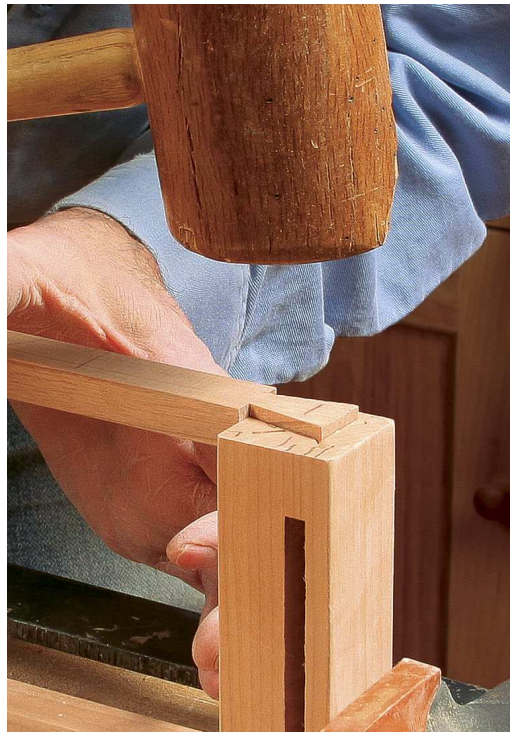
A quick dovetail locks the top rail in place and adds extra sturdiness to the whole base. Dovetail the rail and then cut the mating slots in the legs.

Cut a rabbet on the underside of the dovetails. *Use a tenoning jig. The shallow lip (1/16 in.) helps when you are marking the dovetail's position on the legs.*





Transfer the layout to the legs. *Dry-fit the lower rail to the legs, and position the upper rail across the top of the legs to transfer the dovetail profile (above). Use a small router to cut close to the line (left) and a chisel to finish the job.*



Fit the upper rail. *A final dry-fit of the rails to the front legs ensures an accurate fit and a stress-free glue-up. These parts will be the first step of the gluing process.*

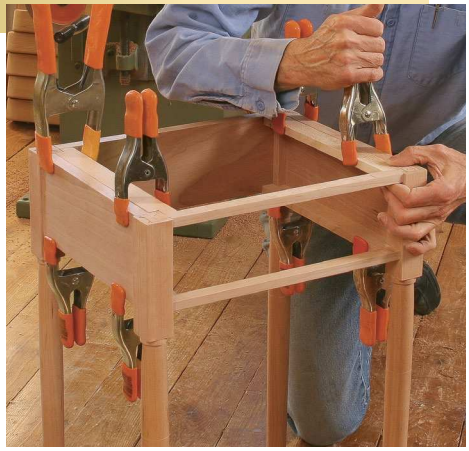
Glue up the bases and add runners, kickers, and spacers

Before adding the runners and kickers, sand the legs, aprons, and rails to 320-grit and glue the bases together. Begin by gluing the front legs to the rails and the back legs to the back apron in two separate assemblies. Once they are dry, add the two side aprons as a final assembly. And once that is dry, you can glue in the runners and kickers.

The drawer runners and kickers (a pair on each side of the drawer) are the same size and shape, simply a strip of wood notched to fit between the front and back legs. The runners sit below the drawer sides and provide the track that the drawer runs on while it moves in and out of the side table. A kicker is a strip of wood that is placed above each drawer side to keep the drawer from tipping down as it is opened and closed. In addition, I use the kicker to screw the top in place. Also, because the sides are inset from the legs, I glue in a spacer just above the runner. This spacer keeps the drawer from tilting left or right.

There is no joinery involved in adding the runners and kickers; they are simply cut to fit the interior, then glued and

Complete the base. *After the front and back of the base are dry, add the side aprons.*



No joinery for runners, kickers, and spacers. *The runners and kickers are simply glued and clamped into place (above), flush with the top and bottom of the aprons and rails. Plane the spacers perfectly flush with the inside faces of the legs before gluing them on (below).*

clamped in place, flush with the top and bottom of the aprons and rails. Trim the spacers perfectly flush with the inside faces of the legs.

Hand-cut dovetails in the drawers

The drawer fronts are cut to fit the openings. I make the front ¾ in. thick, the back ⅝ in. thick, and the sides ½ in. thick. I make the back a little thicker than the sides for three reasons: First, thinner sides make the drawer appear more graceful, and you'll seldom pull it all the way out to see the thickness of the back. Second, the added thickness of the back gives a bit more glue surface to the dovetails, resulting in stronger joints on all four corners. Finally, it allows a solid bottom (not plywood) to expand and contract while remaining hidden under the back.

I cut half-blind dovetails in the front and through-dovetails in the back, cutting the tails first. I make the drawer bottoms from resawn, book-matched stock and secure them with a screw and slot in the back to allow for seasonal movement. I turn the mushroom-shaped knobs on the lathe.

Screw the top in place

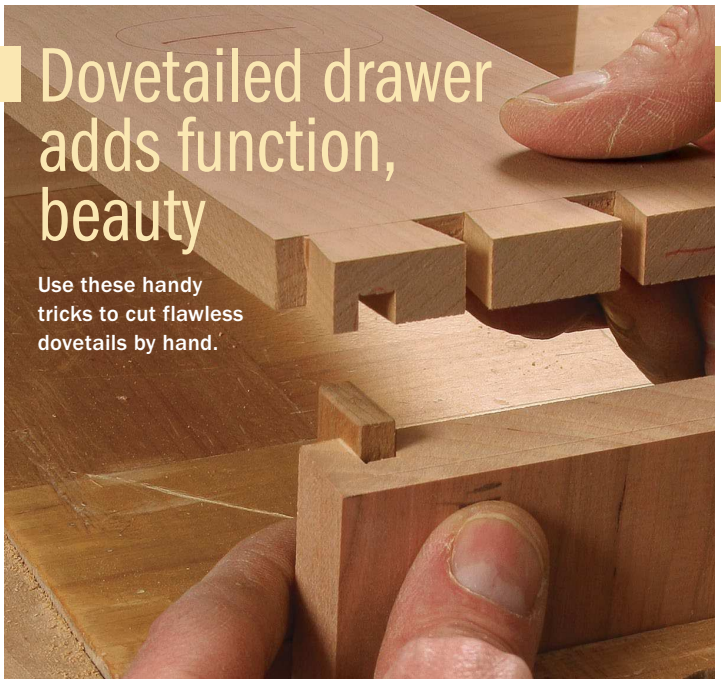
Last, I edge-glue the ¾-in.-thick top, cut it to size, sand it, and use the tablesaw to add a slight bevel to the underside. With the top facedown, I center the base (1½ in. front and back, 4 in. on the sides) and drill three countersunk holes through each of the drawer kickers (one in the center, one at either end) to screw the base to the top. I made the end holes oval-shaped to allow for wood movement.

I give the tables three coats of an oil finish. The first coat is straight Danish oil and the next two coats are a ratio of two parts Tried & True Varnish oil and one part spar varnish. I use only wax on the drawer runners, spacers, kickers, and drawer sides and bottom, to help them run more smoothly. □

Christian Becksvoort is a furniture maker in New Gloucester, Maine.

Dovetailed drawer adds function, beauty

Use these handy tricks to cut flawless dovetails by hand.



Transfer trick. *Becksvoort runs the groove for the drawer bottom on the tablesaw, and then uses the groove (and a small scrap) to align the parts when transferring the tails to the pin board.*

Keep it level. *Secure the pin board in a vise and use a spacer block to keep the tail board level on the pin board for layout.*

Solid drawer bottom made easy. *Cut the bottom of the drawer back to line up with the drawer groove, so the bottom can slide into place. A single screw secures the solid bottom to the back, with a slot to allow seasonal movement.*

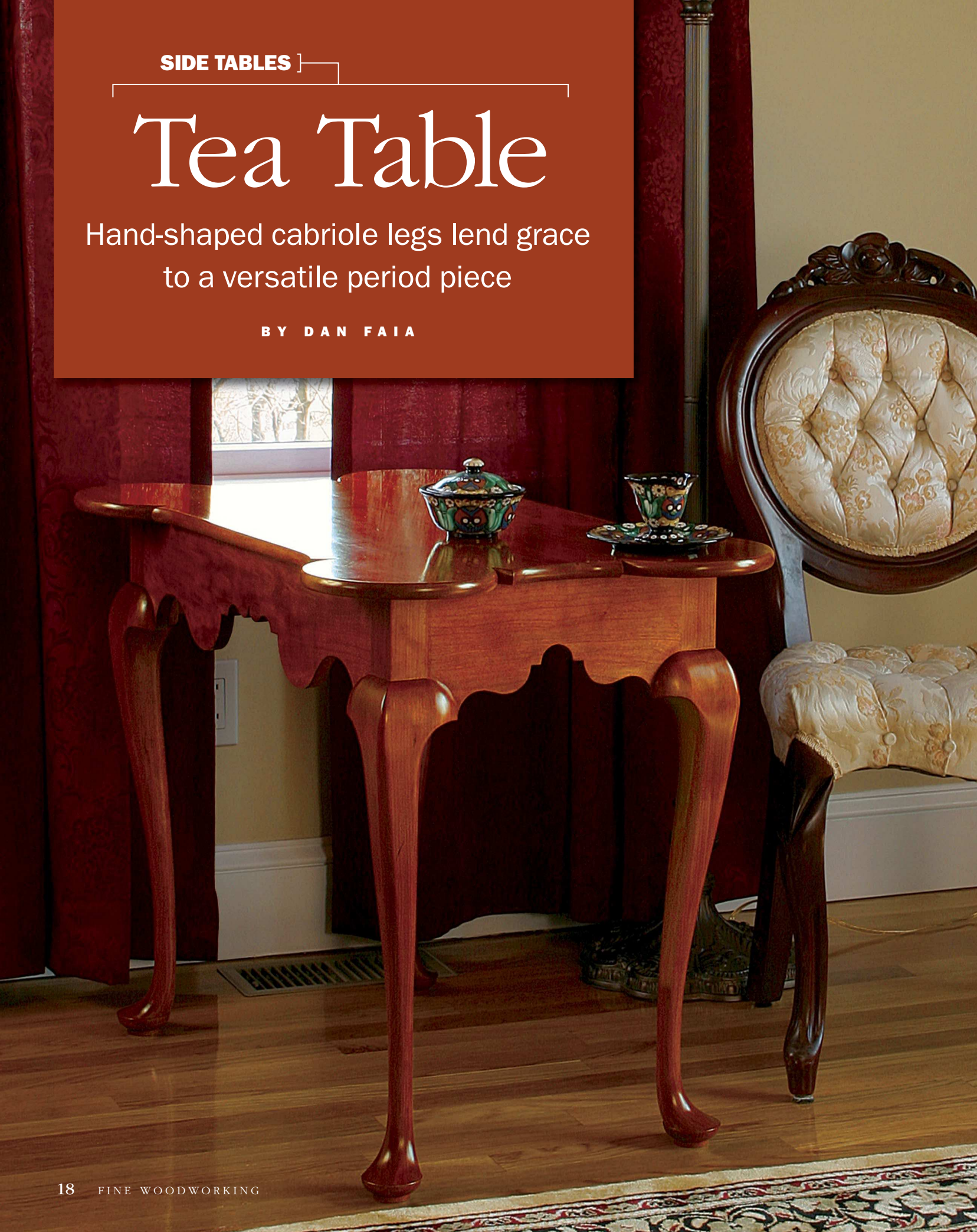
Shakers used an easy oil finish. *After all the construction is finished, Becksvoort uses an oil finish inside and out, but uses only wax on the interior drawer parts.*

SIDE TABLES

Tea Table

Hand-shaped cabriole legs lend grace to a versatile period piece

BY DAN FAIA



When a client asked for a tea table recently, I built this one in the Queen Anne porringer style, named for the top's rounded, soup-bowl-shaped corners. I found the design in an antiques catalog. The original was built in Wethersfield, Conn., sometime between 1740 and 1760.

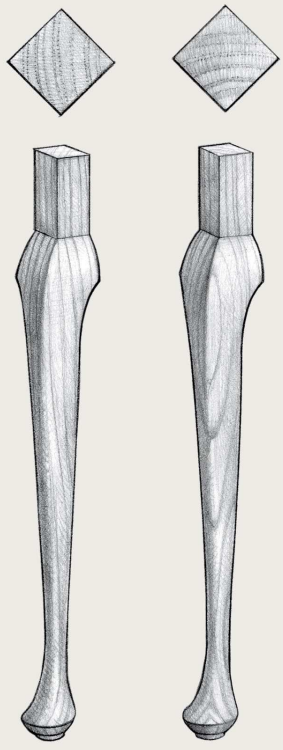
Tea tables were most popular from the William and Mary period in the early 1700s through the Empire period in the mid-1800s. Today, even though earlier dinnertimes have put an end to daily afternoon "teas," these tables still are useful as end tables or occasional tables.

This piece is also a great way to get started in building period reproductions. The design is simple, but there are challenging details in matching the grain, shaping the cabriole legs and transition blocks, and creating the uniquely shaped top. The project requires careful machine work and a delicate touch with hand tools. When you're done, you'll have a handsome, highly functional piece of furniture.

Seek consistent grain for a coherent look

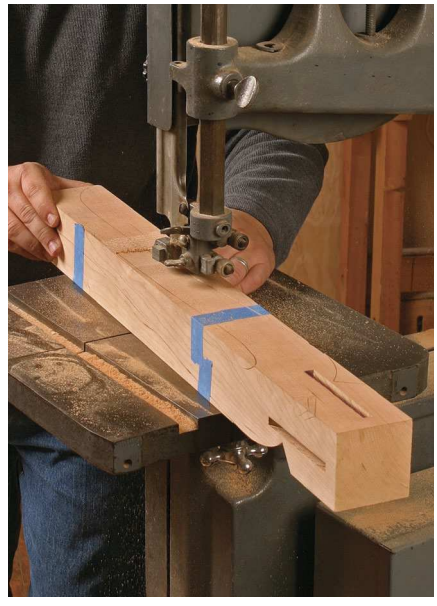
Lumber selection and grain orientation are critical details for any furniture project. Using the right grain for individual parts can

Bandsaw the legs

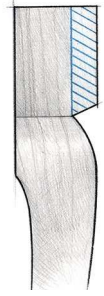


TWO WAYS TO ORIENT THE GRAIN

There are two options for the look of the legs: flow lines and bull's-eyes. Flow lines, used on this piece, keep a parallel vertical pattern that follows the leg's contours. Bull's-eyes are the sunburst patterns seen at the peak of the knee. You can get either pattern from the same blank, depending on how you orient the leg. End grain that runs from inside corner to outside corner will create flow lines (left). Side-to-side grain will produce bull's-eyes (right).



Rough-cut the profile on the bandsaw. *After turning the pad foot, trace the layout onto two faces of the blank and cut one face (above). Leave the waste area above the knee intact for now. Then tape the cutoffs back in place and cut the second face (left). The cutoffs support the work for safe and accurate cutting of the adjacent sides.*



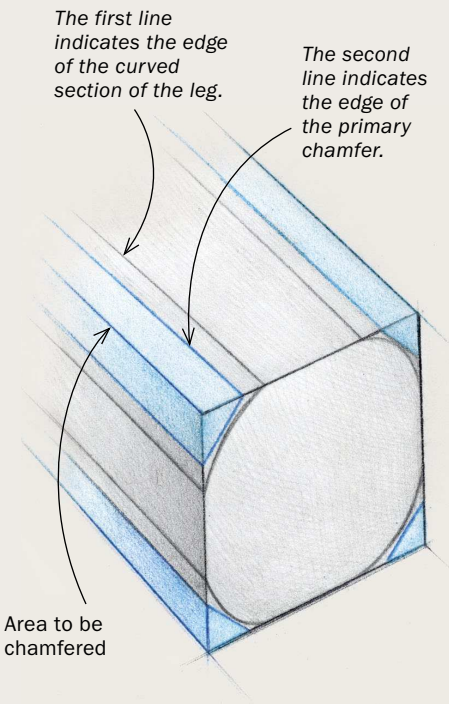
Do not remove the waste until after dry-fitting the legs to the aprons.

Shape the legs

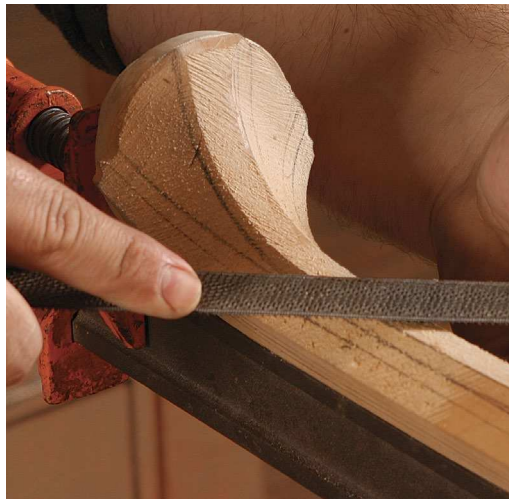
LAY OUT THE PRIMARY CHAMFERS

Mark the edges of the curves. *Begin the layout for shaping the leg by drawing a pair of reference lines on each side, at equal distances from the corners. These are called centerlines because the two meet at the center of the leg's narrowest point.*

Mark the edge of the first chamfer. *Faia visualizes a "5/7" ratio to draw a new set of lines a little less than halfway from the reference lines to the corner on each side. He chisels to these lines in creating the first chamfers.*



Cut the first chamfer. *Use a chisel to remove the wood between the second layout lines (above). Stop the cut at the narrowest part of the leg, where the grain direction changes, and then work from the opposite direction. The sharply curved area just above the foot is hard to negotiate with the chisel. Follow up with a rasp to smooth the transition (below).*



Photos: Steve Scott; drawings: Bob La Pointe

make the difference between a good piece and a great one. For grain consistency, I made the aprons and the slip-matched top from a single board. It might seem shameful to rip wide lumber into narrow pieces, but it pays off in the finished appearance.

Grain selection for the cabriole legs is even more important. Look for a 12/4 board with a rift-sawn end section, but be prepared to spend some time picking through the lumber to find it. Most pieces that will fit the bill will be rift for only half or three-quarters of the width. You'll rarely find a board that will yield any more than two legs side by side in the rift.

Turn the feet before shaping the legs

Start by rough-cutting the leg blanks longer than the finished leg. This leaves matching stock for two transition blocks, which you should trim off after the leg is turned and before it is shaped.

Begin by turning the pad foot on the center of the blank. Layout is done using plywood patterns derived from full-scale drawings. On the lathe, use a parting tool and a pair of calipers to set the pad's maximum diameter and to cut the fillet on which the foot will rest. Then make a rolling cut with a spindle gouge to establish the curve between the foot's widest point and the fillet. The last step on the lathe is to use the corner of the skew to make a shallow scribing cut that just begins the top of the foot. This will help you locate the toe later in the leg-shaping process.

While the blanks are square, cut or chop the mortises for the aprons, making sure to choose the proper inside corner for the grain selection. Label and trim off the transition blocks, and cut the legs to length.

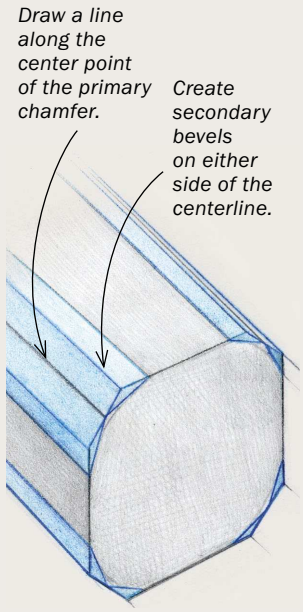
Time-honored cabriole layout method

Lay out the leg pattern on the two inside faces and bandsaw the profile. Do not bandsaw the top of the post, and stay proud of the pattern line by 1/16 in. or more above the knee. It is important to leave plenty of wood here for shaping later. Clean up the cuts with a spokeshave and a rasp, making each surface a fair curve.

I shaped the legs primarily with wide, flat chisels, removing wood in a series of chamfers until I arrived at a rounded profile. For consistency, I laid out the chamfers using a technique called the 5/7 rule.

At this small scale, the 5/7 rule isn't a precise measuring technique. It's a way of eyeballing the layout with consistent results (consistent enough, anyway, to please the eye). Start at the ankle by marking the center point of each side of the leg. From these marks, draw centerlines up and

LAY OUT THE SECONDARY CHAMFERS

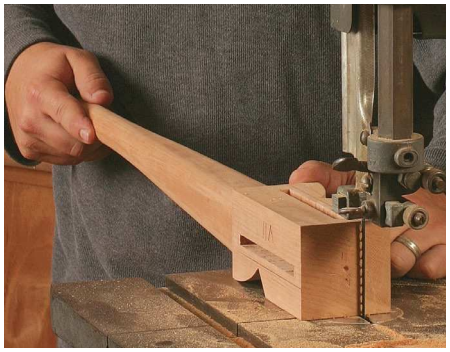


Lay out the next chamfers. *Mark centerlines on the newly created faces. These lines will be used in cutting a second set of chamfers.*

Cut the new facets. *Chisel away a triangular section of waste between the two centerlines. This cut is only about halfway to the line on either side of the corner (above). The remaining ridges are small enough to remove with a spokeshave (below left). Use rasps, files, and sandpaper to shape the leg to its finished contour (below right).*

Assemble the base

Profile the aprons. *Use chisels, rasps, and files to create a smooth surface after bandsawing the apron shape.*



Mark and trim the posts. *Dry-fit the aprons into the mortised leg posts and trace cut lines on the front of each post (top). The finished posts will be flush with the aprons. Cut on the waste side of the line (above) and plane the posts flush with the apron after glue-up.*

down the blank, maintaining the same dimension and following the curves created by the saw.

Your next marks should be a little less than halfway from these centerlines to each adjacent corner. To estimate this distance consistently, imagine that the space between each center point and each adjacent corner is divided into 12 equal parts. From each center, count five units toward the corners and make your marks at those locations. Draw additional layout lines from these marks up and down the blank.

Use a chisel and rasp to remove the material between these second layout lines, creating a broad chamfer. Now mark the centerlines of the chamfers. Refine the profile by paring about halfway in from these centerlines and the original ones to remove the newly created corners. This will create a set of narrower, secondary chamfers. Last, remove the ridges along these faces with a spokeshave. The corners should now be so close to round that no other division is needed. Use a rasp, file, and scraper to achieve the final shape.

Blocks transition from apron to knee

Cut the apron stock to the appropriate lengths and rip the aprons slightly wider than the finished width. I used a dado set on the tablesaw to cut the tenons. Remove milling marks from the aprons with a handplane. Locate the center of each apron, measuring from the shoulders. Trace the apron patterns and bandsaw to shape. Clean up the bandsaw marks with a spokeshave, chisels, and files.

With the base dry-fitted together, trace the outside face of the aprons onto the leg posts, which were left fat earlier. Bandsaw the posts just proud of these lines, leaving wood that can be planed flush to the aprons after assembly. Glue up the base, checking for square and using moderate clamp pressure. Finish the assembly

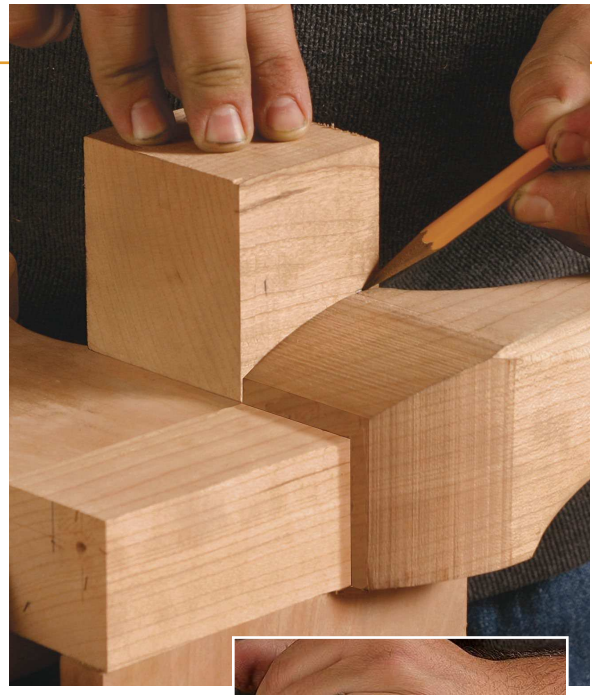
Glue up the base. *Use moderate clamping pressure and be sure to check the assembly for square.*

Add transition blocks

PREP THE LEG FOR CORNER BLOCKS

Plane the post flush. *Use a shoulder plane, referencing off the surface of the apron.*

Locate the transition block. *Clamp the rough stock in place, aligned roughly with the bottom of the apron. Plane the top of the leg to match the block's height.*



Mark and cut the corner block. *Mark the block at the knee's apex to determine its thickness (above). Cut the block to shape and glue it in place before shaping it with a chisel (right).*

Shape the transition block. *Pare across the top of the block, using the leg as a reference surface. As you near the apron, round over the ledge made by the shoulder plane.*

Change directions. *Next, work toward the top of the leg, rounding the transition block until it meets the apron.*

by trimming the posts flush to the apron fronts with a shoulder plane.

To begin fitting the transition blocks, first handplane their mating surfaces so that they fit tightly to the legs and aprons. Now clamp the transition block temporarily into place, aligning it roughly with the flat bottom of the apron, and use it as a reference surface for the shoulder plane. You want to plane the top of the leg where it meets the post, bringing its height flush with the top of the transition block.

Remove the blocks and use a bandsaw to cut the curved side profiles on each. Use chisels and sandpaper to smooth the outer profiles to a fair shape, and then glue the blocks onto the legs and aprons. Chisel the leg profile to shape with the transition blocks. Curve the transitions across their width from the leg to the apron. Continue shaping diagonally to a final rounding.

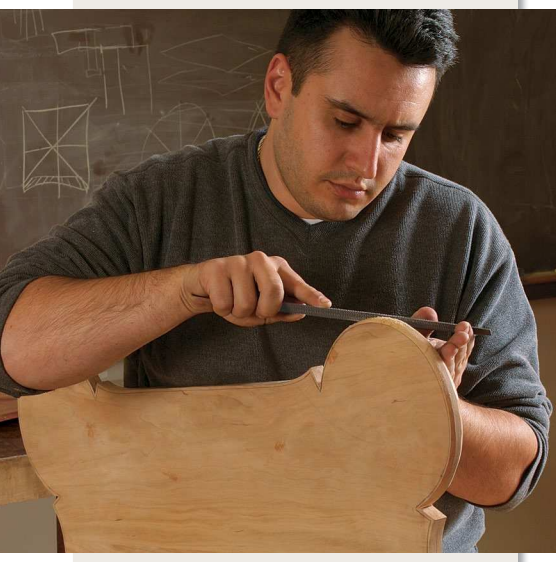
Shape and attach the top

I like to spring-joint the top boards. To "spring" the joint, plane away a minimal amount of wood from the middle section of each edge, so clamping pressure is

Fair the curves underneath. *Use a rasp to smooth the underside of the transition block where it meets the bottom of the apron.*

SHAPING THE TABLETOP'S EDGE

Using chisels, rasps, and files, work between a centerline drawn on the edge and layout lines on the faces.



moderate. Then the joint requires only one center clamp for glue-up. After planing and/or sanding the top flat, lay out and bandsaw the top pattern slightly proud of the lines. A jigsaw is a good alternative for cutting these shapes, especially the large-radius corners. Fairing these shapes by hand will require the use of many tools—spokeshave, chisel, file, and scraper.

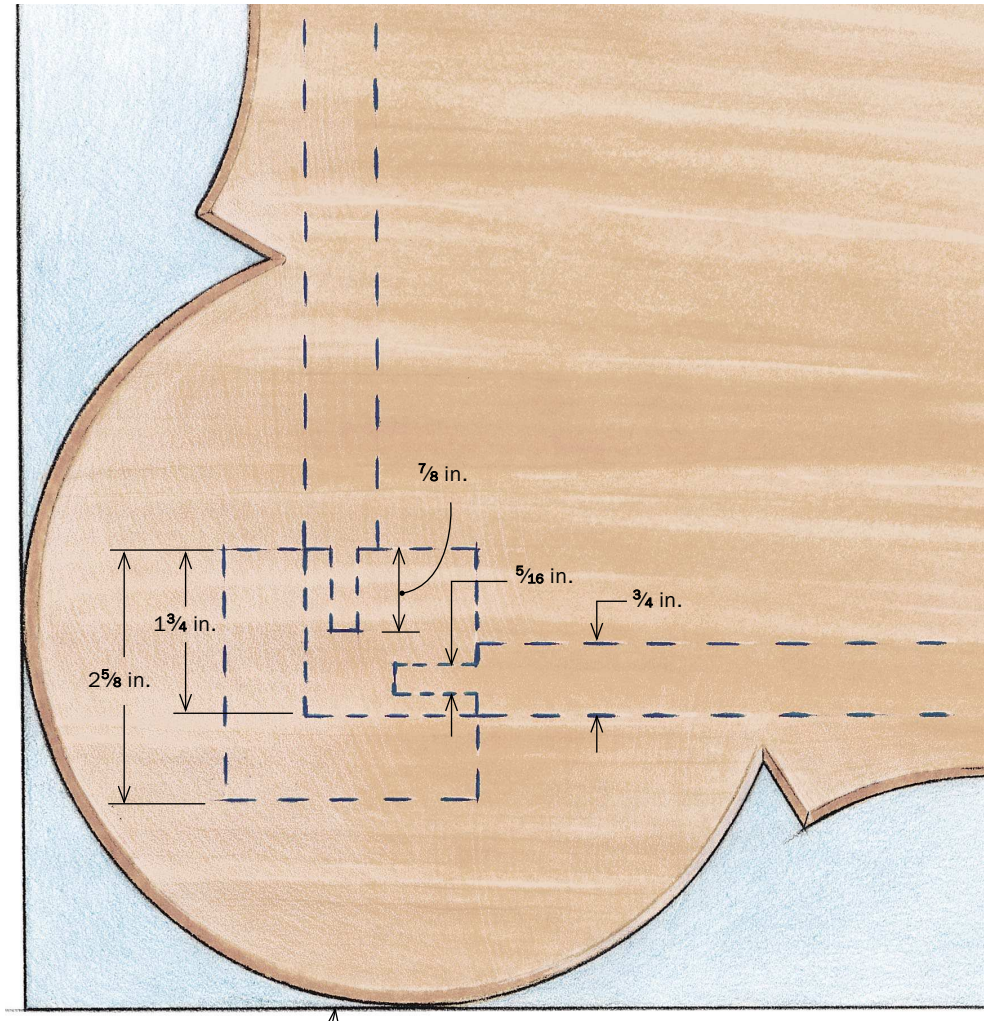
The edge profile is not a half-round shape. It's a section of a larger radius, which is a common profile used in 18th-century furniture. Layout is simple. Draw a single centerline on the edge, and a pair of lines (one on each face) marking the top and bottom of the curve.

The makers of many original pieces used glue blocks to attach their tabletops; however, I don't recommend this because it restricts seasonal movement. Six wood screws, driven through pocket holes in the aprons, hold this top down. Mount the two end screws tightly and widen the slots for the four side screws to allow wood movement. □

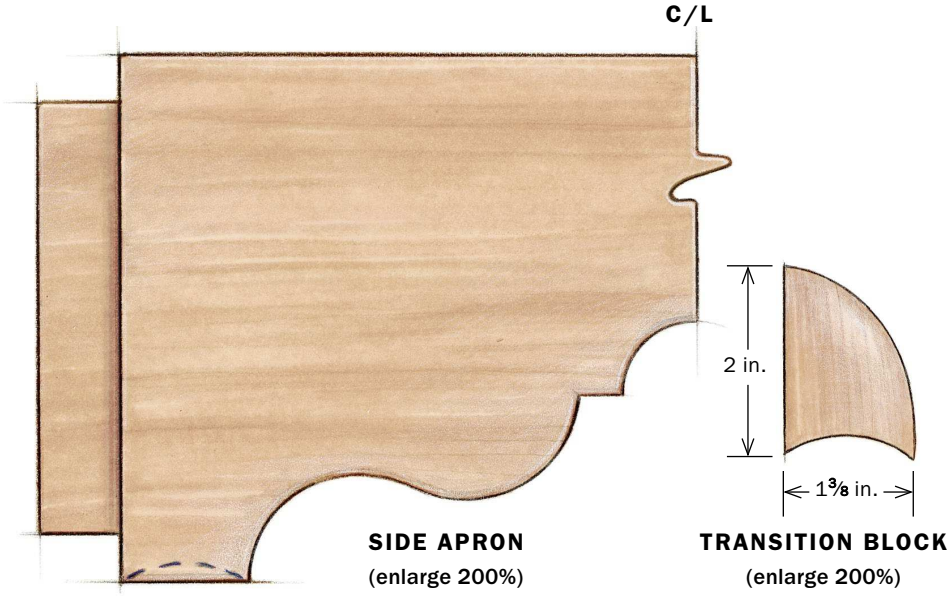
Dan Faia is a custom furniture maker in New Hampshire.

BASIC JOINERY SUPPORTS A GRACEFUL DESIGN

Simple mortise-and-tenon joinery brings the leg posts and aprons together, while the details lend distinction to the piece. The aprons are flush with the leg posts, and the curves in the cabriole legs are echoed by the rounded corners and edge details of the tabletop.

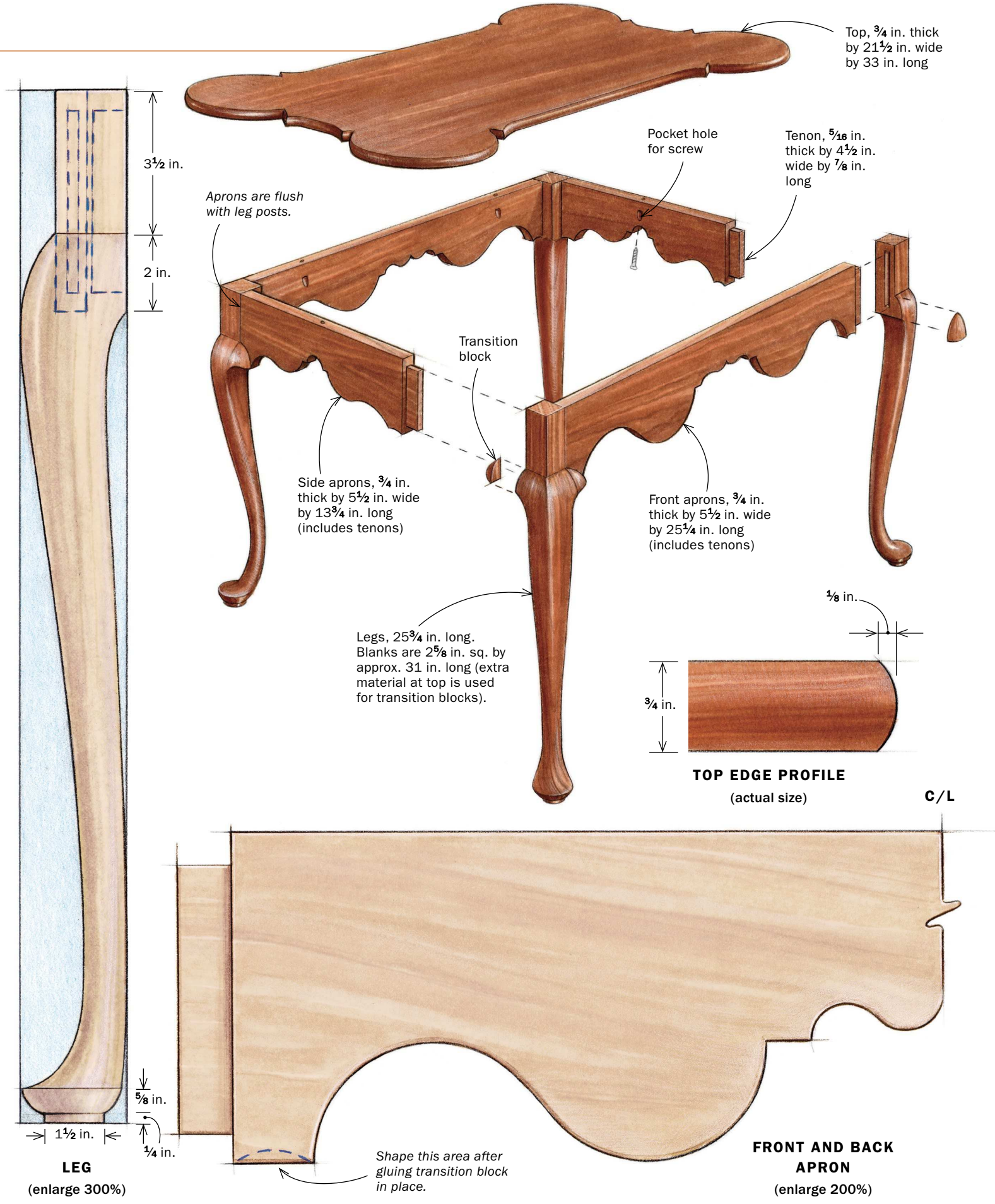


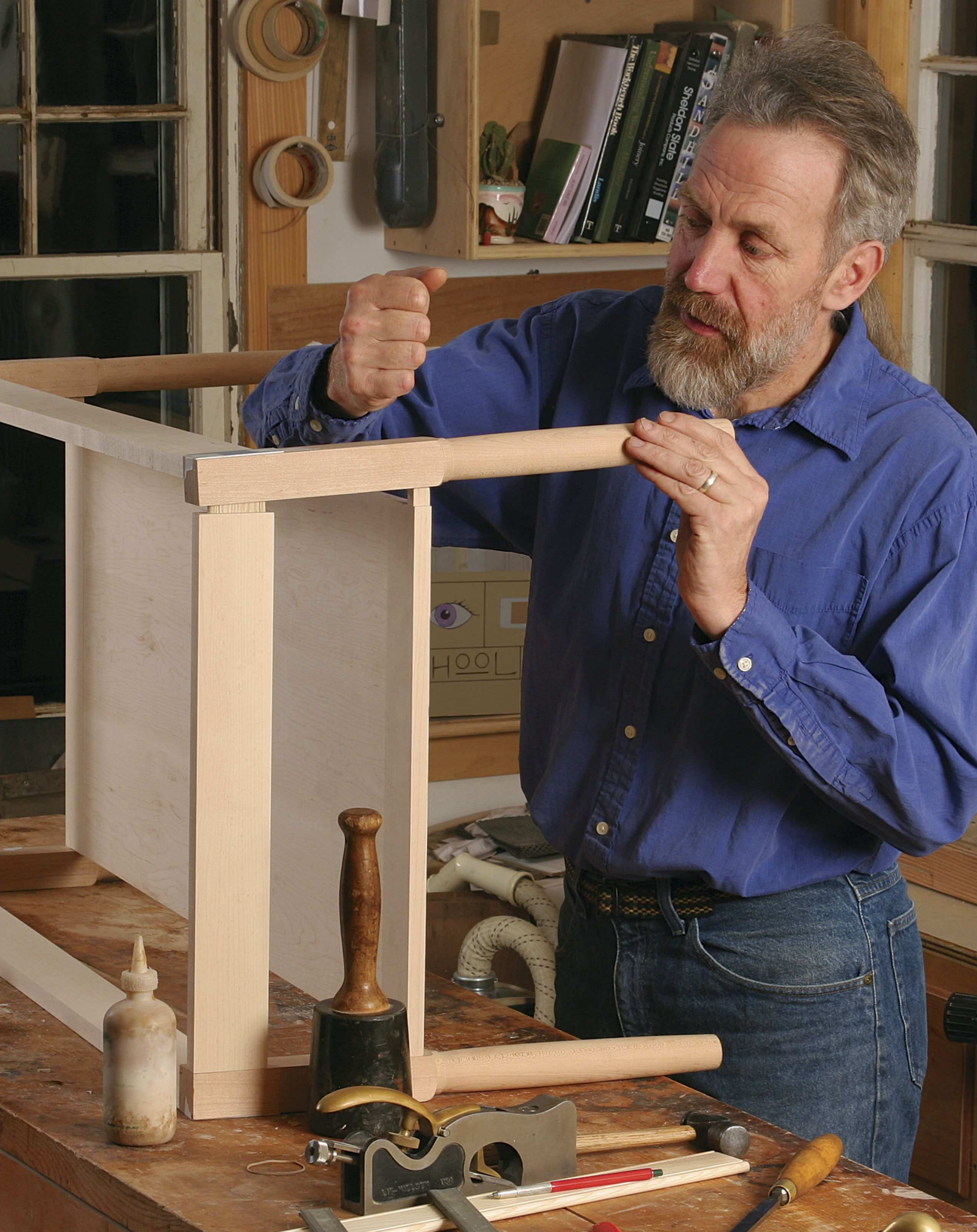
TABLETOP CORNER
(enlarge 200%)



SIDE APRON
(enlarge 200%)

TRANSITION BLOCK
(enlarge 200%)


Top, ¾ in. thick by 21½ in. wide by 33 in. long
Pocket hole for screw
Tenon, 5/16 in. thick by 4½ in. wide by ⅞ in. long
Aprons are flush with leg posts.
Transition block
Side aprons, ¾ in. thick by 5½ in. wide by 13¾ in. long (includes tenons)
Front aprons, ¾ in. thick by 5½ in. wide by 25¼ in. long (includes tenons)
Legs, 25¾ in. long. Blanks are 2⅝ in. sq. by approx. 31 in. long (extra material at top is used for transition blocks).
3½ in.
2 in.
⅛ in.
¾ in.
TOP EDGE PROFILE
(actual size)
C/L
⅝ in.
1½ in.
¼ in.
LEG
(enlarge 300%)
Shape this area after gluing transition block in place.
FRONT AND BACK APRON
(enlarge 200%)


The Workbench Book
Sheldon Slate

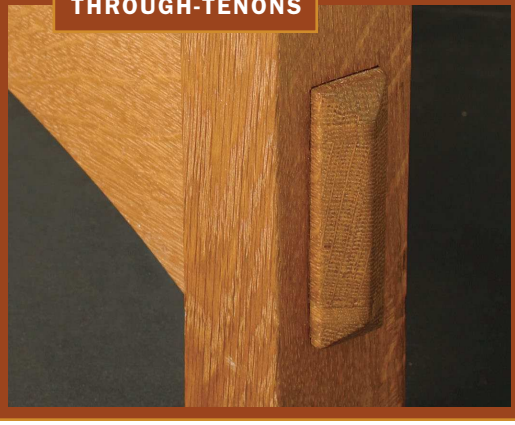
Casual Tables

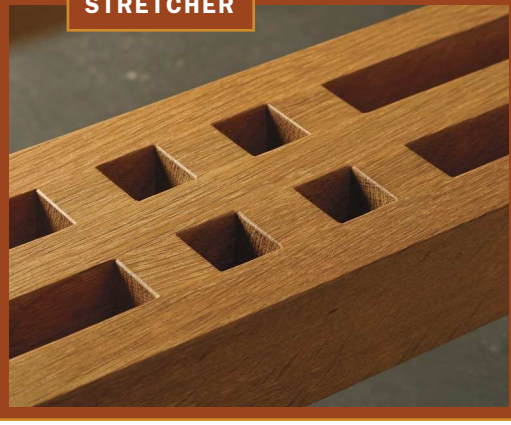
CASUAL TABLES

Coffee Table

Harmonious details put joinery on display

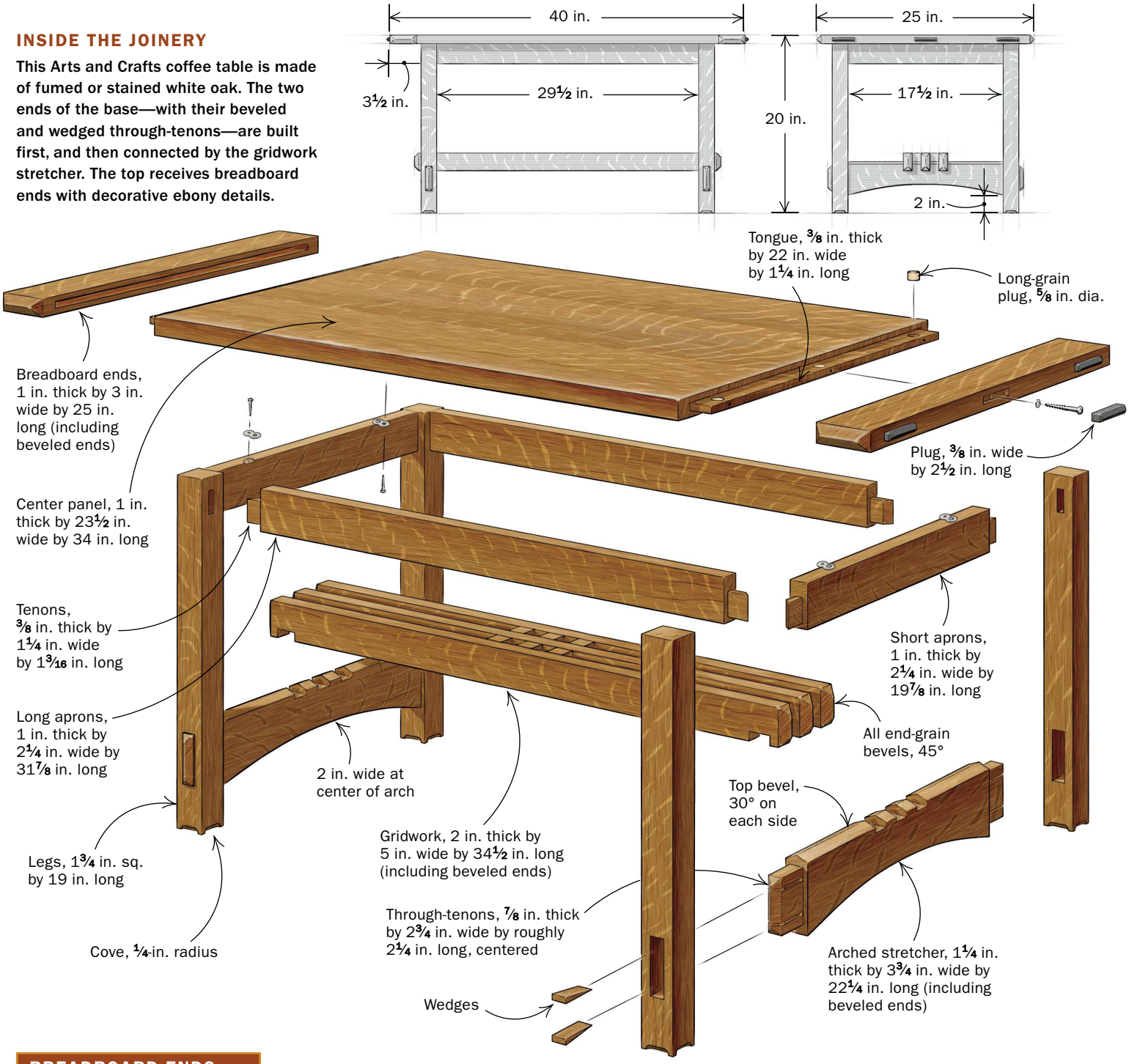
BY KEVIN RODEL





INSIDE THE JOINERY

This Arts and Crafts coffee table is made of fumed or stained white oak. The two ends of the base—with their beveled and wedged through-tenons—are built first, and then connected by the gridwork stretcher. The top receives breadboard ends with decorative ebony details.



Arts and Crafts style is noteworthy for taking joinery—the product of the craftsman's hand—and elevating it to the level of artistic decoration. The basis of this table design is four decorative joints: through-tenons, gridwork, half-lap joints, and breadboard ends. These design elements will work beautifully together in tables of almost any size.

Although the project detailed here is a coffee table, the techniques are the same for all of the tables illustrated on p. 35. I usually build the base first. Start by milling the leg stock to the required square dimensions, and then cut it to length.

Cut mortises before tenons

A rule of thumb is to cut mortises before cutting and fitting tenons. Lay out the mortises in the legs. The aprons are joined to the upper portion of each leg with stopped mortises, which intersect inside the leg. Keep in mind that the leg and apron junction is not flush; the apron is set back from the outside face of the leg, so lay out the mortises accordingly. I recommend

Photos, except where noted: Matt Berger; facing page: Michael Pekovich

a ¾-in. shoulder at the top of each mortise to keep the end grain from splitting, but only a ¼-in. shoulder is necessary at the bottom. Make the tenon ⅜ in. thick. All of these apron mortises can be done with the same machine setup, whether you are using a mortising machine or a plunge router.

The through-tenons at the lower end of each leg are thicker because they also function as a decorative detail. Note that the ends of the tenons are both beveled and wedged, in that order. Make each through-tenon about half the thickness of the leg stock and, of course, centered. That means a ⅞-in.-thick tenon for the 1¾-in.-thick leg on the coffee table. There is no need for a variety of cutting bits to make large mortises for these through-tenons. I make two cuts with a ½-in.-dia. bit, referencing off opposite sides of the leg, which guarantees the mortise is centered. When cutting a through-mortise, set the stops to cut a little more than halfway through the leg, and then turn the workpiece around and finish cutting from the opposite face.

TIP Detailing the bottom of each leg is easier if done before assembling the legs and stretchers.

Because the tenon will receive two wedges when assembled, the mortise must be flared slightly toward its outer, visible face. To flare the mortise, simply add an extra 1/16 in. when laying out the upper and lower ends of the outer face. Then follow the layout lines when mortising halfway through from each side. Don't worry about the small step created inside each end of the mortise. The tenon will be made to fit snugly into the shorter inside length of the mortise, and the wedges will flare the tenon at the top and bottom to close the gap and leave a neat-looking joint.

A final, optional design detail is the small coves I add to the bottom of each leg. They can be cut most easily on a router table, with a bearing-guided ¼-in.-radius cove bit, but you also can use a laminate trimmer and a steady hand.

With the legs complete, make up the apron parts and tenon the ends. The tenons will intersect within the mortises, so cut the ends at a 45° angle.

On the arched stretchers, complete the joinery first

The most labor-intensive pieces in this design are the arched stretchers in the table base. The key is to complete the joinery

Through-tenons show off precision

The beveled ends of the tenons mirror the bevels on the gridwork stretcher and breadboard ends. The outer portion of the mortise is the most critical: Be sure that its thickness fits the through-tenon exactly and that there is extra width to allow for the wedging action.

Dry-fit the joint and mark for the bevel cuts. *Use a sharp pencil. Note that the mortise is slightly wider on the outside of the leg to accommodate the wedging action.*

Bevel the tenons on the tablesaw. *Undercut the bevels by about 1/16 in. Trim them to fit with a file and a sanding block.*

Prepare the tenons for the wedges. *Use the bandsaw to cut a kerf at each end, and drill holes at the bottom of the kerfs to keep the workpiece from splitting.*

before doing anything else. When cutting the stock to length, remember that the through-tenons will protrude ⅜ in. beyond the legs. It is critical that a through-tenon fits snug in the mortise—not so tight that you need to force it in with a mallet, nor so loose that the joint will fall apart from its own weight. When satisfied with the fit, dry-assemble the joint and use a sharp pencil to mark around the tenon where it protrudes through the leg. This line will help you set up the tablesaw for cutting the bevels on the tenon ends. Use a good crosscut blade and don't cut right up to this line; leave 1/16 in. or so between the cut and the pencil line. Now scrape, file, or sand the exposed end of the tenon. When the base is assembled, the beveled end should appear to grow right from the surface of the leg.

Before assembling the table base, bandsaw two kerfs in each tenon—almost down to the shoulder—to receive the wedges. Locate these kerfs about ⅜ in. from the ends, and drill holes at the bottoms to keep the piece from splitting.

Notch the arched stretchers for the gridwork—With the through-tenons complete, notch the arched stretchers for the half-lap joints to hold the gridwork. The half laps are not going to be flush; half of the thickness of the gridwork sits atop the arched stretchers. Therefore, the depth of the notches in the arched stretchers as well as those in the underside of the gridwork should be a quarter of the thickness of the gridwork. Each member of the gridwork is 1 in. wide and spaced 1 in. apart, dimensions which determine the width and spacing of the notches.

I cut the notches in a series of passes with a fine crosscut blade on the tablesaw, using a crosscut sled and working to the layout lines. In keeping with the beveled look used throughout the piece, I also bevel the top edge of the arched stretchers 30° on each side, so it comes to a point.

To make the arch, use a shopmade template of ¼-in.-thick material several inches longer than the stretcher. Lay out, cut, and smooth a curve that is pleasing to your eye. Use the template to lay out the stretchers, and bandsaw them close to the line. Then attach the template to each stretcher with double-sided tape and use a bearing-guided, flush-cutting router bit to smooth the arch.

Before assembly, notch the stretchers. *Use the tablesaw to notch the arched stretchers for the gridwork. For uniform results, use the same fence and stop setup for the two outside notches.*

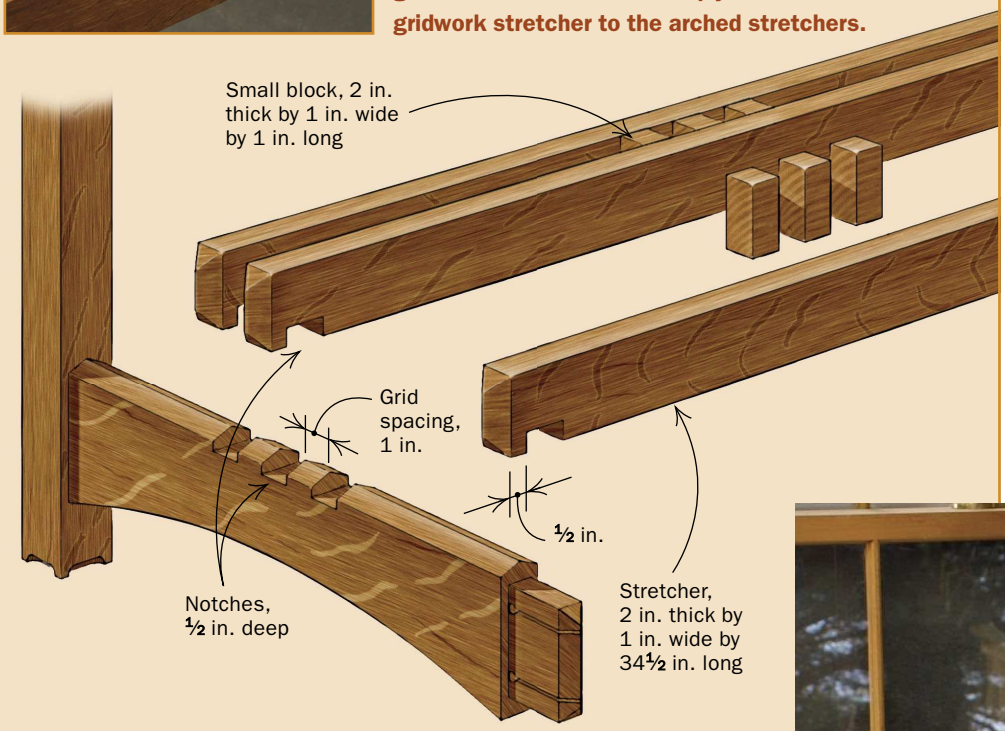
Assemble the ends of the base

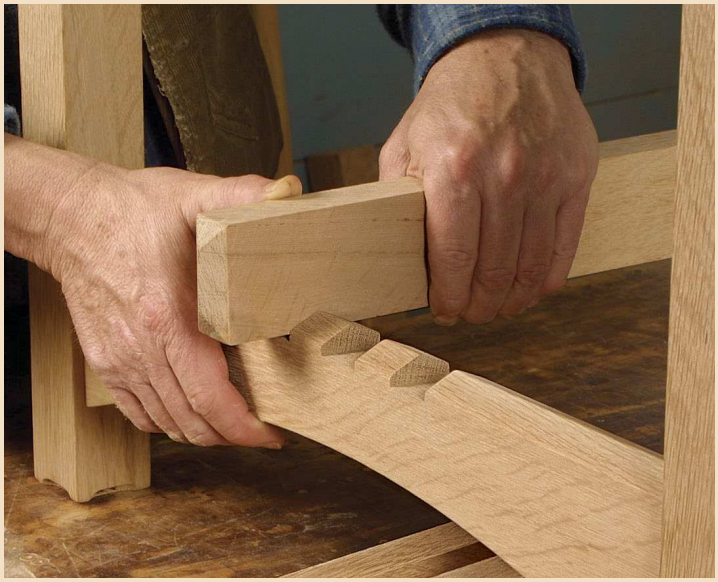
At this point, finish sanding all of the parts made so far and assemble the ends

Drive and trim the wedges. *During glue-up, drive in the two wedges evenly (top) to ensure proper assembly. After the glue has set, use a chisel to trim the wedges flush with the beveled ends (bottom). Use sandpaper to clean up the surface, including any glue residue.*

Gridwork looks harder than it is

The gridwork introduces another geometric element to the angular feel of this design. Like the other end-grain areas of the table, the ends of the gridwork are beveled. Half-lap joints connect the gridwork stretcher to the arched stretchers.





Fit the pieces to the notches. *When milling the pieces for the gridwork, test-fit them in the half-lap notches in the arched stretchers.*

The gridwork is simply blocks and butt joints. *To make the glue-up manageable, start by joining just two of the long grid parts with three small blocks. Place waxed paper under the assembly and press it down as you clamp it. After the glue has begun to set, add the last stick and blocks to the assembly.*

of the table base. Before glue-up, make two wedges for each through-tenon. The wedges should be thick enough to fill the 1/16-in. gap at each end of the mortise before they bottom out in the sawkerf.

When gluing the through-mortises and tenons, I have found it best to apply glue on the tenon only. Spread the glue so that it does not get onto the exposed end and also leaves bare the inner third of the cheek, next to the shoulder. As you seat the tenon in the mortise, the glue will spread backward and cover the entire tenon surface, ideally without oozing out at the shoulder. Never apply glue in a through-mortise; it will push out onto the tenon end and the leg, leaving a mess that is hard to clean up and that might interfere with the finish.

Glue-up of this subassembly should be organized and quick. As soon as the two legs, apron, and arched stretcher are in clamps and checked for square—but

before the glue has set—apply a small amount of glue to the ends of the wedges and drive them into the sawkerfs with a small hammer. Do one tenon and then the other, but alternate hammer blows to the wedges of any one tenon so that both wedges go in equally. Saw off most of the excess with a dovetail saw and then pare the surface clean with a chisel.

Build and attach the gridwork

With each end of the table base complete, dry-fit the entire base using the long apron members. Be sure that the tenons in the apron don't hit each other inside the legs.

Now it's time to decide exactly how long to make the gridwork. It should protrude at least 1 in. beyond the arched stretchers; otherwise, the half-lap joints may be weak. Once you have settled on the length, mill three pieces of stock to the required width—1 in.—but leave them about ¼ in. thicker than the final dimension and at least 3 in. longer. Test-fit these pieces in the half-lap notches you cut earlier in the arched stretchers.

From the excess length, cut off enough 1-in.-long blocks to form the grid, leaving a few extra as temporary spacers. Now cut the three long pieces to their exact length and bevel the ends on the tablesaw just as you did the ends of the through-tenons. Be sure to keep these three pieces the same length. Then, on a flat surface, clamp them together, ends square. Find the centerline and use a sharp pencil to lay out the grid.

The gridwork appears complicated but is actually built with simple butt joints between the long and short pieces.

Dry-fit the gridwork to lay out its notches—When the gridwork is assembled and the glue is set, send the assembly through the planer on each side, taking light cuts to bring it down to final thickness and to level out any inconsistencies in the grid. Now place the assembly on the base and fit it into the half-lap notches. With a knife, scribe the location of the half laps to be cut into the underside of the gridwork. At this point, the extra 1-in. spacer blocks come into play. Tape or hold them in place several inches away from each end to keep the parts from flexing while you cut the half-lap notches on the tablesaw (see photo, below).

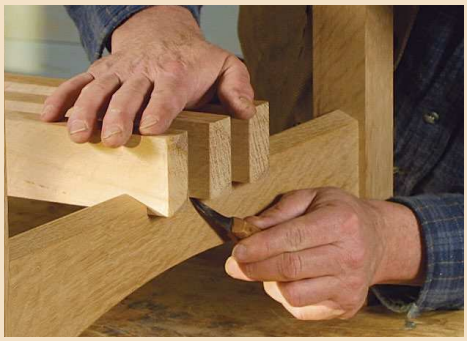
To finish assembling the table base, first glue and clamp the end assemblies to the remaining apron members, and then attach the gridwork. Rather than trusting glue alone to secure the half-lap joints, I like the additional security of screwing these members together from below.

Make the breadboard ends

With the top panel glued up and surfaced, you are ready to make the breadboard joints. Consider the anatomy of the breadboard ends (see drawing, p. 29) when cutting the top to length, remembering to allow for the two tongues. I make the breadboard tongues 1¼ in. long.

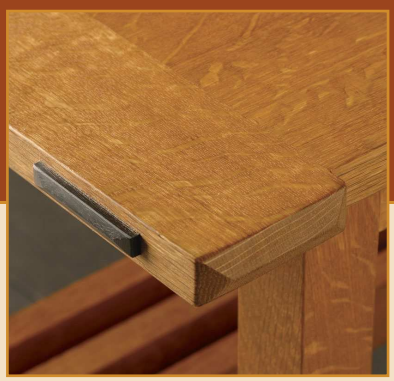
Now, scribe the shoulder line for the tongue around all sides. I attach the finished breadboard with screws driven through its edges into the end grain of the tabletop. However, a screw in end grain does not provide the strongest joint without some modification, so before cutting the tongue, I glue wood plugs into the end

TIP A combination square will ensure that the gridwork remains square during glue-up.



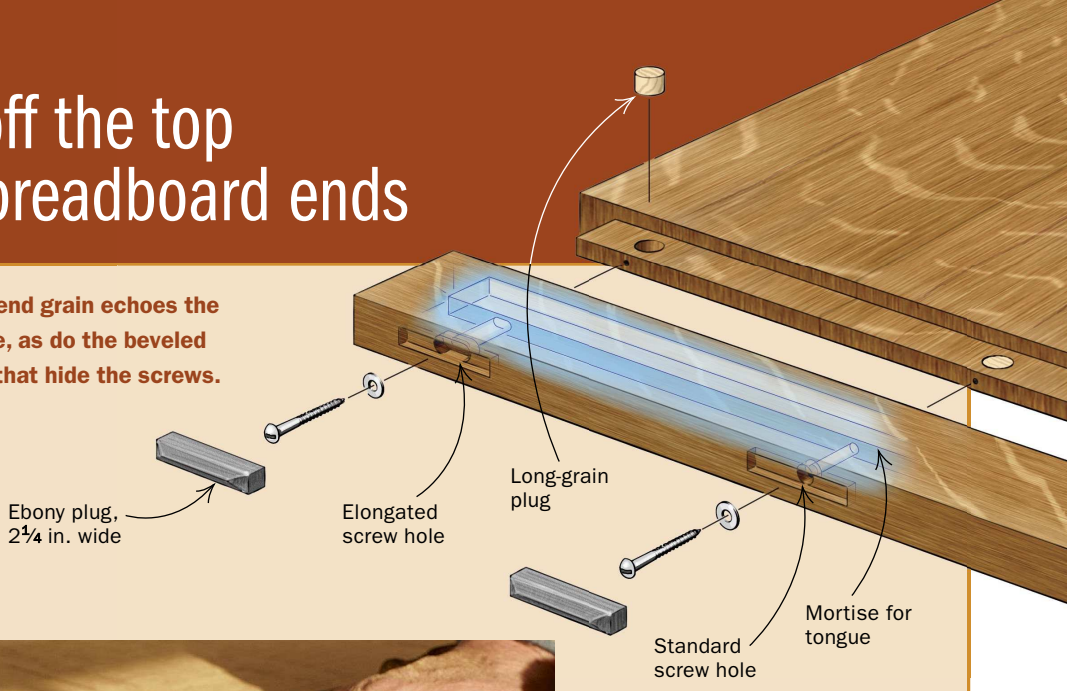
Mark the gridwork for its lap joints. *After lightly planing the whole assembly, set it in the stretcher notches and scribe its mating half-lap joints.*

Notch the gridwork on the tablesaw. *Insert filler blocks between the long parts of the grid to keep them from flexing during the process.*

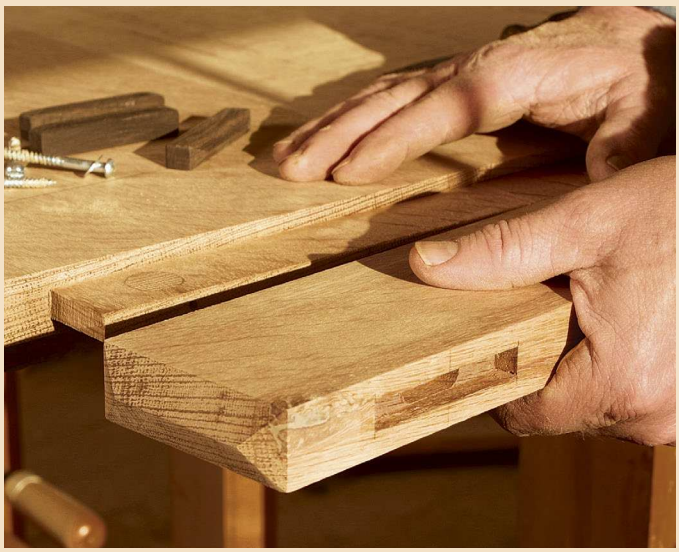


Cap off the top with breadboard ends

The beveled end grain echoes the overall theme, as do the beveled ebony plugs that hide the screws.



TIP Plugs driven into the ends of the tabletop provide a better grip for the screws than end grain.



Fit the ends over the tabletop tongue. *Mortise the breadboards first, then cut and fit the tongues.*

Cap the screw holes with ebony plugs. *Elongate the two screw holes at the ends of the breadboard to allow the tabletop to shrink and expand.*

grain to give the screws some long grain to bite into. While the plugs are drying, make up the breadboards. In keeping with the overall aesthetics of the piece, I purposely make the breadboards longer than the table width and bevel their end grain to match the ends of the through-tenons in the base. Be sure that the length of the breadboards is sufficient to withstand seasonal wood movement; they should remain a little longer than the width of the tabletop, even when it expands due to humidity.

Center the long mortise in the breadboard and cut it a little deeper than the 1¼-in.-long tongue will be. Stop this slot about 1 in. from each end. The center of each breadboard is attached with a screw and glue, while the end screws pass through slotted holes and are used without glue. On the opposite edge of each breadboard, where the ebony plugs will be located, make ¼-in.-deep slots, ⅜ in. wide, squaring the ends with a chisel. Use a drill press to drill clearance holes through the center of these shallow slots. Elongate the outside holes to allow for wood movement.

Now, back to the tongue. Use a router guided by a straightedge to cut the tongue to its ⅜ in. thickness. Trim the ends of each tongue to allow for seasonal expansion, and dry-fit the breadboard to be sure of a snug fit.

Next, insert an awl through the screw holes to mark on the tongue's end grain where the screws will enter. If you did everything right, these points will line up with the hardwood plugs in the tongue. Remove the breadboard, drill pilot holes for the screws, add glue to the center few inches of the joint only, reattach the breadboard, and drive all of the screws.

Finally, make up some plugs from ebony (or any other dark wood) to cover the slots and screw heads. After finish-sanding or scraping the top, attach it to the base. If you use white oak for this project, as I have, you can darken it with ammonia fumes before finishing. I finish all of my work with Tried & True linseed-oil finishes, which have a tone that warms up the cool color of fumed white oak. □

Kevin Rodel designs and builds Arts and Crafts furniture in Brunswick, Maine. To see more of his custom furniture, go to kevinrodel.com.

Drawings: John Hartman; photo, facing page: Michael Pekovich

One design, many tables

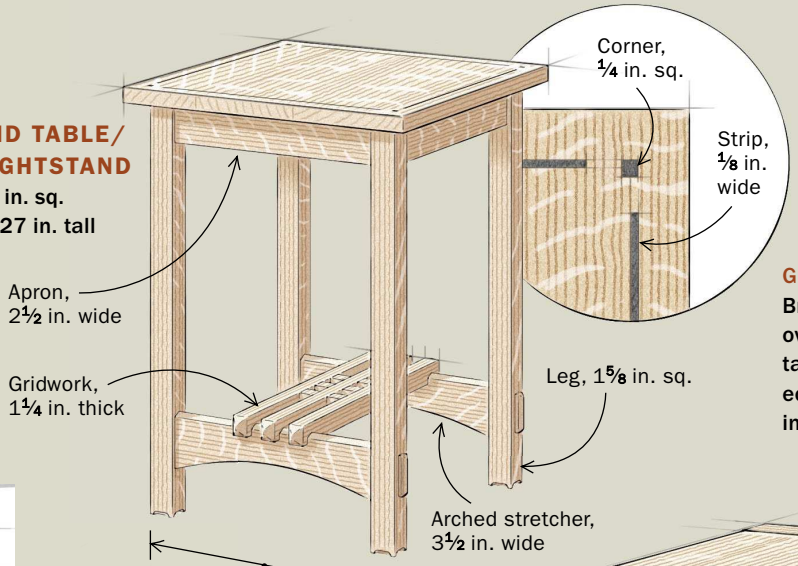
My goal as a furniture maker always has been to develop a design vocabulary, which in turn would allow me to create a line of furniture incorporating pieces that work well together and seem to come from a single maker. This table design is no exception. By changing the dimensions of the stock, you can build similar tables: coffee table, end table/nightstand, sofa/hall table, or dining table. Combining these pieces in a home will unify the decor. The pieces are similar enough to create a nice theme, but they're different enough to avoid the feeling of boring repetition.

One key difference is the tabletops: A simple inlay is enough for the top of the end table, while the dining table has a tile inlay. Of course, for these designs to work visually, the thicknesses of some elements must be adjusted appropriately.

The coffee table and end table work well together. *Both share the same design details.*

END TABLE/ NIGHTSTAND

20 in. sq. by 27 in. tall

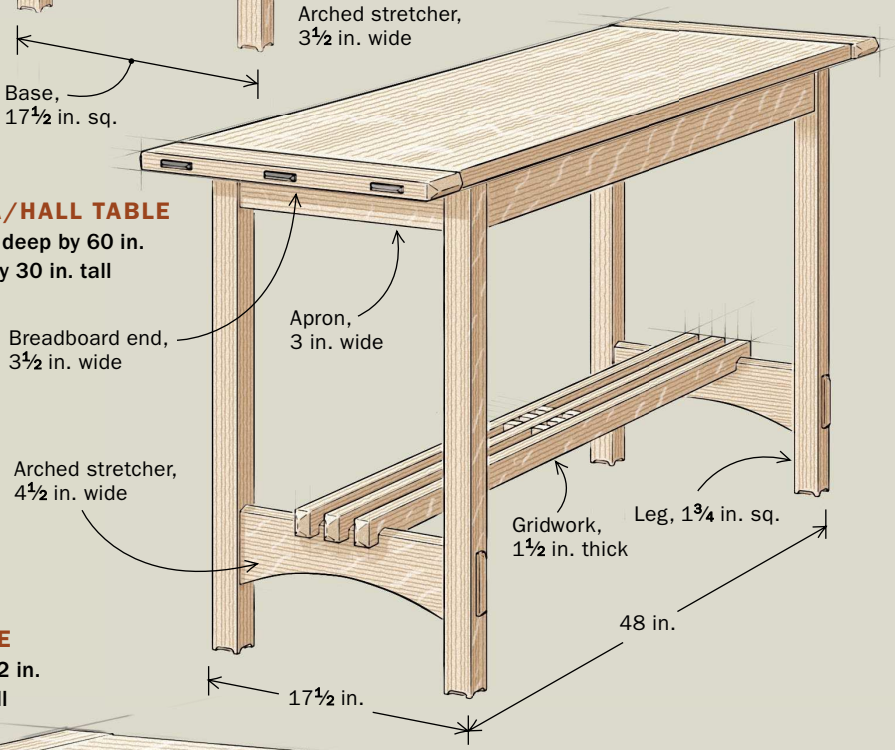


THE END TABLE GETS A SIMPLE INLAY

Breadboards would be overkill for this small tabletop. The ebony inlay echoes the ebony plugs in the other table.

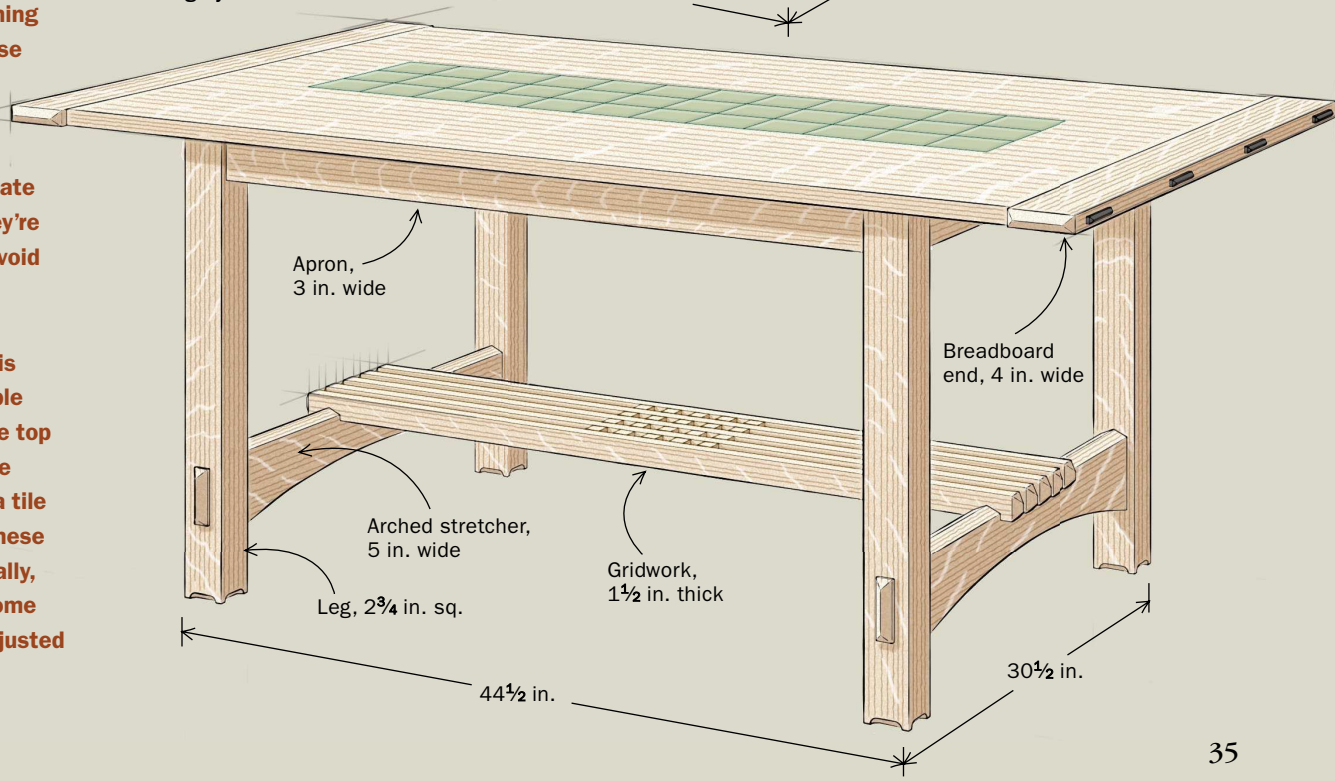
SOFA/HALL TABLE

20 in. deep by 60 in. long by 30 in. tall



DINING TABLE

42 in. deep by 72 in. long by 30 in. tall



CASUAL TABLES

Add a Shelf to a Table

Four attractive ways to handle wood movement in a solid-wood shelf

BY PETER TURNER

I've made many tables over the years, and I often incorporate a wood shelf in the design. The shelf adds an extra layer of storage and more functionality, and it can be incorporated neatly into a night table, a hall table, or a coffee table.

Like a tabletop, a wood shelf moves with changes in humidity. And if you do not allow for that cross-grain movement in both the top and the shelf, the racking force of any expansion, when exerted on the legs, has the potential to cause the leg-to-apron joint to fail, or to damage the leg itself.

Because tabletops typically sit above the aprons and legs, movement can be controlled through the use of buttons or slotted screw holes (see "Keep Tops Flat," p. 104). These methods hold the top fast to the aprons while allowing it to expand and contract freely. But the shelf is a challenge because you must accommodate the wood movement within a fixed space—between the legs.

I've made shelves that connect with the legs via tenons and shelves that rest on brackets. Another option, which I have seen in other furniture makers' work, is to screw the shelf to a table's stretchers; so I consulted two other makers for variations on that method. All of these solutions give the shelf freedom to move.

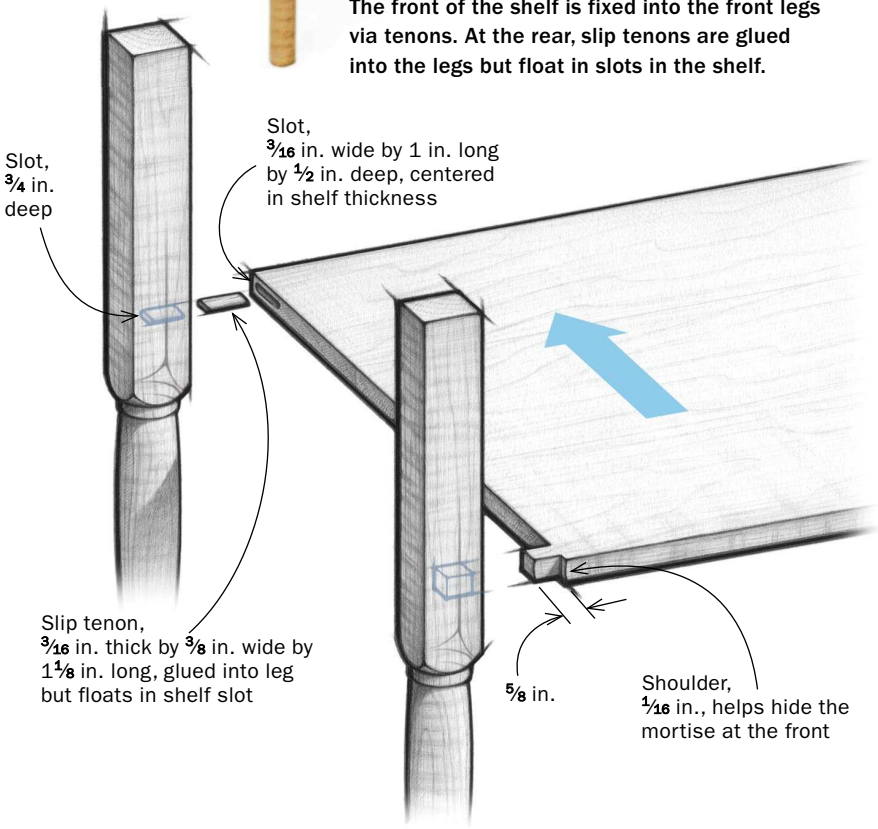
Peter Turner is a furniture maker in South Portland, Maine.

Photos, except where noted: Thomas McKenna; this page: Dennis Griggs; drawings: Christopher Mills

Solid-wood slab is tenoned into legs

MOVEMENT DIRECTED TOWARD THE REAR

The front of the shelf is fixed into the front legs via tenons. At the rear, slip tenons are glued into the legs but float in slots in the shelf.



A solid slab is the simplest form of table shelf, and it can be incorporated easily into most designs. When I use a solid-wood shelf, I orient it so the grain runs side to side and the movement is front to back. I attach it to the front legs with fixed tenons, and at the back, I use a slip tenon that floats in an elongated slot in the shelf.

The joinery is pretty easy to cut. On the shelf stock, mark out the front tenons and the shelf width. Next, make the inside shoulder cuts on the tablesaw. Clamp the shelf vertically in a crosscut sled, and use a stop block so you can make identical cuts on both sides of the shelf.

Cut away most of the waste behind the front tenons on the bandsaw, roughly defining the shelf width and reducing the waste for the stopped tablesaw cut that follows. For the tablesaw cut, you'll need a well-made crosscut sled. Clamp a stop block in place to align the cuts and ensure consistency on both sides of the shelf. Raising the blade higher than normal will allow you to get closer to the tenon shoulder, reducing the cleanup in the corner later. Be sure to watch closely so you don't cut into the tenon. Clean up the inside corner using chisels.

Next, use a handsaw to define the front shoulder of the tenon and then pare to the line with the grain to complete the tenon. While you're at it, lightly chamfer the tips of the tenons, which makes it easier to engage the tenon and mortise during assembly.

Now place the shelf on the legs to mark its top and bottom locations. As well, trace the tenon locations on the front legs.

For the front mortises, I drill out most of the waste and pare to the line with chisels. To cut the slots in the rear legs and shelf, I use a Multi-Router. If you don't have a slot mortiser, use a router and a mortising jig to cut the slots.

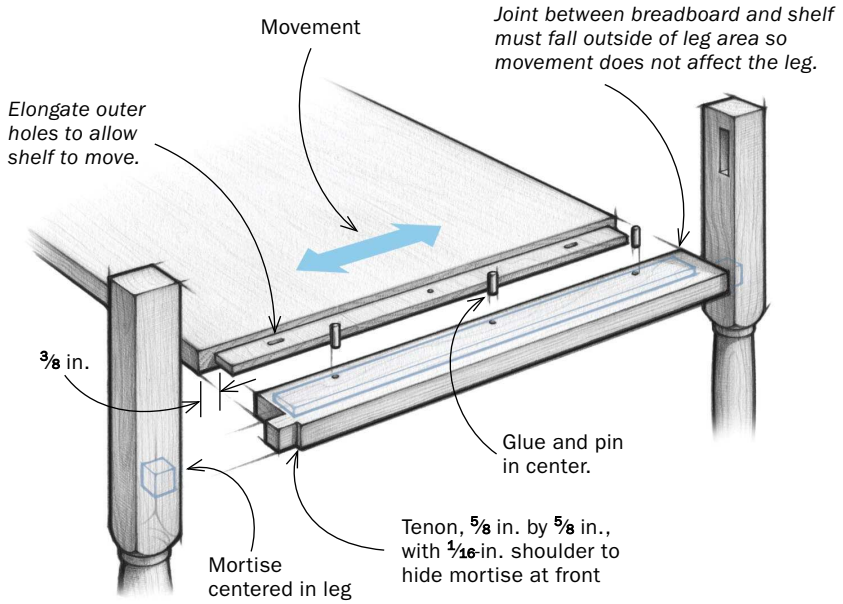
When gluing up a table with this type of shelf, glue up the side aprons first. Then glue in the shelf at the same time you glue in the front and rear aprons.

A caution here: In thin shelves, there's not much meat above and below the slot. This method would be best used in designs that limit the weight and abuse the shelf must withstand. I do this by keeping the shelf close to the apron, maybe 4 in. to 5 in. away, and by keeping the shelf (and table) fairly small, say around 16 in. deep in ½-in.-thick material.

Breadboards keep shelf flat and control its movement

BREADBOARDS FILL TWO NEEDS

This design not only allows the shelf to expand and contract, but it also helps keep the shelf flat. Breadboards are recommended for larger tables, where movement may be more severe.



Breadboard ends are often used on tabletops to keep them flat and stable as the humidity level changes, and the design offers a straightforward method of attaching the shelf to the legs. A breadboard shelf looks best with a breadboard top.

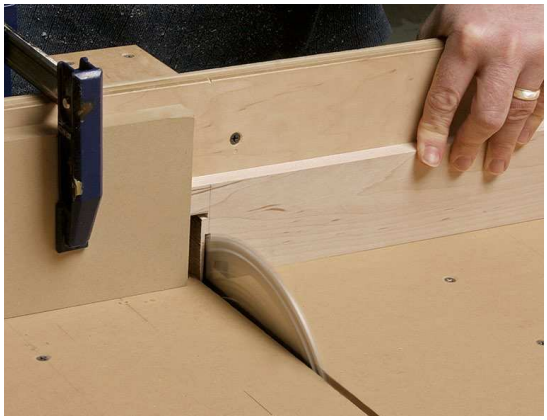
The breadboards are cut 1¼ in. longer than the shelf width to allow for ⅝-in. tenons on both ends. Cut the ¼-in.-thick shelf tenon and the corresponding stopped grooves in the breadboards. Once you have a good fit, start working on the breadboard tenons.

Mark out the tenons on the ends of the breadboard and then cut the inside shoulder on the tablesaw. Next, cut to the shoulders, removing most of the waste on the bandsaw and finishing up on the tablesaw (see photos, below). Clean up the inside corner with a chisel, then carefully pare to the line on the front to finish up the shoulder there.

To lay out the mortises on the legs, dry-assemble the shelf and breadboards and the front and rear leg-to-apron assemblies. Stand the shelf in place to mark the mortise locations on the legs. Drill out most of the mortise waste using a Forstner bit, and fine-tune the fit with chisels. This is painstaking work, but that's the fun part. If you prefer, you can create shoulders on all sides of the tenons, which will help to hide any gaps.

1 MAKE THE BREADBOARDS

Cut the groove for the shelf tenon. *The ¼-in.-wide by ½-in.-deep groove should stop 1¼ in. shy of the end at this point.*



Define the tenon on the tablesaw. *Cut the inside shoulders with the board held vertically (left) and then on edge (above), using a stop block to ensure consistency. Before making the second cut, remove most of the waste on the bandsaw so the offcut doesn't get jammed between the blade and the stop block.*

Photos (bottom left and right): Michael Pekovich; top left: Peter Macomber; opposite page (bottom): Dennis Griggs

2 LAY OUT MORTISES CAREFULLY

Dry-assemble to lay out the mortises. *Mark the bottom of the shelf on the legs and clamp a long straightedge along those lines. Next, while holding the shelf vertically—registered against the straightedge—transfer the tenon locations to the legs.*

The right glue-up sequence. *You must assemble the long leg-to-apron joints first, install the side aprons and the shelf, then install the other legs and apron.*

FRAME AND PANEL: BREADBOARD'S COUSIN

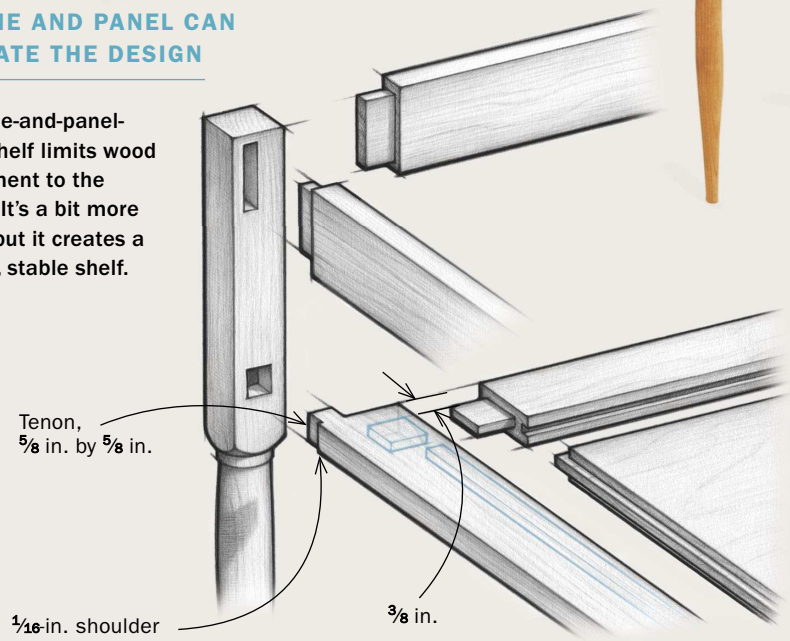
Another way to build a shelf is to use a frame-and-panel design. The frame accommodates the movement of the panel, and the construction makes for a sturdy shelf.

The panel is flush, top and bottom, within its frame. Like the breadboards, the short end stiles have integral tenons on their ends that are housed in mortises in each leg. Again, leave a 1/16-in. outer shoulder on the tenons to hide the mortise at the front of the legs. Although I haven't done it, you could use stub tenons to join the frame, instead of full-length tenons. The panel groove would serve as the mortise, so this method will save some time.

Of course, you do need to allow for movement where the solid panel meets the frame. Also, as with the breadboard example, during assembly you must glue the long sections of the table first.

FRAME AND PANEL CAN ELEVATE THE DESIGN

A frame-and-panel-style shelf limits wood movement to the panel. It's a bit more work, but it creates a strong, stable shelf.



Brackets for circular shelves

When I made this table five years ago, my daughter Morrigan liked it so much that she named it Lucy. Lucy's circular shelf ruled out the use of breadboards and tenons. So I supported it by means of four small arms, or brackets. Each bracket has a tenon that joins it to its corresponding leg. Screws attach the shelf to the brackets. If the shelf were a clock face, with the grain running from 6 to 12, the arms at these points would hold the shelf fixed. The arms at 3 and 9 must accommodate seasonal movement, so their screw holes are slotted.

Begin by cutting the leg mortises for the brackets. Next, rip the bracket blank to width, but leave it long so you can cut the tenons on these small parts safely on the tablesaw. Check the fit of the tenons, then cut the brackets to length. Repeat for the other pair of brackets.

After tracing the bracket profile onto each blank, cut them out on the bandsaw and smooth the rough cuts on a spindle sander. Please be careful cutting and sanding these small parts. Finally, cut the recesses and slots in two of the brackets (see photos, right), and drill a countersunk hole for a screw in the other two.

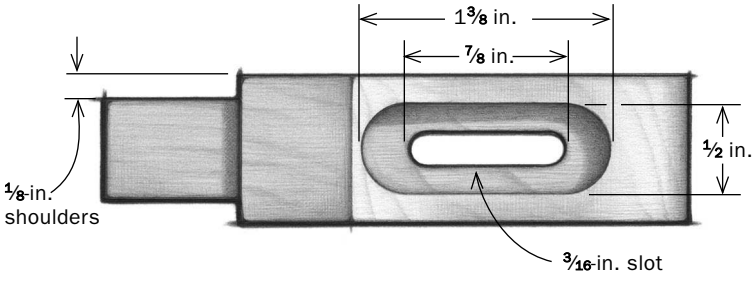
When assembling this irregular-shaped table, I needed to glue up the aprons and legs, install the brackets, then lay the shelf into place before installing the top.

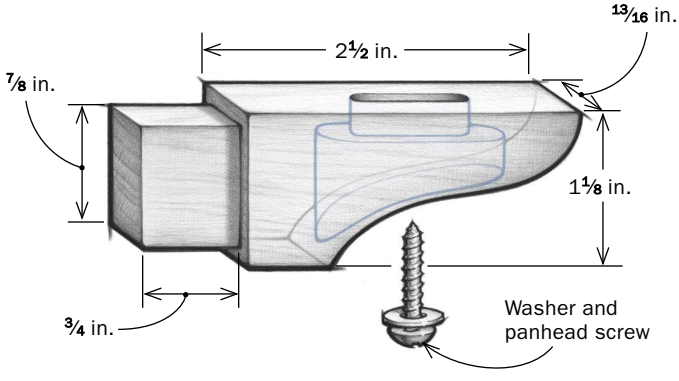
Trace the profile. *After cutting the tenons on the bracket blanks, trace the profile using a template and then cut it on the bandsaw.*

Slotted brackets get special treatment. *First use a ½-in. Forstner bit to hog out the wide area of the recess that will hold the washer (top left). Use a 3⁄16-in. bit to rough out the slot (bottom left). Finally, clean up both cuts with a chisel (right).*

SMALL BRACKETS CARRY A HEAVY LOAD

Turner used brackets to support the round shelf in this low table. One pair is slotted to allow movement (shown); the other pair simply has one fixed screw.





Photos, this page (top left): Dennis Griggs; facing page: John DeGirolamo (top); Hank Gilpin (bottom)

Sit a shelf on stretchers

Like many pros, my woodworking training came on the job. So I'm never afraid to ask a friend for a solution when I have a question.

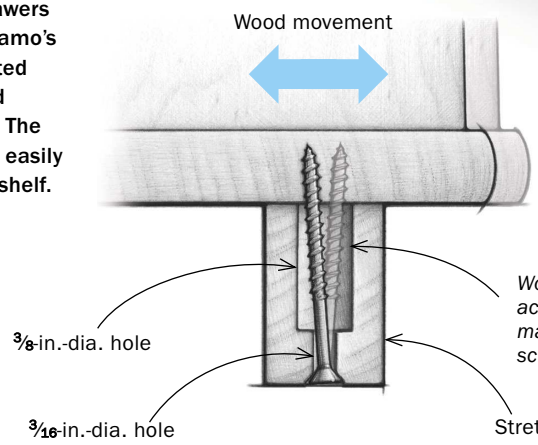
To bring more variety to this article, I consulted a couple of fellow furniture makers, John DeGirolamo (jovanni.com) and Hank Gilpin, to see how they install shelves in tables. Both offered examples in which the shelf is supported on stretchers.

For DeGirolamo's Emily side table (right), stretchers support a whole bank of drawers, adding a new design layer to the table. He uses the same approach with shelves. The drawer case is secured to the table with four countersunk screws that travel up through the stretchers and fasten into the box. John accommodates movement in the case by giving the last two-thirds of each screw some breathing room in an oversize hole.

Gilpin offered an end table (below) in curly hickory as an example of how to attach a shelf. The orientation of the small shelf makes predicting movement tricky. It helps that the shelf is small and will move relatively little. Just to be safe, Hank slightly enlarges each screw hole at the top of the stretcher. This way the shelf can move in any direction it wants.

ADD A LOW BANK OF DRAWERS TO A TABLE

The bank of drawers in John DeGirolamo's table is supported by the front and rear stretchers. The arrangement is easily adaptable to a shelf.

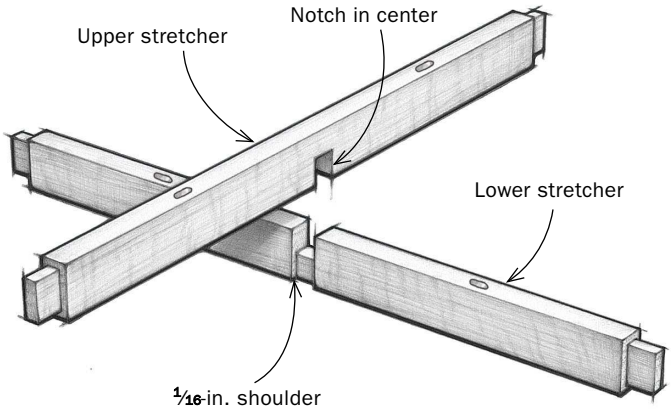


SIDE-VIEW DETAIL

Wood movement is accommodated by making a portion of the screw hole larger.

NO-NONSENSE APPROACH TO MOVEMENT

Hank Gilpin allows for movement in the shelf by elongating all the holes, simply by wiggling the drill bit. This way, the shelf can move in any direction.



Hall Table

Floating the top adds lightness and distinction

BY TIMOTHY ROUSSEAU

When you float the top of a table—lifting it up to create a gap between it and the aprons—you're contradicting centuries of sensible furniture making (traditional tops attach easily, and serve to stiffen the base). So why do it? For me, it's partly for the kick of doing something different. And partly for the visual interest and refinement it can bring to a piece.

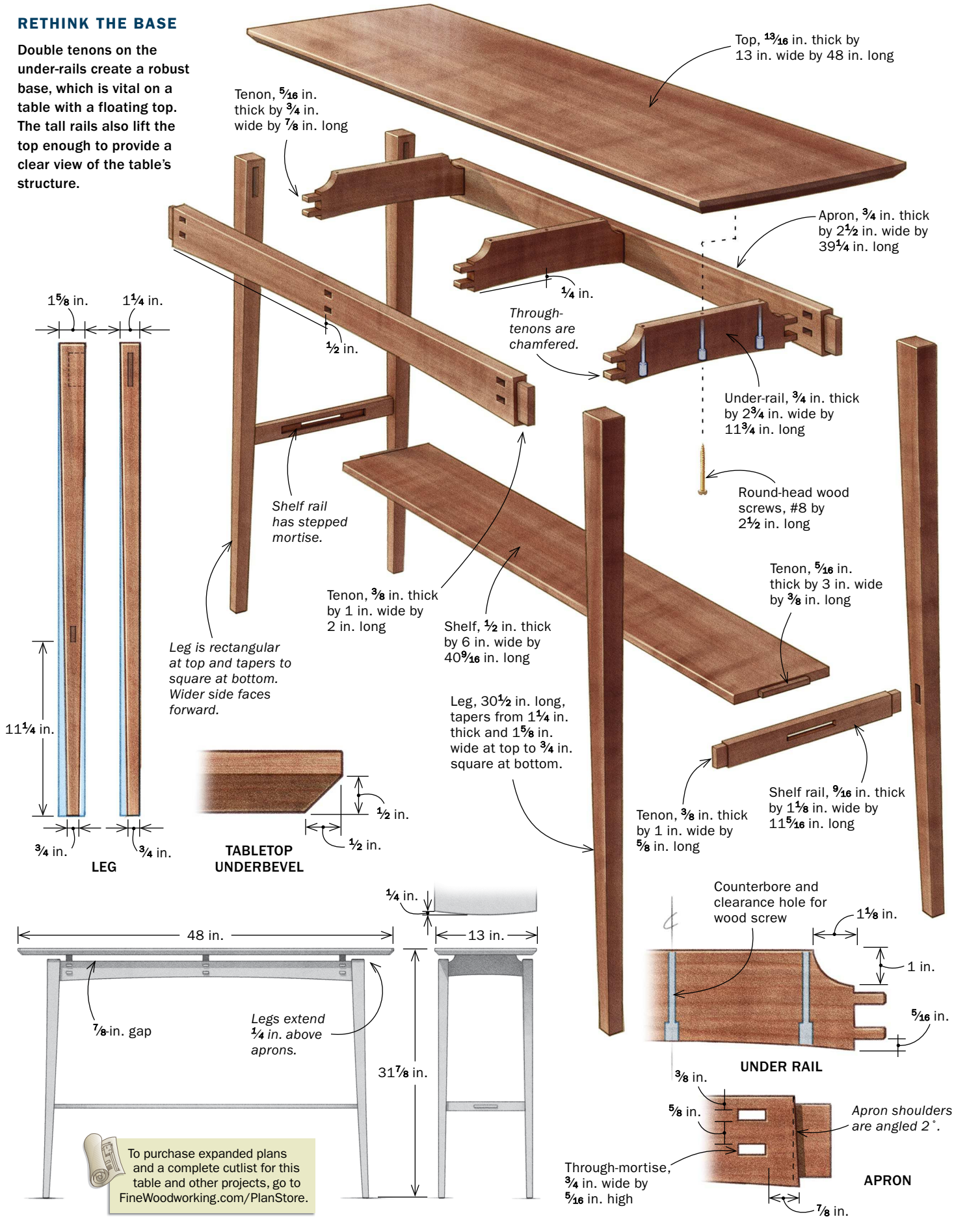
Some makers float their tabletops ½ in. or less, creating a dark shadowline, or reveal, below the top, which gives the table an air of mystery and makes you wonder what's holding up the top. I prefer to float my tops higher, so you can see right through to the structure underneath, almost as if the table were an exploded-view drawing. Either way, a floating top will add flair to your table.

Most tables can be made with a floating top, but if you want to expose the structure, it helps to do so on a tall table; on a coffee table, even a wide gap will rarely be

Photos: Jonathan Binzen

RETHINK THE BASE

Double tenons on the under-rails create a robust base, which is vital on a table with a floating top. The tall rails also lift the top enough to provide a clear view of the table's structure.



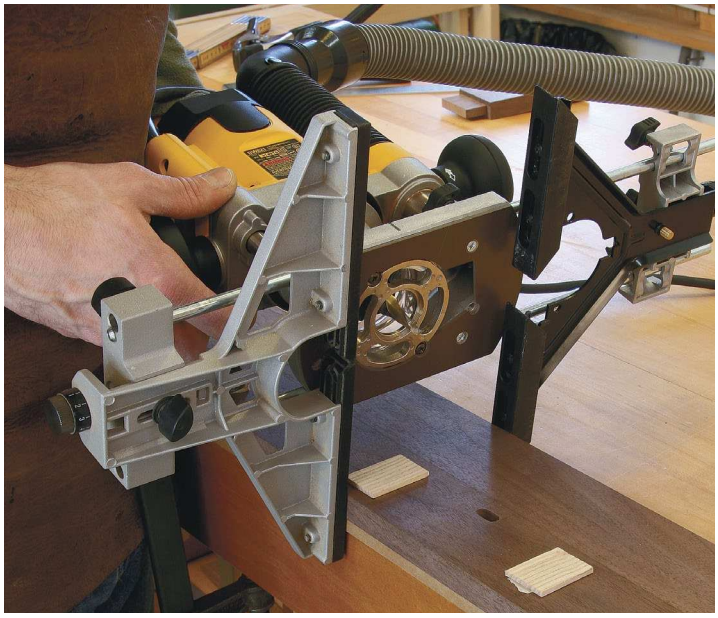
To purchase expanded plans and a complete cutlist for this table and other projects, go to FineWoodworking.com/PlanStore.

Drawings: John Hartman

Double mortise-and-tenons made easy: Spacers are the key

ROUT THE MORTISES

Take the plunge. *Rousseau starts by cutting the top mortise. After setting the router's guide fence (silver), he snugs up a second fence (black) so the bit won't wander. A sacrificial board prevents blowout underneath.*



Quick stops. *Using double-faced tape, Rousseau affixes two pieces of scrap to the workpiece to limit the router's travel. He places the aprons side by side to provide a wider surface for the router to ride on.*

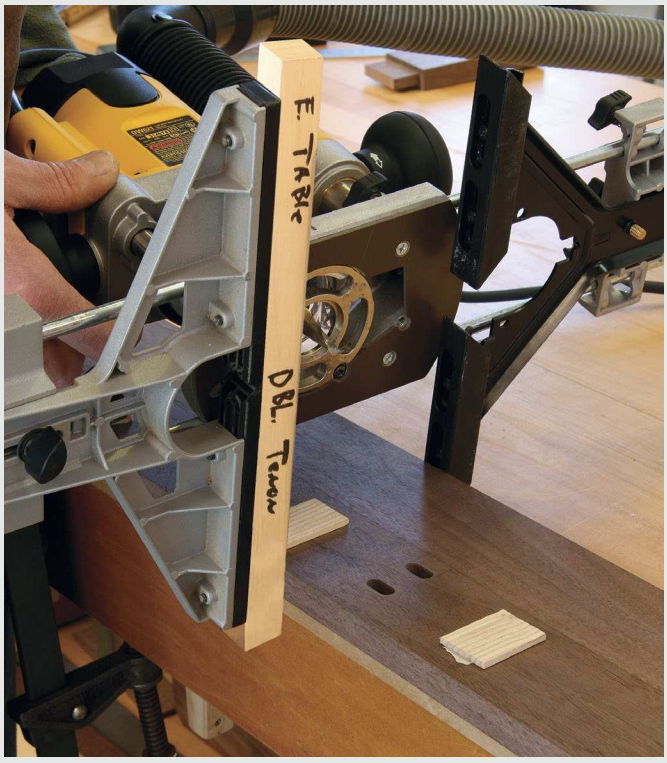
visible. I made a series of decisions in the design process to help expose the structure and create the floating feeling from every vantage point. First, I dispensed with end aprons and supported the top with under-rails inset from the ends. I designed the under-rails so they would lift the top ⅞ in. above the front and back aprons, providing a clear view underneath. To increase the sense of airiness under the top, I cut away the shoulders of the under-rails in deep curves and cut a shallow curve along their bottom edge. I also pushed the proportions of all the table's parts to the thin side, and made the top appear even thinner by giving it an underbeveled edge. The 6-in. overhang at the ends also helps.

I'll cover the parts of this table that support the floating top, giving you the fundamentals you need to build any table like it.

Double tenons beef up the base

Without the top adding strength to the table, you want to be sure the joinery in the base is rock-solid. I decided to join the under-rails to the aprons with double through-tenons. Multiple horizontal tenons provide the best joinery in this situation, since they maximize the long-grain-to-long-grain glue surface. Using one large vertical tenon would have given me much less glue surface and weakened the apron considerably. I used through-tenons—

ADD A SPACER FOR THE SECOND MORTISE



Automatic spacing. *A spacer block enables Rousseau to cut the second mortise without readjusting the primary guide fence, though the second fence does need to move. Double-faced tape holds the spacer to the router fence.*

TWO SPACERS FOR TWIN TENONS

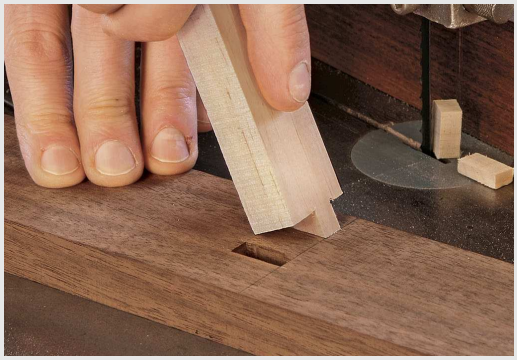
To cut the tenons at the bandsaw, Rousseau uses the gap spacer—which he used for routing the mortises—in conjunction with a tenon spacer.

DIAL IN THE TENON SPACER WITH A TEST PIECE

The tenon spacer's thickness equals the width of the mortise plus one bandsaw kerf. Once within range, Rousseau dials in the exact thickness of the tenon spacer by cutting a test tenon.

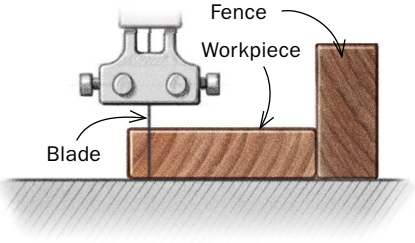
Any scrap will do for a test tenon. *Rousseau cuts the first cheek with the scrap against the bandsaw fence.*

Drop in the tenon spacer to cut the second cheek. *Then crosscut freehand to chop out the waste.*

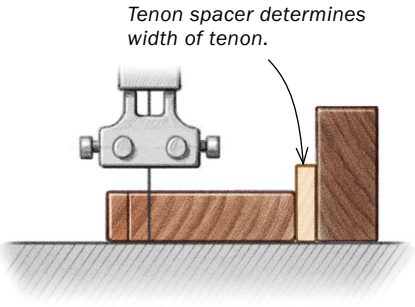


A snug fit means the spacer is finished. *If the tenon is too tight, Rousseau puts the spacer through the planer again. If the tenon is just a bit loose, he thickens the spacer with a piece or two of tape.*

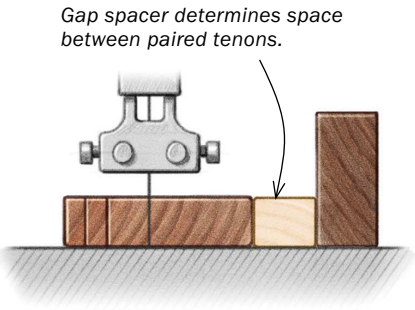
No spacer. *With the top edge of the rail riding against the fence, Rousseau cuts the bottom cheek of the lower tenon, stopping at his pencil line.*

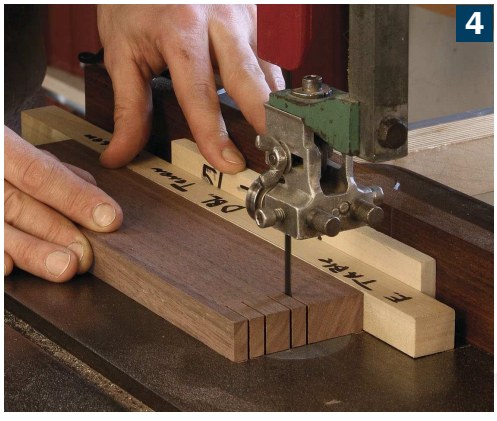


Tenon spacer. *Dropping the tenon spacer between the fence and the workpiece, Rousseau cuts the top cheek of the lower tenon.*

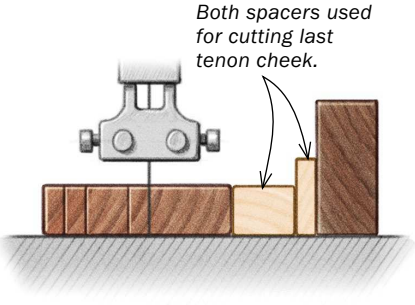


Gap spacer. *The gap spacer—the same one used with the router—rides between the fence and the workpiece to cut the lower cheek of the upper tenon.*



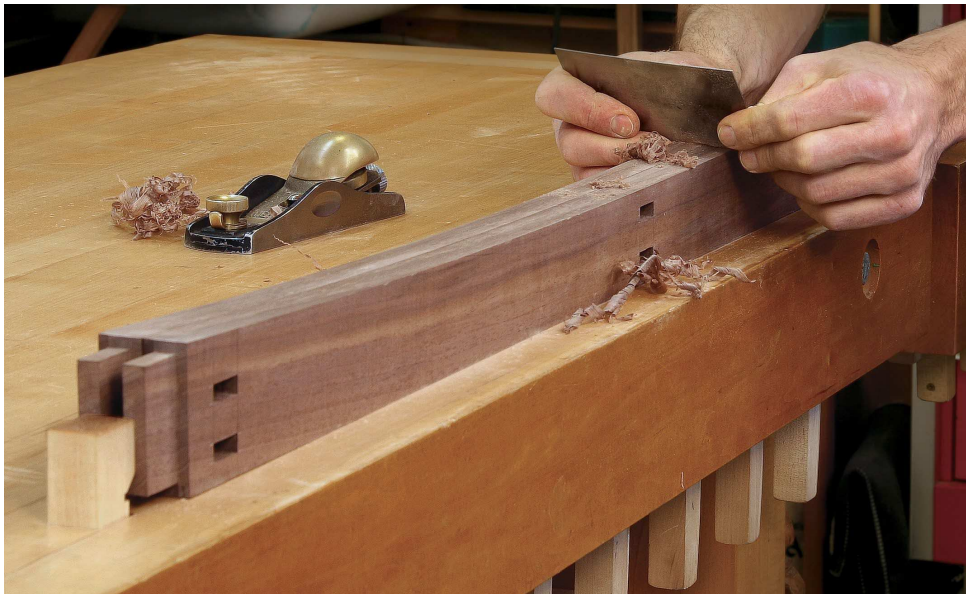


Both spacers. *The last cheek is cut with both the gap spacer and the tenon spacer riding between the fence and the workpiece.*



Curves lighten the look

Stacked for sawing. *After chiseling the mortises square, Rousseau joins the two aprons with double-faced tape and saws the long curves on the bottom edge (right). After fairing the curve with a spokeshave, Rousseau leaves the aprons paired and does final smoothing with a scraper (below).*



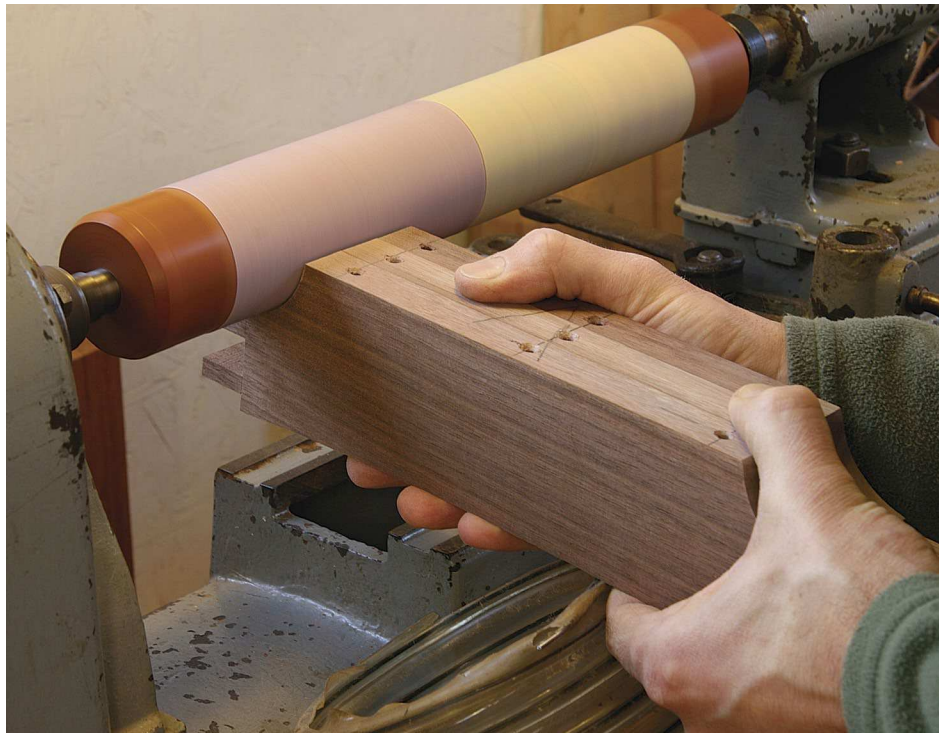
and left them proud—because I wanted to emphasize the unusual structure of the table. Someone wanting to keep the support structure hidden could use stopped tenons instead.

Double tenons might seem like a challenge. But I use a simple system of spacers to help cut perfectly sized and spaced mortises and tenons. The process is surprisingly quick. I use the same spacer with the plunge router and the bandsaw, so the gap between mortises is always identical to the gap between tenons. A second spacer determines the width of the tenons.

I also have a few tricks for laying out the joinery. When possible, I size furniture parts to match my measuring tools. In this case, the thickness of the rails—¾ in.—is the same as the width of my combination square's blade. So when I'm laying out the location of one of the under-rails on the apron, for instance, I just mark along both sides of the blade without moving the square.

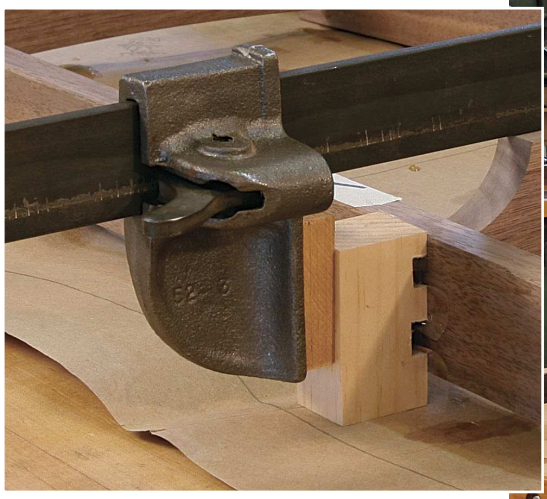
To plunge-rout the mortises, I use two fences, making it nearly impossible for the bit to wander during the cut. I used to improvise a second router fence using a block of wood, but recently I bought a second guide fence and some metal rod to make extra-long rails so I can fit guide fences from either side of the router onto the one set of rails.

When I bandsaw the tenon cheeks using my spacers, I can cut all 12 through-



Tip for the tight curves. *To use his lathe like a spindle sander, Rousseau turned a hardwood cylinder and cut a slot along its length with a handsaw. He tucks the ends of the paper into the slot. Strips of double-faced tape on either side of the slot hold the sandpaper in place. Rousseau wraps three sheets of sandpaper side by side on the spindle, so he can progress from coarser to finer grit without changing the paper.*

Assembly starts with the apron



Clever clamping blocks. *Rousseau makes custom clamping blocks that accommodate the proud through-tenons. He faces them with packing tape to keep glue from sticking.*

tenons with one fence setting. Since these will be proud tenons, I make them ⅛ in. longer than the thickness of the aprons. I bandsaw to just shy of the shoulder line. To remove the waste between the tenons I use a fretsaw, and then I chisel the shoulders clean. I handplane the faces of the under-rails slightly until the fit is perfect, then chamfer the tenon ends with a block plane.

Beveled top really floats

Because the tabletop is thin and only supported across half its width, it's important to select dimensionally stable lumber—quartersawn if possible.

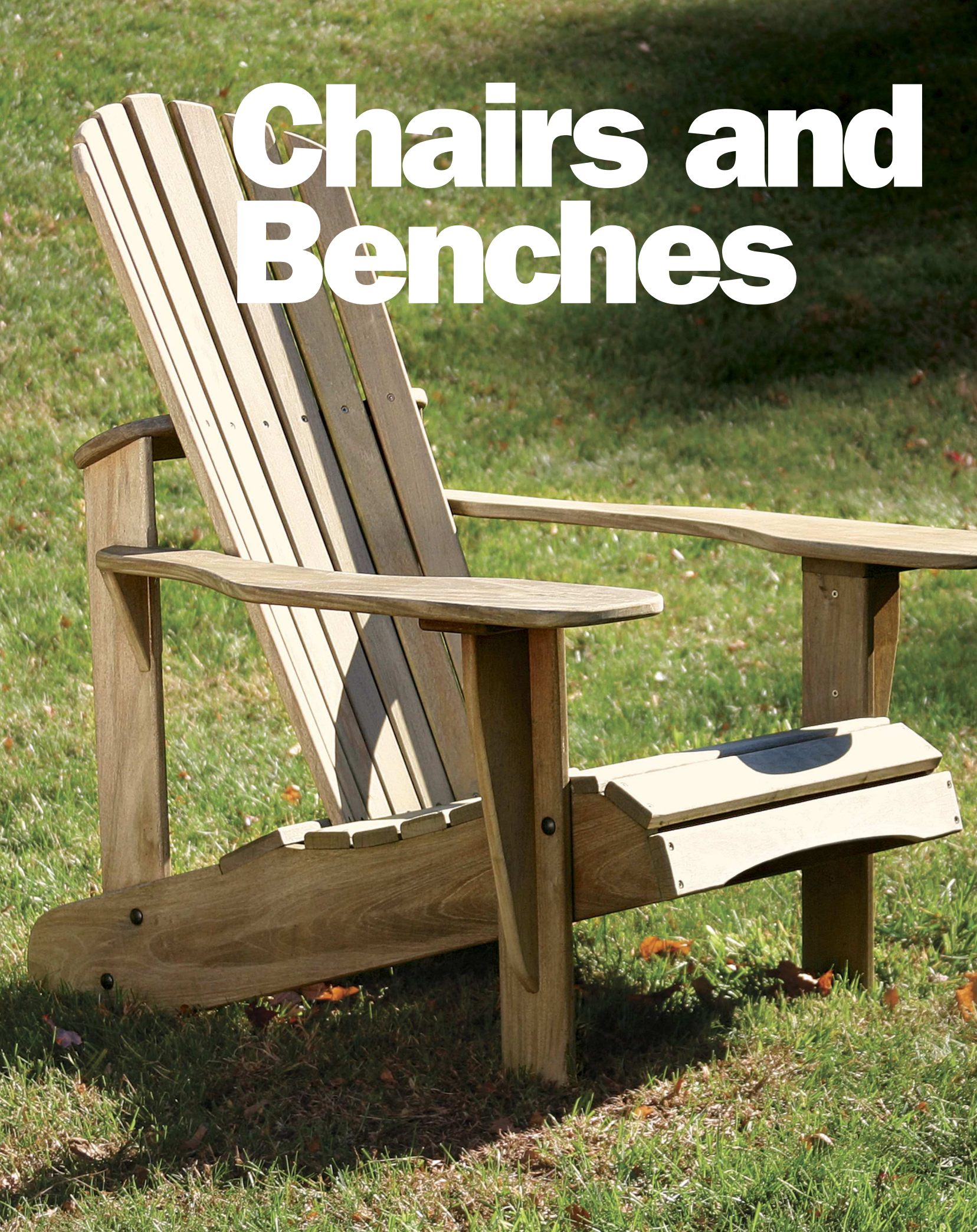
Before ripping the top to final width, I bandsaw the two curving ends and clean them up with a block plane. I do the ends first so that when I later cut and plane the sides, I'll remove any end-grain blowout.

Finally, with a 45° bit in the router table, I cut a bevel around the underside of the top. I clean up the surface with a block plane and finish by scraping and sanding. I put special effort into this, because when people come up to a table like this they run their hands over the edges and reach underneath, and I want it to feel as good as it looks. □

Timothy Rousseau builds furniture in Appleton, Maine, and teaches at the Center for Furniture Craftsmanship.

VIDEO WORKSHOP
Watch Rousseau build this table in a members-only video.

Inverted at the end. *After gluing the legs to the aprons and preparing all the parts for finish, Rousseau attaches the top with three screws through each under-rail.*



Chairs and Benches

CHAIRS AND BENCHES

Side Chair

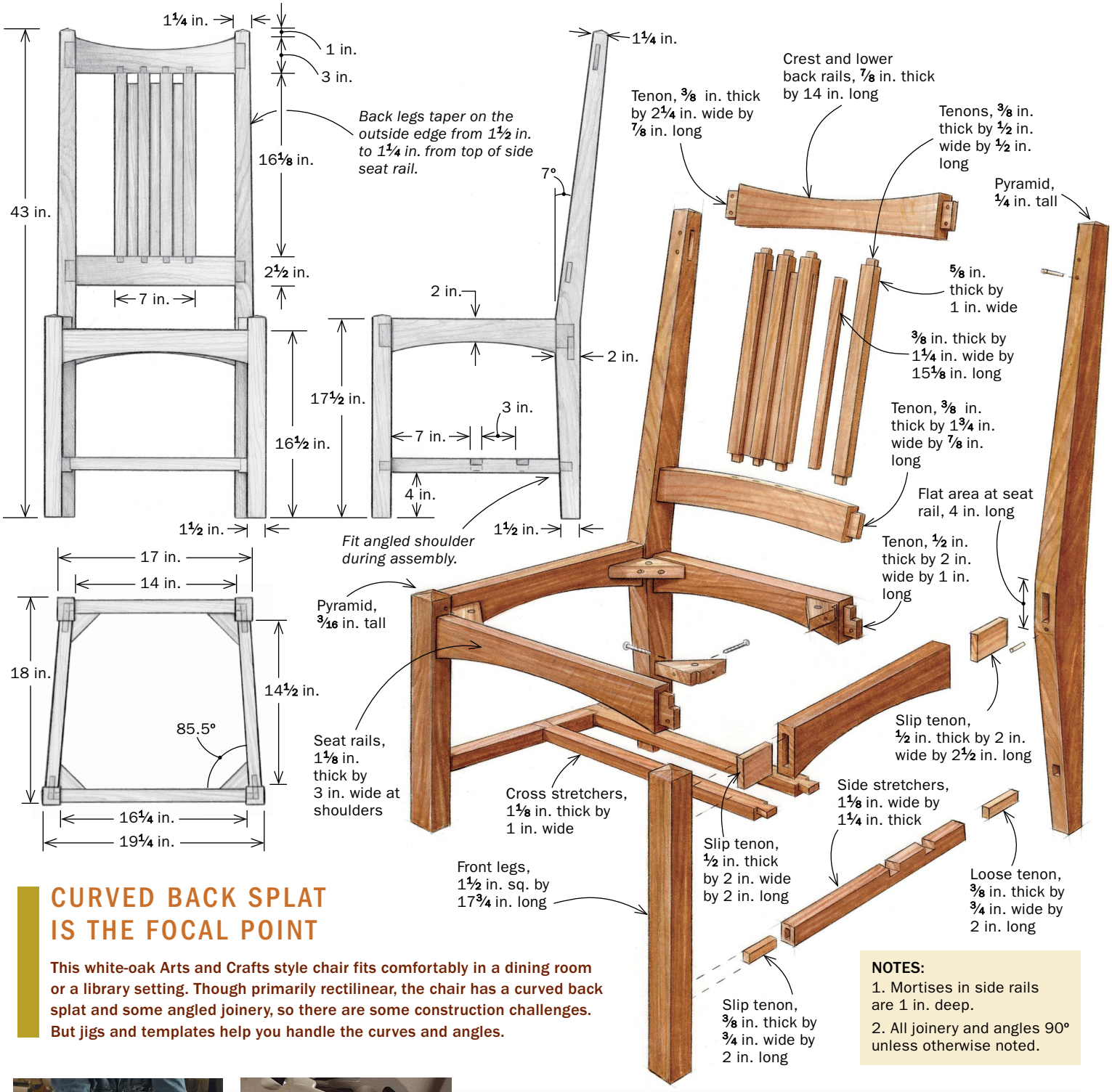
With templates for curves and joinery, you can make a roomful of chairs

BY KEVIN RODEL

I designed this chair in 1993 for a design competition sponsored by the Maine Arts Commission. My intention was to design a chair that would be sturdy, comfortable, and clearly derivative of Arts and Crafts styling, but still compatible with contemporary interiors. Since then I have made many of these chairs with very little design change, including one set ordered by Disney Films in 1999 for the movie "Bicentennial Man." This version is made of white oak, though I've made the same chair in cherry and walnut.

Because I wanted the chair to function either as a dining chair for long, leisurely meals or as a reading chair for a desk or library table, an upholstered seat was a must. The degree of back slope, depth of seat area, arch or curvature of the back rest, and other critical dimensions also contribute to the comfort. I use jigs to duplicate curved and angled parts, as well as to

Photos, except where noted: Thomas McKenna; drawings: Bob La Pointe



CURVED BACK SPLAT IS THE FOCAL POINT

This white-oak Arts and Crafts style chair fits comfortably in a dining room or a library setting. Though primarily rectilinear, the chair has a curved back splat and some angled joinery, so there are some construction challenges. But jigs and templates help you handle the curves and angles.

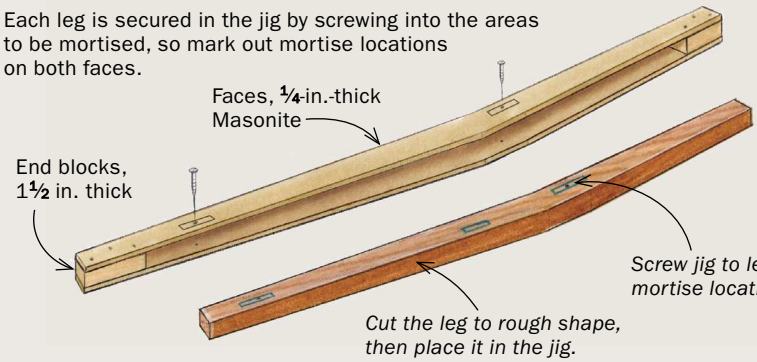
NOTES:

1. Mortises in side rails are 1 in. deep.
2. All joinery and angles 90° unless otherwise noted.

Clamp the jig to a bench to rout the leg shape. *A long bearing-guided bit can do the job in one pass; a shorter bit requires you to flip the jig and make two passes.*

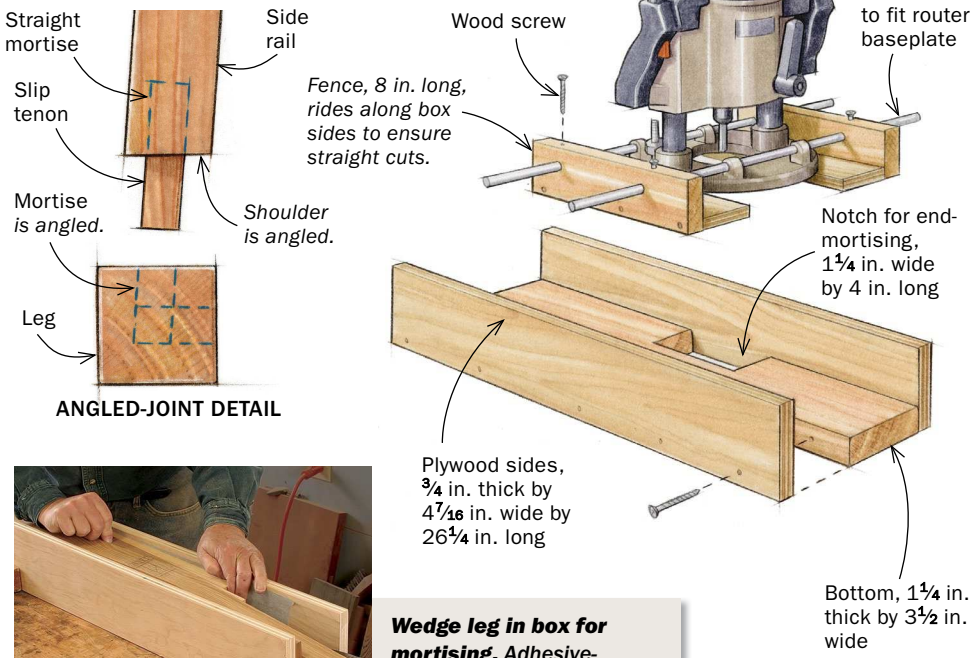
TWO-SIDED JIG FOR ROUTING BACK LEGS

Each leg is secured in the jig by screwing into the areas to be mortised, so mark out mortise locations on both faces.



Router box simplifies mortising

This jig allows you to cut angled and straight mortises in the legs with a plunge router. It also allows for mortising for the slip tenons in the ends of the side rails.



Wedge leg in box for mortising. *Adhesive-backed sandpaper prevents the wedges from slipping.*

create accurate angled joinery. These jigs will come in handy if you decide to build a set of chairs.

Shape the back legs using a template

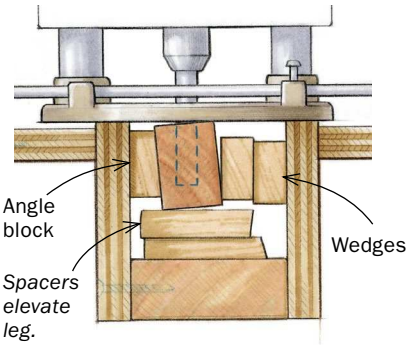
First, trace the back legs on the stock using a full-size template made from ¼-in.-thick Masonite. Rough-cut the legs to shape using a jigsaw or bandsaw, being careful to leave the line. The only cuts that should be exactly to the line at this point are the top and bottom cross-grain cuts.

For final shaping, mount the back legs in a template-routing jig (see photos and drawing, p. 51) that works with both legs. Use a large-diameter, bearing-guided straight bit (½ in. or more). Amana makes a 1⅛-in.-dia. by 1½-in.-long bit with a top-mounted ball-bearing guide (part No. 45468) that allows you to shape the leg in one pass.

Once you have both rear legs shaped, cut the front legs to length. Now you're ready to lay out and cut the mortises.

USE AN ANGLE BLOCK FOR SIDE-RAIL MORTISES

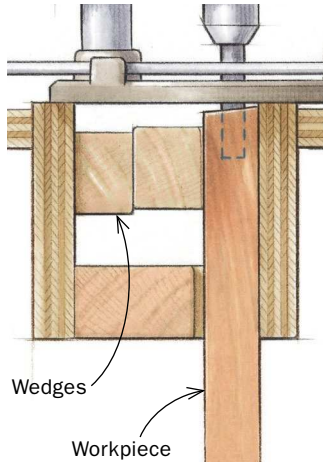
Angle block orients the leg at 85.5°. *Set the block against one side of the leg before adding the wedges. Then cut the mortise with a plunge router.*



USE THE BOX FOR END GRAIN, TOO

The front and back rails meet the legs at 90° and have standard tenons. But the side rails meet the legs at an angle. Instead of cutting angled tenons, mortise for slip tenons.

Start by angling the ends of the rails. *Cut the side rails to length at 85.5°, paying careful attention to the orientation of the angle cuts.*



Mortise the ends of the rails. *These mortises are easily cut by wedging the rail vertically in the router box.*

Angled mortises made easy

It is certainly easier to cut right-angled, 90° mortises and tenons. But to conform to the body, the chair must have some angled joinery. I've limited the angled joints to the side rails and the lower side stretchers.

The easiest and most consistent way to cut the angled joint is to bore the mortise in the leg at the required angle. Then you can simply crosscut the ends of the adjoining rails at the same angle, cut a straight mortise into the end grain of the rails, and glue in a slip tenon.

Square up the mortises. *Use a chisel and mallet and pare to the line.*

The angled mortises in the front and rear legs can be cut using a plunge router and a router mortising box (see photos and drawings, opposite page). You can use the mortising box, a mortiser, or chisels to cut the straight mortises.

Now add the decorative details on the rear legs. Taper the outside faces on the bandsaw and plane to the line. Cut the shallow pyramid heads on both the front and rear legs. Finally, cut the mortises for the square pegs in the crest rail.

Side rails meet the legs at an angle

With the legs complete, begin working on the seat rails—front, back, and side. The rail-and-seat structure takes the brunt of the load, so use care when fitting the tenons.

The front and back rails meet the legs at 90° and have standard tenons. The side rails, which are angled into the front and back legs, are attached with slip tenons.

Cut the side rails to length at 85.5° at the shoulder line (left photo, above). The rail should look like a long, thin parallelogram, not a trapezoid. Next, lay out and cut the mortises on the ends for the slip tenons (see photos and drawing, this page) using the router box. After mortising, fit and glue the slip tenons into the side rails.

Template ensures consistent curves in all of the chair rails

You want the arches in the rails to be consistent, so cut them to shape using templates made of ¼-in. Masonite. You'll need three templates for the seat-rail arches: one

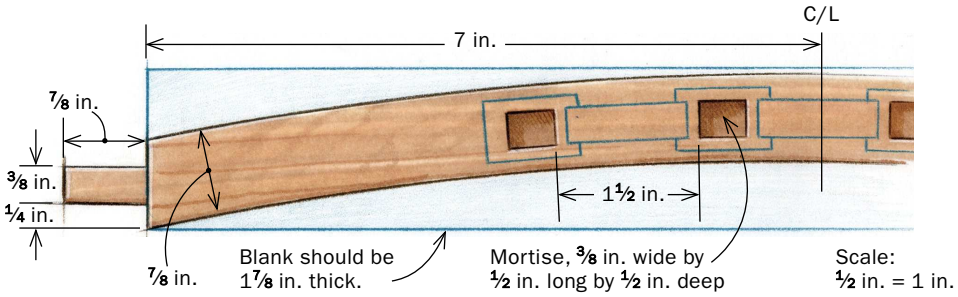
Glue the slip tenons in the side rails. *The tenon should fit with a bit of hand pressure. If you have to beat on it with a mallet, the fit is too tight; if it drops out, it is too loose.*

Now rout the side-rail arches. *Rough-cut the curve on the bandsaw. For consistency, screw a router template to the tenons, and secure the assembly to the bench for routing.*

Make the back-rest assembly

The rails of the back rest are curved on the front and back faces, and the crest rail is arched on its top edge. Both rails are mortised to hold the back splat, a curved assembly of narrow strips.

CREST RAIL AND LOWER BACK RAIL LAYOUT



CUT THE JOINERY BEFORE SHAPING THE UPPER RAILS

Cut the tenons and the inside curve of the rails before mortising. *Mark the locations of the back-splat mortises using a template and drill them out on the drill press (left). A curved fence helps support the tall workpiece. Next, following the lines marked from the template, square up the mortises (right).*

Arch the top of the crest rail next. *Re-use the rear seat rail template to trace the arch along the top of the crest rail, then rough out the shape on the bandsaw.*

each for the front, sides, and back. Use the templates to draw the arch on the seat rails, then use a bandsaw to remove most of the waste. Now use a bearing-guided straight bit to template-rout the arches.

The two curved back rails require a few more steps than the seat rails. Mill up extrathick blanks and cut the offset tenons on the ends. For consistency, it helps to make a template showing both the inside and outside curves of the rail (see drawing, left). Trace the concave curve first, then remove the waste with a bandsaw, and clean up the surface using a spokeshave or sandpaper. If you prefer, you can use the template to make a jig to clean up the surfaces using either a router or shaper. Now use a marking gauge to scribe the ⅞-in. thickness of these rails, referencing off the just-milled front faces.

Before shaping the crest and bottom rails further, lay out and cut the four small mortises for the back splat (see photos, left).

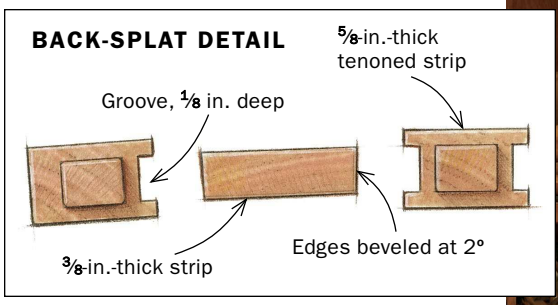
The next operation is to arch the top of the crest rail using the same method and template used to shape the back seat rail (save the cutoff). Finally, cut the convex curves of the crest and bottom rails on the bandsaw, just leaving the line. Clean up these faces with a disk or belt sander.

Back splat serves as the focal point

The back splat is a curved assembly of 1-in.-wide strips, with three 1-in.-sq.

Finally, cut the curves on the backs of the top rails. *Leave the scribe line, and clean up the surfaces with a belt or disk sander.*

MILL AND GLUE UP THE BACK SPLAT



Tenoned strips are grooved on both sides. *Cut and fit the ⅝-in.-thick strips into the mortises in the rails, then rout the ⅜-in.-wide groove, ⅛ in. deep, into their edges. The outside strips are grooved only on the inside edge.*

Bevel the thin strips. *After ripping the ⅜-in.-thick strips to width, joint a 2° bevel on their edges to allow the splat to curve.*

Use the crest rail and the bottom rail to guide the glue-up. *Apply glue with a syringe to avoid squeeze-out. Do not glue the splat to the rails yet. Once the back splat has dried, go ahead and glue it to the crest and bottom rails, then assemble the rest of the chair back.*

openings at the top, that conforms to the shape of the crest rail and the back rail. For this element, you'll need two blanks, ⅜ in. and ⅝ in. thick and wide enough to cut the required number of strips.

Dry-fit the crest rail and the back rail into the legs and measure vertically between them. Add 1 in. to that measurement for the ½-in. tenons, and cut the ⅝-in.-thick blank to length. Now cut ⅜-in.-thick tenons on each end, rip the board into four 1-in.-wide strips, and then cut the remaining tenon shoulders on the strips. Next, cut the grooves for the ⅜-in.-thick strips, beginning 1 in. from the top shoulder line, and square up the top edge with a chisel.

Now cut the ⅜-in.-thick blank to the same length as the grooves, rip it into strips, and joint a 2° bevel along each edge of the thin strips. Sand all the parts to 220 grit, and glue up the back splat using the crest rail and bottom rail as glue-up jigs. To avoid squeeze-out, use a glue syringe to apply the glue.

Glue up the front and rear assemblies

While the back-rest assembly is drying, glue up the two front legs and the front seat rail. Notch the tenon on the front rail to give clearance for the side-rail tenons. Be sure the legs are parallel with no toe-in or splay as you clamp up the assembly. Reinforce the joints with a 3⁄16-in.-dia. dowel hidden on the inside face.

When the glued-up back splat has cured, remove the crest and back rails, apply glue to the mortises, and glue these parts together. To help with the clamp-up, use the arch cutoff as a caul.

Allow this assembly to dry, then glue it and the back seat rail to the rear legs. Again, reinforce the rear seat tenons on the inside with a 3⁄16-in.-dia. dowel. While you are at it, install the 3⁄16-in. pegs in the tops of the rear legs through the ¼-in.-sq. peg

Article Extra
Watch Rodel mill and assemble the back-splat elements for this chair.

Fit the lower stretchers

The lower stretchers help stabilize the chair against racking forces. The side stretchers attach to the legs with slip tenons, and the cross stretchers connect to the side stretchers via half-lapped dovetails.

Cut the rear shoulders first. *The rear shoulders of the stretchers are angled 85.5° horizontally. In addition, they must be angled vertically to match the leg taper. Start by dry-clamping the chair, and set a bevel gauge to the vertical angle (left). To cut the rear shoulder on the tablesaw (right), tilt the blade to 85.5°, then use the bevel gauge to set the angle of the miter gauge.*

holes to reinforce the crest rail mortise-and-tenon joint.

Install the lower stretcher assembly

The lower stretcher assembly not only helps stabilize the lower part of the chair against racking forces, but the exposed dovetail joints also add a decorative twist. The side stretchers connect to the legs with slip tenons, and the cross stretchers are attached to the side stretchers with half-lapped dovetails.

With the chair dry-fitted and clamped together on a flat surface, measure and cut the lower stretchers to width and thickness. The side stretchers meet the legs at compound angles with slip-tenon joinery. The mortises are already cut. To cut the compound angle on the ends of the stretchers, set a bevel square to the angle formed where the inside face of

Creep up on the fit. *Reset the miter gauge to 90°, leaving the blade tilted to 85.5°, and cut the front shoulders. Leave each stretcher a little long and take light cuts until the ends align with the mortise locations.*

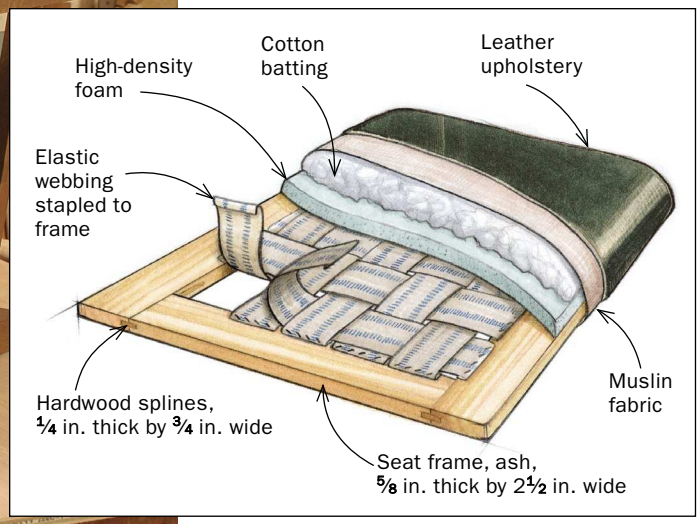
Install the cross stretchers after glue-up. *Cut the half-lapped dovetails on the cross stretchers, then scribe them onto the side stretchers.*

Screw in the corner blocks. *The blocks help reinforce the corner joints and serve as anchors for the seat frame.*

Photo, facing page (bottom right): Michael Pekovich

SLIP SEAT COMPLETES THE CHAIR

The chair has a leather-upholstered seat, installed after the chair has been fumed and finished. The frame is screwed to the corner blocks between the rails.



the rear leg and the flat surface meet. Set the tablesaw's miter gauge to that angle, set the blade to 85.5° (double-check that angle with another bevel gauge), and cut the compound angle on the rear end of one stretcher. To cut the opposite stretcher, reset the miter gauge past 90° to the same angle in the other direction. Now cut the forward ends of the stretchers at 90°—with the miter gauge at 90° and the blade still at 85.5°—sneaking up on the length until they just fit.

Next, cut a ⅜-in.-wide mortise, centered in the end grain of each stretcher and about ¾ in. deep. Dry-fit the slip tenons. When the fit is perfect, glue up the chair.

While this glue is setting, you can mill up the two cross stretchers. Once the stock is milled to width and thickness, locate where each cross stretcher will meet the side stretchers. Cut each one to length, leaving them about ⅛ in. extralong on both ends.

Hold a cross stretcher in place, and locate the shoulder cut by scribing a line on the underside where it meets the side stretcher. Cut a half-lapped dovetail on each end of each cross stretcher. Set the cross stretchers in place, then scribe and cut out the dovetail slots in the side stretchers using a handsaw and chisels. Once the dovetail sockets have been cleaned out, glue the cross stretchers in place.

After the glue has set, sand all the stretchers flush on their upper faces, and go over the chair thoroughly for any residual glue squeeze-out and touch-up sanding. Finally, make up the corner blocks and screw them to the inside corners, flush with the upper edges of the front and rear seat rails. Add an additional screw hole up through the body of the corner blocks before attaching them. This will be used to attach the upholstered slip seat to the chair.

The very last item before finishing is installing the pyramid-shaped decorative pegs in the crest rail. I use ebony, but any hardwood species will work.

This white-oak chair is fumed with a topcoat of Tried & True linseed oil. The seat is upholstered in leather purchased from Dualoy Inc. (dualoy.com). □

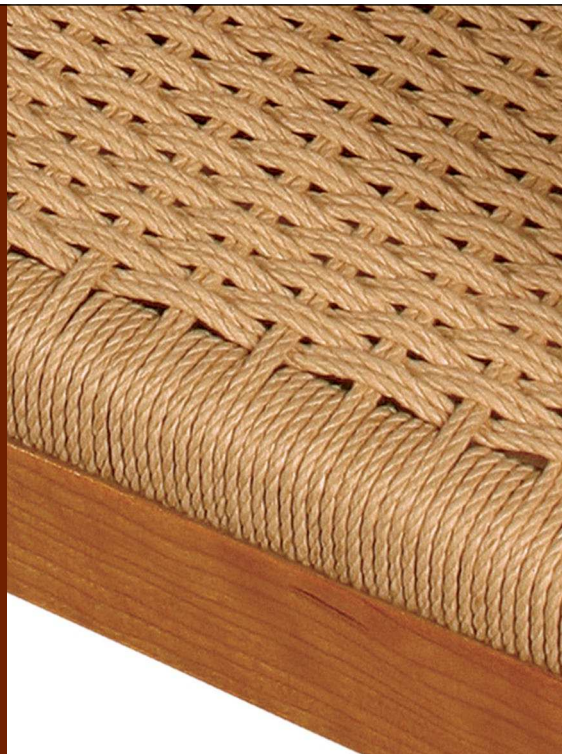
Kevin Rodel is a furniture maker and teacher in Brunswick, Maine.

CHAIRS AND BENCHES

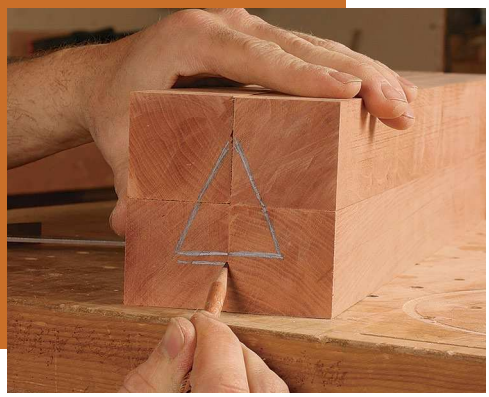
Hall Bench

Curves and a woven cord seat add grace and comfort

BY MARK EDMUNDSON



SHAPE THE LEGS



Lay out the legs. *A cabinetmaker's triangle marked on the ends of the leg blanks helps keep them oriented properly (above). A template (right) not only gives you a pattern for the two curved faces on the legs, but it can also hold all the information you need to mark mortise locations on the leg blanks.*

This bench has been part of my entire woodworking career. I designed it as a student in the College of the Redwoods fine woodworking program. A chair by famed Swedish furniture designer Carl Malmsten inspired the shape of the armrests and legs; the Danish-cord seat adds texture. Over the years I've made a half-dozen benches like this one, and used the Danish-cord weave on many pieces.

The bench is a good project for mastering mortise-and-tenon joinery, for working with gently curved components, and, of course, for making a woven seat. You can get all the parts from one 8/4 plank that's 7 in. to 8 in. wide and 8 ft. to 10 ft. long. In a pinch you can use a secondary wood or sapwood for the seat rails because the Danish cord hides the wood completely.

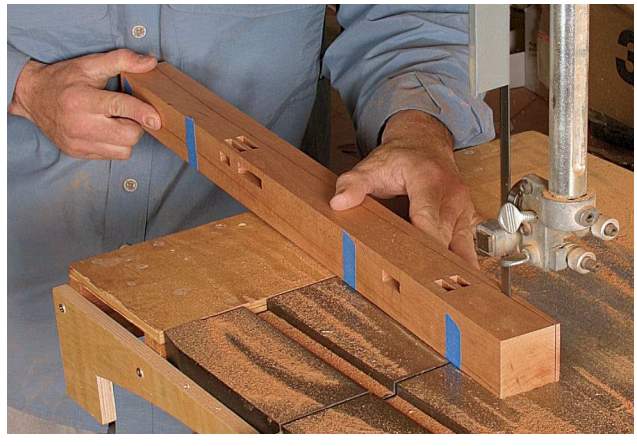
Cut the legs, armrests, and lower side rails from the outside edges, where you'll have straight quartersawn grain. It's a good idea to have enough stock for an extra leg blank. Take the long seat-support rails from the middle of the plank.

Legs are square where it matters

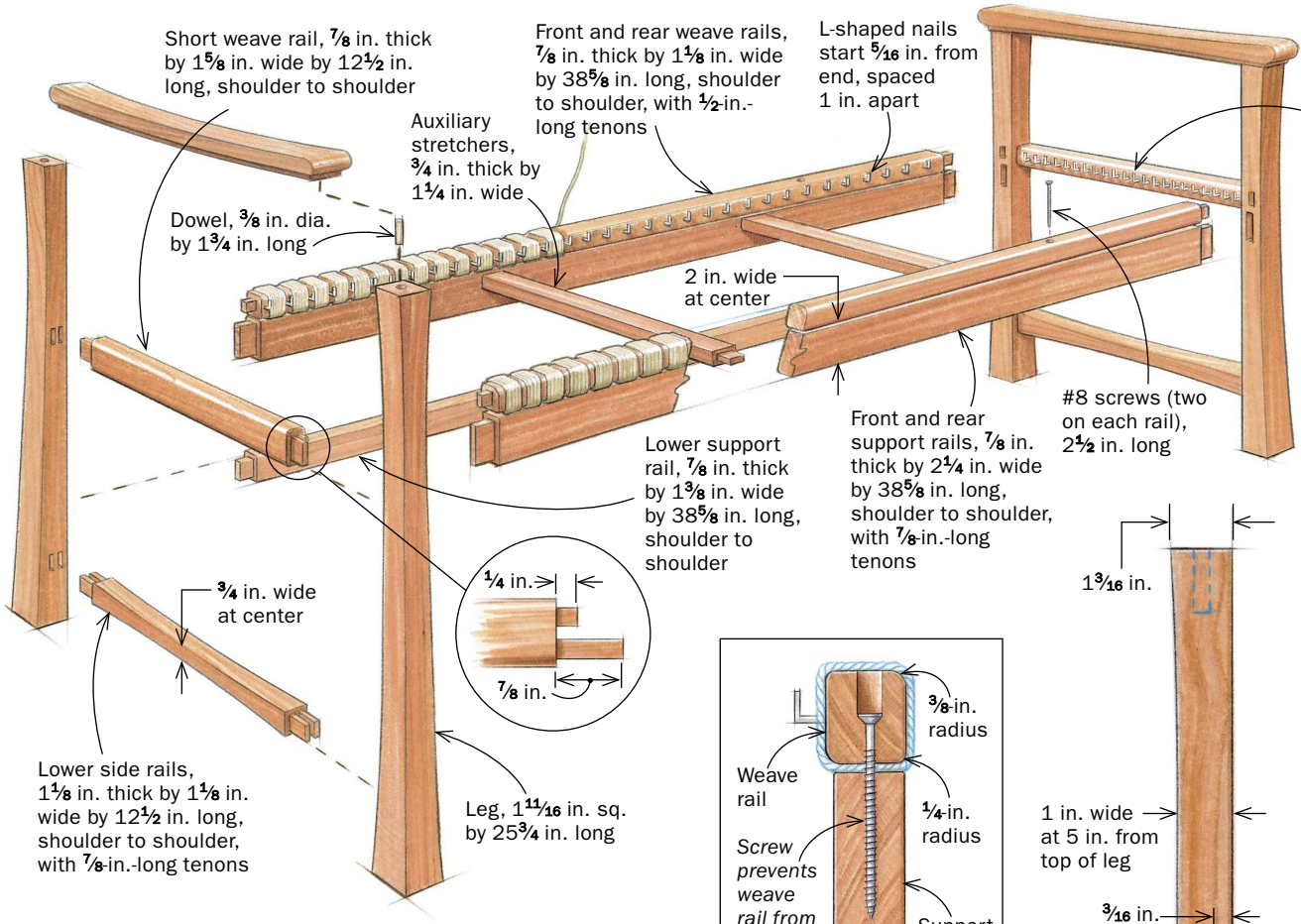
Using the drawing on p. 60 as a guide, make templates for the leg, the curved rails, and the armrests. It's imperative that you know which legs go left, right, front, and back, because of the way they're curved. Label them clearly.

Mark the leg template with the locations of the top and bottom of each mortise. Transfer the mortise locations to the leg

Cut the mortises. *If you use a plunge router with an adjustable edge guide, you can easily dial in the depth of the different mortises and their distances from the edge of the blank. Stop blocks clamped to the blank control the length of the mortises. After routing, use a chisel to square up the ends of the mortises.*



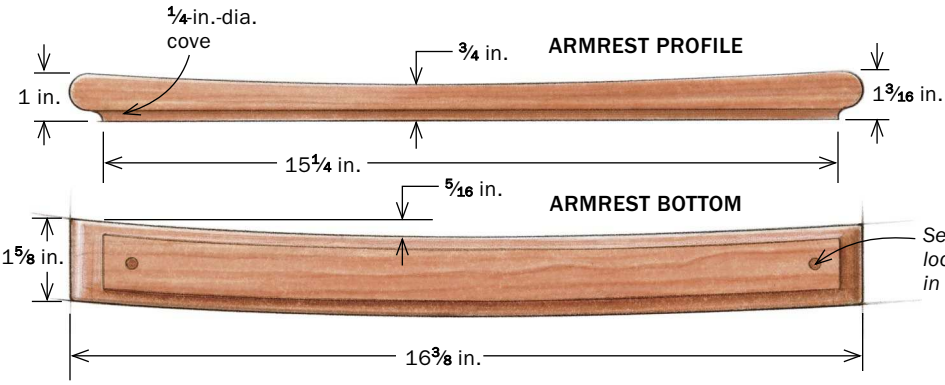
Bandsaw the curves. *Once you've cut the curve in one face, tape the offcut onto the blank. It will help keep the leg square on the bandsaw table as you cut the second curve. Use coarse sandpaper, a scraper, or a spokeshave to smooth the curves. Don't worry if the curves aren't identical; the eye won't pick up minor variations.*

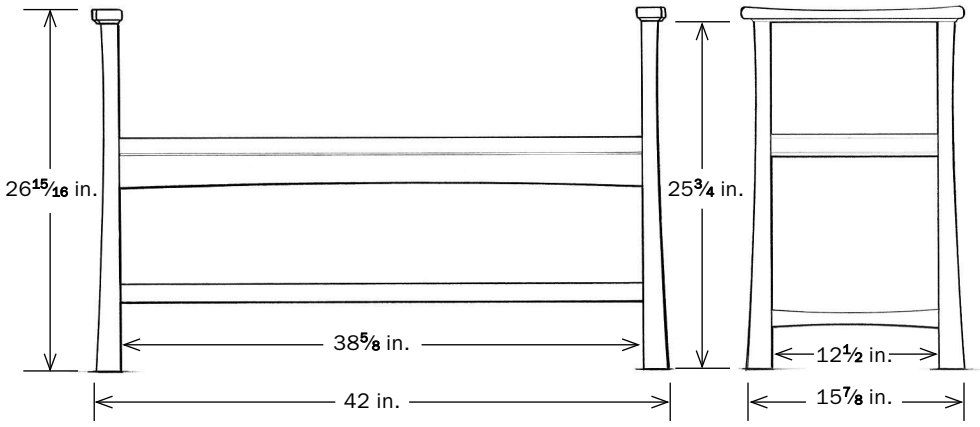


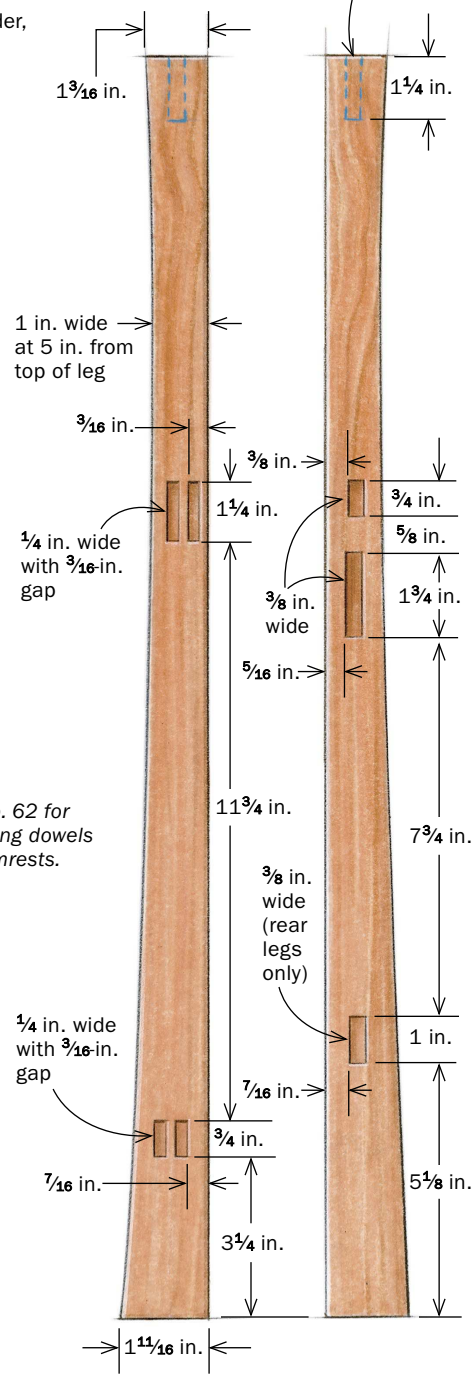
A SIMPLE MORTISE-AND-TENON FRAME

Only the two outside faces of the legs are curved; the inside faces are straight where the mortises for the rails are located. That keeps the joinery simple.

FRONT RAIL DETAIL







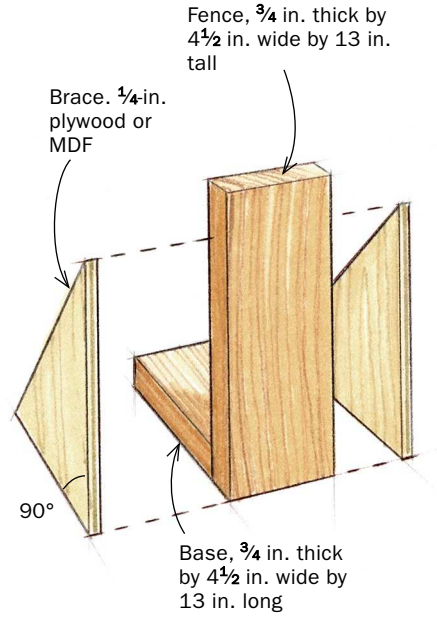
FRONT AND REAR INSIDE FACES **SIDE INSIDE FACES**

Photos, except where noted: David Heim; p. 58: Chris Guibert; drawings: Bob La Pointe

CUT THE TENONS ON THE RAILS

Cut tenon shoulders first. *Edmundson uses a narrow, shopmade sled to cut the tenon shoulders, with a stop block clamped to it.*

Add a tall fence to cut tenon cheeks. *An auxiliary fence clamped to the sled supports the work when cutting the cheeks.*



blanks, beginning with the side-to-side mortises. Remember not to mark mortises for a lower support rail on the front two legs. Similarly, transfer the locations of the front-to-back mortises from the template to the leg blanks, then trace the curve on the outside of each leg.

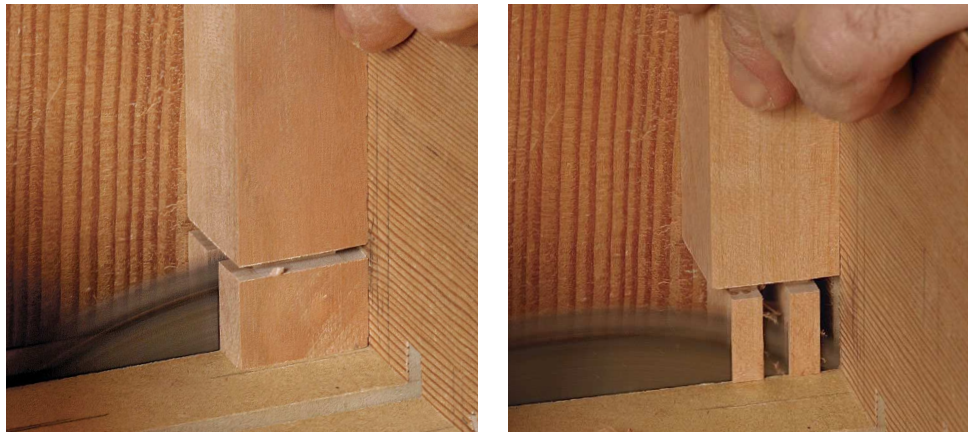
Refer again to the drawing for the widths of each mortise, the distances from the edge of the leg to the mortises, and the spacing between double mortises. Tenon lengths tell you the depth of each mortise. Transfer these measurements to each leg, then cut all the mortises, using a router or a hollow-chisel mortiser. If you use a router, chop the ends of each mortise square with a chisel.

Saw tenons on the stretchers

Dimension the rails and cut them to length, then mill the tenons. Use the tablesaw and miter gauge to cut the tenon shoulders first, and then use a tablesaw tenoning jig (see drawing, above right) to cut the cheeks.

To mill the double tenons, cut the tenon shoulders, then load the piece in the tenoning jig and saw away the 3/16-in.-wide space between the double tenons. I make one pass over the blade, then rotate the piece 180° and make another pass, checking it with the leg to see if the gap is tight.

CUTTING THE DOUBLE TENONS



Begin in the middle on the double tenons. *Once you've cut the shoulders, cut away the waste between the tenons in the middle of the stock (left). Cut the inside face of one tenon, then rotate the stock 180° for the second cut. Creep up on the right distance, using the leg to check the fit. Finally, cut the outside cheeks and ends (right).*

When the fit seems good, cut all the spaces between double tenons, then change the setup to cut the outside cheeks. Lower the blade to 1/8 in. above the table and make a cut, checking the results against the mortise in the leg. When it's to your liking, raise the blade so that it is just below the shoulder crosscut and make a pass. Rotate the work and cut the other side. You'll have to clean up a bit of wood between the tenons with a narrow chisel or file.

Finally, cut the two small mortises on the inside of the long support rails. These will house two short auxiliary stretchers. Wait to cut those stretchers until you have dry-fitted the rest of the bench.

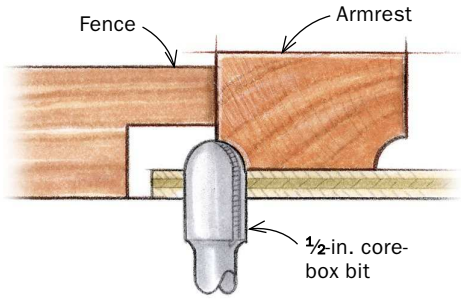
Dry-fit and cut the curves

Assemble one pair of legs and short rails, fit the long rails in place, then press the remaining legs and short rails in place. Pull the joints together with clamps to be sure the mortises and tenons seat properly.

Be sure there's at least a 1/8-in.- to 3/16-in.-wide gap between the long weave rails and the support rails below them. A smaller

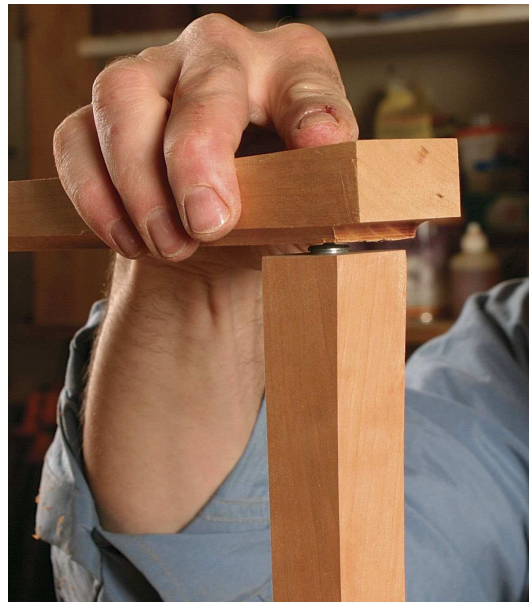
SHAPE THE ARMRESTS

Bandsaw curves. *Begin with the curve for the top of the armrests (above), then bandsaw the curves for the sides (right).*



Rout a cove on the underside. *The cove gives the thick armrest a lighter look. Edmundson uses a narrow shopmade guide that clamps to the router table and sits above the blade. It follows both the convex and concave sides of the armrests. Reset the stop for the end-grain cuts.*

Drill for dowels. *Use ⅜-in.-dia. dowels to connect the legs to the armrests. Drill the legs first, then use dowel centers (left) to locate the holes in the armrests. Position the armrest and press down (right). Now you can drill the mating hole in the armrest.*



gap will make it hard to weave the Danish cord. Plane the support rail if you have to widen the gap between the rails. Also, be sure that the tenon shoulders on the long weave rails don't interfere with the tenon shoulders on the adjacent support rail.

If everything looks good, make the auxiliary stretchers to fit between the long support rails. After the initial dry-fit, cut the curves on the legs, lower side rails, and front rail on the bandsaw.

There are several tools you can use to clean up the bandsaw marks. I use a thin piece of wood wrapped in 100-grit sandpaper, a shopmade plane with a gently curved sole, a spokeshave, a scraper, and a block plane. Check your progress against the leg template. No two faces will be exactly the same, but that's all right. Just be sure the legs don't seem too bottom-heavy and that they flare out a bit at the top.

Finish shaping the legs by chamfering the corners. I also like to plane a gentle taper on the inside straight faces. Scribe a line 1/16 in. from the top inside edges. Plane from the top of the mortises to those scribe lines.

The top and bottom faces of the lower side rails have the same inside curve as the armrest. Align the armrest template 1/16 in. below the top and bottom faces of the rail, then trace the curve. You may want to plane the outside edge of the rail so it aligns with the edges of the legs. Chamfer the corners as you did the legs.

You also can use the inside curve of the armrest template to plot the gentle curve at each end of the long support rails.

Shape and join the armrests

When the legs and rails are to your liking, rough out the armrest on the bandsaw, and clean up the curves with sandpaper and a scraper. Use a router table and a core-box bit to cut a ¼-in.-radius cove on the underside. Finally, round over the ends of each armrest.

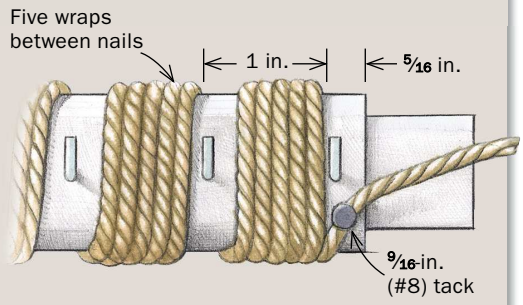
Join the armrests to the legs with dowels. Use dowel centers (see photos, left) to mark the locations of corresponding holes in the armrests.

Prepare the seat rails

Round over the four weave rails at the router table. The short ones have a ⅜-in. radius on all four edges. The long ones have a ⅜-in. radius on the top outside

Attach the nails that hold the cord. *Drill pilot holes along the seat-support rails and hammer the L-shaped nails in place.*

ADD NAILS AND WRAP THE LONG RAILS BEFORE ASSEMBLY



Wrap the long rails. *Tack the cord to the end of the rail, then spin the rail to wind the cord. Wrap the cord five times between each nail, creating a gap at the nail that subsequent weaving will fill. Golf gloves reduce wear and tear on fingers.*

ASSEMBLE THE BENCH

Glue up the end frames. *Curved offcuts again make ideal clamping pads. Because Edmundson oils the components before glue-up, he puts leather scraps between the leg and offcut to protect the finish.*

Add the long rails. *Once the glued-up end frames are dry, connect them with the long rails. Then screw the weave rails to the support rails.*

and lower inside edges and a ¼-in. radius on the other edges. That's partly for comfort, partly to make it easier to cinch the cord.

Finally, drill rows of 1/16-in.-dia. pilot holes in the weave rails and drive in the L-shaped nails to hold the Danish cord.

Also, drill a pair of holes on top of the front support rail for #8 2½-in. screws. They secure the weave rail to the support rail and keep it from bowing.

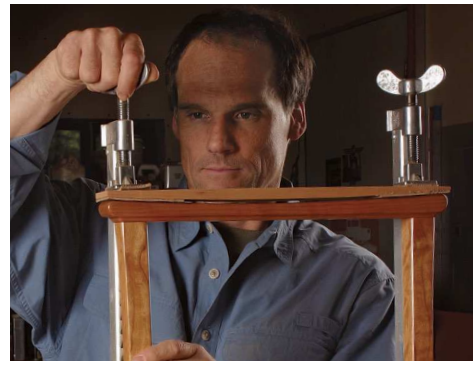
Prewrap the long weave rails with Danish cord. While the cord will cover the short weave rails, the front-to-back warp strands won't cover the long rails by themselves. The wrapping fills in the spaces (see photos and drawing, above).

Glue up the bench, then weave

I finish all the pieces before glue-up. Glue the legs and short rails together first, using the leg offcuts as pads. Then attach the armrests.

Spread the cord on the long weave rails so it's evenly spaced over the screw holes in the support rails. Drive the screws until they begin to seat; stop before they pull the two rails together.

Weaving the Danish-cord seat is the final step (see pp. 64-65). It takes me about three hours. But if this is your first experience with a woven seat, allow more time until you get the hang of things.



Clamp armrests last. *The offcut from the curved top acts as a clamp pad. Use the edge of the bench to hold one end of the clamp, and tighten it directly over the leg.*

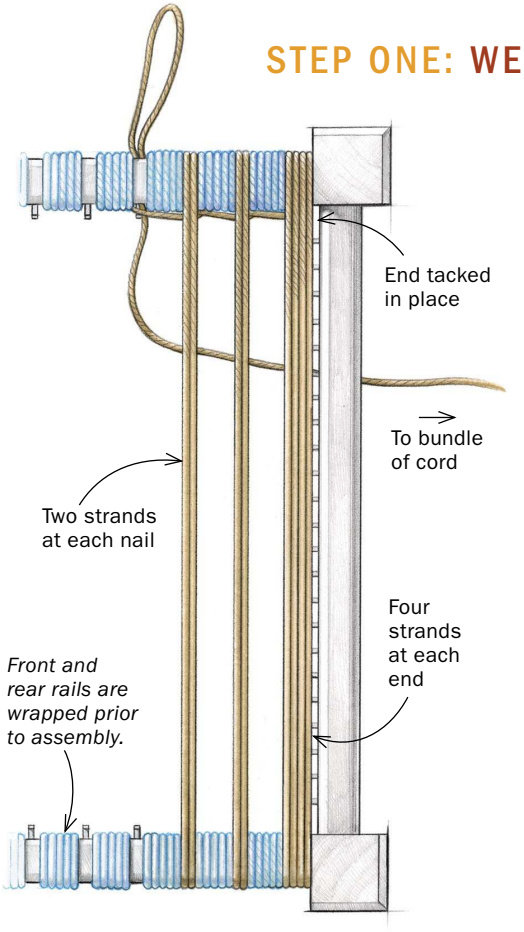
Mark Edmundson builds furniture and cabinets in Sandpoint, Idaho.

How to weave with Danish cord

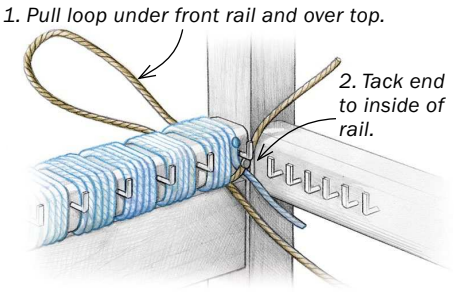
Article Extra
Watch a video of Edmundson weaving the seat and get the finishing recipe for this project.

Danish cord resembles thick hemp twine, but it's made from strands of tightly rolled paper. You weave the seat by looping the cord over L-shaped nails driven into the inside of the weave rails. The cord comes in 2-lb. bundles, about enough for a single chair seat, or in 10- to 11-lb. rolls, ample for two benches. You can order the nails and cord from several retailers, including caning .com, caneandreed.com, and countryseat.com. Before you begin, wrap the long weave rails with cord, as shown on p. 63. Then do the weaving in two stages: First, run warp strands from front to back; then, weave cord from side to side. No need to measure; you're always taking a loop of cord from the bundle, hooking it on a nail, passing a looped end to the other side of the bench, and hooking it onto a nail.

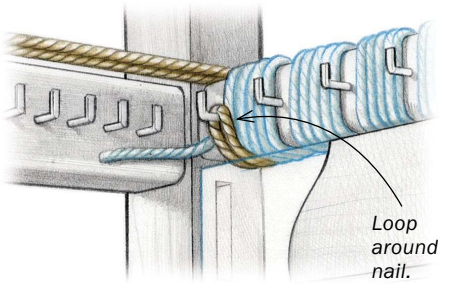
STEP ONE: WEAVE FRONT TO BACK



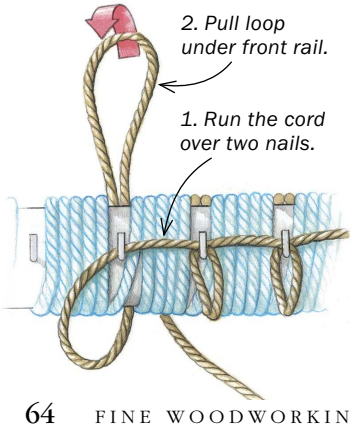
1. Start the warp. *Loop a length of cord, keeping the strand from the bundle toward the center of the bench. Push the loop under the front weave rail next to the leg.*



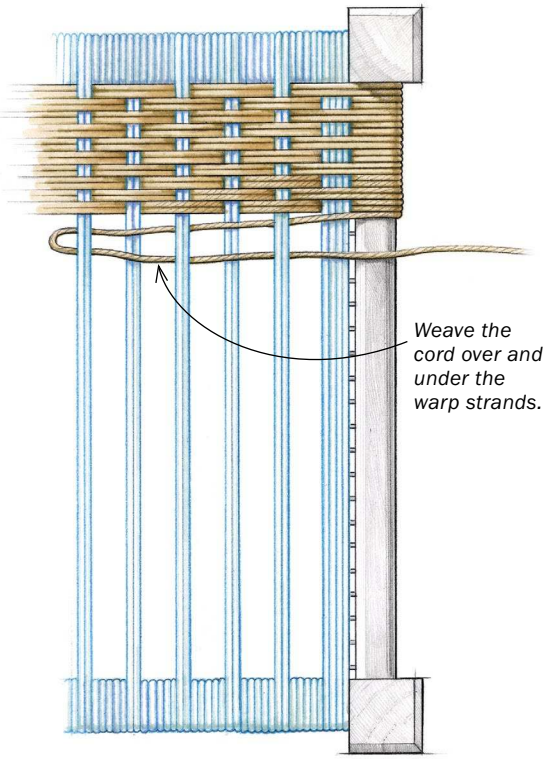
2. Bring the loop to the rear rail and hook it on a nail. *This makes the first two warp strands. Repeat for a total of four strands on the first nail.*



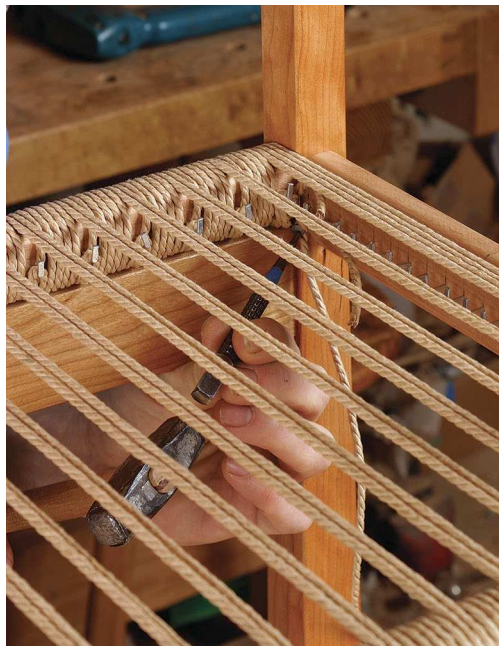
3. Hook the cord and drag it to the next nail. *Pull the cord taut and hook it over the first nail. Bring it across the top of the next nail. Make a loop with the strand from the bundle to the outside, and push it under the front rail.*



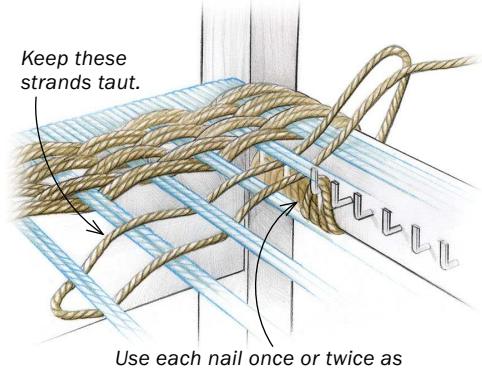
4. Continue running the cord from front to back*, with a pair of warp strands hooked over each nail. Finish with four strands at the end, twisting the loop so that the strand from the bundle is closest to the leg.*



STEP TWO: WEAVE SIDE TO SIDE



1. Begin the weaving. *Start at the rear of the bench, tacking the cord in place at the corner of a leg. Make a loop, and bring the cord over the short weave rail. Push the loop over the group of four warp strands, under the next pair, over the next, and so on until you reach the opposite side. Keep the weave strands snug, but not so tight that they make the warp strands flex up and down.*



2. Hook the cord and weave it again. *As you weave toward the front of the bench, hook the cord twice over each nail in the short rails. In order to keep the weave strands parallel to the long rails, you may need to hook the cord only once over some nails.*

3. Push each weave strand in line. *Each time you weave the cord through the warp strands, use your fingers to push the cord snug against the weave. When you're about halfway through the weave, sight down the length of the bench to be sure the weave strands are straight.*

4. Tack down the weave cord. *Turn the bench upside down and tack the end of the weave cord to the leg. Work the pigtails of cord at the corners out of sight, tucking them under the L-shaped nails.*

5. Clinch the nails. *Carefully tap the short leg of the L on each nail down over the cord. If you break a nail, use pliers to pull out the stub and tap in a replacement, making sure you catch all the loops of cord.*

6. Straighten the weave. *Use a thin stick to push any wayward strands into alignment. Don't try to make everything perfect; it's better if the seat has some small variations to signal that it's been woven by hand.*

Adirondack Chair

Build this comfortable, lightweight version of an American classic

BY TOM BEGNAL

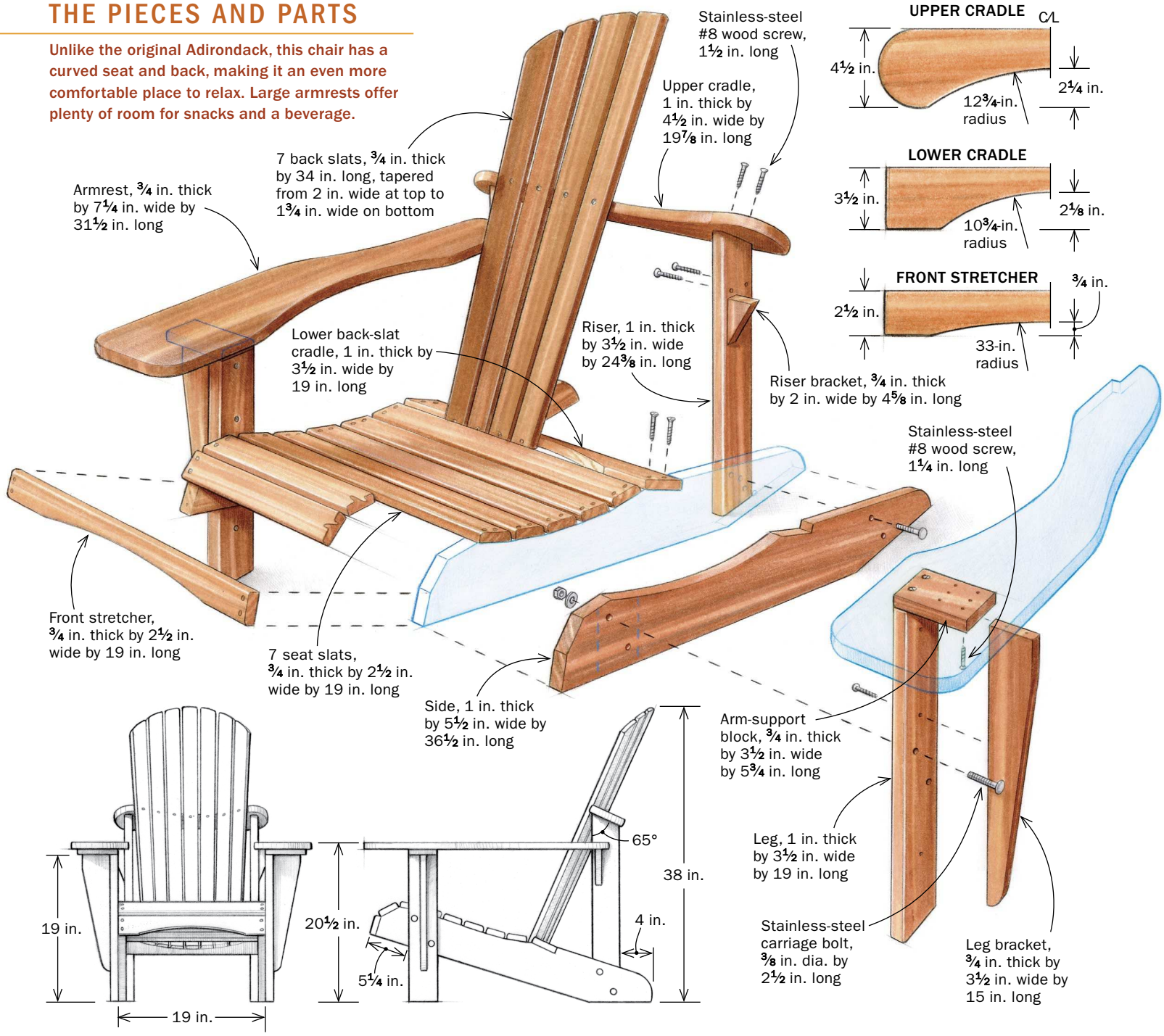
This quintessentially American outdoor chair was born in the early 1900s in the Adirondack mountain region of New York state. The generous slant of the seat and back make it an inviting place to relax outdoors. And for those who like to graze while relaxing, armrests the size of small tables offer plenty of room for a plate of snacks and a favorite beverage.

Unlike the original, our chair has a curved seat and back, making it a place where you won't mind spending a lot of downtime. It is made from western red cedar, a weather-resistant, lightweight wood available at most lumberyards. Cypress, mahogany, and redwood also are lightweight and enjoy the outdoors. Ipé and

Photos, this page: Michael Pekovich (top); Roy Engelbrecht (bottom left)

THE PIECES AND PARTS

Unlike the original Adirondack, this chair has a curved seat and back, making it an even more comfortable place to relax. Large armrests offer plenty of room for snacks and a beverage.



teak are at home outdoors, too, but expect a chair made from either to be a muscle-strainer.

Most of the parts are made from presurfaced "1-by" stock, but for the parts that carry extra load—sides, legs, risers, and cradles—I used ⅝ presurfaced stock. Much like a 2x4, the actual dimensions end up slightly less. That said, if you use teak, ipé, or any other hardwood, you can build the entire chair from 1-by boards.

Begin with the sides

The sides are the foundation of the framework. Cut a full-size pattern, then transfer it to the stock, and cut out the shape on the

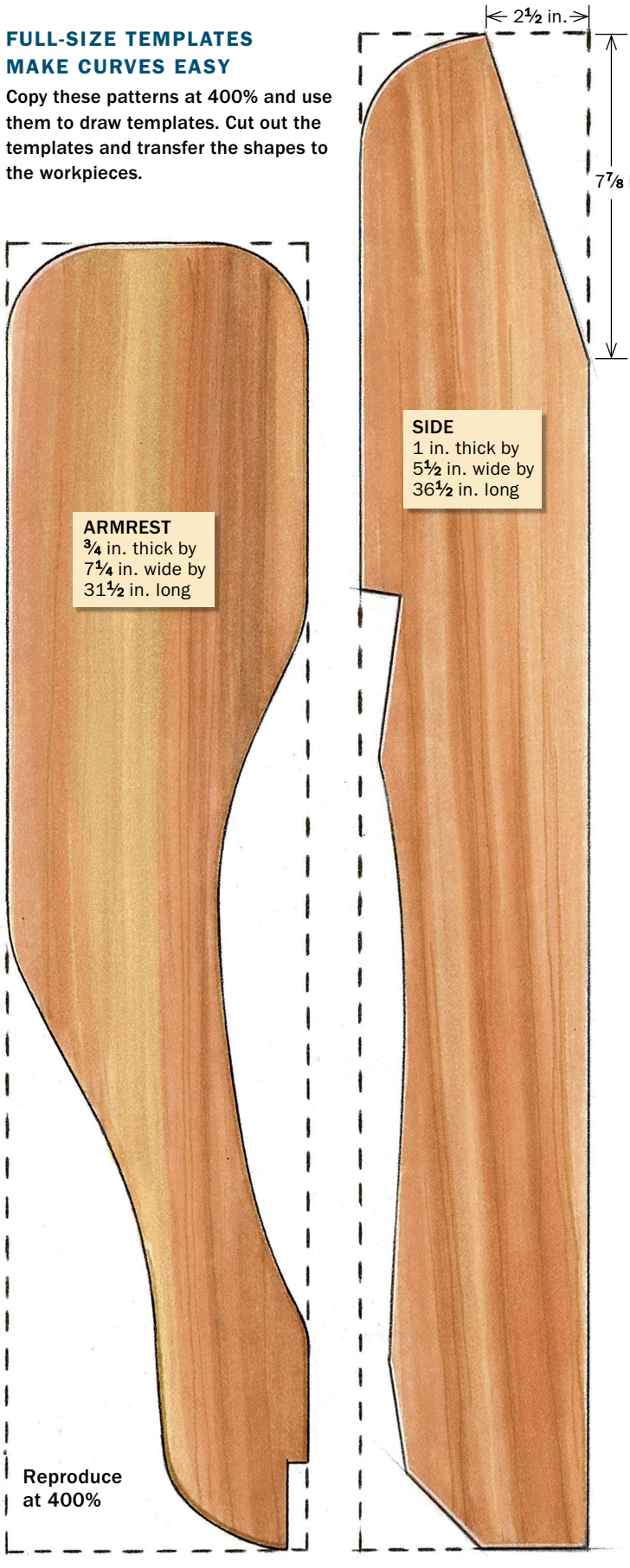
TIP

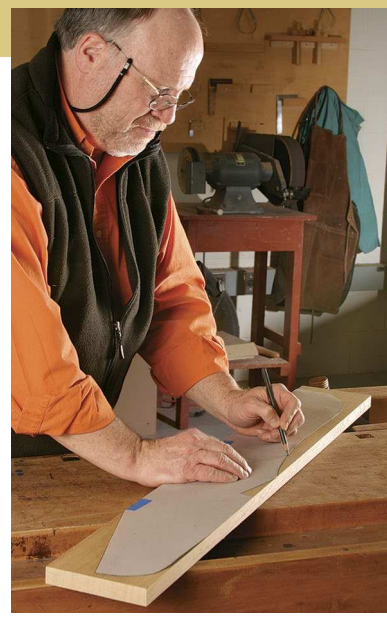
Make a jumbo compass. *The compass is a thin strip of wood about 36 in. long. Measure 1 in. from the end, and drill a hole to accept a nail. Create a pivot point by driving the nail through the strip and into a square block of ¾-in.-thick stock. The location of the pencil hole will vary depending on the radius of the arc.*

BEGIN WITH THE SIDE PIECES

FULL-SIZE TEMPLATES MAKE CURVES EASY

Copy these patterns at 400% and use them to draw templates. Cut out the templates and transfer the shapes to the workpieces.





Trace the shape. *Use a thick paper template to outline the side shape on stock.*

Tape sides together. *Begnal uses double-faced tape to hold the boards together as he cuts them.*

Keep the parts taped together. *A file, followed with sandpaper, is a good way to smooth the edges of inside or outside curves. Start sanding with coarse paper, say 80-grit, working up to 150-grit.*

bandsaw. Smooth the sawblade marks on the edges of the sides with a plane, scraper, or sanding block.

Cut seat slats, stretcher, and lower back-slat cradle

Cut the seat slats to size before moving on to the front stretcher. To lay out the curve along the bottom edge of the stretcher, make a jumbo compass (see tip, p. 67). Measure 33 in. from the compass pivot point and drill a ⅛-in.-dia. hole to accept a pencil point.

Before scribing the curve, add reference points to the stretcher. At a point ¾ in. from the front edge, draw a line across the length of the piece. On that line, mark the center point. Now, place the stretcher on a workbench. Align the pivot point of the compass with the center mark on the stretcher, positioning the pencil on the center point. Use the compass to scribe the arc across the stretcher, use a bandsaw to cut it out, then smooth the sawn edges.

Again, turn to the jumbo compass to scribe the curved front edge of the lower cradle. Relocate the pencil hole to create a 10¾-in. radius. At a point 2⅛ in. from the front edge of the cradle, draw a reference line across the length of the piece. Then, mark the end-

Photos, except where noted: Anissa Kapsales; drawings: Bob La Pointe

TAPER AND SHAPE THE BACK SLATS

Easy tapering on the jointer. *With the infeed table set to make a ⅛-in.-deep cut, add a piece of tape to the fence 1 in. from the front edge of the outfeed table. Also, wedge the guard open 1 in. or so. Now, with the machine running, lower the top end of a slat onto the outfeed table, using the tape as a guide and keeping your hands a safe distance from the cutterhead.*

One pass per side. *Use a push block to feed the back slat through the cutterhead. Flip the slat over and repeat. The short untapered portion at the top end won't be visible after sanding.*

to-end center point on the line and cut the curve on the bandsaw. After that, smooth, sand, and round over the edges.

Move on to the leg assemblies, then the back

Each of the two leg assemblies is made up of a leg, a leg bracket, and an arm-support block. With the parts disassembled, drill all the shank holes in the legs and support block. Use a bandsaw to cut the taper on the bracket, and then smooth with a smoothing plane. Now, sand all the leg parts and round over the edges. But do not round edges where parts meet. Screw one block to the top of each leg. For each leg assembly, screw a bracket to the underside of a block and outside of a leg.

The back assembly is made up of two parts: a pair of vertical risers and a pair of riser brackets. Once the parts are cut, rounded, and smoothed, screw them together. To locate the proper position for the riser brackets, place a leg assembly on the riser with both bottom ends flush, then use the arm-support block as a straight-edge to scribe a line across the riser. Position the bracket so that its face is flush with the front edge of the riser and its top edge is at the marked line. Secure each bracket in place by driving three screws through the inside face of the riser and into the bracket.

Make the upper cradle

To create the curved front edge, use the jumbo compass again. This time, though, locate the pencil hole 12¾ in. from the nail hole. Again, add a reference point to the cradle. Draw a line 2¼ in. from the front edge of the cradle, and then mark the end-to-end center point on the line. Use the compass to scribe the arc.

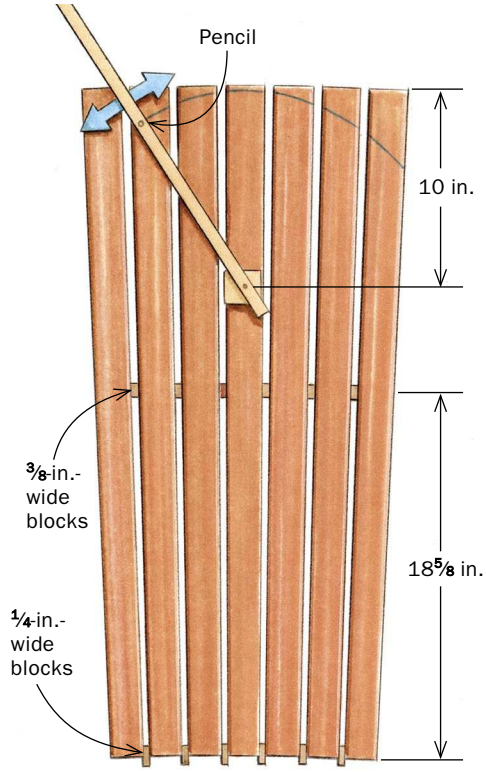
The end curves are next. I experimented with several shapes on the end of a 4½-in.-wide piece of cardboard. When I hit on one that looked good, I cut out the curve and used the cardboard to trace the shape on each end of the cradle. Use a bandsaw to cut them out, and then smooth the sawn edges.

Cut out the arms

The arms are the focal point of the chair. Enlarge the drawing on the opposite page to trace a full-size pattern on stiff paper or

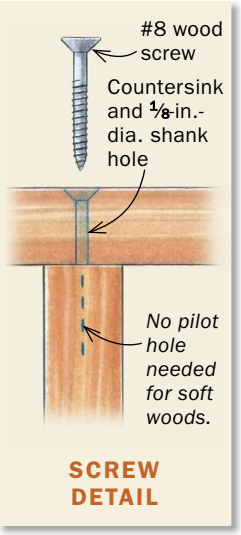
SCRIBE AN ARC ON THE BACK SLATS

Use the tip on p. 67 to create a jumbo compass. After that, measure 10 in. from the nail hole and drill a ⅛-in.-dia. hole—a size just big enough to accept a pencil point.

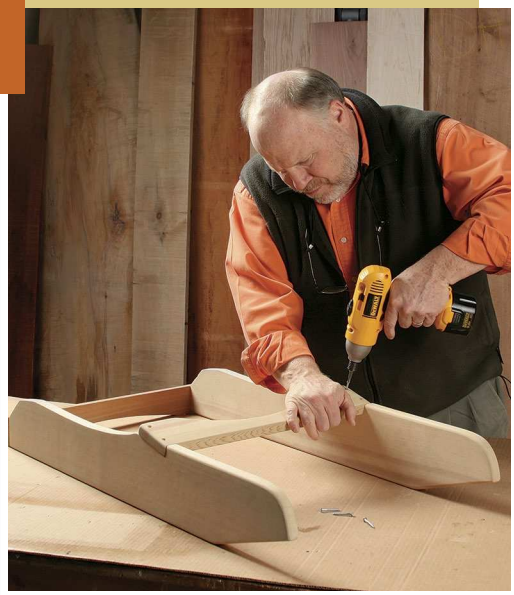


Mark the arc. *A clamp and some light pressure keep the back slats and spacers from shifting while Begnal uses the jumbo compass.*

ASSEMBLE THE BASE



SCREW DETAIL



Make a subassembly. *Screw the stretcher to the front and follow with the lower cradle.*

Add one leg assembly at a time. *Use a spring clamp to temporarily clamp each one to a side piece, then square it to the work surface.*

Secure the leg assemblies. *Once the leg assemblies are in place, drill ⅜-in.-dia. holes through the sides and legs and add bolts, nuts, and washers.*

Article Extra

Watch Tom Begnal walk through the complete assembly process.

cardboard. Cut out the pattern and use it as a template to trace the shape on each length of stock. Then use a bandsaw to cut out both arms at the same time. Smooth the edges, round them over, and sand through 150-grit.

Taper the back slats

To taper the seven back slats, I used an old jointer trick that makes the process quick and easy. First, apply a piece of tape to the jointer fence to establish a point about 1 in. from the front edge of the outfeed table. Lower the infeed table ⅛ in. (the amount of taper you want on each edge). Then wedge the guard open so that you can lower a slat onto the cutterhead.

Next, with the machine turned on, rest the bottom end of the slat on the infeed table (or, if the infeed table is short, overhanging the end), and align the top end of the slat with the tape. Holding the slat against the fence with your hands well behind the cutterhead, lower the end onto the outfeed table. Use a push block to feed the slat through the cutterhead. Repeat on the opposite edge.

Now you're ready to trace the top curve on the back slats. Start by placing all the back slats edge to edge with a pair of spacers between each. Redrill the pencil hole on the jumbo compass

Attach the upper cradle. *Use a temporary spacer board to ensure that the risers stay parallel when the upper cradle is attached.*

ADD THE ARMS AND SLATS

Add the arms. *Drive the riser screws (at the back) first to be sure the arm notch fits snugly around the riser. Begnal conceals the screws by driving them in from the inside of the riser and the underside of the support block.*

Position the back slats. *Start with the center slat, then the two end slats, and work your way in. The slats must be aligned at the bottom of the lower cradle, with even spacing between them.*

Layout trick. *Place the chair on its back and use spring clamps to level it. This will allow you to rest the slats on the cradles and adjust positioning without slippage.*

10 in. from the nail. Position the pivot point 10 in. from the top end of the slats and centered on the middle slat. Scribe the arc across all the slats.

Cut out the curved ends with a bandsaw. Sand or scrape each sawn edge and sand the faces through 150-grit before rounding the edges.

Assemble all the parts

You are ready to start putting the chair together. Stainless-steel screws (countersunk) and carriage bolts eliminate the need for glue. Start the assembly by screwing the stretcher to the front end of each side piece. With the stretcher mounted, add the lower back-slat cradle to give some rigidity to the subassembly.

Now, on each side piece, mark a line 5¼ in. from the front face of the stretcher. Elevate the stretcher until the back ends are flat on the work surface. Then place a leg against the side piece, and use a square to make sure it is square to the work surface and on your mark. Add a clamp to make sure it won't inadvertently shift out of position as you drill a pair of ⅜-in.-dia. holes through the legs and sides. Bolt the leg in place, then attach the other leg.

With the legs safely at first base, the back assembly is now at bat. At a point 4 in. from the back end of the side, clamp a riser to a side piece. Check for square with the work surface, then drill the holes and add the bolts. Follow the same procedure for the second riser.

The upper cradle is next. Position the cradle so that its back edge is set back ¼ in. from the back edges of the risers. Measure and drill for a pair of shank holes at each end of the upper cradle.

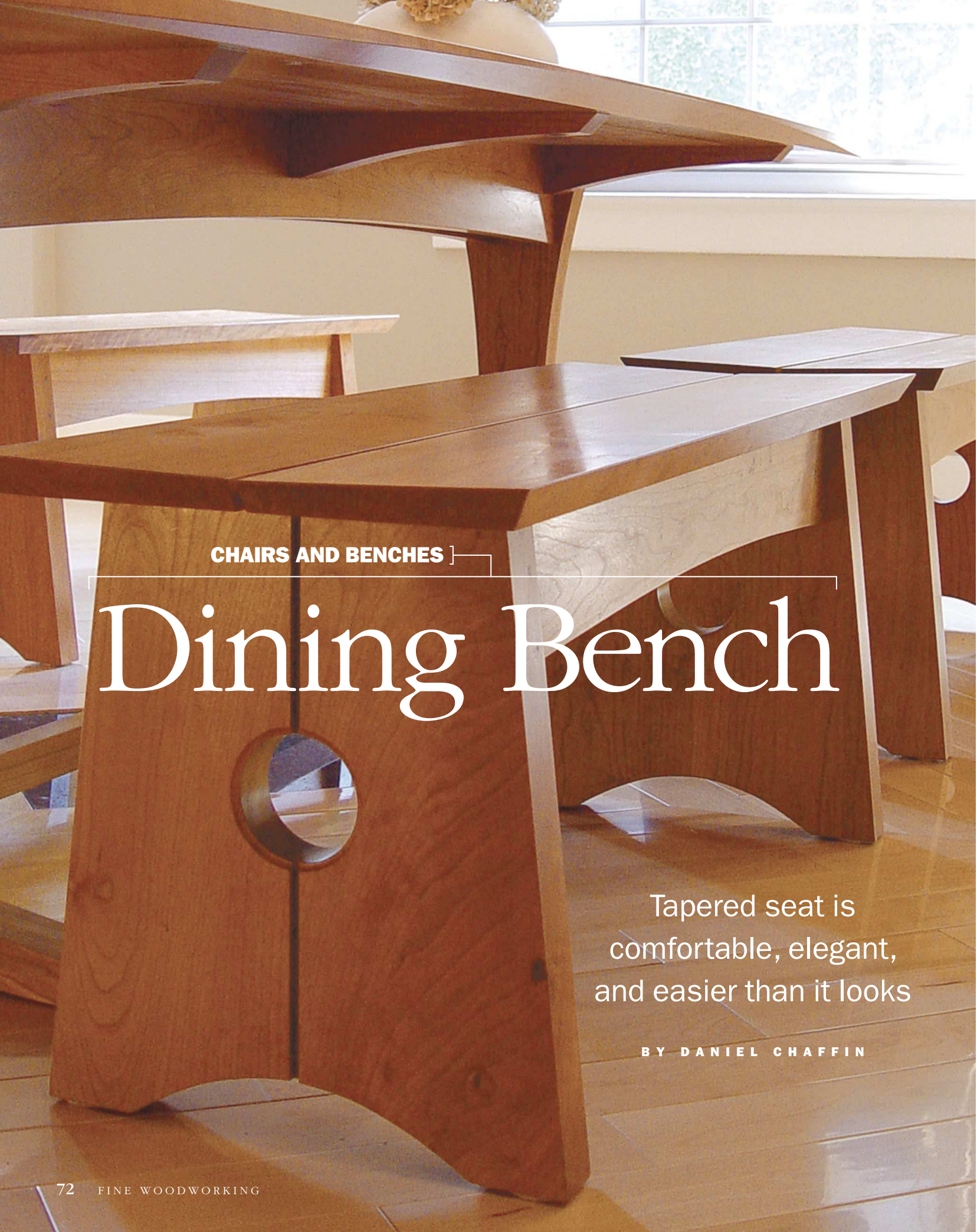
After you attach the upper cradle, add the arms, as it becomes a chore to attach them once the back slats are in place. Position each arm so that the notch fits around the riser, and screw through the riser and arm-support block.

The back slats are attached to the lower and upper cradles. I attach the center slat first, then move to the two outside slats and work inward. Before drilling the shank holes, it is important to align them from left to right, up and down, and keep the spacing even to maintain a nice curve on the bottom and the top.

Seat slats are the final step. *The seven slats are attached at each end. The ⅜-in. spacers between each slat make placement a snap.*

Give the entire project a quick once-over with 150-grit sandpaper, and break any sharp edges. You can leave the chair unfinished and let it weather naturally. Or, three coats of spar varnish provide a finish that will hold up well in an outdoor environment. A fresh coat every couple of years should keep the chair happy and fit for decades to come. □

Tom Begnal is a woodworker in Kent, Conn.



CHAIRS AND BENCHES

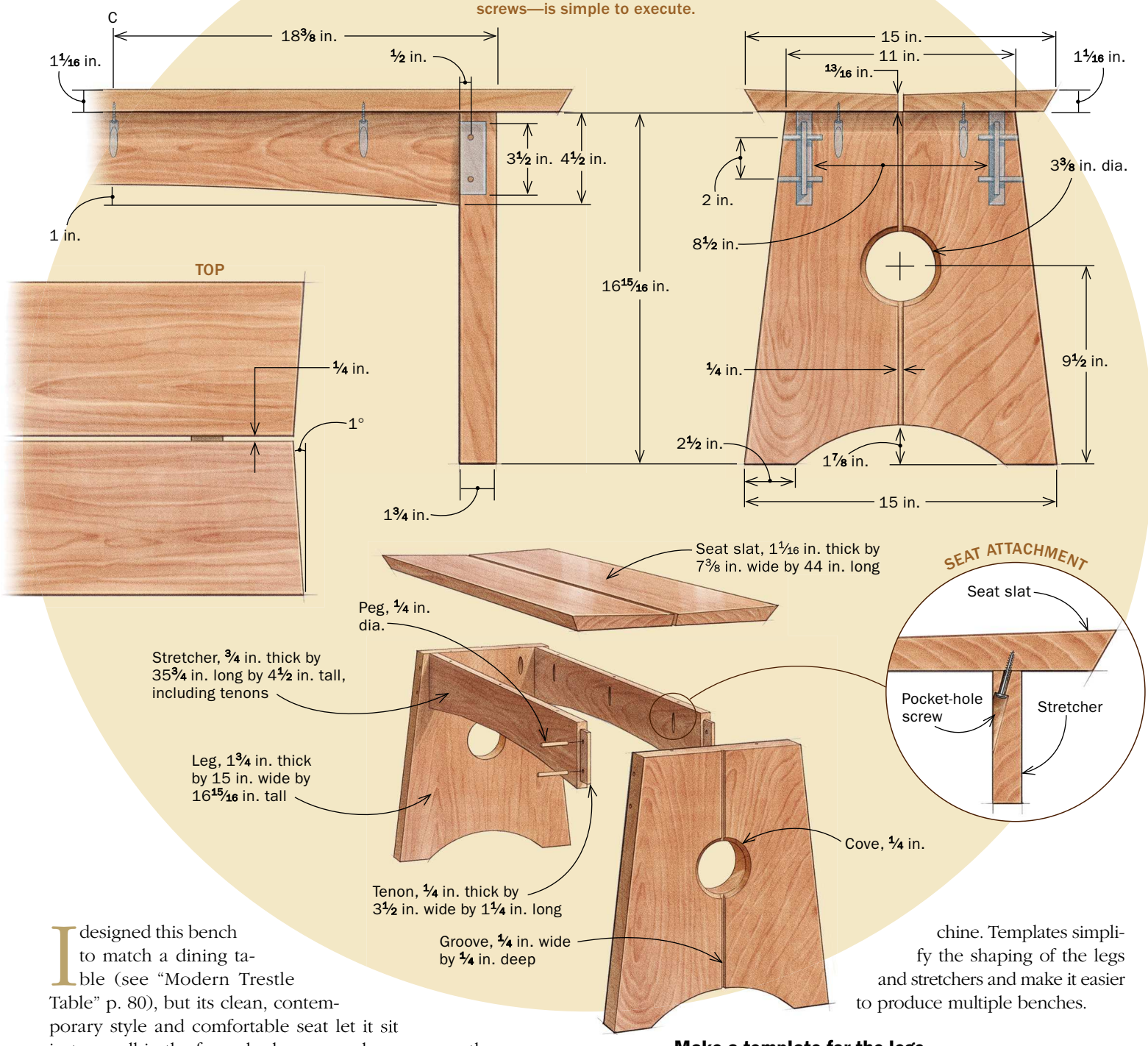
Dining Bench

Tapered seat is comfortable, elegant, and easier than it looks

BY DANIEL CHAFFIN

BUILD IT IN A WEEKEND

Aside from the mortise-and-tenon joints, everything else—from tapers, grooves, and bevels to pocket screws—is simple to execute.



I designed this bench to match a dining table (see "Modern Trestle Table" p. 80), but its clean, contemporary style and comfortable seat let it sit just as well in the foyer, bedroom, mudroom, or on the front porch. It even works under a tree in the backyard, if made with exterior woods and finishes.

The slight taper on the tops of the seat slats complements their beveled edges. The legs, which are glued up from two boards, have a routed groove that both hides the glueline and ties the legs to the spaced seat slats. The legs also are arched along the bottom, a detail repeated on the stretchers.

These design details seem difficult, but they are surprisingly straightforward. Tapering the seat slats would be tough by hand, but I'll show you how a simple stick turns a planer into a tapering machine. Templates simplify the shaping of the legs and stretchers and make it easier to produce multiple benches.

Make a template for the legs

You could make the legs from a single 15-in.-wide board, but few people have a jointer and planer wide enough to handle it. I recommend using two narrower boards for each leg.

Leave some extra width on the boards. That will help keep the glueline centered so it will be hidden by the routed groove. Keep the boards a bit long as well, so there's room to adjust them for the best grain match. After gluing the boards together, joint one edge and rip the leg to width, keeping the glueline centered.

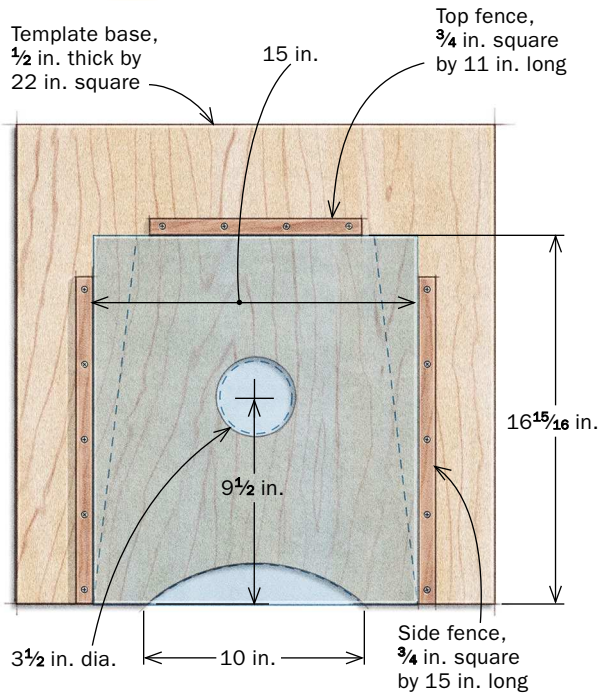
Making a template for the legs is time well spent. A Forstner bit large enough to cut the hole in the leg will leave tearout on the

Photo, opposite page: Matthew Frederick; drawings: John Hartman

A template makes quick work of the legs

This template not only helps lay out the arc and hole before roughing them out, but it also works as a guide for your router, ensuring that both legs are the same and that the hole and arc are accurate and clean.

1 MAKE THE TEMPLATE



***Attach three fences**—one for the top and two for the sides—to align the legs in the template so that they're marked and routed consistently. After attaching the first two, place the leg blank against them, and use it to align the third.*

2 REMOVE THE WASTE BEFORE ROUTING

Place the leg blank in the template, and trace the arc and circle onto its inside face. Cut the waste from the arc, leaving about 1/16 in. to be routed away. For the hole, Chaffin uses a 3¼-in. Forstner bit, which leaves about ⅛ in. of waste. Any tearout on the outside is removed by the router.

walls of the hole. The template allows you to drill the hole undersize and rout it to finished diameter with a spiral bit, leaving a smooth surface.

I guide the spiral bit with a bushing, so the hole in the template needs to be 3½ in. dia. to account for the offset and create a 3⅜-in.-dia. hole. The arc, on the other hand, is made with a bearing-guided, flush-trimming bit, so it should be actual size on the template. To draw the arc, use a ⅛-in.-thick batten made from quartersawn lumber. Register the ends of the batten against two small clamps, push it to its apex, and trace the arc.

Remove the waste at the bandsaw. Smooth the cut by sanding to the line. Bore the hole at the drill press and attach the fences.

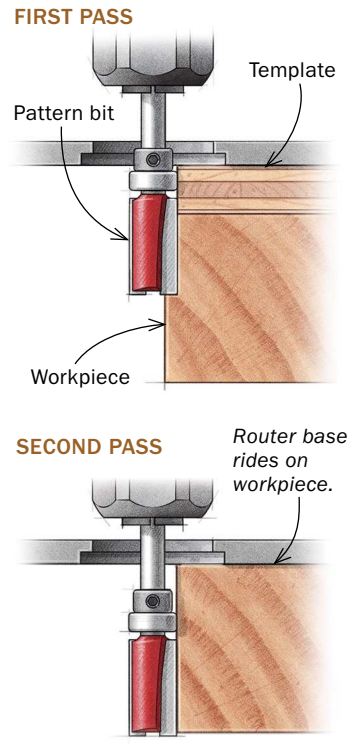
Put that template to work

Use the template to mark the arc and hole on your leg stock. Then bandsaw and drill out the waste. Put the leg back in the template and secure it to the bench—I use holdfasts. There's no need for double-faced tape, because the three fences and clamping pressure hold the leg in place. Rout the arc and hole to final size.

I clean up the routed surfaces with a card scraper—using a narrow one for the hole—and sandpaper. While you

Photos, except where noted: Matt Kenney

3 ROUT THE ARC AND CIRCLE



Rout the arc. *Because the legs are 1¾ in. thick, it takes two passes with a pattern bit to rout the arc flush. On the first pass, the bearing rides against the template. For the second pass, remove the template and register the bearing against the routed surface (see drawings above).*

have the router out, rout the cove detail on the show sides of the holes and then groove the center of the legs. Now mortise the legs. I do this before tapering them because I use a hollow-chisel mortiser to cut them, and I want square edges to register against its fence. A router and edge guide would also work.

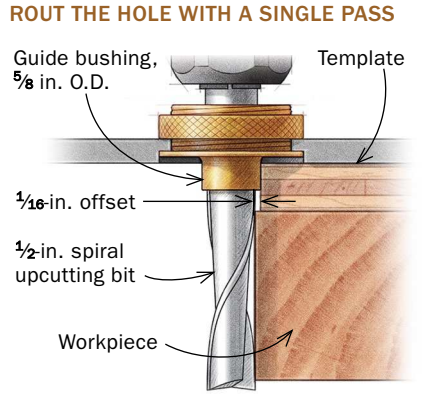
After all the mortises are cut, lay out the leg tapers with a straightedge and cut close to the lines at the bandsaw. Clean up the cuts with a smoothing plane. Mark the arc on the stretchers. I make a plywood template, using a batten to lay out the arc, so that they're the same. Cut the tenons and trim them to fit. Then cut the arc at the bandsaw and clean it up with a spokeshave.

Simple stick tapers seat

Nearly every surface on the seat slats is beveled or tapered, and it's important to cut them in the right order. First, taper the slats' thickness. Then cut the compound angles on the ends. Finally, bevel the outside edges.

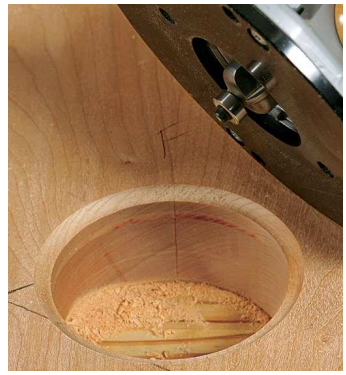
I've tapered the seat slats across their width with a handplane, but it took forever. I've also used an elaborate sled for my planer. Every taper I cut with it had to be fixed with a handplane, so I rethought my approach and came up with a simple solution—so simple, I wonder how I could have missed it earlier.

All you need so that your planer will make this cut time after time is a stick that lifts the inside edge of the slat higher than the outside edge. Ironically, the stick I use is an offcut from the elaborate sled. Attach the stick to the bottom of the



Rout the hole. *A 2-in.-long spiral bit cuts end grain and long grain cleanly, and is long enough to trim the walls in one pass.*

Finishing touches



Cove the edge. *A ¼-in. bearing-guided cove bit routs a nice detail on the outside edge of the hole.*

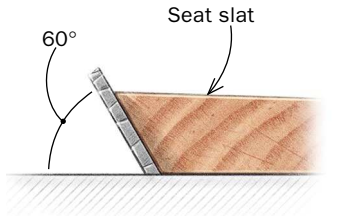
Groove the glueline. *Use a ¼-in. straight bit to rout a ¼-in.-deep groove over the glueline.*

Taper and bevel the seat

A flat seat isn't comfortable. Taper the slats across their widths so that they are thinner on the inside edge than the outside.

Taper first

Bevel second



Ends get a compound angle. *With the blade tilted to 60° and the miter gauge at 89°, crosscut the slat to length. The outside edge should be against the fence. For the second cut, move the miter gauge to the other side of the table and turn the board over.*

Edges last. *Leave the blade at 60° and bevel the outside edge of the seat slat.*

TIP

A SIMPLE TRICK FOR BIG TAPERS

All you need to taper the seat slats is a ¼-in.- square stick. Attach it to the inside edge of the slat with double-faced tape (below). Chaffin puts cross-hatching on the board to gauge his progress (above).

slat on the inside edge with double-faced tape, and use a pencil to mark lines over its face. When the last bit of pencil has been removed, you're done. It's that simple.

With the ends still square, clamp the slat between benchdogs and plane all the surfaces smooth.

Tilt the tablesaw blade to 60°, adjust the miter-gauge fence to 89°, and crosscut the slats. Move the gauge to the other side of the table and flip the board onto its other face to cut the second end. With the blade still at 60°, bevel the outside of each slat.

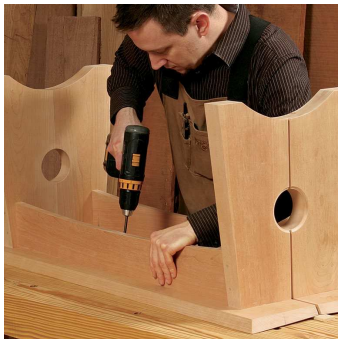
Prep all the surfaces for finishing now. If you wait until after assembly, you'll find places that you can't get at well enough to do a good job, like between the stretchers. I use a smoothing plane and break the edges with a block plane. Because cherry is prone to blotching, I lightly sand all the parts

Assembly is straightforward

With only four joints, assembly isn't tough. Glue the base together, then peg the joints.

Glue the stretchers to the legs. *Spread glue on the tenons and tap them home. Scrape away the squeeze-out when the glue starts to gel, but leave the clamps on for a few hours.*

Peg the joints. *Saw off the waste, and use a sharp block plane to bring them flush.*



Add the seat. *Secure the top with pocket-hole screws. Note the ¼-in.-thick spacer on the bench keeping the tapered slats flat against the legs.*

with 320- or 400-grit sandpaper so that it absorbs the oil finish more evenly.

Assemble and finish the bench

I use pocket screws—located on the inside of the stretchers and legs—to attach the seat slats. Cut the pocket holes before assembling the bench.

Begin the assembly by gluing and clamping the stretchers and legs together, making sure that their top edges stay aligned. Let the glue set for a few hours and then drill holes for the pegs that pin the tenons. I make cherry pegs with a dowel plate, but you also can buy them. Don't use much glue on the pegs. They're a tight fit in the holes, and the pressure created when you drive them in could force glue out through the faces of the legs. Cut the pegs close and plane them flush. Now place the slats on top of the legs, aligning their inside edges with the groove cut into the legs. Drive in the pocket screws and you're ready to finish the bench.

You can build this bench in a weekend, but the finishing might take longer. I applied three thin coats of Tried and True varnish oil, wiping away excess oil after an hour. Allow plenty of time for each coat to dry before applying the next. In Kentucky, that can mean four days between coats in the summer, less in the winter. Buff the first coat with 0000 steel wool, and the last two with a soft cloth. Top it off with a coat of paste wax. □

Daniel Chaffin is a professional furniture designer and maker in Louisville, Ky.

Oil finish for warmth. *Three coats of a linseed oil/varnish finish brings out the natural color of cherry, and protects the seat.*

Dining Tables

Modern Trestle Table

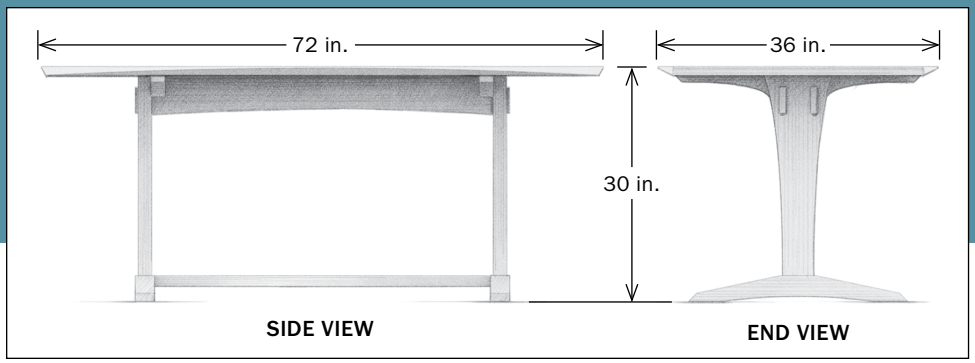
Graceful edge highlights clean lines

BY DANIEL CHAFFIN

This table, designed to go with the bench on pp. 72-77, has traditional roots with a modern feel. Its most distinctive feature is the top's gently curved edges, which seem to vary in thickness. What's surprising about the effect is that even though it looks complex, it's very easy to create. I'll show you how. I'll also demonstrate how to make the trestle base using a hollow-chisel mortiser, an invaluable tool. If you don't have one, you can certainly use other mortising methods.

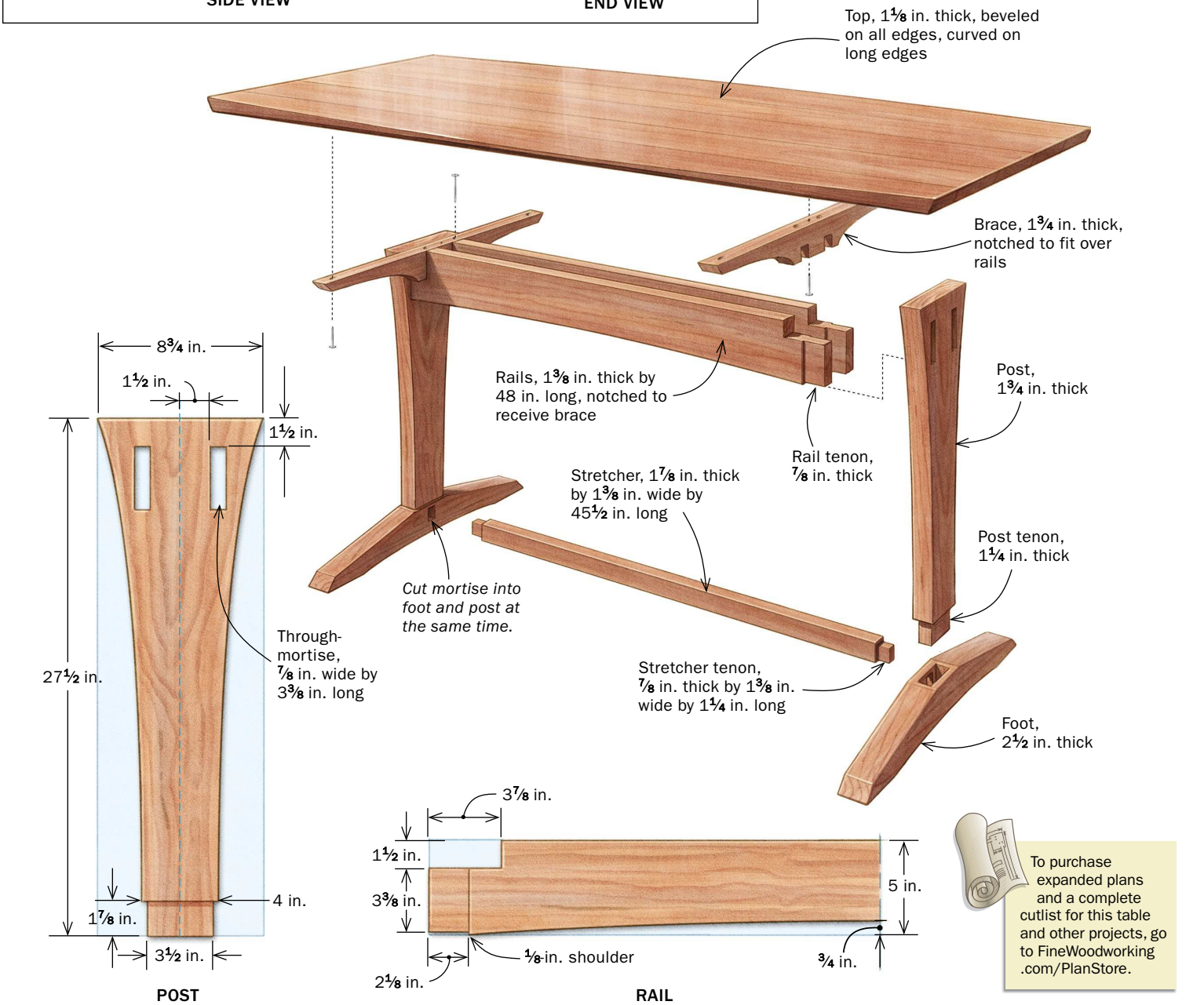
I use a sliding tablesaw and shaper, but you can use a crosscut sled (or miter gauge) and router table instead. Although I know most home woodworkers

Photos, except where noted: Matt Kenney; this page: Matt Frederick



A CONTEMPORARY TURN ON A DOWN-HOME CLASSIC

A perfect combination of practicality and beauty make this a breakfast table that can find a place in any home. Expand it a bit, and it works just as well for dining.



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

Drawings: John Hartman

Cut the joinery while parts are square

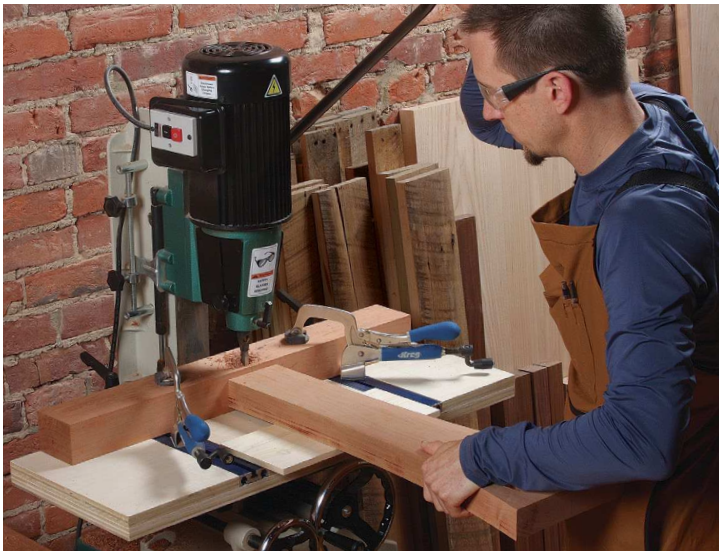
The base is held together by mortise-and-tenon joints and lap joints, which are very difficult to cut on curved parts. So tackle them before you do any shaping.

Add a bigger table to your mortiser. *If yours has a moving table, bolt this one down. If not, it will need to slide. With its hold-down clamps, the auxiliary table allows you to mortise oversize parts.*

GET CREATIVE WITH YOUR MORTISER

Big parts and big mortises will challenge the limits of any mortiser, but using an auxiliary table and a smaller bit makes them easy.

Outside rows first. *Use a bit that's less than half the mortise's width. Because these are through-mortises, you can finish with a single cut at each end to remove the waste between rows. Use a backer board so that you don't ruin your auxiliary table.*



Different deal for the stretcher mortise. *This one goes partway through the post tenon, so you need the post and foot to be dry-fitted when cutting it.*

don't have commercial and industrial tools like these, the truth is when you make furniture for a living as I do, you cannot compromise on machinery. These machines have features (like the mortiser's X-Y table) that allow me to work more efficiently.

In terms of construction, this table is identical to the one shown in the bench article, but it is smaller. That version was sized for a dining room and could fit two benches on a side; this one is the right size for a breakfast table and fits one bench per side.

The base is a lesson in big mortises

Except for the stretcher, every part of the base has a curve on it. If you shape these parts first, you'll lose the straight and square edges needed to cut the joinery. So cut the joints first.

Start with the mortises, which present a few problems. First, they are all at least ⅞ in. wide. Second, the posts are too wide to fit between a mortiser's fence and clamp. The solution to the first problem is to use a narrow bit (5⁄16 in. or ⅜ in.) and cut along the outside walls first, then go back and remove the waste in the middle. For larger parts, take off your mortiser's clamp and replace it with a large plywood auxiliary table. Mine has two T-tracks, so I can use hold-down clamps to secure parts for mortising.

If your mortiser doesn't have a sliding table, then don't bolt the auxiliary fence to the mortiser's table. Instead, leave it unclamped so that you can move it between cuts and adjust the fence. There is one mortise that you can't cut now. It's on the inside edge of the foot and goes partway through the tenon on the bottom of the post. You'll cut it after dry-fitting the tenon into the foot.

Compared to the mortises, the tenons are a breeze. I cut them with a dado set and miter gauge (with auxiliary fence) on my

STOPS ARE THE SECRET TO ACCURATE LAP JOINTS

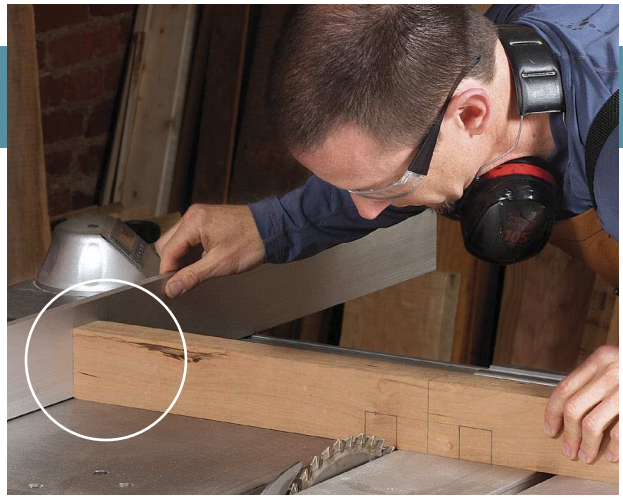
The outside edges of a lap joint are critical. Get them wrong and the joint will be too tight, or—much worse—sloppy with visible gaps.

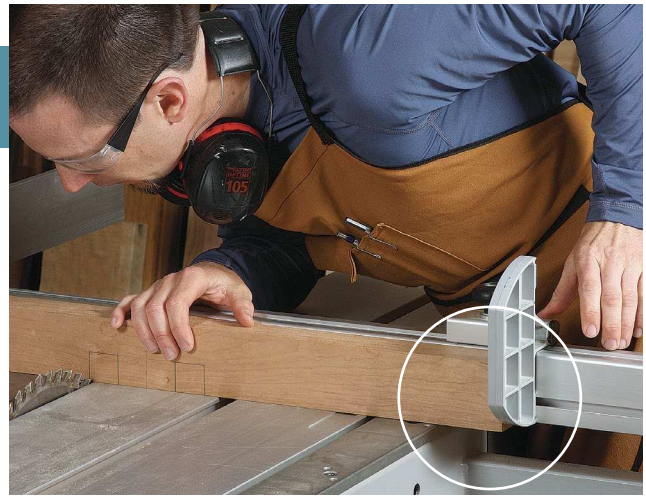
One stop for the notch in the rail. *Use the rip fence as a stop to control the notch's width. Cut the shoulder first, and then remove the waste with a series of cuts.*

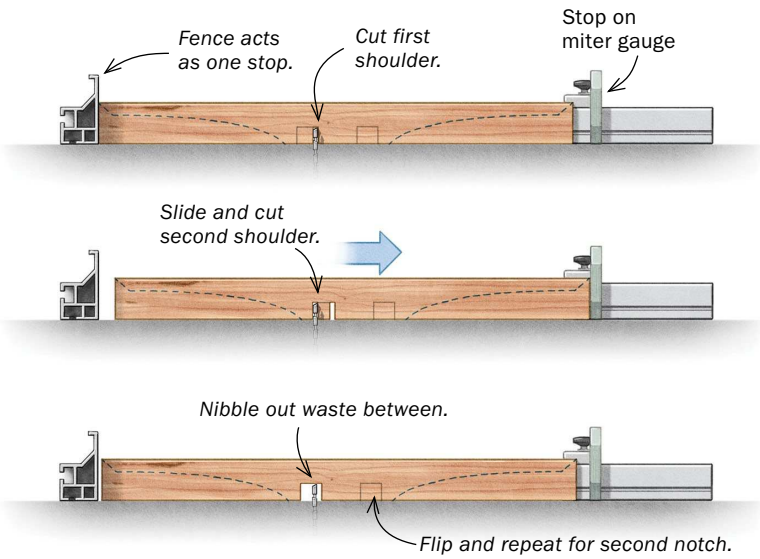
Mark the braces. *After dry-fitting the rails between the posts, set the brace in the notches, aligning its centerline with the post's. Mark the shoulders of both notches with a fine pencil as shown. Then turn the brace over to mark the notches' depth.*

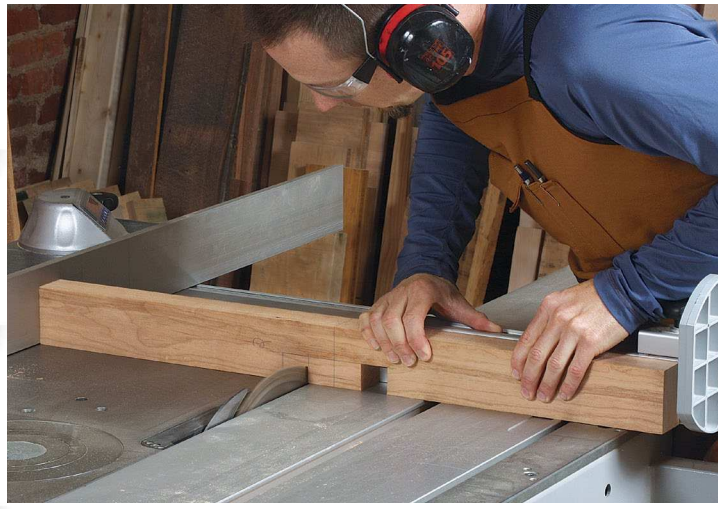
TWO STOPS NEEDED FOR THE BRACES

The rip fence locates the brace for the inside shoulder (left photo), and a stop block locates it for the outside shoulder (right). Then just flip the workpiece to cut the second notch.









Nibble out the waste. *Cut the two shoulders first. Again, you can remove the waste with a series of cuts.*

Shape the foot at the bandsaw. *Cut the curve on the bottom and the tapers on the top.*

tablesaw. Because this is not a through-cut, you can use your rip fence as a stop to control the tenon's length. All of the wide cheeks can be cut with a single setup. Then, after a quick blade-height adjustment, all of the narrow edge cheeks can be cut. After fitting the tenons, dry-fit the post into the foot and cut that last mortise.

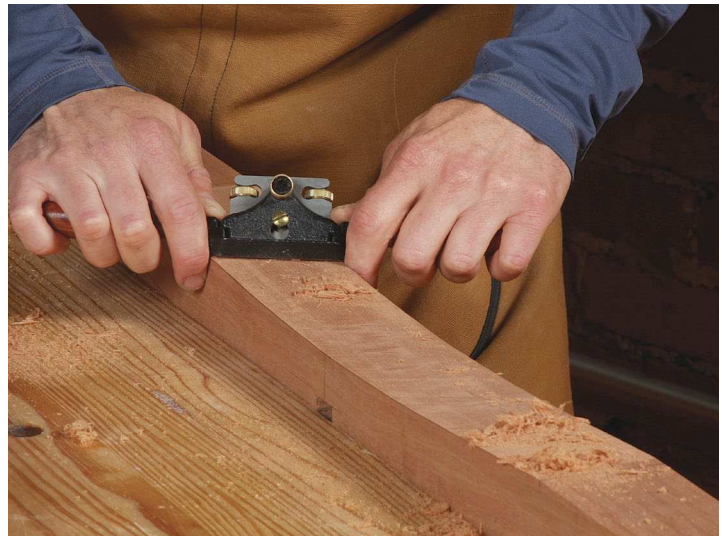
Next up are the lap joints that attach the support braces to the rails. Cut the notches on the rails at the tablesaw. These are one-sided notches; the second side is created by the post when the joint is assembled. Dry-assemble the posts and rails and slide the braces into the notches. Use a sharp pencil to lay out the notches on the braces, and then cut them at the tablesaw.

Shape the parts before assembly

After all the joinery has been cut, start cutting the curves. For the posts, rails, and support braces, I use a template to lay out the curve. I rough out the part on the bandsaw, and rout it flush to the template. I bevel the ends of the feet and support braces with a chopsaw followed by a block plane. But the feet are too thick to rout in a single pass, so I rough out the curves at the bandsaw and use a spokeshave to clean up the cut. I cut the tapers on the top edges of the feet at the bandsaw, too, cleaning up with a jack plane.

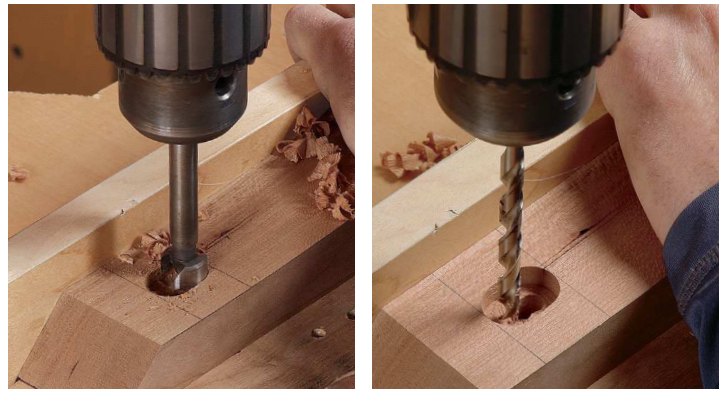
Shape the parts with power and hand

For shorter curves or tapers, it is faster to go straight from the bandsaw to hand tools. For bigger jobs, it makes sense to jig up.



Clean up with hand tools. *A spokeshave or card scraper works great on the curved bottom. Use a handplane on the tapers.*

Flush-rout the posts. *After roughing out the curves at the bandsaw, screw the post to a post template. Chaffin uses a shaper for the job, but a router table and a bearing-guided bit work, too.*



Drill slotted holes for screws. *The screws attach the top to the base. Start with the counterbore, slightly overlapping three holes (left). Then drill the clearance hole the same way (right).*

Glue up the base

There's no easy way to clamp the entire base at once, so work in stages, sacrificing a bit of time for less stress and better results.

Posts first. *To minimize the chance that glue will get into the stretcher mortise, don't put glue on the tenon. Brush it on all four walls of the mortise instead. After inserting the post, check the stretcher mortise for glue. Do both posts, and let them dry.*

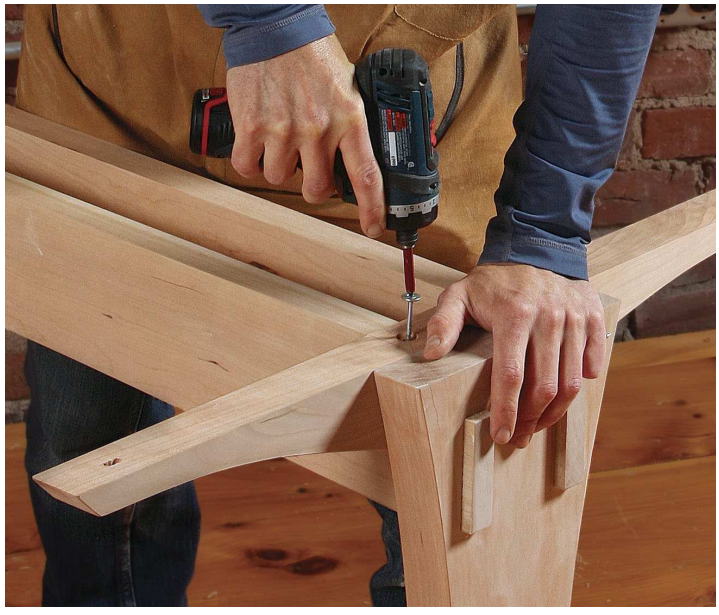
Add the rails and stretcher. *Raise the bottom post off the floor to create clearance for clamps. Again, let the assembly dry before moving on.*

At this point, drill holes in the support braces for the screws that attach the top to the base and the braces to the rails. To accommodate the top's seasonal movement, slot the holes at both ends of the braces. I overlap three Forstner bit holes to create the slotted counterbore and three brad-point bit holes to make the slotted clearance hole. Use a small file to clean up the slots.

Prepare all of the parts for finishing, sanding through 320-grit and easing the edges. Now glue up the base. Start by gluing the post into the foot. After the glue is dry, glue the stretcher and rails between the posts. Finally, glue the braces to the rails, and drive the screws into the joint (see photo, right).

Edge profiles on the top

With the base assembled, turn your attention to the top. After gluing up the boards to make it, the top should be 36½ in. wide and a few inches too long. To get the side profile correct, you must first cut the top to length. The ends are beveled, and it's easiest to cut the top to length and bevel the ends at the same time. The top is too big to do this on a tablesaw, so use a circular saw and straightedge. Tilt the saw's blade to 30° and cut one end. Move



Glue and screw the braces. *There is no easy way to clamp the braces. Screws hold them in place while the glue is drying and reinforce the joint after it has dried.*

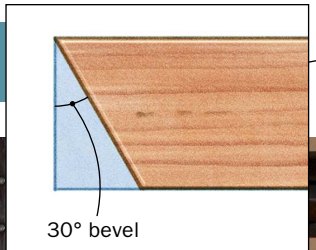
The top gets an elegant edge profile

Two simple edge treatments—a bevel and an arc—combine to create a unique detail along the sides.

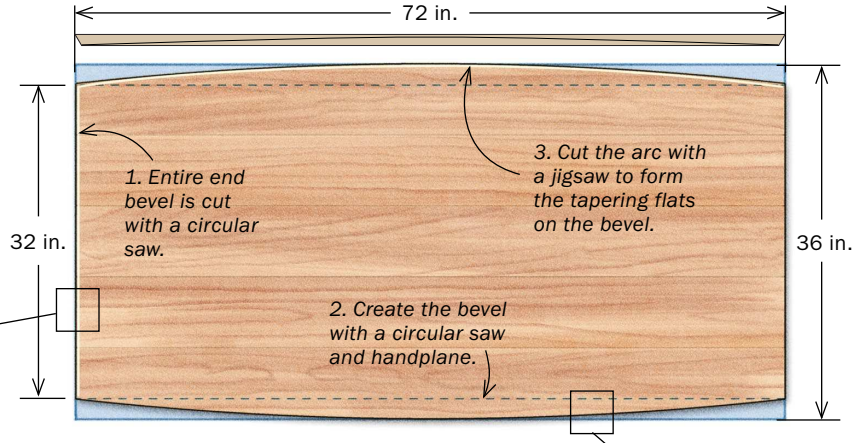
BEVELS FIRST

Track saws are great for these cuts, but if you don't have one, just make a plywood straightedge for your circular saw.

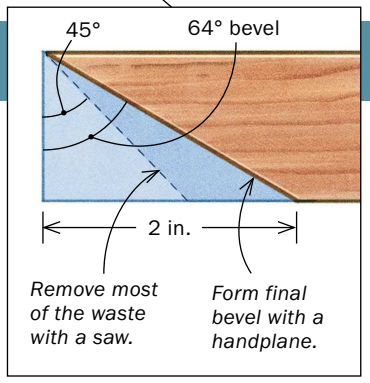
BEVEL TABLE ENDS FIRST



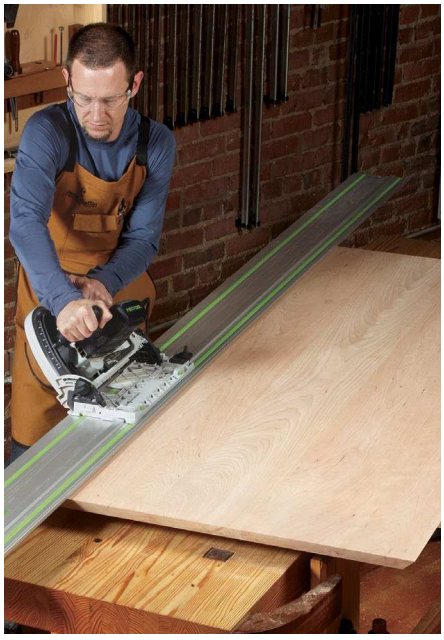
One cut does it. *Tilt the saw to 30° and try not to wobble.*



BEVEL THE TABLE SIDES IN TWO STEPS



Lay out the bevel. *Set your bevel gauge to 60°. When you lay it on the angled end grain, it creates a bevel that's 64° to the top.*



Two tools do the job. *Start with a circular saw (or tablesaw) tilted to 45° (left). Then use a jack plane or jointer plane to complete the bevel, working down to your layout lines (right).*

Use a batten to lay out the curve. *At the ends of the board, the arc aligns with the inside edge of the bevel. In the middle, it touches the outside edge of the top.*

NOW THE CURVE

Cut the curve and clean it up. *Use a jigsaw with the blade set at 90° (left). Because jigsaws can create severe tearout, cut at least 1/16 in. away from the layout line. Clean up the sawn edge with a block plane (above).*

to the other end of the top and cut it to final length. Clean the bevels with a block plane, and sand them to 320-grit.

The edge profile on the sides is created with a two-step process. You'll bevel the straight edge first and then cut a gentle arc into it. Because it's a 64° bevel, you can't cut it completely with the circular saw, so cut a 45° bevel along the edge, and then use a jack plane to remove the remaining material. Next, lay out the arc with a long, ¼-in.-thick batten. At the centerpoint of the table, the arc should pass through a point ¼ in. from the edge. Rough out the arc with a jigsaw, with the blade set at 90°. Use a block plane to smooth the cut and work down to the layout line. Sand the edge and the rest of the top, too.

The table is now ready for a finish. I use Tried and True varnish oil: three coats for the base and five for the top. Apply very thin coats, allowing them to dry for an hour before wiping off any excess. Then, let each coat dry for one to three days. After the first coat has dried, work the surface with 0000 steel wool. Replace the steel wool with a cotton cloth, buffing between the remaining coats. □

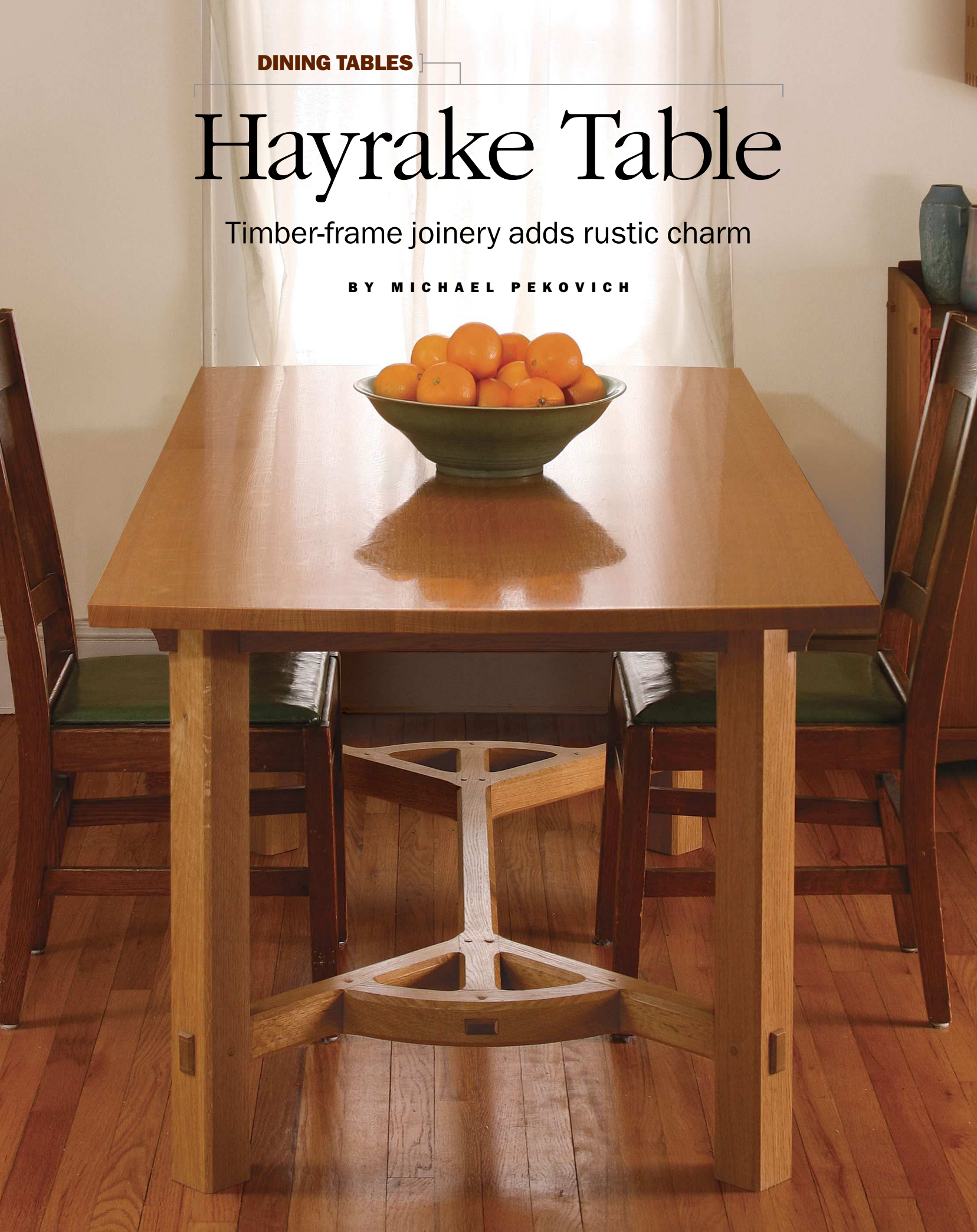
Attach the top. *The holes at both ends of the brace are elongated to allow for seasonal movement. The one in the center is not. Chaffin uses 1¼-in.-long FastCap PowerHead screws.*

Dan Chaffin is a professional furniture maker in Louisville, Ky.

Hayrake Table

Timber-frame joinery adds rustic charm

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.

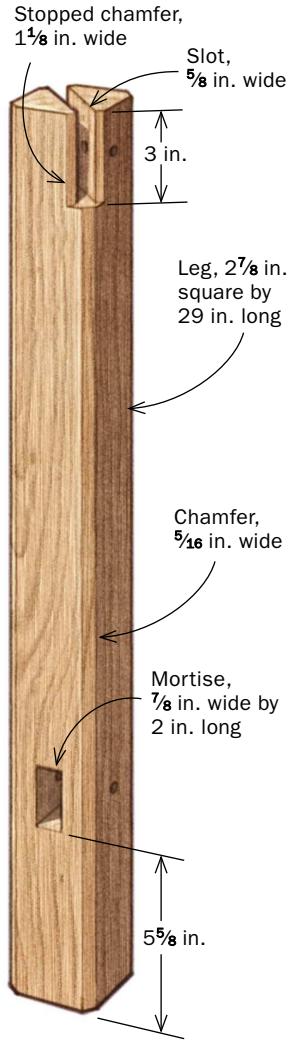
Another distinctive feature of the table, though it may not be apparent at first, is the orientation of the legs. They're at 45° instead of parallel to the edges of the tabletop. This makes the joinery to the hayrake stretcher simple—just a single through-mortise. Things get a little more interesting 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

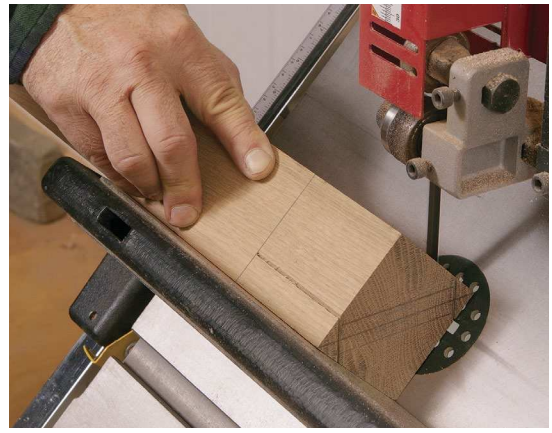
The base of this white-oak table requires 12/4 stock. If you can find it, buy riftsawn stock for straight grain lines on all the faces. If you can't find these massive

Start with the legs

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

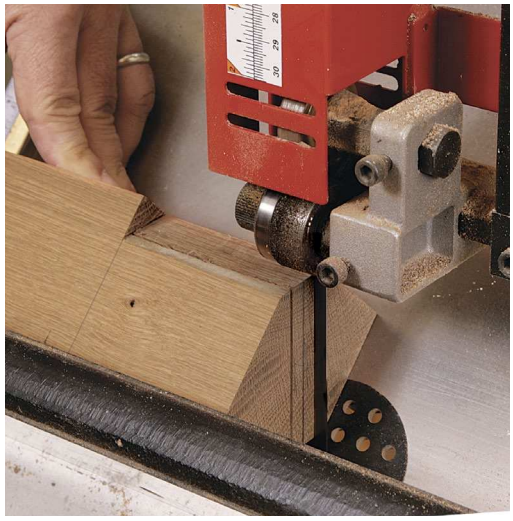


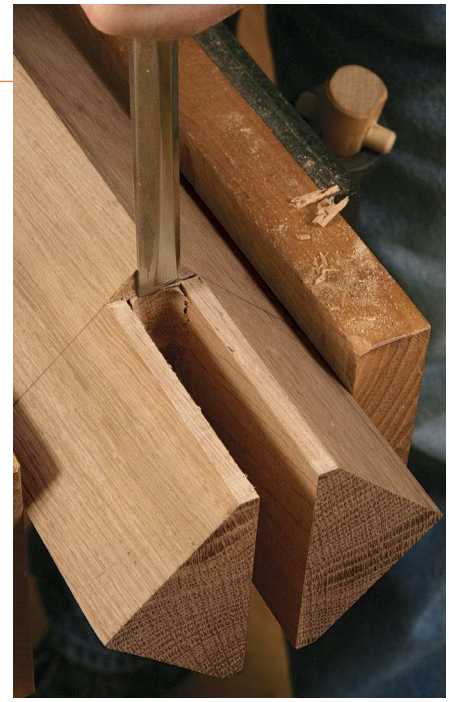
CUT THE STOPPED CHAMFER



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.*

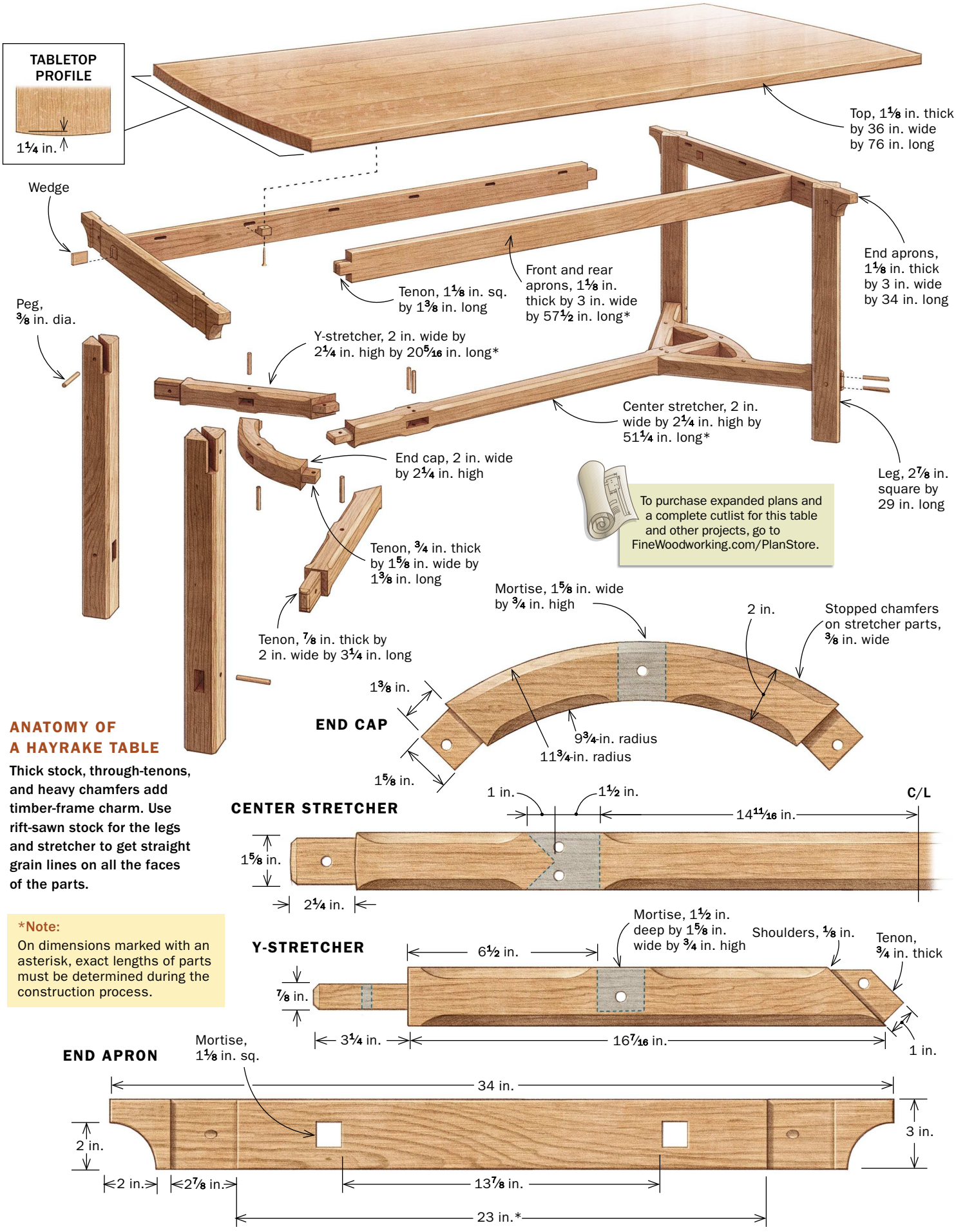
THEN THE SLOT





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).*

Photos, this page: Mark Schofield; facing page: Michael Pekovich



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.

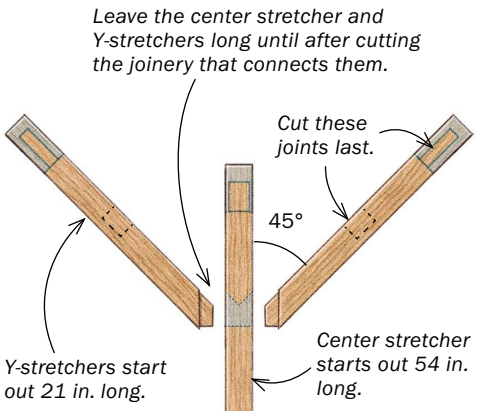
***Note:**
On dimensions marked with an asterisk, exact lengths of parts must be determined during the construction process.

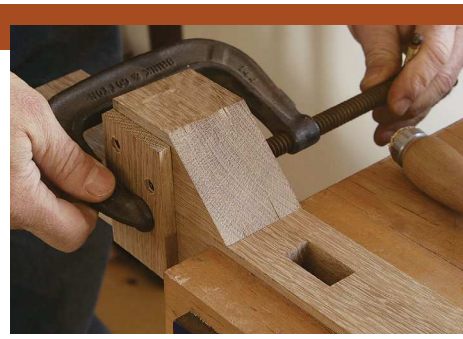
Drawings: John Hartman

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.

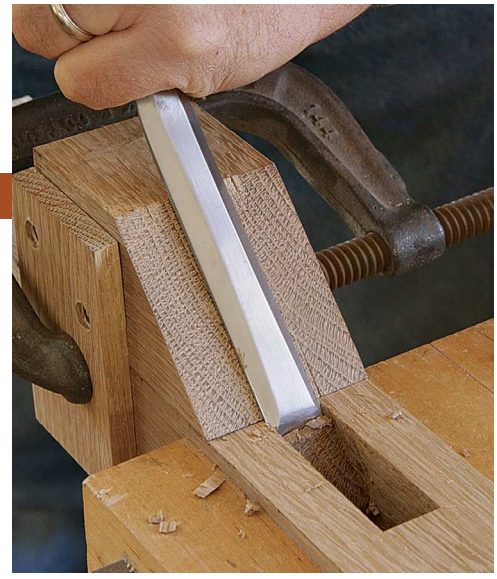
1. JOIN THE Y





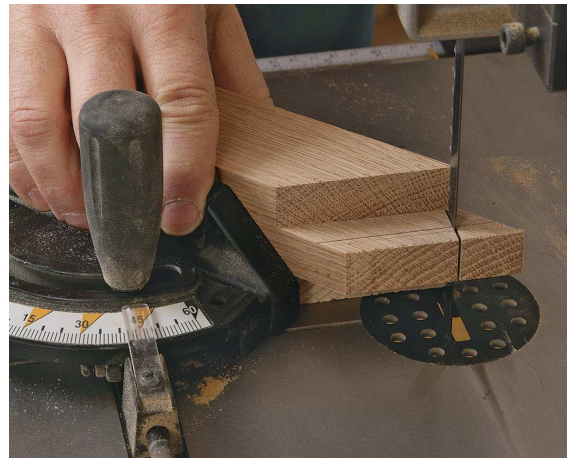
MAKE THE ANGLED MORTISES

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).



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.



planks, you can get by with 8/4. Here's how. Reduce the thickness of the hayrake stretcher parts just ⅛ in., to 1⅞ in., and glue up the 2⅞-in.-thick leg stock from two 1½-in.-thick layers. Make sure the layers are flatsawn 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

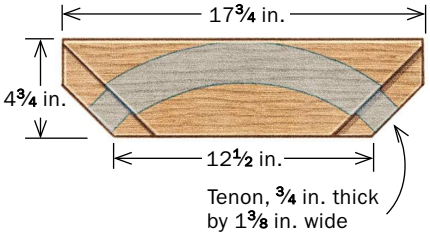
The lower stretcher system is where the fun begins. The curved and angled parts look daunting, but if you tackle the joinery one step at a time, it's really not that tough. The curved end cap actually simplifies the

Photos, except where noted: Rachel Barclay

Hayrake stretcher continued

2. END CAP: CUT THE TENONS BEFORE THE CURVES

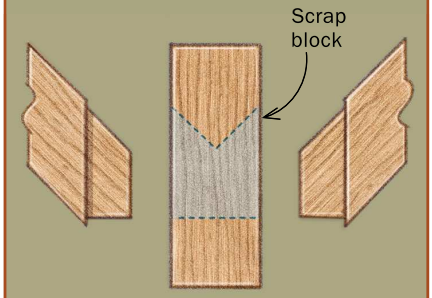
The end cap starts as a block with mitered ends. All of the joinery is cut at 45° angles, which the tablesaw and bandsaw handle easily.

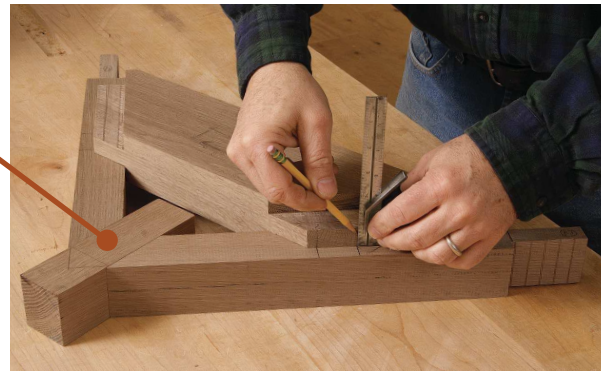


More angled shoulders. *Start by mitering the ends of the end cap on the tablesaw using the same sled that you used for the Y-stretcher ends. This will ensure an exact angle match between all of the joints. Then cut the tenon cheeks with a dado blade as before (right).*

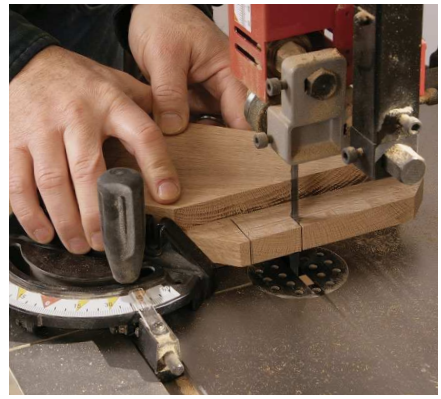
SCRAP BLOCK IS THE SECRET

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.*



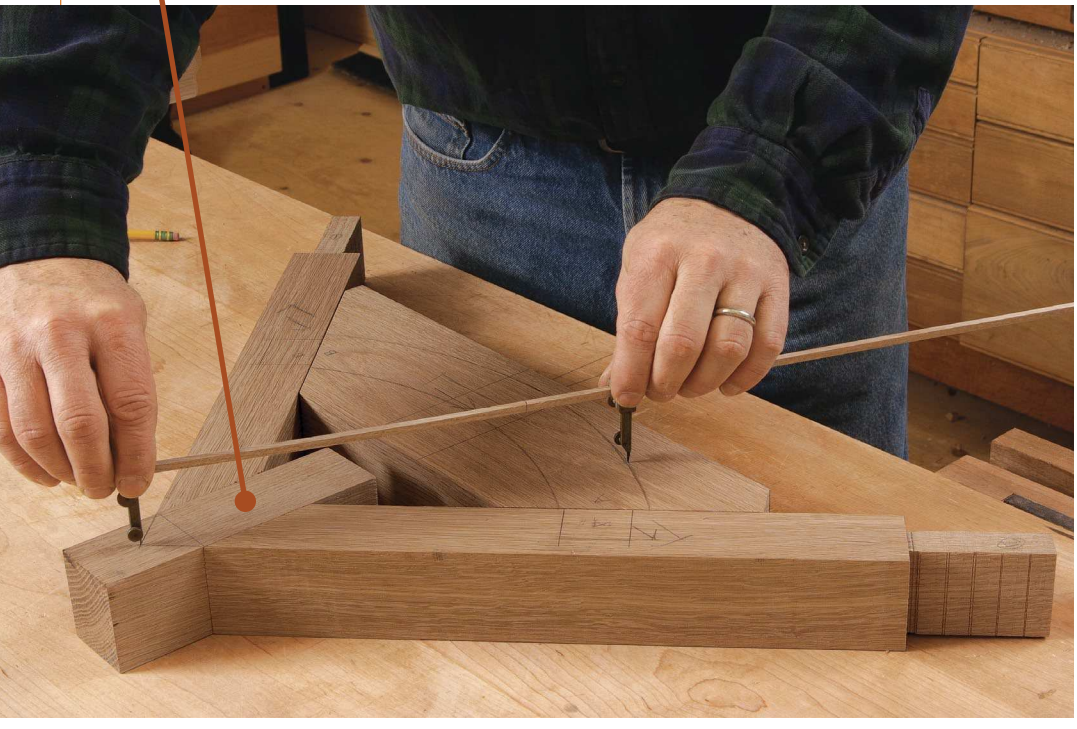
Cut the tenon ends on the bandsaw. *Use a miter gauge to guide the workpiece, flipping it backward in its slot.*

joinery. It allows you to cut mortises in the angled Y-stretchers at 90° instead of 45°.

The first task is to join the Y-stretchers to the center stretcher. The ends eventually will be tenoned to fit the end caps, but leave the stretcher long for now, taking all measurements from its midpoint. Start by cutting the through-mortises, noting that one shoulder on each side is cut at 45° to receive the diagonal stretchers. Cut a simple through-mortise, then chop the angled shoulder with a chisel as shown on p. 91.

With the mortises done, tenon the Y-stretchers as shown on p. 91. Finally, use a backsaw to cut the tenon ends and clean them up with a block plane.

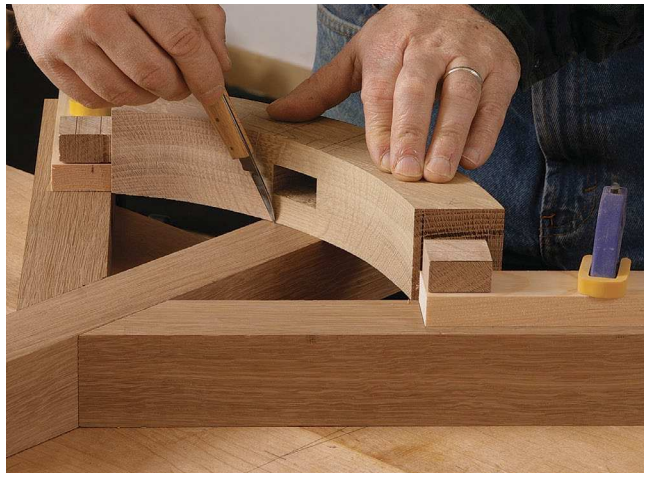
With the angled tenons done, it's quick work to cut the stretchers to length and



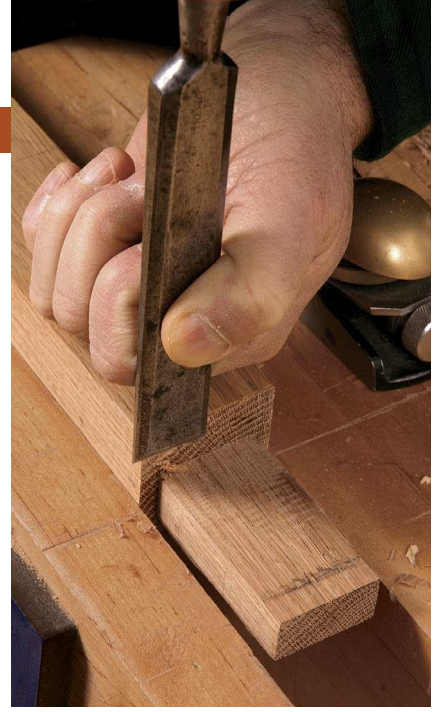
Now cut the curve. *Dry-fit the end cap to the assembly and lay out its curves (left). After sawing out the center of the end cap so you can mortise for the center stretcher tenon, cut the curves on the bandsaw (above).*

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 pegs 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 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.

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.*

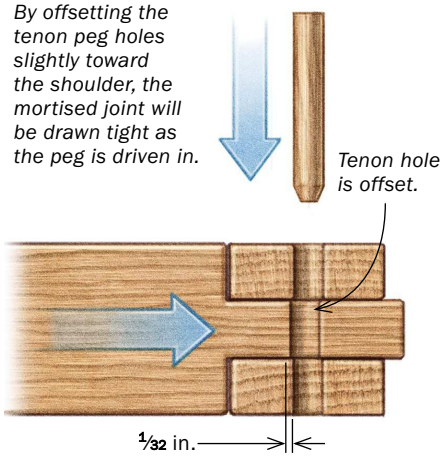
Smart methods for thick chamfers

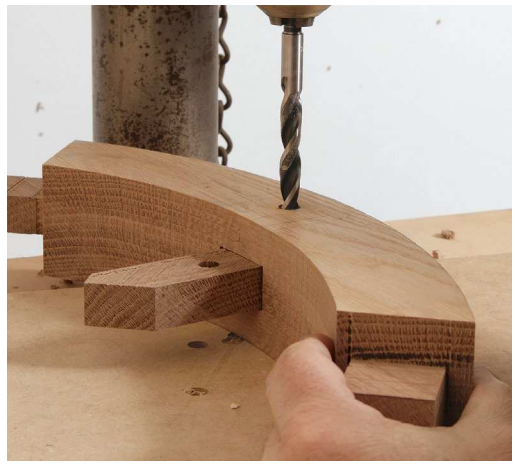
The last task before assembly is to chamfer the parts. These chamfers were originally made by hand with a drawknife. I wanted to keep the handmade look, but I sped things up a bit by using a router for most of the work. The trick is to rout the chamfer, stop short of the end lines, and then use a chisel 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.





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

VIDEO WORKSHOP
Watch Pekovich build this table from start to finish in a members-only video.

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).*

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

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.*

angles, 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 a furniture maker, instructor, and Fine Woodworking*'s executive art director.*

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.*

Photos, this page: Gina Eide (top left); Steve Scott (top and bottom right)

DINING TABLES

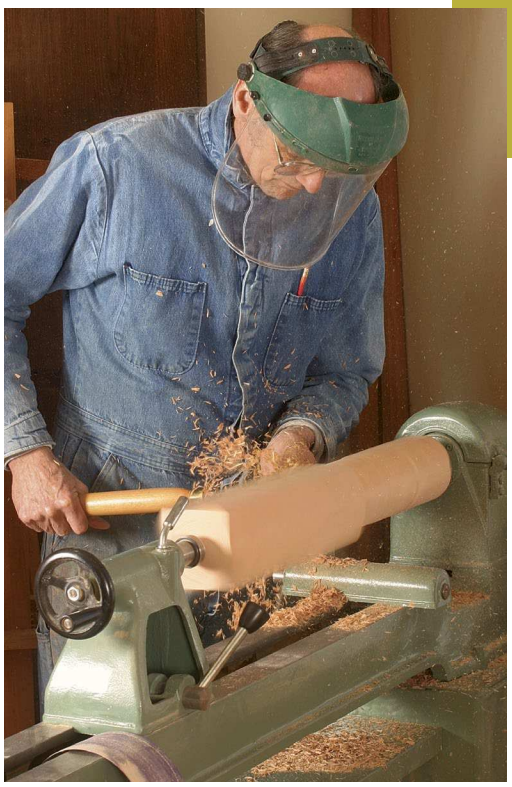
Shaker Dining Table

Form meets function in this classic design

BY CHRISTIAN BECKSVOORT

Photos, except where noted: Tom Begnal; this page: Michael Pekovich

The posts are simple turnings



Turn the blank. *Becksvoort turns a 3⅝-in.-sq. blank to 3½ in. dia., then makes a series of 2⅜-in.-dia. parting cuts along the midsection, checking the diameter with calipers. After that, with the parting cuts serving as guides, he reduces the entire midsection to 2⅜ in. dia.*

This table is based on a piece built at the Shaker community in Hancock, Mass. (It's now in the collection of the Fruitlands Museum in Harvard, Mass.) The original, made from cherry, is almost 11 ft. long, with a third trestle to support the center. Such a length made good sense for communal dining, but it's not practical for most homes today. My version has only two trestles, and I typically make the top either 8 ft. or 9 ft. long.

A trestle table has appeal for a few reasons. For one, it can be "knocked down" without fuss. Remove the top from the base parts and the stretcher from the trestles, and you can move the table through doors and up or down stairs. Unlike most tables, which have aprons around the perimeter to stiffen the structure, trestle tables have a single center stretcher. This gives more vertical legroom. On the other hand, most trestle tables have flat feet, which tend to get in the way of the feet of diners sitting at either end. This Shaker design solves that inconvenience by replacing the flat feet with arched feet. This simple change not only makes the piece more ergonomic, but also gives it an especially graceful look.

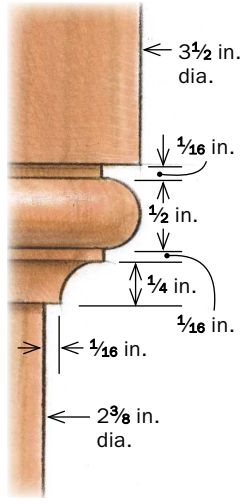
Most lathes will handle these posts

I make the posts first, using 16/4 stock. If this size isn't readily available, consider face-gluing two pieces of 8/4 stock from the same board. Using the same board means the grain and color of the pieces will be close and the glue joint less visible.

Mill the stock to about 3⅝ in. sq. and crosscut it to 24½ in. long. Then mount it in a lathe and turn it to 3½ in. dia. At a point 6 in. from the top and 4 in. from the bottom, use a parting tool and calipers to establish the 2⅜-in. diameter of the center section.

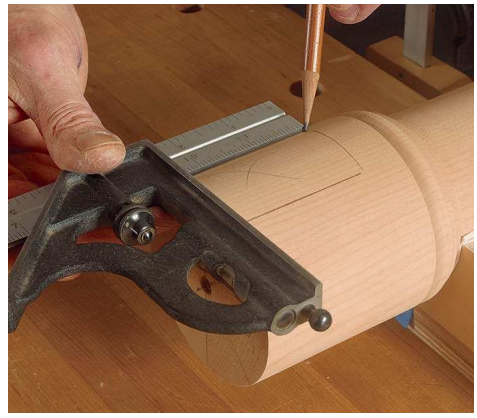
Continue using the parting tool to make a series of 2⅜-in.-dia. cuts between the end cuts. With these cuts serving as a depth guide, use a gouge to reduce the entire center section to 2⅜ in.

Coves and beads. *Each end of the midsection terminates in a cove and bead. Mark the ⅞-in. width of the detail by lightly touching a pencil point against the spinning post. Cut the cove with a roundnose chisel or small gouge, then the bead with a diamond-point or skew chisel.*

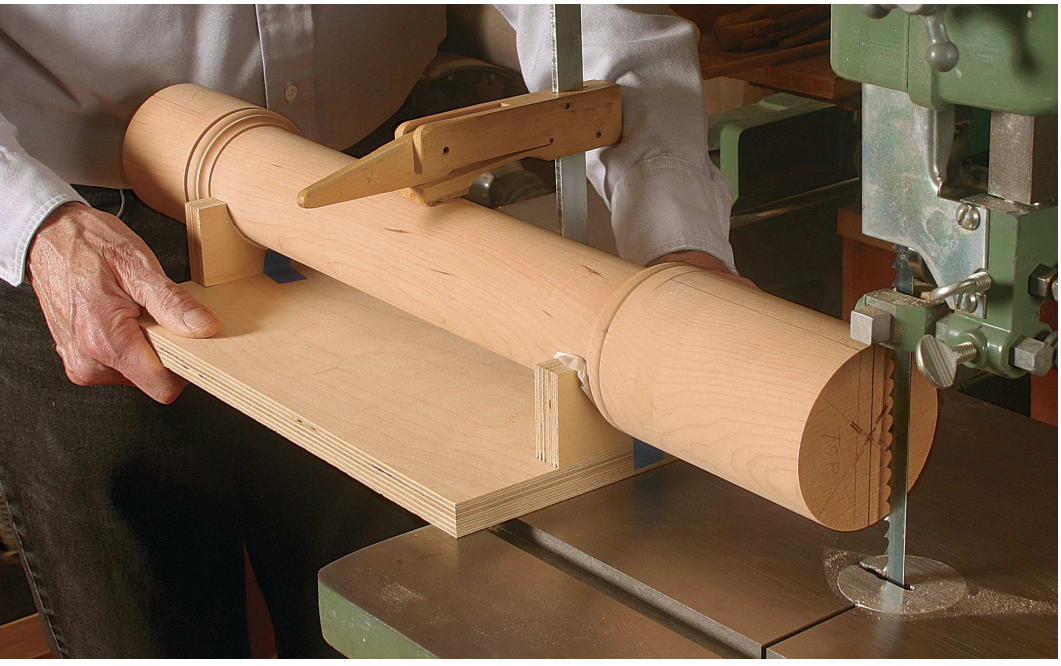


Notch the posts

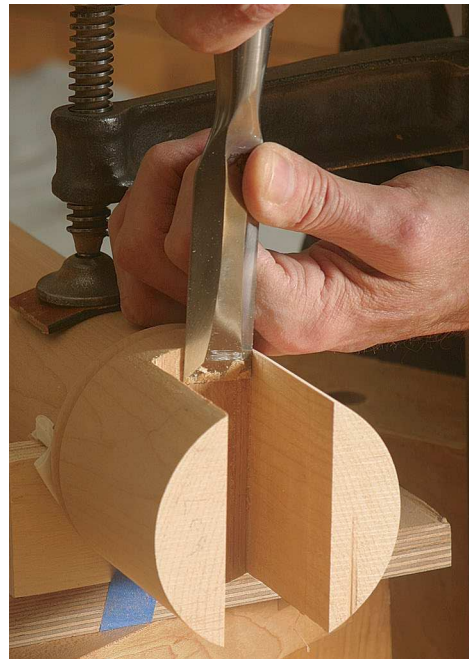
Build a cradle. *Two saddles screwed to a base, ¾ in. thick by 8 in. wide by 12½ in. long, create a cradle for the post that simplifies a number of construction steps.*



Lay out the location of the notches. *With the cradle on a flat surface, use a square to mark a vertical centerline on each end of the post (left). Measure and mark the width of the notch, then use a square to scribe the notch depth (right).*



Cut the two notches. *With the post securely clamped in the cradle, use a bandsaw to cut the notch on each end, following your layout lines by eye.*



Hand work. *Smooth the ends of the notches and the cheeks with a sharp chisel.*

dia. At each end of the center section, turn a small cove and a bead with a small flat at each end of it (see drawing, p. 97). If your turning skills are rusty, practice first on a shorter blank.

Jig simplifies post joinery

Once both posts are turned and sanded, they need to be notched for the braces, feet, and stretchers. To hold them for layout and machining, I clamp the posts to a shopmade cradle that consists of a couple of U-shaped saddles screwed to a rectangular piece of plywood. A narrow piece of paper towel in each saddle, held in place with masking tape, helps prevent scratches on the posts.

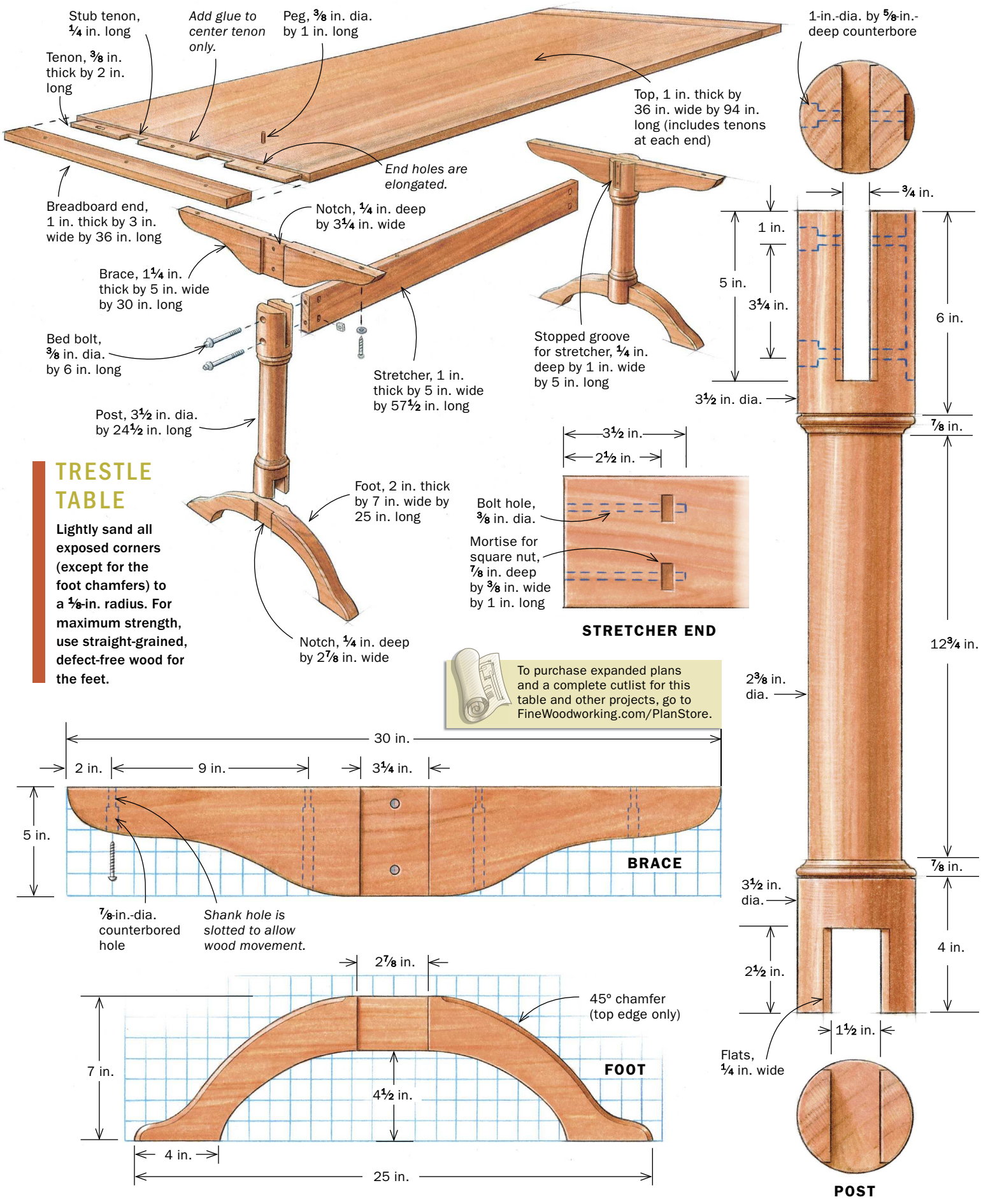
Place the cradle on a bench (with the clamp between the opened jaws of the vise so the cradle can rest flat). Use a square to lay out the width and length of the notch on each end of the post. To lay out a notch, first use a square to mark a vertical line through the center of the turning. Using that centerline as a reference, mark the width of the notch. Finally, mark the depth of the notch. The notches can be cut by hand with a deep backsaw; but a bandsaw does as good a job in less time. With the post clamped in the cradle, carefully saw between the lines to the bottom of the notch. Then, nibble out the bottom of the notch with the blade. As you switch from one end to another, you'll need to reposition the clamp so that it doesn't bump into the saw table as you cut.

Rout a shallow groove for the stretcher—There's one more machine cut to make on each post—a groove, ¼ in. deep by 1 in. wide by 5 in. long, that will accept the end of the stretcher. You can cut the groove with a chisel, but it's easier on a router table.

Again, I use the cradle to support the post. A clamp gets in the way on the router table, so I made a wooden yoke that serves as a clamp. With the yoke screwed to the base of the cradle, the post stays securely in place. Before tightening the yoke, make sure the cheeks of the slot are parallel with the router-table surface.

Install a 1-in.-dia. straight bit in the router, and raise the bit to make a ¼-in.-deep cut in the post. Adjust the router-table fence so that when the cradle slides against it, the bit is centered on the post. Also, clamp a stop block to the fence to stop the cradle

Drawings: Bob La Pointe



TRESTLE TABLE

Lightly sand all exposed corners (except for the foot chamfers) to a ⅛-in. radius. For maximum strength, use straight-grained, defect-free wood for the feet.

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

Notch the posts (continued)

Cut small shoulders. *Cut a flat on each side of the notches to ensure gap-free contact between the post and the brace and foot. First, lay out each flat with a pencil and ruler (right), then make a vertical chisel cut to establish the end point. Finally, make horizontal cuts with the chisel to pare the stock to the layout line (below).*

Cut the groove for the stretcher. *With a U-shaped yoke screwed to the cradle serving as a clamp, use a router table to cut a stopped groove in the top end of the post (above). Square the rounded end left by the router bit with a chisel (right).*

when the groove is 5 in. long. Hold the cradle firmly against the fence as you slide it forward to feed the post in the bit.

The router bit leaves rounded corners at the end of each groove. Use a chisel to cut them square.

Fit the other parts to the posts

Templates for the brace and feet can be found on p. 99, but you'll need to enlarge them to full size. I'm not fussy about pattern stock; light cardboard or poster paper works just fine.

Use the patterns and a pencil to transfer the profiles to the stock. Cut the parts on the bandsaw, staying just outside the lines. Next, lay out and mark the location of the dadoes in the braces and feet. These mate with the deep notches in the posts. They can be cut by hand, with a router, or with a dado blade on the tablesaw. To save time, I use the dado blade set for the widest possible cut.

To support the braces and feet during the dado cuts, clamp a long fence to the miter gauge. The fence should extend at least 15 in. on either side of the dado blade. Add a pair of stop blocks to ensure that the shoulders of the dadoes align perfectly on both sides of the joint. When setting the depth of cut, I leave the areas between the dadoes a bit thick. That way, I can trim them with a rabbet plane for a perfect final fit.

With the dadoes cut, I smooth concave edges of the braces and feet using a spindle sander, and convex edges using a stationary disk sander. Smooth the curved edges further by hand-sanding.

Now use the router table and a chamfer bit to rout a ¼-in. chamfer along the top edges of the feet. Stop each chamfer at a point ½ in. from the dadoes.

Complete the trestles

Dado the legs and braces. *Cut a wide dado on each side of the brace and foot (above). Use the tablesaw miter gauge with a long auxiliary fence to support the parts during the cuts. A pair of stop blocks helps ensure that the ends of the dadoes end up perfectly aligned on both sides of the parts.*

To fit a joint, first make a knife cut at the shoulders of the dado to sever the wood fibers before trimming the dadoes with a rabbet plane. When the joint begins to engage, I mark the leading edges of the slots with a pencil, which shows me exactly where the joint is still tight. A few more strokes with the rabbet plane and the joint should fit snugly.

Once all braces and feet are fitted to their respective posts, the parts can be glued and clamped to create a trestle. A pair of clamps, each spanning from brace to foot, is all that's needed. After that, at one end of the trestle, measure the distance from the top edge of the brace to the bottom edge of the foot. Do the same at the other end. The measurement should be the same. If they differ, adjust the pressure on the two clamps until the measurements agree. Once dry, sand the bottom of the post and the underside of the arched foot until flush.

When making the stretcher, I start with slightly thicker stock. Then I make light passes with a thickness planer until the stretcher fits snugly in the groove routed in the top of the post.

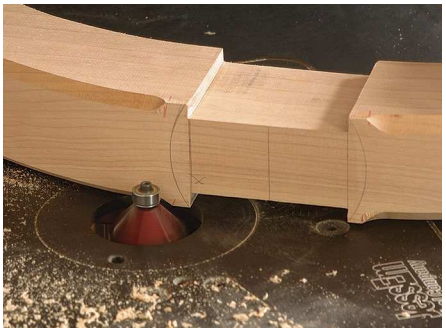
How to install bed bolts

Each trestle attaches to an end of the stretcher with a pair of ⅜-in. by 6-in. bed bolts and nuts (available from Horton Brasses; horton-brasses.com). Each bolt extends through a post and brace and into the end of the stretcher. The end of the bolt threads through a nut mortised into the stretcher. When the bolt and nut are tightened, the stretcher and trestle are pulled together to produce a rock-solid joint.

The bed-bolt work starts at the drill press. Once again, the cradle comes in handy. Use the yoke to secure the trestle to the cradle, with the stretcher groove facing down. Make sure the sides of the brace and trestle are parallel to the work surface. If the parts tilt, the holes won't be square.

Measuring from the top end of the post, mark the hole centers at 1 in. and 4¼ in. Position the cradle so that a 1-in. Forstner bit is centered on the upper hole. Clamp the cradle to the drill press,

Dry-fit the parts. *Check the fit of the posts to each dado (above). If too tight, use a rabbet plane (left) to trim the sides or bottom of the dado.*



Rout chamfers. *A chamfer bit in a router table is used to chamfer the top edges of the feet. Stop the cut ½ in. short of the dado.*

Add the bed bolts

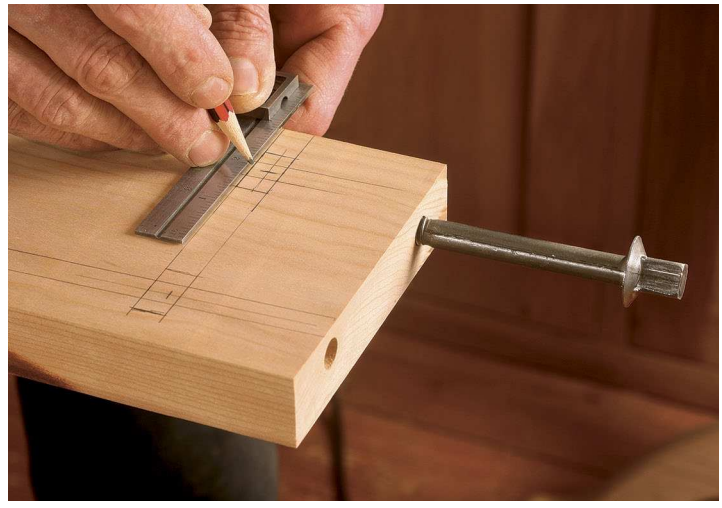
Start by drilling. *With a trestle clamped in the cradle, and the cradle clamped to the drill-press table, use a 1-in.-dia. Forstner bit to drill a ⅝-in.-deep hole (right). Then, remove the Forstner bit and use a ⅜-in.-dia. brad-point bit to drill a hole completely through the post.*

Drill holes in the ends of the stretcher. *Add a trestle to the stretcher temporarily, then use a ⅜-in.-dia. brad-point bit to extend the bed-bolt hole slightly into the end of the stretcher. After that, remove the trestle and drill deeper to complete the hole.*

and then bore a ⅝-in.-deep hole to accept the head of the bed bolt. Replace the Forstner bit with a ⅜-in.-dia. brad-point bit and bore a hole completely through the post and brace. Repeat the process for the remaining holes.

Next, clamp the stretcher in a vise and temporarily mount one of the trestles. Transfer the ⅜-in.-dia. bit from the drill press to a portable drill. Using the holes in the trestle as guides, drill matching holes in the end of the stretcher. Remove the trestle and continue drilling until the hole is at least 3½ in. deep, measured from the end of the stretcher.

Portable drills rarely produce a hole perfectly square to the stretcher ends. So, to make sure the mortise for the nut is properly located, I use a bed bolt as a guide. Allow a good portion of the bolt to extend from the hole. Then place a long ruler so it's centered along the length of the exposed bolt. Use a pencil to extend the centerline along the face of the stretcher. With the centerline showing the location of the bolt hole, measure 2½ in. from the end of the stretcher, and lay out the location of the mortise for the nut. A few minutes' work with a chisel yields a mortise just



Lay out the location of the bed-bolt nuts. *With a bed bolt in a stretcher hole serving as a guide (in case the hole isn't drilled perfectly square), mark the location of the bed-bolt nut (above). Cut the mortises for the nuts (left) just deep enough to allow the bolt to thread into the nut.*

Photos, facing page: Michael Pekovich

Assembly is easy

Put it together. *After all the parts have been sanded and finished, it's finally time to put the table together. With the table parts upside down, slide the ends of the stretcher into the post grooves and slip the bed-bolt nuts into the mortises in the stretcher. Then, insert the bolts (top right).*

Attach the top. *A screw and washer go into each counterbored hole in the braces. The slotted shank hole allows wood movement.*

big enough to accept the nut. You'll know the alignment is OK if you can slip the bolt into the hole and thread it into the nut. I use a special bed-bolt wrench (available from Horton Brasses; a 12-point socket also works) to turn and tighten the bolts.

With the holes drilled and all the mortises cut, you can mount the trestles to the stretcher.

Build the top and breadboard ends

I make the tabletop by edge-gluing 1-in.-thick stock, using three or four well-matched boards across the 36-in. width.

Breadboards are applied to either end. The original table, made from ⅞-in.-thick stock, had a ¼-in.-thick by ½-in.-long tongue cut fully across each end of the top and pinned to allow for wood movement. The tongue fit into a corresponding groove cut across the entire length of the breadboard end. I make my tenons longer for added strength (see "Keep Tops Flat," pp. 104-109, for more detailed instructions).

The top is attached with screws driven through counterbored holes in the braces and stretcher. To allow the top to expand and contract in width due to seasonal changes in humidity, be sure to elongate the shank holes in the braces.

For a finish, I use an oil-and-varnish mix (equal parts of each), applying three coats to all the table surfaces, including the top and bottom of the top and breadboard ends. For added durability, the top then gets two more coats. □

Contributing editor Christian Becksvoort builds furniture in New Gloucester, Maine.

basics

Keep tops flat

THREE WAYS TO KEEP A TOP FROM CUPPING WHILE LETTING IT MOVE WITH THE SEASONS

BY CHRISTIAN BECKSVOORT

Any well-made solid-wood table has a dead-flat top when new. And you expect that top to stay flat for years to come. But unless the maker follows some basic rules, the top is likely to warp down the road, courtesy of the humidity in the air. That said, if you understand how to assemble, finish, and restrain these wide panels, they will be flat when the next millennium arrives.

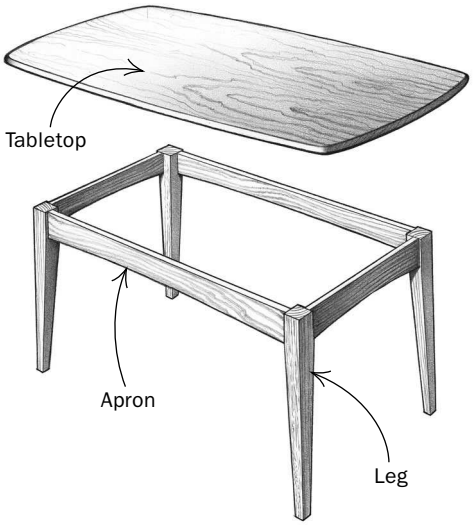
Understanding tabletop warp

Moisture entering the cell walls of wood causes the cells to expand, while moisture leaving the cells makes the walls contract. Warp results when different areas of the wood expand and contract at different rates. One common form of warp, called cup, occurs when one side of a board expands and contracts at a different rate from the other. All else being equal, cup tends to become more pronounced as boards get wider.

Quartersawn vs. flatsawn—When viewed from the end of a board, the growth rings can tell you a lot about whether the board is likely to cup. If the rings meet the face at between 45° and 90°, the wood is considered quartersawn. The rings on flatsawn wood meet the face at less than 45°.

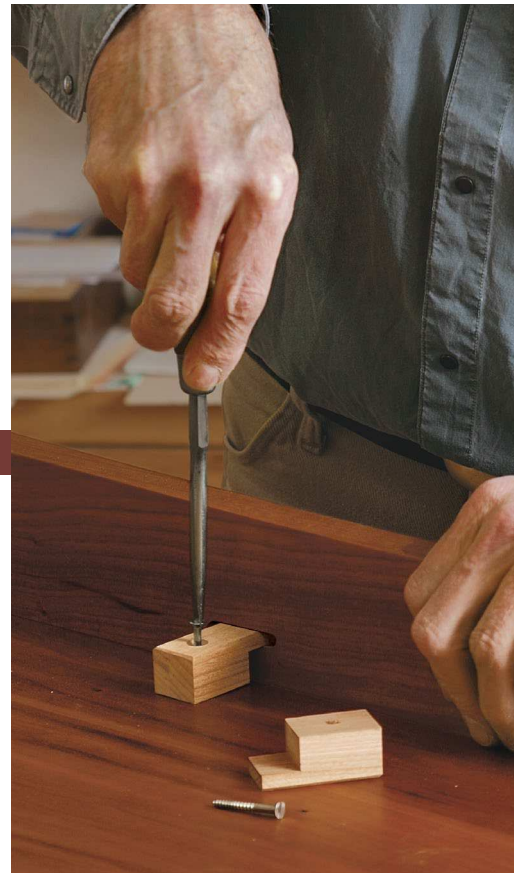
Quartersawn wood moves only about half as much as flatsawn and is much less likely to cup. So quartersawn wood often is a good choice for tabletops that cannot accept a mechanical support to help keep them flat.

When edge-gluing several flatsawn boards to create a tabletop, some woodworkers prefer to alternate the growth rings (concave toward the top, then concave toward the bottom, and so on), while others prefer to run them in the same direction. But after 40 years of gluing up hundreds of tabletops and



1. Take advantage of aprons

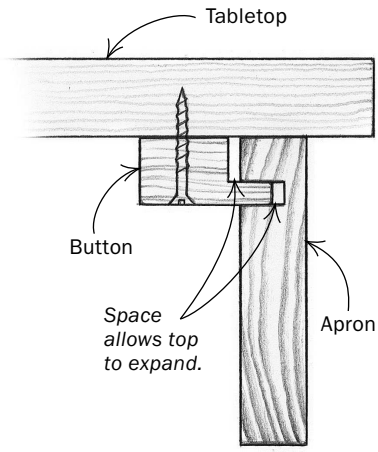
Aprons provide a built-in means to keep a tabletop flat. When secured to the flat, straight aprons, the tabletop stays flat and straight, too. On wide tabletops (generally 24 in. and wider for oak or hard maple, 30 in. and wider for cherry), Becksvoort uses wood buttons that slip into grooves cut into the inside face of the aprons. On narrower tabletops, he simplifies the process by screwing through pocket holes in the aprons.



TWO OPTIONS FOR ATTACHING THE TABLETOP

SHOPMADE BUTTONS

Buttons fit into grooves in the apron and are screwed to the tabletop.

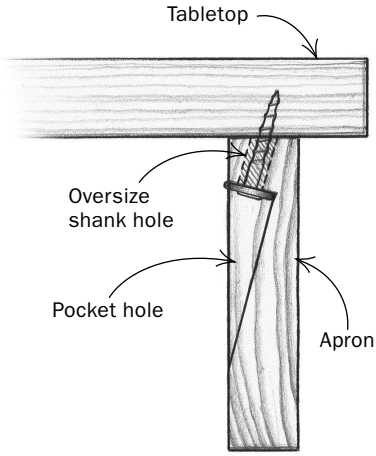


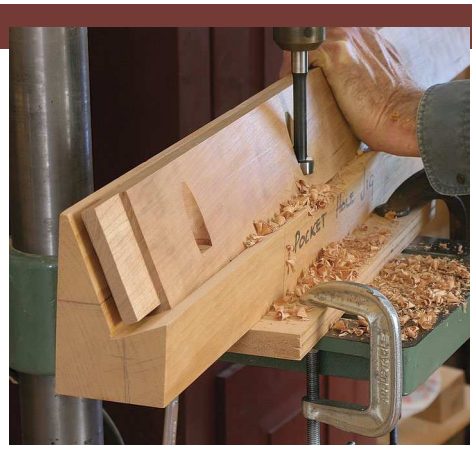
Make the buttons. *After rabbeting the end of a board to create a lip, Becksvoort uses a tablesaw and a miter gauge to crosscut the stock into individual buttons.*

Add the buttons. *The lip of each button slips into a groove in the apron. It takes just a single screw to secure the button to the underside of the top.*

POCKET HOLES

Angled holes are drilled into the aprons before assembly. The oversize shank holes allow for seasonal movement.

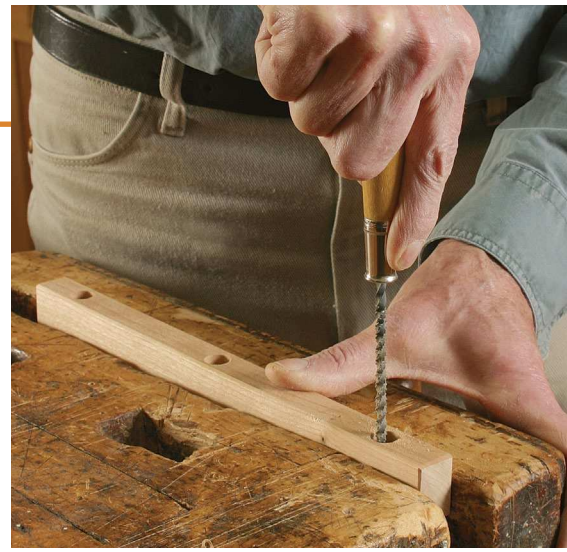




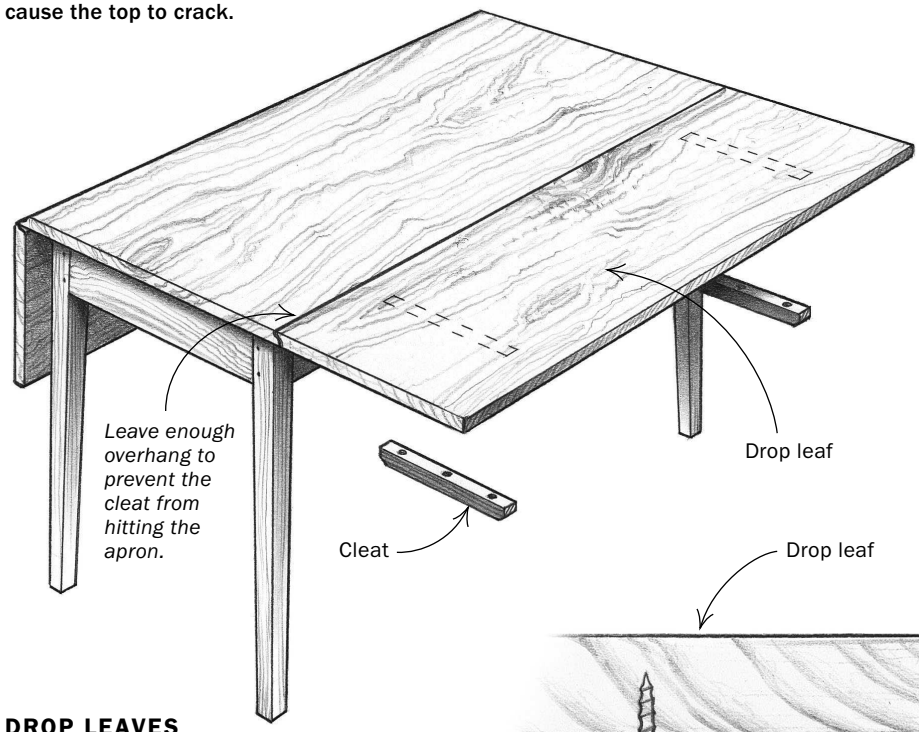
Jig simplifies pocket-hole drilling. *A shopmade drill-press jig holds the apron at a suitable angle for drilling the pocket holes with a Forstner bit (above). A screw driven through an oversize shank hole in the pocket joins the top to the apron (right) while allowing the top to expand and contract.*

2. Screw cleats to the bottom

A straight cleat, screwed to the underside of a drop-leaf table, an extension table, or a pedestal table, is a simple and effective way to keep a top flat. Don't use glue here, however, or the top won't be free to expand and contract with changes in humidity, and that could cause the top to crack.

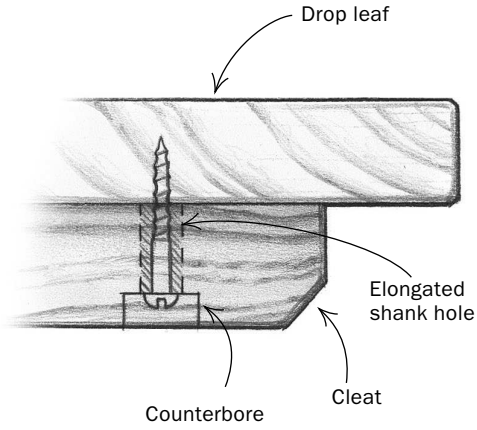


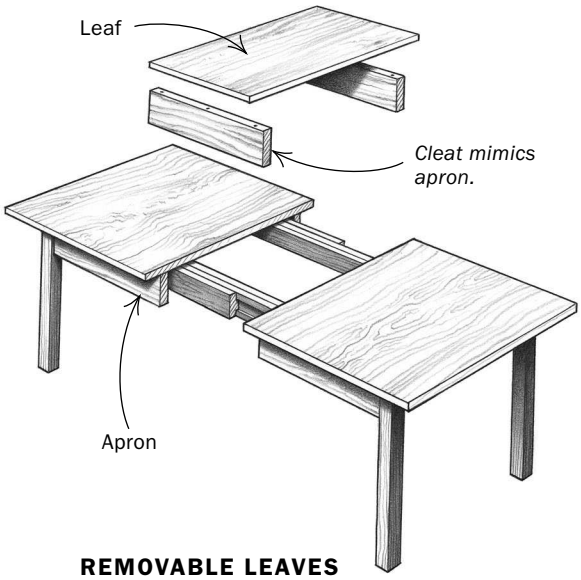
Elongate the end holes. *A typical cleat has three holes, with the two nearest the ends elongated to allow the top to expand. The author uses a round rasp for the job.*



DROP LEAVES

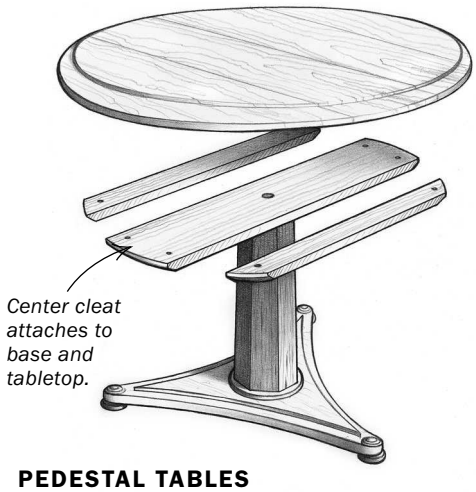
Cup generally doesn't become a problem until a drop leaf is wider than 12 in. or so. With a wider leaf, two or three cleats screwed to the underside should keep the leaf flat.





REMOVABLE LEAVES

An extension-table leaf might cup without some sort of support. A cleat mimicking the apron provides a perfect solution.



PEDESTAL TABLES

The wide, mostly unsupported top of a pedestal table is a prime candidate for cup. In addition to the center cleat, a couple of outside cleats provide extra support.

thousands of panels, I find that grain orientation really makes little difference. My priority is to position sapwood and blemishes on the underside of the table, which usually means that the growth rings are concave toward the top.

Wood species can make a difference—Some wood species tend to cup less than others. If you aren't tied to a specific type of wood, consider one of these cup-resistant species: Ash, cherry, yellow birch, black walnut, and white pine are good choices.

An even finish can help—For a finish to reduce cup effectively, all of the surfaces of a tabletop (top, bottom, and all four edges) must be finished equally. If not, one surface will gain or lose moisture faster than the other, and that's a formula for cup. The ends require particular attention. They absorb and expel moisture faster than face grain, and should be sealed with a few extra coats.

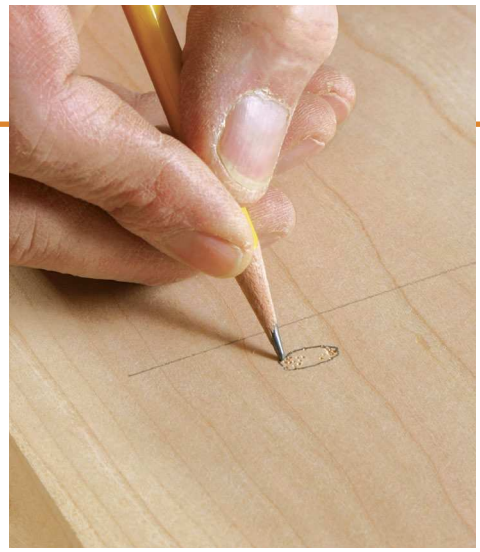
Furthermore, tables should always be finished with the top removed. When a table is finished after assembly, it ends up with unfinished areas under places like cleats, stretchers, aprons, and bases.

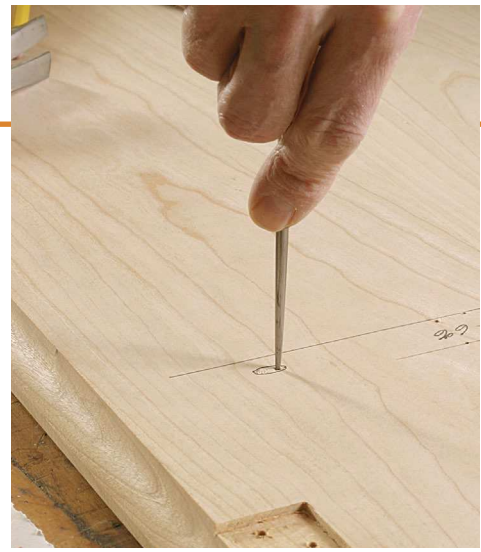
Mechanical support ensures flatness

Ultimately, no finish will exclude moisture completely. Many furniture

Photos: Michael Pekovich; drawings: Michael Gellatly

Mark the hole locations. *Position the cleat on the underside of the top and mark the center of the middle hole. Make a series of points with a scratch awl to mark the elongated holes.*





Outline the elongated holes and locate the position of the outside screws. *With the points made by the scratch awl as a guide, use a pencil to scribe the elongated shape. If you anticipate the top is likely to expand, locate the pilot hole near the inside end of the elongated hole. If the top is expected to shrink, put the pilot hole near the outside end.*

pieces need mechanical support to keep their tops from cupping.

Take advantage of aprons—Most table designs incorporate four aprons that support the legs and provide a means to attach the tabletop to the base parts. But aprons can do more. They are perfect for serving double duty as cleats to hold a tabletop flat, given enough attachment points.

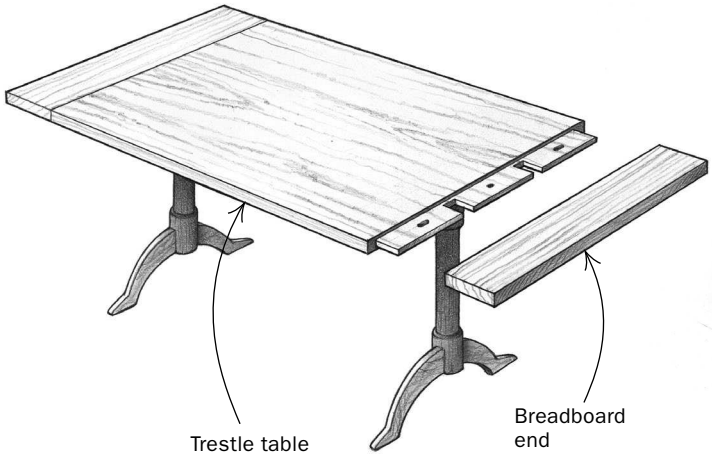
Tabletops can be secured to aprons in several ways. For a wide top, I use wood buttons, as they allow for a lot of expansion and contraction. On a narrow table, I mount the top through pocket holes in the aprons, a faster and simpler method. Although it allows only limited wood movement, this method is more than enough for most narrow tables.

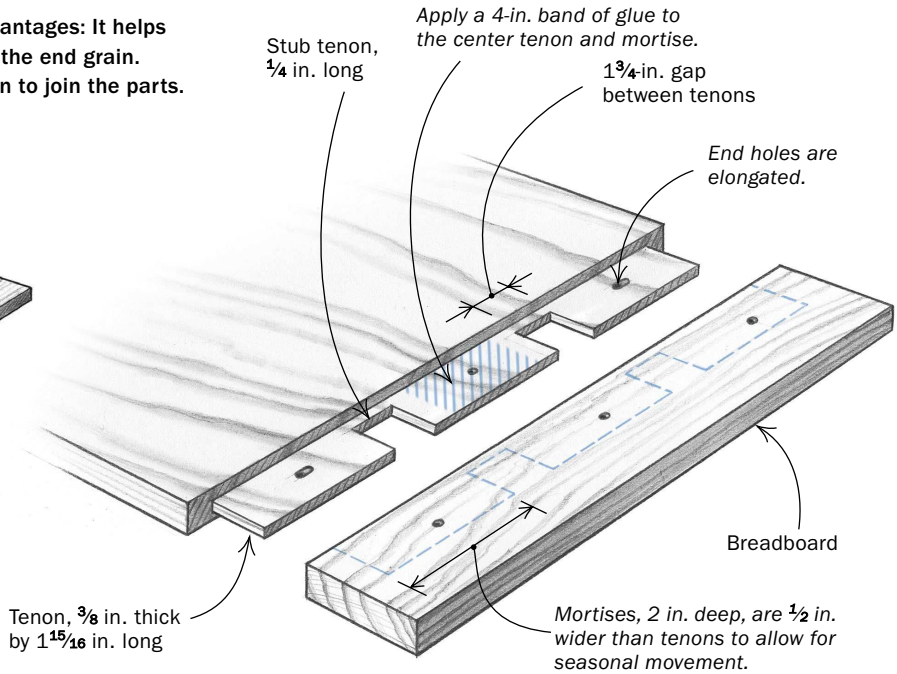
Cleats work effectively—A cleat is simply a flat, straight piece of relatively narrow wood that is attached, typically with screws, to the underside of an otherwise unsupported tabletop. It is found most often on drop leaves, extension-table leaves, and pedestal tables. To prevent the tabletop from cupping, attach the cleat at a right angle to the grain. Don't use glue; the top has to be free to expand and contract. Generally, a screw at the midpoint of the cleat anchors the parts at the center. Screws on either side of

Drive the screws. *After drilling pilot holes, drive the screws through the cleat until it's snug against the underside of the top. Don't use glue.*

3. Add breadboards to the ends

Mounting a cleat to the ends of a tabletop has a couple of advantages: It helps keep the top flat while allowing the top to move, and it covers the end grain. Becksvoort uses an elongated version of the mortise-and-tenon to join the parts.





Cut the tenons. *Use a router with a straight bit guided by a straightedge to cut the shoulders and cheeks (top). Cut the notches between each tenon using a dovetail saw (bottom) parallel to the grain followed by a coping saw across the grain.*

Assemble the breadboard ends. *Check the tenon fit in the breadboard mortise, and trim the tenons as needed. When the fit is right, use pipe clamps to snug the breadboard ends to the tenon shoulders, then drill holes all the way through for the pins.*

the anchoring screw go into slotted holes in the cleat.

Drop-leaf tables may or may not require cleats, depending on the size of the leaf. For relatively narrow leaves, say, 12 in. or less, I tend to avoid cleats when working with stable woods such as cherry or pine. On wider leaves, or when using less well-behaved woods such as oak or hard maple, a few cross-grain cleats on the underside are in order. They must be relatively small so that they won't bump into the apron when in the down position or interfere with any slide or spinner supports.

Extension-table leaves, when used on a leg-and-apron table, can be kept flat by continuing the aprons below the leaf. Again, use an anchoring screw at the center and slotted holes on either side. Also, make the extension apron a bit shorter than the leaf. That way, when the leaf shrinks in the dry winter season, it won't become narrower than the length of the aprons and create a gap between the leaf and the tabletop halves.

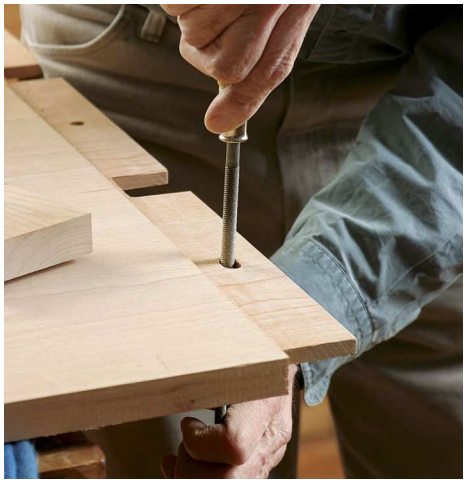
A cleat also can be a welcome addition to a pedestal table. Make the cleat as long as possible, but not so long that it can be seen easily. Again, use an anchoring screw at the midpoint with slotted holes on either side of the anchor.

Breadboard ends are another good option—Because of their large overhangs on either end, trestle tables traditionally have breadboard ends to keep the tops flat. Essentially, a breadboard end is a cleat attached to the end of a tabletop with a mortise-and-tenon joint. Each end of the tabletop is tenoned, while a mortise is cut into the breadboard ends.

For overhangs of 14 in. or less, I avoid breadboard ends because the cross brace at the top of the leg is close enough to keep the table flat. But they are a good option for overhangs of 18 in. or more.

The downside to a breadboard end is that its ends are flush with the table edges for about half the year. The rest of the time, either the top is a bit wider than the breadboard, or the breadboard is a bit wider than the top. □

Christian Becksvoort is a furniture maker in New Gloucester, Maine.



Elongate the holes. *With the breadboard ends removed, use a marking gauge to scribe a pair of lines tangent to the end holes. A round file or rasp is ideal for elongating the end holes, but stay just inside the lines.*

Drive the pins. *Reassemble the breadboard ends after adding glue to the center tenon and mortise. Then add a thin coat of glue to each pin and drive them home. Trim the ends flush with the table.*

The right edge for your tabletop

GO BEYOND ROUTER-BIT PROFILES FOR CUSTOM EDGES THAT STAND OUT

BY GARRETT HACK

A tabletop edge needs to endure a life full of bumps and bruises, even spills, yet still be attractive, with lines that are in keeping with the overall piece and with a profile that is pleasant to touch.

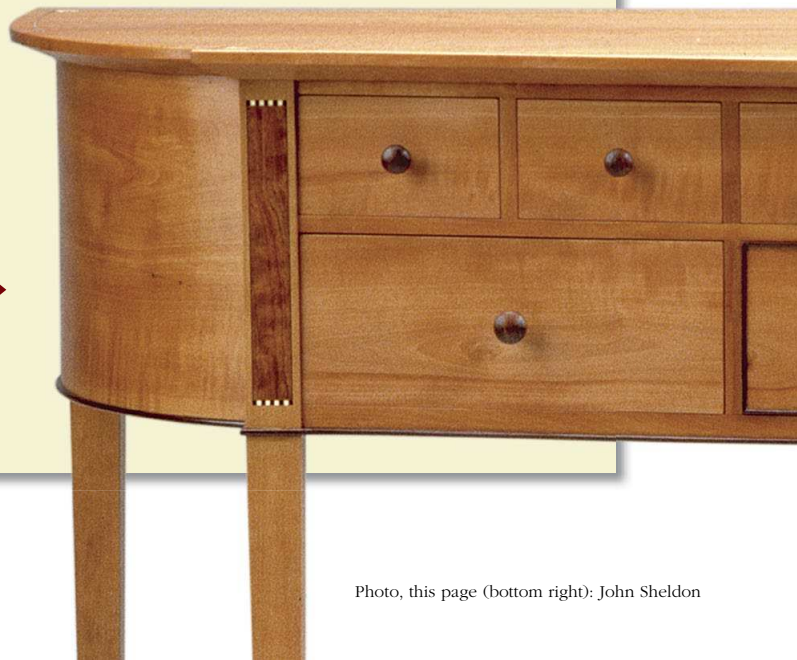
The edge profile is an important part of a cohesive design, so I consider the shape or aesthetic of the table and its function, the size of the overhang, the wood the top is made of, and how thick the top is or how thick I would like it to appear. You can make the top look thinner by shaping the underside of the edge with, say, an underbevel. You can accentuate thickness

Don't overlook the overhang

The overhang is an important aspect of table design. Wide overhangs can accommodate seating and increase surface area, but they can hide aprons or drawers from standing view. Short overhangs tend to draw attention away from the top, blending it in with the overall lines of the piece.

Small table with lots of surface area. *The top of Hack's end table is wide with large overhangs. A sweeping underbevel on the front and ends makes the top look thinner, in keeping with the overall light feel of the table.*

Thick top doesn't distract. *The short overhang and wide underbevel on Hack's sideboard draw attention away from the top and toward the facade of the case.*



Photo, this page (bottom right): John Sheldon

Chamfers and bevels

A chamfer cut along the top or bottom of a tabletop is a simple and very effective profile that catches light, draws the eye, and softens hard edges. A bevel is simply a wide chamfer. Both can be cut with handplanes, but bevels often are cut with a router or a tablesaw and refined with a block plane.

Chamfers are quick to make with a block plane. *You can kiss an edge for a light facet or make repeated passes to create a wider flat. Use your fingertips to register the tool at a consistent angle for each pass.*

Two steps to a bevel. *Rough out the bevel on the tablesaw (above). Be sure to support the top with a tall fence as you make the cut. Clean up the sawn surfaces with a handplane (left).*

CHAMFER

UNDERBEVEL

BEVELED TOP WITH FILLET

by using a simple bullnose or roundover, or by incorporating a beveled top edge.

Hardwood vs. softwood tops

Choose a profile that works with your wood selection: softwood or hardwood, figured or plain.

Softwoods dent easily and don't take or hold detail as well as harder woods, so for softwood, you may want to incorporate pronounced chamfers or bold profiles with less complex shaping and no sharp edges. The harder the wood, the better it holds detail.

Finally, think about the figure; a tabletop with abundant figure or prominent grain may beg for a less-detailed edge that doesn't compete for attention.

Custom edges that sing

You can choose an edge profile based on the router bits you have, but that isn't creative or interesting.

Instead use common router bits as a starting point. Use a router to rough out the profile, then refine the machined edge with hand tools. Sometimes all it takes is delicate passes with a block plane or a spokeshave, or even scrapers and sandpaper.

Chamfers—A light chamfer is created by kissing the corner with a block plane. More passes create wider chamfers. They can be cut at any angle, even at a different angle on the top than the bottom. You also can cut multiple chamfers into an edge.

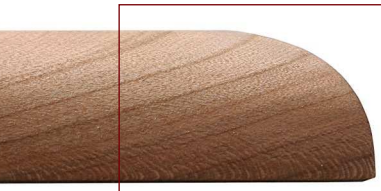
Beyond the basic bevel

COVE

You can shape a concave profile, or cove, on a beveled edge using hand tools. First, make thick marks along the top and bottom edges of the bevel (top). Next, use a convex spokeshave (or curved scraper) to remove material between the marks (middle). Finally, use a bullnose sanding block to fine-tune the shape and remove the reference marks (bottom).

Roundovers

Expecting dings and bumps? Rounded edges help deflect them. This classic quarter-round is roughed out on a tablesaw, then refined with hand tools.



QUARTER-ROUND

BULLNOSE

BULLNOSE WITH BEVEL

Make a template of the profile. *Then use the template to trace the profile on the corners.*

Mark the boundaries. *Extend a line across the top, indicating where the profile will end. The lines will provide a consistent stopping point for all the shaping cuts to follow.*

Round the edge with a block plane. *After making a few chamfers on the tablesaw, take light cuts with the plane, removing corners of the facets with each pass.*

Check your progress. *The template will show where you need to remove more material.*

When a roundover meets a bevel

Elegant roundover for wide overhangs. *The edges on Ted Blachly's claro walnut sideboard taper up and away from the carcase, giving a light feel to the top. The profile is also lightly chamfered along the rounded edge.*

Bevels—A bevel is a wide chamfer. Cut on the top edge or the bottom, bevels often disguise or play up the thickness of the top. Steep angles accentuate thickness, while wider bevels tend to play it down, especially on the bottom edge.

Roundovers—Bullnose-style roundovers are common. One way to make a bland roundover more attractive is to reshape it; sometimes an asymmetrical roundover is best. Another way is to use just part of the full radius. I also often add light-catching chamfers to the top and bottom of the profile.

Complex profiles—High-style tabletops often feature complex edge profiles with multiple shapes. Here's where I use a router to rough out the profile, and then planes or custom-made scrapers to refine it.

Beads—Beaded profiles work well as part of a table profile. I prefer to cut beads with hand tools in order to create a fine quirk (the narrow indentation on the inside edge of the bead). Bead-cutting router bits leave a wide quirk. You can combine a bead with a chamfer to create an elegant edge with lots of light-reflecting and shadow-catching surfaces. You also can incorporate multiple beads for a traditional look. □

Garrett Hack is a Vermont furniture maker and a member of the New Hampshire Furniture Masters Association.

Photos, except where noted: Thomas McKenna; detail shots: Kelly J. Dunton

Complex profiles

It's easy to use a router bit to get an edge on a tabletop. But you wind up with a cookie-cutter look that adds no dazzle to the design. To personalize your furniture, design your own profiles, then combine power tools and handwork to get the shape you want.

FILLETS

Adding a fillet to a simple roundover creates a shadowline and catches light. Rough out the profile with a router, then use hand tools to customize the shape.

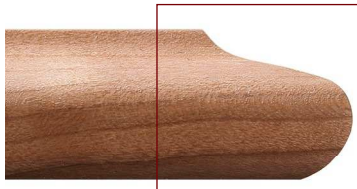
ROUNDOVER WITH FILLET

ROUNDOVER WITH FLAT AND FILLET

Router and planes work hand in hand. *Use a quarter-round bit to remove most of the material (above). The bit will carve a fillet at the top and base of the profile. Next, scribe lines to indicate the stopping point of the handwork on top (middle). Finally, refine the edge with a block plane. Remove corners of the facets in steps until you have a round surface. You can leave fine facets to stimulate the tactile senses or smooth the surface with sandpaper.*

OVOLOS

This classic edge is simply a modified ovolo profile, created with a tablesaw, router, and handplanes. Start by making a template of the profile and tracing it on the table edge.



OVOLO

OVOLO WITH FILLET

Round the tip. *Use a quarter-round bit to rout the lower edge of the profile.*

Hollow a channel. *Use a core-box bit to rout the concave area of the profile.*

Refine with hand tools. *Following the layout lines on the edge, smooth the curves with handplanes and sandpaper.*

finish line

Perfect finish for a table

BRUSH ON POLYURETHANE FOR PROTECTION, THEN WIPE ON THE FINAL COATS FOR A SILKY HAND-RUBBED FEEL

BY MARK SCHOFIELD

My go-to finish for a lot of furniture projects combines shellac, gel varnish, and paste wax, all wiped on by hand. But it is not ideal for tabletops because you'd have to build up so many coats to get the protection you need. Instead, it is far quicker to brush on several coats of liquid polyurethane and then switch to the wipe-on gel for the final few coats. This approach to a durable yet smooth finish is foolproof. And because it starts with a quick washcoat of shellac, it is also great for pieces made from blotch-prone woods, such as cherry.

Sand carefully, then seal

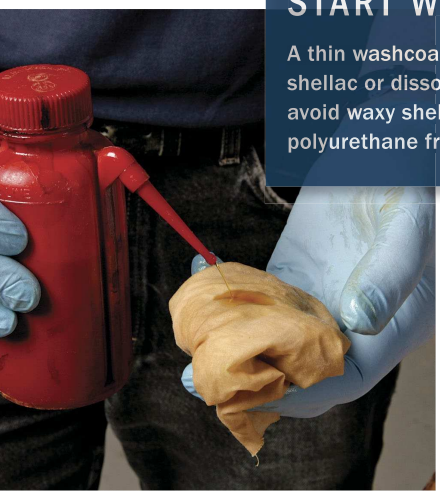
Especially when dealing with an eye-catching large, flat surface, good preparation is essential. If you are experienced with hand tools, you can flatten and smooth a tabletop using handplanes and a scraper. If you are more comfortable with a random-orbit sander, start at 100 grit and work your way up to 220 grit, then hand-sand with the grain using the final grit. Remove the dust using a vacuum or compressed air to clean out the pores.

Next, apply a thin coat of shellac to the whole piece. This will reduce the likelihood of blotching, give the wood a slightly warmer tone, and let you build a sheen faster with the gel finish. You may have heard that polyurethane will not adhere to shellac. This is true if you use shellac containing wax, such as Zinsser's clear or amber Bulls Eye Shellac. Polyurethane will adhere perfectly to dewaxed shellac such as Zinsser's SealCoat or your own mixture using dewaxed shellac flakes.

Mix a 1-lb. to 1½-lb. cut (dilute the SealCoat by about a third with denatured alcohol). You can apply the shellac with a natural or synthetic filament brush, but it's easier and just as quick to wipe it on with a cotton cloth. It also requires less sanding afterward.

START WITH A COAT OF SHELLAC

A thin washcoat of shellac reduces blotching. Use pre-mixed shellac or dissolve some flakes in denatured alcohol, but avoid waxy shellac, which will prevent the subsequent coat of polyurethane from adhering.



Wipe on a thin coat. *Make a couple of passes to seal the wood with shellac. Whether you use a French-polishing-style pad or folded-up cotton cloth, adding the shellac with a squeeze bottle is quick and controllable.*

Photos: staff

BRUSHED POLY BUILDS A BASE

Three or four coats of liquid polyurethane, sanded smooth between coats, are enough to give the wood real protection without a thick, plastic look.

A light touch. *Lay on a coat of polyurethane starting a few inches from one edge and brushing off the opposite edge. Use a light touch, holding the brush at about 45° to the surface. After the first pass, land the brush just inside the far end and return, smoothing the strip of wet finish until you cover the small dry area and go lightly off the end. By brushing off the ends and not onto them, you avoid having finish run down the edges.*

Let the shellac dry for two to four hours depending on the temperature and the humidity, and then lightly sand the surface with 320-grit paper wrapped around a cork or cork-faced block. All you are doing is removing any particles, dust nibs, etc. to leave a smooth surface. Wipe and vacuum away the dust.

Brush polyurethane to add toughness

Because you won't be brushing on the final coats, you don't need an expensive brush that leaves a perfect surface. A $10 to $20 natural-bristle brush, 2 in. or 2½ in. wide, works fine. You can use any brand of oil-based gloss polyurethane, even those recommended for floors, but the viscosity between different brands varies greatly. The Minwax Fast-Drying Polyurethane I used is about the consistency of 1% or 2% milk and can be used straight from the can. If your finish is closer to heavy cream, then thin it with mineral spirits.

You need to apply a roughly equal thickness of finish to both sides of the top to prevent uneven moisture changes, which cause cupping and warping. Start with the underside

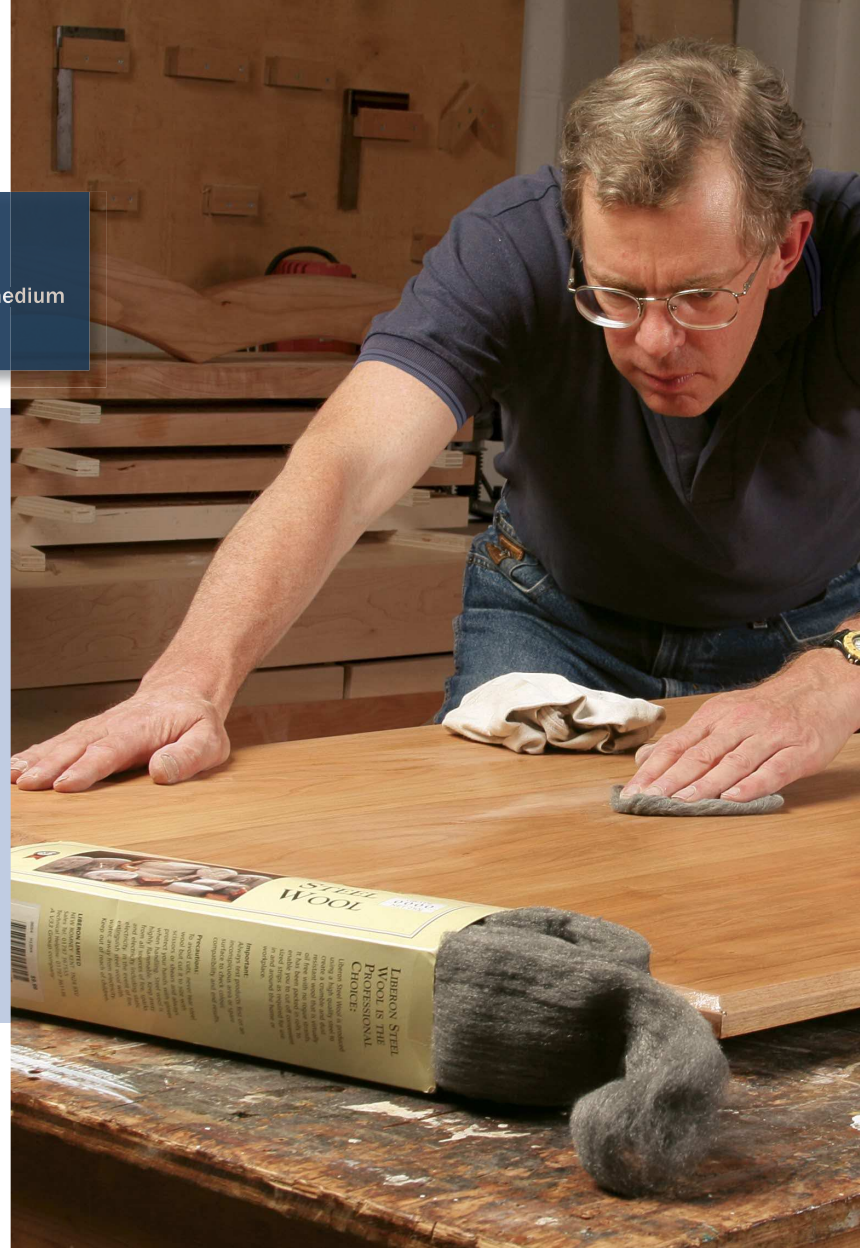
Sand between coats. *Use 320-grit sterated paper to prevent clogging. Move to a fresh piece as soon as it stops cutting. Don't try to sand out every small depression in the surface.*

WIPE ON A FEW TOPCOATS

Thin coats of quick-drying, wipe-on gel poly give the top surface a medium sheen devoid of dust nibs and brush marks.

SANDPAPER AND STEEL WOOL SMOOTH THE TRANSITION

Final sanding. *Use 400-grit sandpaper to smooth the final coat of brushed-on poly. Don't try to sand down to a perfectly flat surface. To dull the small, shiny depressions and leave the surface with an even sheen, rub the surface with good-quality 0000 steel wool.*



of the table, a good place to practice your brushing technique. Brush on three coats. You don't need to sand between coats as long as you apply the next coat within 24 hours.

As soon as the underside is finished, start on the top. Let the first coat cure overnight, then sand the surface with 320-grit paper. Use stearated paper, which is designed to resist becoming clogged with finish. Most sandpaper is stearated (it has a slightly white, opaque look) but avoid garnet paper designed for bare wood. Even stearated paper clogs fairly quickly, so wipe the paper frequently on a carpet remnant.

Don't overuse the sandpaper. It is meant to be disposable, and you'll get much better results if you switch to a new piece as soon as the paper no longer feels rough or becomes clogged.

When the whole surface feels smooth to the touch, including the edges, remove the dust with a vacuum. Apply at least three coats. Sand intermediate coats with 320-grit paper, but sand the last one with 400-grit.

Unlike a high-gloss, rubbed-out finish, you don't need to make the surface dead-flat before applying the satin gel poly, so don't try to sand away all the small, shiny depressions. However, the shininess will show through, so after sanding rub the surface with the grain using Liberon 0000 steel wool to dull these spots and to give the whole surface an even scratch pattern. Use raking light to check your progress.

Gel poly removes topcoat terror

After you carefully vacuum away all the remnants of steel wool, the surface should look smooth, with a fairly even sheen. Now you'll top off the surface by wiping on and buffing off several coats of gel finish. These super-thin coats dry so quickly that dust doesn't have time to settle on them. Again, the brand doesn't matter: I've had good results with Bartley's Gel Varnish and the one I'm using here, General Finishes' Gel Topcoat.

Take a piece of cotton cloth about 4 in. square and dab some gel varnish onto it with a small stick. Wipe the gel onto the surface in a circular motion. Don't try to cover more than 2 or 3 sq. ft. before immediately coming back with a larger piece of clean cotton and buffing the surface in quick strokes with the grain.

If you wait too long and the surface becomes sticky, wipe on a little more gel to reactivate the finish and then immediately buff the surface. What you

Tips for gel poly. *Use a stirring stick to place some of the thick finish on a small piece of cotton cloth (above left). Dipping the cloth is too messy. Apply the gel in a circular motion until you've covered a few square feet in an even layer (below left). Buff off the surplus finish right away using quick, firm strokes and turning frequently to a fresh section of cotton cloth. Repeat until the whole tabletop is done. Look at how happy you'll be with your flawless finish (bottom).*

are doing is obscuring the fine scratches left by the steel wool. These are very thin coats of finish, so be prepared to apply at least three coats. The directions on the can will probably say to wait overnight between coats, but in warm, dry conditions, eight hours is plenty.

For the areas of the table that don't need the extra protection of the brushed-on polyurethane, just wipe on the gel finish as described. Four or five coats should be sufficient.

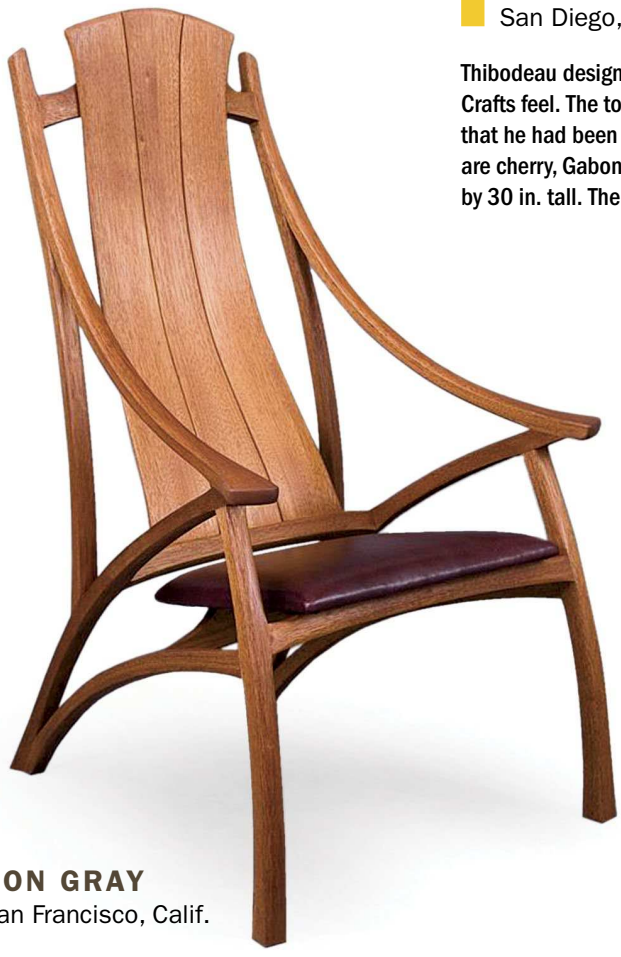
A coat of wax is optional. On pieces likely to be handled regularly, I use it for the feel and protection. But on a dining table likely to be wiped frequently with a damp cloth, wax is a waste of time. □

Mark Schofield, based in Southbury, Conn., was Fine Woodworking's *resident finishing expert for more than a decade.*

gallery

CRAIG THIBODEAU
San Diego, Calif.

Thibodeau designed this dining set for a client who wanted a slightly Asian/Arts and Crafts feel. The top incorporates a special four-way book-match of Carpathian elm burl that he had been saving. The base also has burl panels, as do the chairs. Other woods are cherry, Gabon ebony, and Macassar ebony. The table is 39 in. wide by 74 in. long by 30 in. tall. The finish is conversion varnish and lacquer. PHOTO: CRAIG CARLSON



DON GRAY
San Francisco, Calif.

Gray spent 250 hours designing and mocking up this laminated mahogany chair, and another 200 hours building it. He was inspired by the natural form of forked tree branches and wanted the angles and joints to subtly reflect that image. The chair, finished with Liberon Finishing Oil, is 32 in. deep by 27 in. wide by 47 in. tall.

MATTHEW OSBORN
Indianapolis, Ind.

"My wife and I were used to living in tiny apartments with our daughter and having to move our furniture around," Osborn says. "This table design was my solution to that situation." He calls these white oak and walnut tables "Mother and Her Cub." With the smaller one (20 in. dia. by 16 in. tall) nestled inside the larger coffee table (42 in. dia. by 14 in. tall), there is plenty of surface area to play games or eat. Or, you can take out the smaller table to use as a side table. The tables are finished with Danish oil and took about 40 hours to complete. PHOTO: PHIL TENNANT

ADAM WEBB
Whitianga, New Zealand

Webb wanted to convey a feeling of lightness and warmth in this contemporary take on a Shaker hall table. The table is 14½ in. deep by 59 in. wide by 34 in. tall. The cherry is finished with Danish oil; the maple with Briwax only. PHOTO: DANIEL ALLEN

DOUGLAS W. JONES
Los Lunas, N.M.

This bench was designed for a large, circular sitting area in a private residence that overlooks spectacular Lake Champlain. The lines of this bench were intended both to complement the curving architecture and to evoke nautical themes brought to mind by the view of the lake. Measuring 23 in. deep by 51 in. wide by 28 in. tall, the bench is constructed with mahogany slats over a bent-plywood armature sandwiched between solid frames; Jones turned the four legs and hand-carved the armrests. He finished the piece with an oil/varnish combination. PHOTOS: SUSAN TEARE

QUENTIN KELLEY
Milton, Mass.

Kelley based the design of this chair on one his client liked. The original, made by an Italian manufacturer, was badly proportioned, so Kelley resized his version. He also thought he could improve on the details of the arms, crest rail, back splat, and seat apron. So he designed a chair of soft maple, adding dark stain and upholstery according to the client's wishes. Then he made this version (21 in. deep by 21 in. wide by 39 in. tall) for himself, leaving it unfinished and upholstering the seat with simple muslin fabric. It took about 100 hours to complete. PHOTO: CHRISTIAN PHILLIPS

WOODWORKERS MART

JIM PROBST
Hamlin, W.Va.

This walnut and butternut dining set is part of a series Probst calls his Meander collection, named for the S-curve that winds its way through each piece. Here it is seen in the table uprights and back legs of the chairs. The table is 42 in. deep by 84 in. wide by 30 in. tall; the chairs are 19 in. deep by 19 in. wide by 39 in. tall. The finish is tung oil and polyurethane.

ADRIAN FERRAZZUTTI
Guelph, Ont., Canada

A student of James Krenov, Ferrazzutti says this ebony, holly, and maple vanity has "Jim's influence all over it." He learned most of the construction methods at Krenov's College of the Redwoods: The veneers are shopsawn and jointed with a wooden plane; the drawer pocket has "let go," which means the fit tightens up as the drawer is pulled out. The dovetails are hand cut (pins first), and attention to detail is paramount.
PHOTO: JOHN HOWARTH

SETH KIEDAISCH
Andover, N.H.

When a client asked Kiedaisch to design a table with "those butterfly things and that ragged edge," he decided to have fun. Instead of the typical slab top with traditional butterfly keys and an angular base, he built a very organic, curved base out of walnut. He did a lot of lumberyard sleuthing to find the bird's-eye maple slab top, and he played with the size and shape of the keys, curving them to mirror the base. Finished with oil and wax, the table is 20 in. deep by 50 in. wide by 15 in. tall. PHOTO: CHARLEY FRIEBERG

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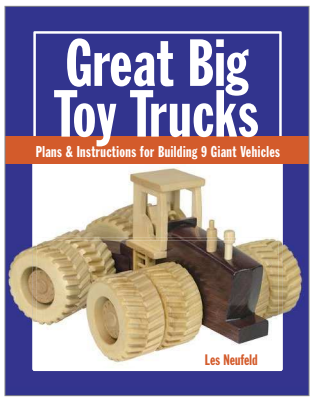

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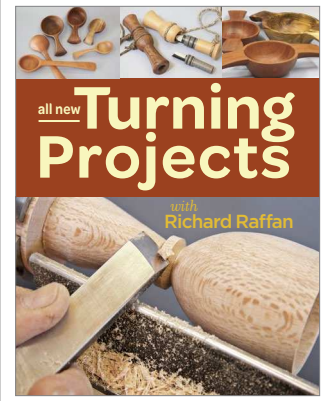

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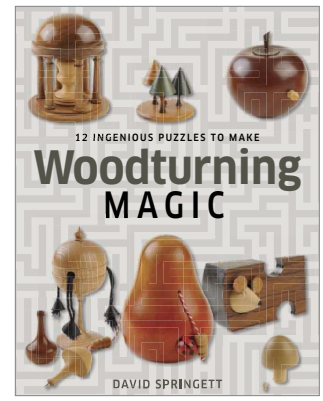

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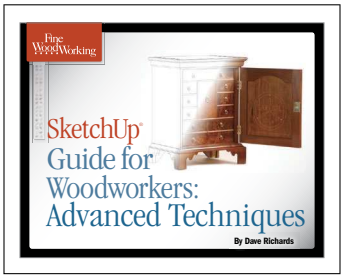

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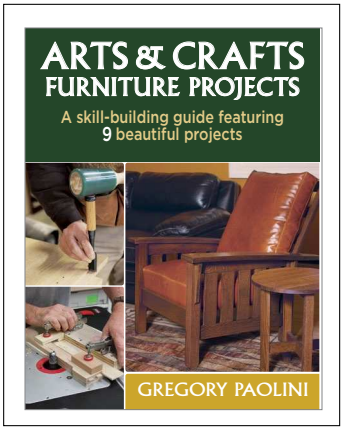

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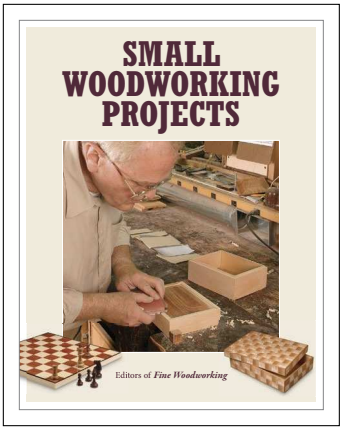

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