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DANISH MODERN CHAIR PAGE 50



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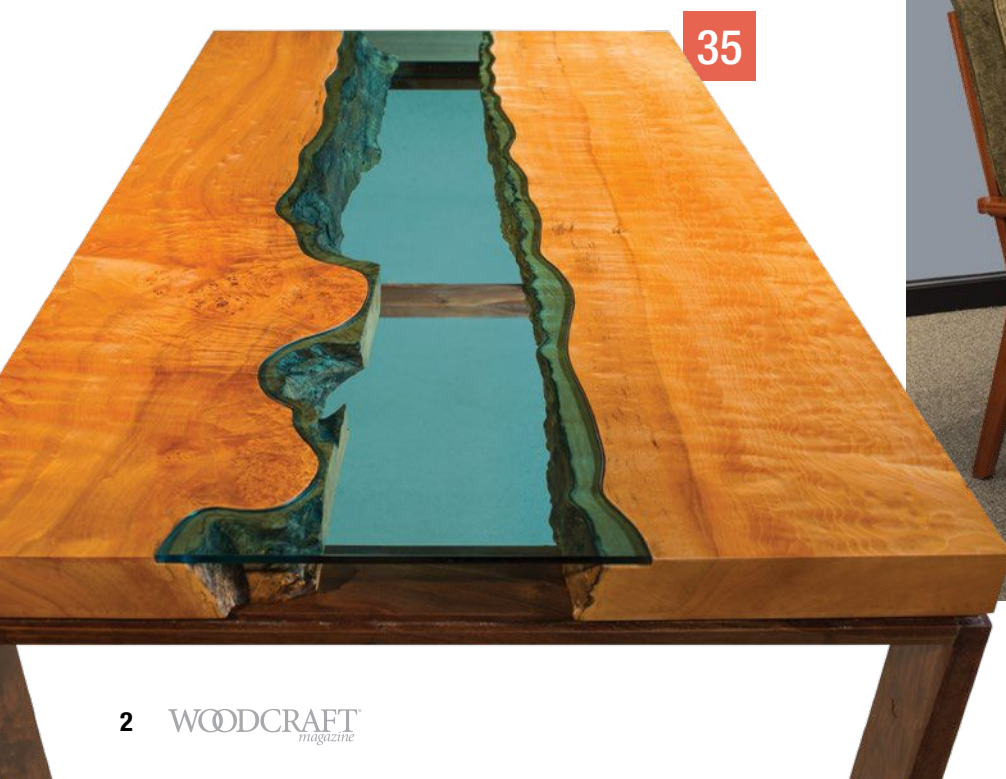
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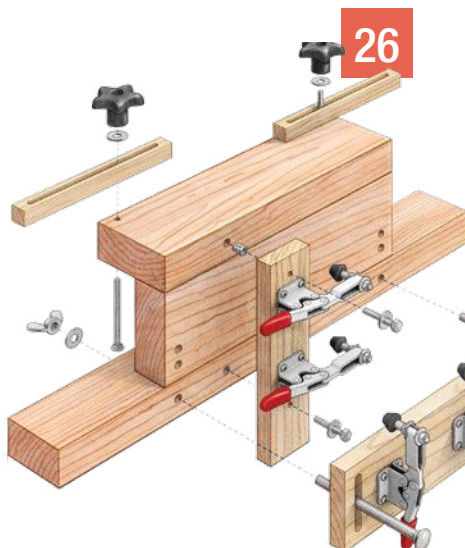
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- Simple saw blade cleanup



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Contributors



How does a former chief editor of *Fine Woodworking* end up pedaling on the hundreds of bike trails that wind in and around Portland, Oregon? **Asa Christiana** clearly has some “splaining” to do.

“My wife and I quit our jobs in 2015, left one daughter in college, and drove cross-country with our middle-schooler, one dog, one cat, and all the woodworking gear and furniture we could fit into a PODS container. It was a long-planned move for all the usual reasons people move to Portland: nice people, mild weather, amazing outdoor recreation, and an emphasis on experiences over things.” The photo shows our “Welding for Woodworkers” (p. 42) author at the summit of Mt. St. Helens.



Ken Burton (“Easy Chair,” p. 50) has been working with wood for more than 30 years and writing about it nearly as long. Check out his website at wrwoodworks.com. Ken teaches woodworking classes at Peters Valley Craft Center in Layton, New Jersey, and at Yestermorrow Design/Build School in Warren, Vermont. ■



Brendan Whitehead's adventures in woodworking began in England, building rabbit hutches and repurposing bed slats into a garden gate. After moving to the United States, his interests expanded into carving, starting with small figurines and culminating in a 15-foot chainsaw carved totem pole. Since moving to Colorado, he focuses his creative energy on furniture and design, particularly slab furniture such as the “River Table” (p. 35), and the mysteries of grain graphics. In addition to making tables, Brendan teaches an assortment of classes at the Woodcraft store in Denver, Colorado, including hand and power tool woodworking, and knife making.

On the Web



Free fundamentals! This issue's “Dressing Stock” article from senior editor Paul Anthony delivers essential woodworking knowledge. To go along with that good foundation, we're offering up two stories that pack the same punch. Go to woodcraftmagazine.com and click on onlineEXTRAS to download these free PDFs. ■



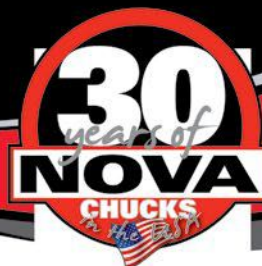
Don't miss the next issue!

Master woodworker Mario Rodriguez provides all the step-by-step details to build this beautiful tall bureau.



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Beauty is in the eye of the beholder

Woodworking encompasses an impressive range of activities—from making toys and turning bowls to building cabinets, carving spoons, and creating furniture in different styles. Here at the magazine, we can't possibly touch on all the possibilities in a single issue, or even a year's-worth of issues. But that's not going to stop us from trying.

We've recently heard from readers who think that we're giving too much coverage to traditional furniture styles, and

too little coverage to contemporary designs. I can't argue with that contention. Many woodworkers get their start by practicing traditional techniques and mastering the basic joinery tasks in traditional Shaker and Craftsman-style projects. But there are plenty of other folks who come to woodworking with an affinity for contemporary design and a desire to combine wood with metal and other materials. We want to embrace this broader view of our favorite activity, and that's what we're doing in this issue.

Artisans have been combining wood and steel for a long time, but this trend has really taken off in recent years. Our "Welding for Woodworkers" article (p. 42) provides some design possibilities along with details on how to get a safe and satisfying start in welding mild steel.

Live-edge slab furniture is another popular woodworking genre—a great way to celebrate the natural beauty of wood. Brendan Whitehead's River Table (p. 35) demonstrates a unique design approach: orienting the live edges inward to create a flowing composition highlighted by tinted glass.

My favorite project in this issue might surprise you; it's a foam-cushioned chair that manages to be superbly comfortable without a single curve. Ken Burton's "Easy Chair" (p. 50) is a tribute to Danish Modern design—a composition of polygonal parts that wows you with its honest functionality and minimalist beauty. ■



Contemporary coffee break. Many of our projects are photographed at The Big Sandy, a major home furnishings store in Parkersburg, West Virginia, with great room backdrops and a generous and understanding staff. The oldest guy gets the most comfortable chair. Next to me are managing editor Chad McClung, associate art director Bobby Schehl, and photographer Larry Hamel-Lambert.

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- Min. stock length: 6"
- Feed rate: 16 and 30 FPM
- Cutterhead diameter: 3"
- Number of knives: 3 HSS
- Knife size: 15" x 1" x ½"
- Cutterhead speed: 5000 RPM
- Table size: 20½" x 15" x 3½"
- Overall size: 32" W x 28" D x 23½" H
- Approx. shipping weight: 382 lbs.

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- Max. cutting width: 15", Depth: ½"
- Max. stock thickness: 8", Min: ¾"
- Min. stock length: 8"
- Feed rate: 16 & 30 FPM
- Cutterhead diameter: 3", Speed: 4800 RPM
- Power feed rollers: solid serrated steel
- Precision-ground table size: 15" x 20"
- Overall size: 32½" W x 42" D x 45½" H
- Approx. shipping weight: 675 lbs. (G0453), 672 lbs. (G0453Z)



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Norm's Advice: *Be patient, work safely, and enjoy the journey.*



WC: You started your career as a building contractor. Did you ever imagine you'd make the change from carpenter to TV personality to master woodworker?

NA: I could never have imagined how things turned out. I learned carpentry from my father, and my major goal was to build a successful contracting business. If Russ Morash (the producer of *This Old House*) hadn't hired me to build a garage with an attached workshop, I wouldn't have had the start at *This Old House* that led to *The New Yankee Workshop*.

WC: Is building furniture more difficult than building or remodeling houses?

NA: House construction was more complex when I started out because the most accomplished builders were true master carpenters. They had working knowledge of masonry, framing, finish carpentry, roofing, flooring, and other

aspects of construction. Building today is much more specialized; you've got subcontractors who handle these different jobs. Because I came up through the master carpentry tradition, I learned to appreciate the value of careful planning, doing things in the right order, and building a project in your head before you lifted a hammer. These skills served me well when I turned to woodworking. Construction and remodeling can be challenging because of unpredictable factors like the weather. But I think making furniture is more demanding because precision is so critical from start to finish.

WC: Do you have a favorite project, from all those episodes of *The New Yankee Workshop*?

NA: I've got several favorites. The tiger maple highboy stands out because it was definitely the most difficult piece I made. Using a museum-quality antique as a model certainly put me

I'm not often in the right place at the right time. But I got lucky in 1988. I was looking for work, and Norm Abram was planning the first season of *The New Yankee Workshop* with producer Russell Morash. They needed help producing

a book to accompany the TV show. I worked with Norm as coauthor and photographer, while my wife Barbara did all the graphic design and layout. None of us had any idea how successful the show would become. Recently,

Norm and I had a chance to talk about the show and his journey from building contractor to TV personality to woodworking superstar. Here are some highlights from our conversation.

—Tim Snyder

under pressure, but I enjoyed the challenge as well as the end result. The mesquite bookcase (at right) and Adirondack chair are also among my favorite projects.

WC: Have you seen woodworking change since *The New Yankee Workshop* began nearly 30 years ago?

NA: I sure have. Adhesives have improved, enabling me to use fast-setting glues that save time. I like the increased emphasis on safety in different areas—flesh-sensing saws, quieter motors, better dust collection. CNC technology is becoming

gaining popularity. Old wood isn't good just because it's being saved from the landfill; it often has a patina you can't find in new lumber.

WC: What advice would you give someone interested in becoming a woodworker today?

NA: Apart from being safe, I think the most important thing is to be patient. Enjoy the learning process and build your skills one technique at a time. Despite the impressive array of power tools available today, it's still important to master basic hand tool techniques, so take

the time to feel comfortable using chisels, planes, and hand saws. It's also smart to take advantage of the good instruction

“Despite the impressive array of power tools available today, it's still important to master basic hand tool techniques.”

more affordable, providing woodworkers with design, and fabrication options they didn't have before. But I also like the fact that hand tools haven't lost their importance in the workshop. It's great that high-quality hand tools are still being made. I've always enjoyed using reclaimed lumber, and it's good to see this trend

you can find in magazines and books, at a Woodcraft store or a woodworking school. There's plenty of advice online, too—but you'll have to separate the good from the bad. Finally, get together with fellow woodworkers to share ideas, and to keep learning that there's always another way to do something. ■

Visit newyankee.com for measured drawings of *The New Yankee Workshop* projects. You'll also find DVDs, tools and gifts for sale.



Mesquite masterpiece. Inspired by an antique example found on a trip to Tuscon, Arizona, this cupboard is one of Norm's favorite projects.



Not bad for carpenter.

During the 21-season run of *The New Yankee Workshop*, Norm somehow found time to write eight books, appear on *This Old House*, serve on the board of trustees for Old Sturbridge Village (osv.org), and shake hands with thousands of fans at trade shows across the country.

Super standing desk

I finished the standing desk from Issue #70. It is a Merry Christmas/Happy Birthday/Happy Valentines/Happy Father's Day gift to my husband! He is already putting it to use, but we may add wheels to make it higher and more portable. I am looking forward to my next big project. This desk wouldn't have happened without your help. Thank you.

P.S.- Someone said that I should wax the drawer glides. What do you suggest?
—Ann Blasdel, via email

Chief Editor Tim Snyder responds:

Congratulations on a job well done. The desk looks great, and I'm sure your husband is pleased.

As for your next project, you're in luck. I think you'll find a worthy desk accessory on page 21.

Regarding the advice about wax, lubricating the drawer slides (and the bottom edges of the drawer sides) is a good idea. A little candle wax, or a product called Slipit sliding compound, will work wonders.

Thanks for staying in touch. Good luck in the workshop, and everywhere else.



Jewelry box, redux

Regrettably, a few errors crept into last issue's open-frame jewelry box ("Jewelry Chest," #76, pp. 36-43).

The rail length given on page 39 should be 14", as correctly noted in the drawing on page 37. As for the notch offset on the Rail Mortising Jig drawing on page 38, the dimension should be 3/4", not the 13/16" shown. In addition, the notch-to-notch distance for the Leg Mortising Jig drawing on page 38 should be 2 5/8", not 1 5/8" as indicated.

—Staff





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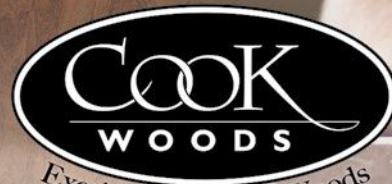
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Safer sawing

I am a longtime subscriber and enjoy your magazine. I understand the "Safety First!" disclaimer at the beginning of the magazine, but the photo in last issue's "Customize a Keyhole with an Inlaid Escutcheon" (April/May 2017, #76), left me worried. It appears that Chris's fingers are inches away from the blade. If the inlay were to shift, there's a chance that his fingers might come in contact with the blade. I think a pushstick, or some other mechanical device, ought to be used.

—Dennis C. Szymanski, via email

Contributing editor Chris Hedges responds:

Thank you for your note. Safety should always be at the forefront of any woodworker's mind. However, there are mitigating factors that can shift the line between safe and unsafe practices. In this case, there were a couple of things working in my favor. First, I am a proud owner of a SawStop table saw. I am utterly confident that the saw will do exactly what it is advertised to do. Second, the double-sided tape mentioned in the story is nearly bomb proof. That stuff could hold a car together even better than duct tape!

This should go without saying, but if you aren't comfortable with any technique, it is wise to stop and consider a safer alternative. In this case, you could employ a hold-down, such as toggle clamp, to secure the blank to the sled. In addition, you could increase the width of the plywood. This combination would ensure that your hands stay completely clear of the saw blade.

Raise a mug for Wharton Esherick



Entries are being accepted for the 24th annual Wharton Esherick Museum Woodworking Competition and Exhibition. This year's theme, "Creative and Imaginative Vessels," was inspired by an intricate oak mug carved by the artist in 1927. Esherick (1887-1970) was a sculptor who worked primarily in wood, extending forms to furniture, buildings, and more. His studio in Malvern, Pennsylvania, now a National Historic Landmark for Architecture, features more than 300 of his works.

The competition's purpose is to encourage resourceful and innovative thinking that results in objects that surprise and delight. Winning pieces will be exhibited at the museum.

The entry deadline is July 1. For more information, visit whartonesherickmuseum.org. ■

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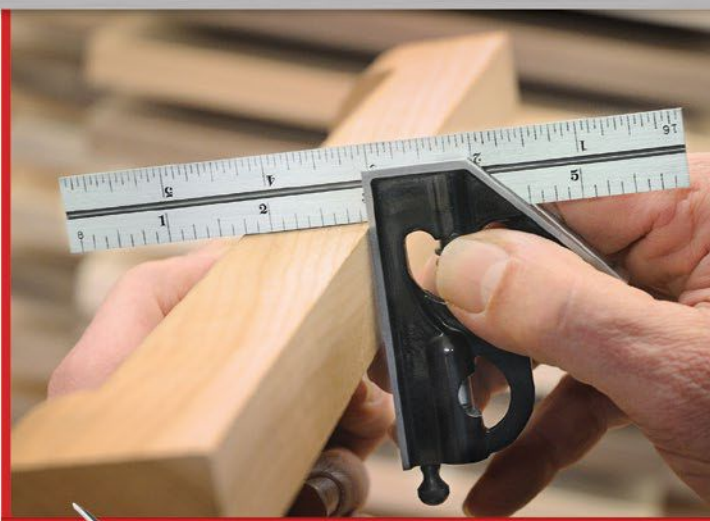
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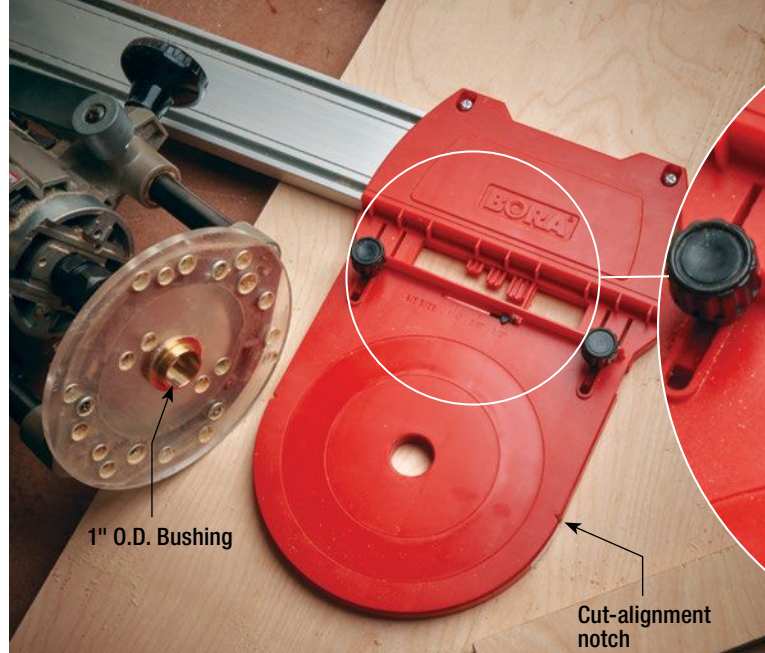
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Panel-perfect dados and grooves

Bora Router Guide and WTX Modular Clamp Edge Guides

It's annoying enough that most hardwood plywood doesn't live up to its nominal thickness, but it's downright disturbing to discover that panel thickness can vary from one sheet to the next as much as $\frac{1}{16}$ ". This little detail becomes a big problem when you want snug-fitting dados, grooves, and rabbets. Undersized "plywood" bits offer a partial solution, but there's no guarantee that such a bit's $\frac{1}{32}$ "-reduced diameter will be an exact match to your material. There are classic tricks for routing perfect dados involving spacers (see p. 18), but now there's a simple, slick router jig that beats 'em all.

The Bora Router Guide is designed to work perfectly with the Bora WTX Modular Clamp Edge Guide, which serves as a guide rail. The working principle of the system is that a cut is made in two overlapping router passes with a $\frac{1}{4}$ "-, $\frac{3}{8}$ "-, or $\frac{1}{2}$ "-bit that's bigger in diameter than half the width of the



dado. The included 1" O.D. Porter-Cable style guide bushing ensures that almost any router can be fit to the jig's plastic base.

Using the guide is simple: First, place a scrap of the plywood you're using in the guide's jaws and tighten the lock knobs, as shown top right, facing page. Next, clamp the guide rail to your workpiece, using the notch on the baseplate (indicating the bit's center) for positioning. (To simplify things, I made a mark on tape to indicate the first pass' outer edge.) Make your first pass, then set the bit offset slider to correspond to your bit's diameter.

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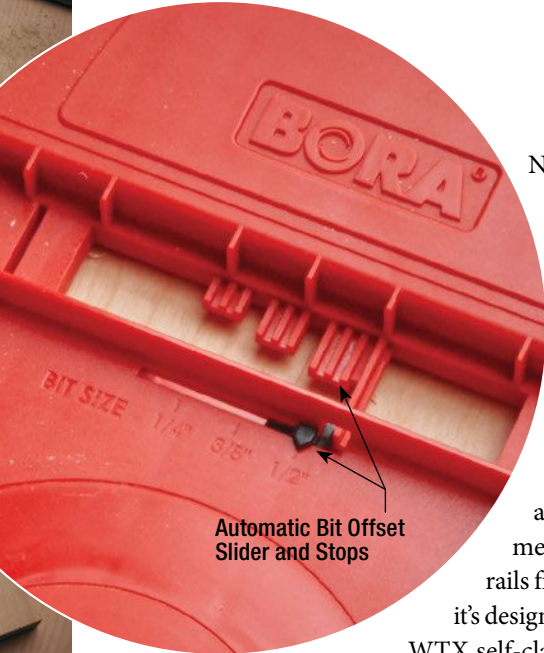
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Now loosen the knobs, and shift the base toward the fence, which presses the slider against the appropriate stop to guarantee that the second pass creates a groove that exactly matches the width of your stock (bottom right).

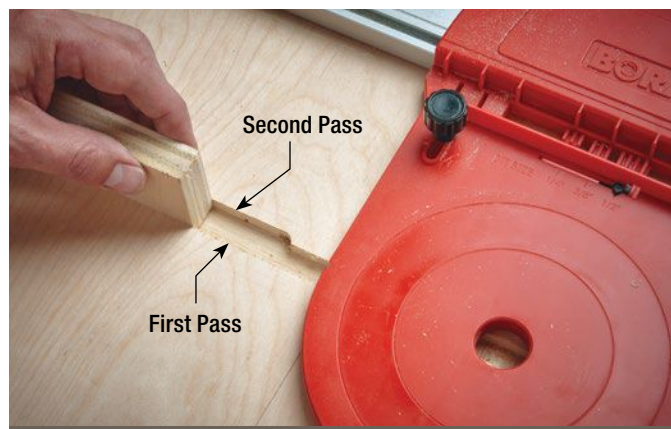
The router guide can be adjusted to fit other commercial or shop-made guide rails from 2¹⁵/₁₆ to 3³/₁₆" wide, but it's designed to work with Bora's new WTX self-clamping guide rails. Unlike some other self-clamping rails I've worked with,

the WTX quick-release locking mechanism has a particularly tenacious grip, and the extruded aluminum track does not deflect in use. The 36" rail works well for cutting dados in standard-sized cabinets. With the optional circular saw base, it could also be used for crosscutting doors and countertops. The 50" rail would be handy for crosscutting standard sheet goods, while the 100" rail serves for ripping full-sized sheets lengthways.

Tester: Joe Hurst-Wajszczuk



STEP 1: Set jig and rout the first pass.



STEP 2: Reset jig and rout the second pass.

Axe makes the cut

Carter Products Axe Carbide Turning Tools

I'm a big fan of carbide-tipped lathe tools because they stay sharp so much longer than high-speed steel tools, especially when shaping my cast-resin turnings. So I was happy to give Carter's new Axe turning tools a test spin. Initially, they seemed very similar to the competition in that the replaceable carbide tips come in square, radiused, round, and diamond shapes. However, I discovered a few details that help them stand out from the crowd.

The obvious difference is in the namesake handle. Its axe-handle shape is unorthodox, but I appreciate how the flat faces offer feedback about the orientation of the carbide tip, giving me greater control when it's hidden in a bowl or vase. I also like how the shape fits within the meat of my palm, dampening vibration better than a traditional handle.

The faceted handle works in tandem with the tool's uniquely shaped shank. On both the square- and round-tipped tools, the shank includes a flat section on the underside for positive tool rest registration. However, it transitions to a round cross-section, which enables you to roll the tool to make a smoother shearing cut, reducing cleanup work with sandpaper.



Experienced turners will enjoy these tools, but I think they are a particularly smart buy for beginners. They are ready to use right out of the box, and the carbide tips eliminate the need for a bench grinder or additional sharpening gear. When the carbide starts to dull, simply rotate the screw-locked cutter head, and get back to turning. ■

Tester: Keith Lackner

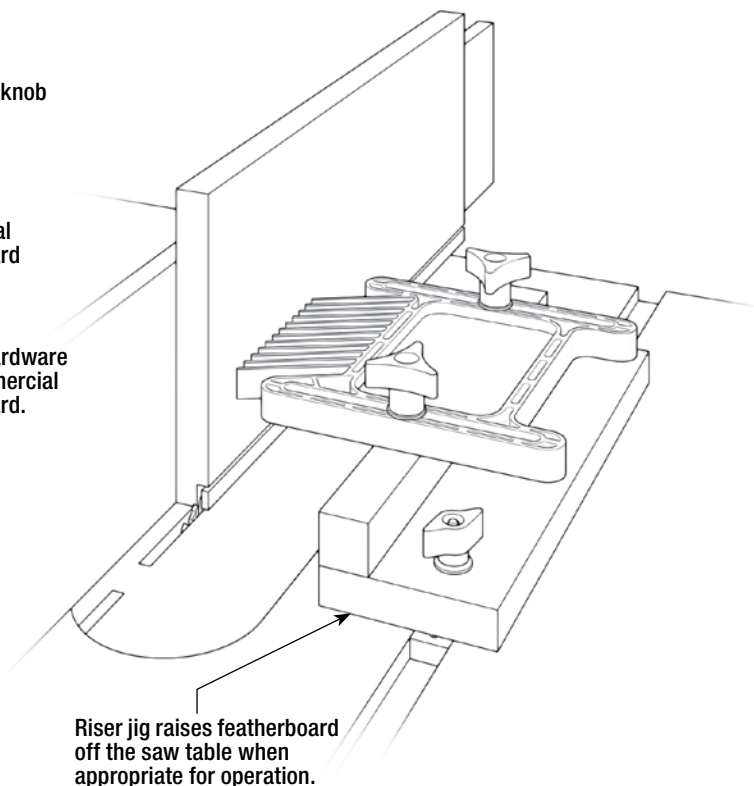
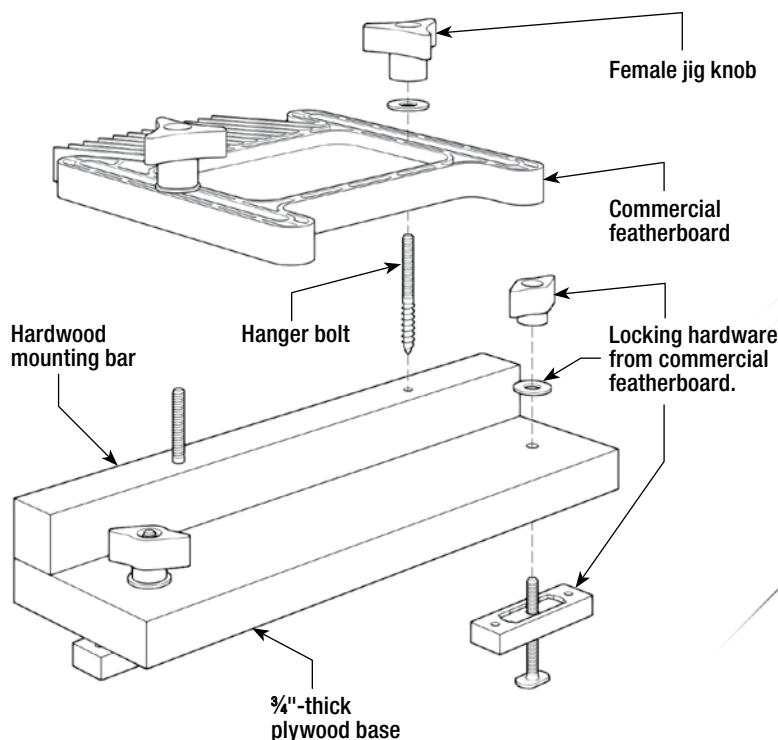
TOP TIP

Featherboard riser

A featherboard is great for controlling feed at the table saw, bandsaw, or router table, preventing kickback and keeping a workpiece firmly pressed against a fence for both safety and accuracy of cut. But there are times when a featherboard is best raised up off the table. For example, when rabbeting at the table saw, a table-mounted featherboard will press against the freed offcut, causing it to eject violently. Raising the featherboard prevents this. A raised featherboard also keeps tall panels and other workpieces perfectly vertical, which helps when resawing against a tall fence, among other operations.

This simple riser jig works with commercial featherboards, most of which include hardware that locks the unit in your machine table slots. Make the jig base from $\frac{3}{4}$ "-thick plywood, about 3" wide and a few inches longer than your featherboard width. Glue on a hardwood mounting bar, the width of which raises your featherboard to the desired height. Install the featherboard locking hardware in the jig base, and then mount the featherboard to the mounting bar with hanger bolts from the hardware store and female jig knobs.

—Dan Martin, Galena, Ohio



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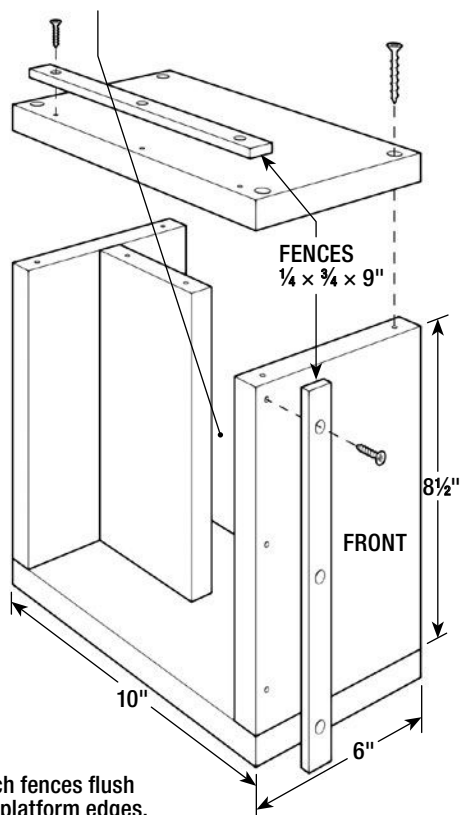


Dovetailing platform

When making hand-cut dovetail joints, it's common to use a completed tail board as a template to lay out the pins. However, I've found it difficult to keep the tail board and pin board accurately and securely aligned for the process, especially while bending uncomfortably low over my workbench. This small clamping platform solves the problem nicely (as seen on page 21.) The simple open-sided box is made from five pieces of $\frac{3}{4}$ " plywood, which I cut to length from a single 6"-wide ripping. Just glue and screw the pieces together, taking particular care to align the front panel with the front edges of the top and bottom. In addition to having a fast, foolproof way to keep boards aligned for joint layout, you can clamp a tail board against the front panel for cutting the tails. Just extend the top end up above the platform.

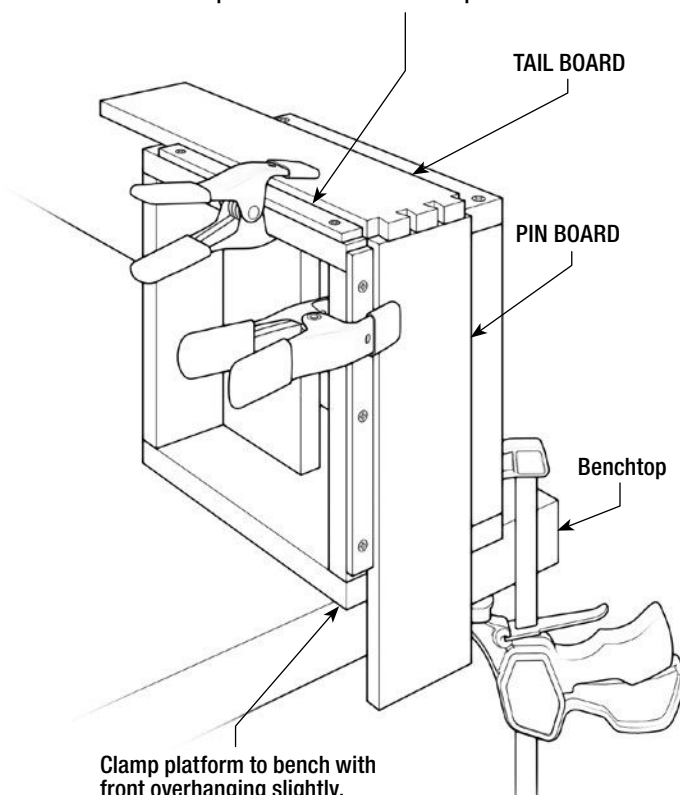
—Tim Snyder, editor

Center gap allows access for clamping wide pin boards to platform front.



Attach fences flush with platform edges.

Register workpieces against fences, aligning them for scribing the tail profile onto the end of the pin board.



Clamp platform to bench with front overhanging slightly.

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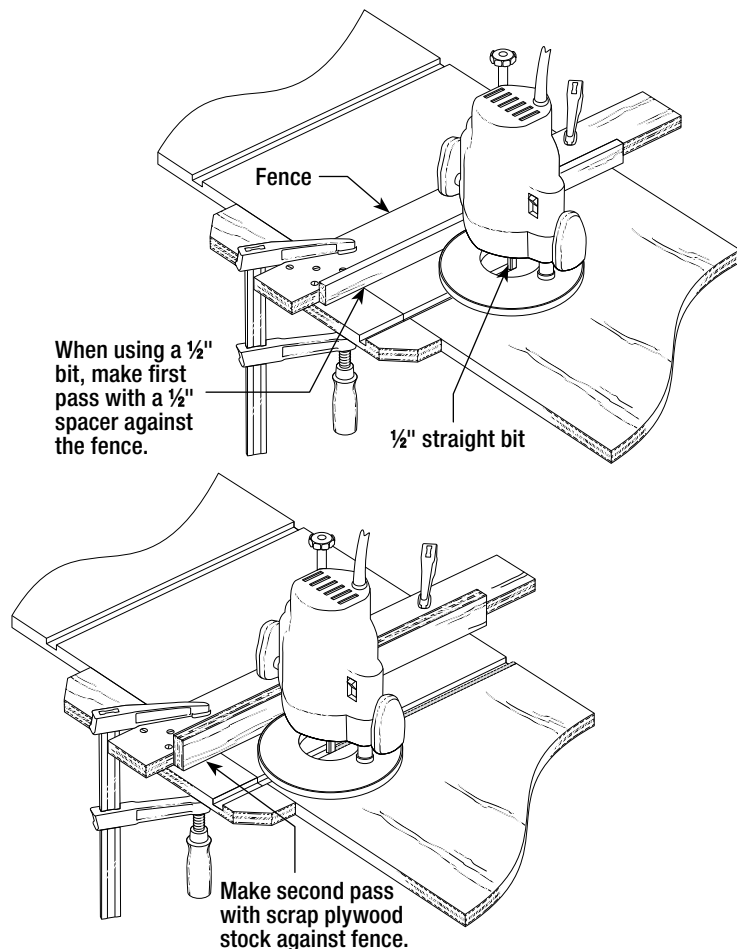
Classic Tip

Perfect router-cut dados

Hardwood plywood usually doesn't match its nominal thickness; it's typically undersized between $\frac{1}{64}$ " and $\frac{1}{32}$ ". Therefore, when routing dados, a single pass with a single bit is unlikely to yield a perfect fit. (Even "undersized" panel bits sold for the purpose may not exactly suit the thickness of your particular stock.) To solve the problem, I've come up with a two-spacer trick to rout perfectly sized dados. All you need is a bit that's at least half as wide as your dado, but smaller than the final cut; a couple of scraps of wood; and a straightedge fence.

First, make a spacer that's exactly the same thickness as your bit diameter. To set up the cut, sandwich the spacer between the fence and router base, and align the bit with the dado layout line that is nearest the fence. Secure the fence and rout your first pass. Next, replace the spacer with a scrap strip of your plywood stock, standing it on edge. Then make a second pass with the same bit to create a dado of perfect width. ■

—Ryan Reese, New York, New York



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Desk CADDY

Keep it together with an organizer you can make from lumber leftovers

By Tim Snyder



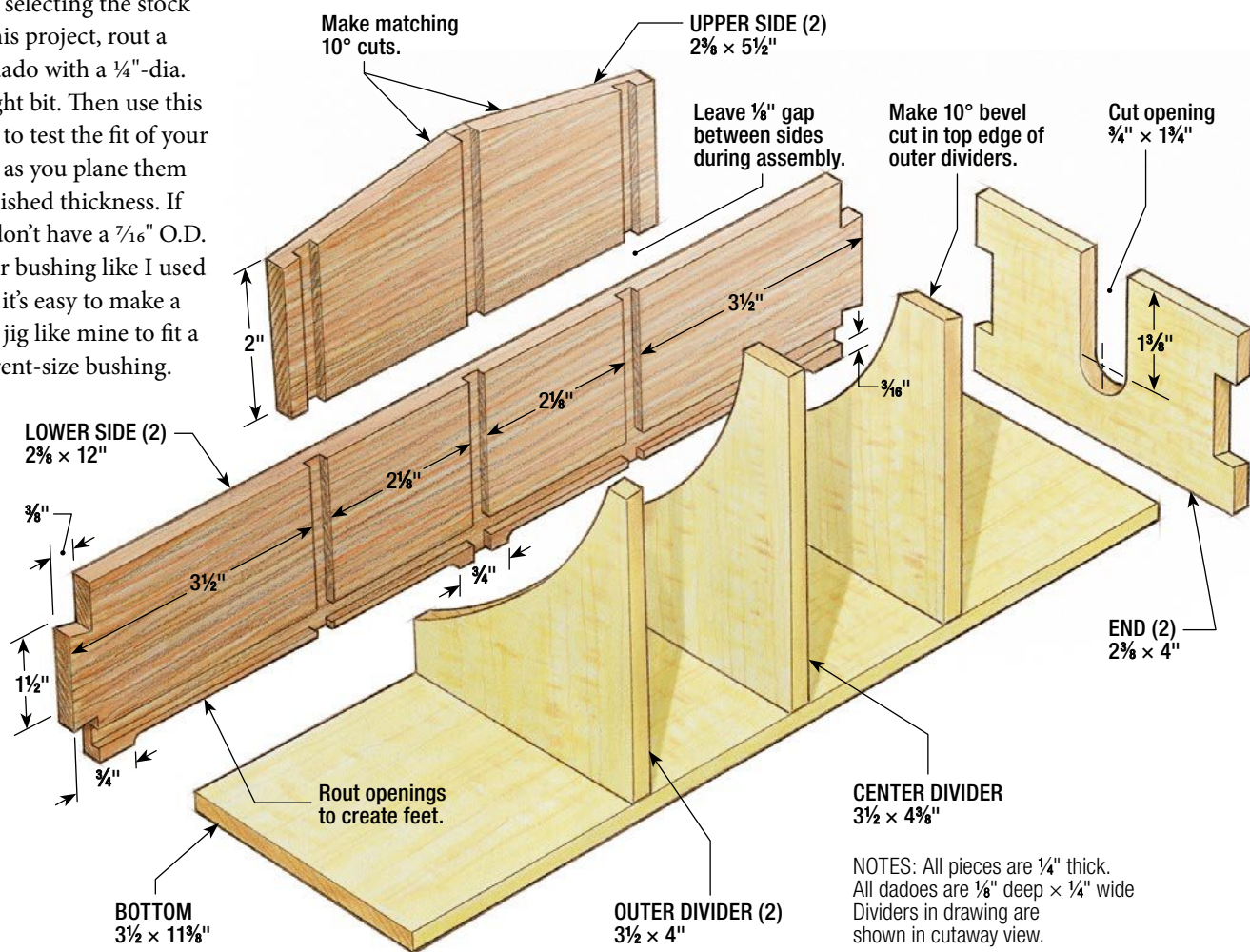
When my box of lumber scraps starts to overflow, I've got two choices. I can dispose of the excess wood or find a small project to utilize my favorite pieces. The latter option is always preferable, and that's how this small but useful project came into being. My desk caddy holds the everyday items that otherwise get misplaced in pockets,

drawers, and elsewhere throughout the house: loose change, odd screws and hardware items, pens, eyeglasses, my cell phone and a stack of square Post-it notes. The square note pads, which I consume at an astonishing rate, actually dictated the size of the two outer compartments. You could easily adjust the dimensions to suit your particular storage needs.

Building this project is an opportunity to try out a couple of tricks for routing dados precisely and making hand-cut dovetails with a shop-made guide. If you've got enough wood scraps to make two or three of these organizers, go for it. The jigs will speed your production, and you'll have some useful gifts for friends or family members.

10 pieces, 12 dadoses, 4 dovetails, and 1 bottom groove

After selecting the stock for this project, rout a test dado with a $\frac{1}{4}$ "-dia. straight bit. Then use this dado to test the fit of your parts as you plane them to finished thickness. If you don't have a $\frac{7}{16}$ " O.D. router bushing like I used here, it's easy to make a dado jig like mine to fit a different-size bushing.



Order of Work

- Mill dadoses in upper and lower sides.
- Rout groove in lower sides; then rout openings to create feet in lower sides.
- Trim top edges of upper sides at 10° angle.
- Cut dovetail joints in lower sides and end pieces. Make rounded access slot in one end.
- Dry-fit the caddy, then measure and cut the dividers and bottom to fit. Cut the top of each outer divider at a 10° bevel.
- Glue up, then finish.

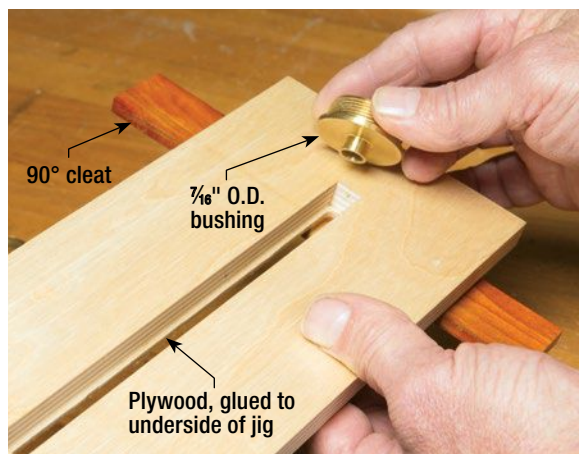
Have it your way



This project lends itself well to combining different wood species. For the caddy at left, I combined quilted maple and walnut. The caddy at right is cherry and maple, with round-head brass escutcheon pins installed as accents. The version in the lead photo was made with bocote and curly maple.

Route dados on a work board

For speed and accuracy, I set up a work board that holds a lower and upper side in place between wood strips. This enables me to quickly rout dados using a router equipped with a $\frac{7}{16}$ " O.D. bushing and a $\frac{1}{4}$ " straight bit. When your first set of sides is set up in the work board, take care to lay out your dado locations carefully, so that outer dados are equidistant from the center dado.



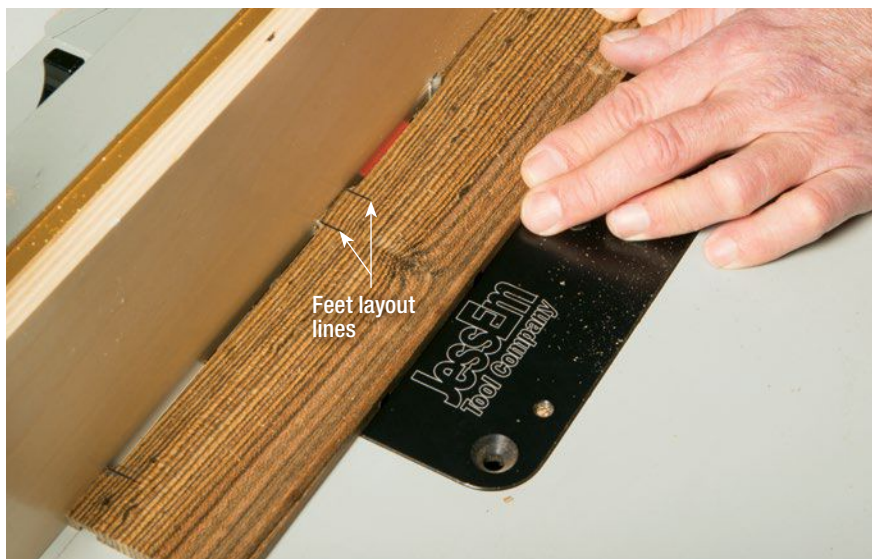
Route 2 sides at once. With an upper and lower side positioned on my work board, I can rout dados in both parts using a right-angle routing jig sized for a $\frac{7}{16}$ " O.D. bushing. As shown in the photo at left, I glued $\frac{1}{8}$ " plywood to the underside of my jig so that a preliminary cut would create an exact dado location for foolproof alignment. Set the router to make $\frac{1}{8}$ "-deep dados, and make three cuts to complete the six dados in these two sides. When you position the remaining sides on the work board, align your jig with the dados you cut in the alignment strips.

Route bottom grooves and complete the feet

The same bit I used to dado the sides will work in my router table to mill the bottom grooves and rout recesses in the lower sides to create the feet.



Match the dado depth. Adjust bit height to match the depth of dados milled in the sides. Then set the fence $\frac{3}{16}$ " from the bit, and mill the bottom grooves by running the bottom edge of each lower side against the fence.



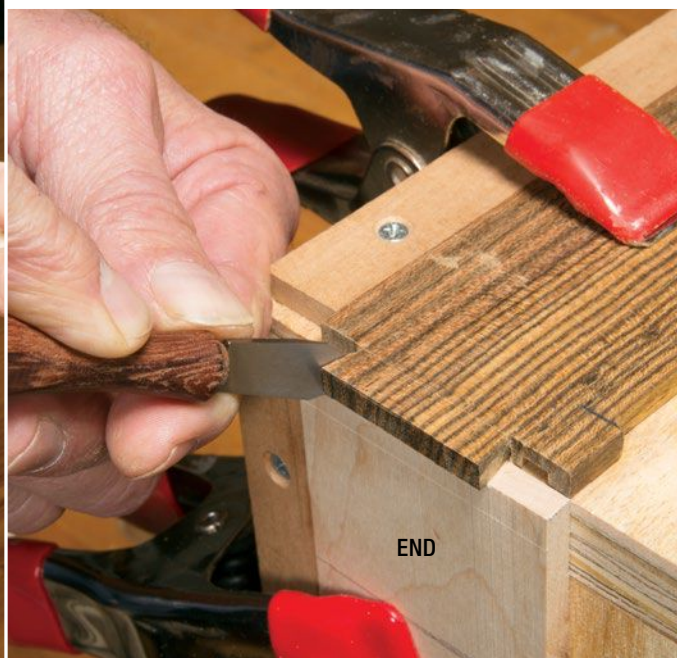
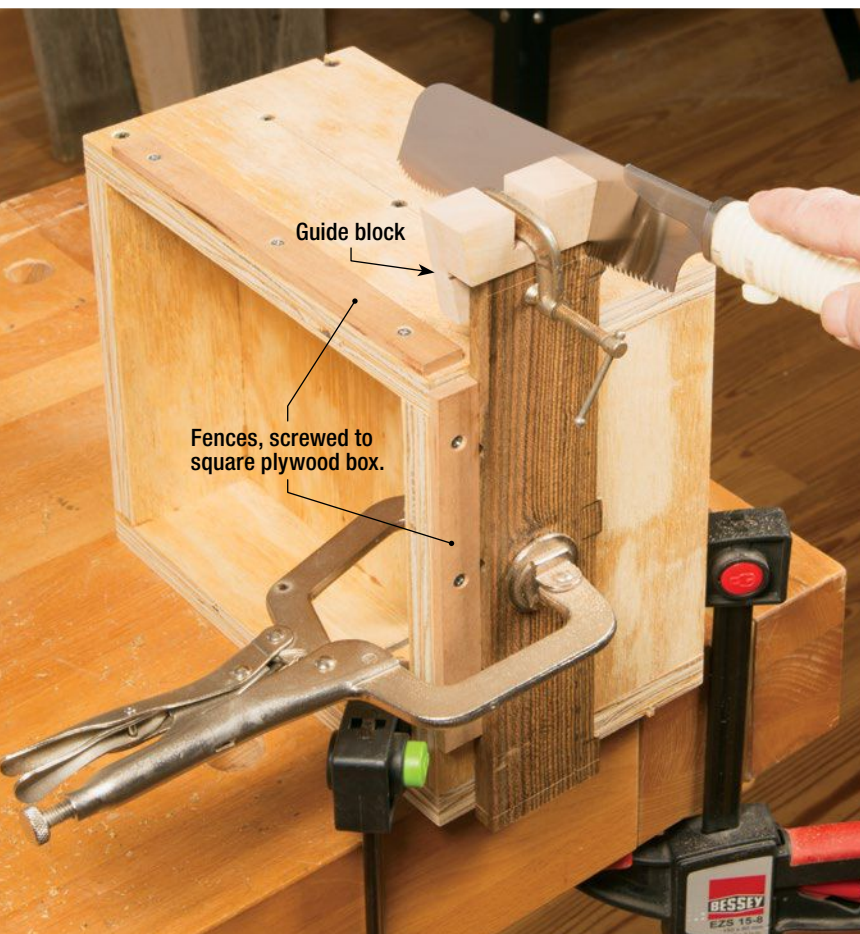
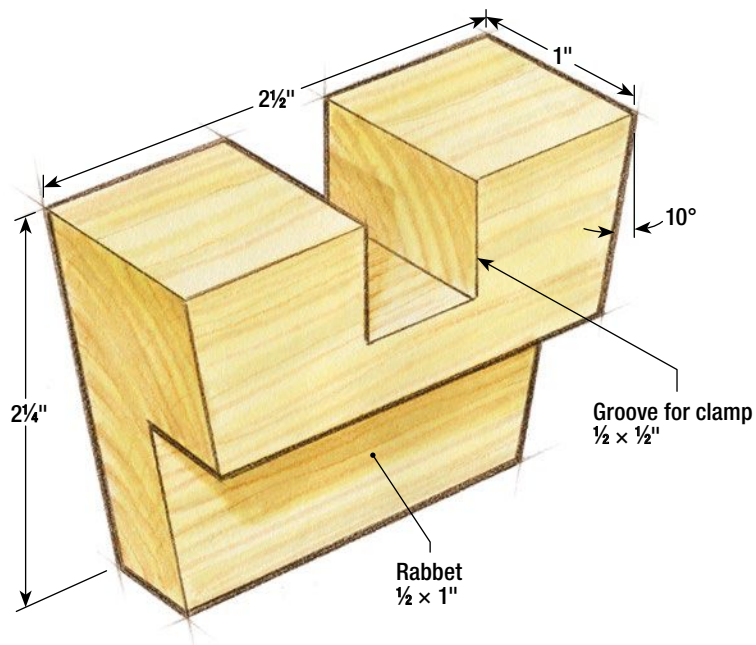
Creep up on your feet. Making a couple of shallow cutouts on each lower side will create feet, giving the project a graceful appearance and solid stance. This technique requires levering the side's bottom edge into the bit, making a shallow cut (aim for $\frac{3}{32}$ "), then stopping the bit at the foot layout line.

Cut dovetails by hand with a simple saw guide and

To highlight the dovetail joints at the ends of the organizer, I allow the dovetails to extend $\frac{1}{8}$ " beyond the end pieces. To create this detail, I use a marking gauge to scribe dovetail baselines $\frac{1}{8}$ " deeper than the thickness of end pieces. As you scribe baselines, make reference marks on the inside faces of your pin and tail pieces so that you can keep track of which parts go where.

As shown below, I use a square plywood box equipped with a pair of fences to hold these small workpieces for cutting and scribing. To make a dovetail guide block, start with a board about 10" long, $2\frac{1}{4}$ " wide and 1" thick. Cut the rabbet and the clamp groove on the tablesaw, then make the 10° cuts on the chopsaw.

Dovetail Guide Block



Cut the dovetails, then scribe the pins. Clamp the lower sides together so their dovetails can be cut at the same time (left photo). A guide block clamped to the sides keeps the blade on track when making the angled tail cuts. Complete the dovetails by cutting out the waste at each corner. Then use the dovetails to scribe pin cuts in end pieces (photo above). Make the pin cuts just inside these layout marks.

some sharp chisels



Create a shallow shoulder, then chop out the waste. When pin cuts have been made in end pieces, it's time to remove the waste between pins. Clamp an end piece flat, as shown above, and deepen the baseline with your chisel. Then remove small wedges of waste to create a shoulder that will guide the chisel as you chop down. Follow vertical cuts with horizontal taps to remove narrow pieces. When you've gone a little more than halfway through the joint in this manner, flip the workpiece and repeat to clear the space between pins. Test-fit the joint, pare as necessary for a snug fit, then move on to the next joint.

Prep parts, then assemble, finish, and get organized!

When a dry-assembly indicates that all 10 pieces fit together well, I spend a good 20 minutes chamfering edges with my block plane and final-sanding every piece. Then I get set for glueup by making four clamping cauls that enable me to put pressure on upper and lower side pieces with a pair of clamps. Alternatively, you can fasten dado joints together by driving brass escutcheon pins into predrilled holes, as I've done sometimes. Having used wipe-on poly for my first organizer, I have switched over to spraying satin varnish from an aerosol can, which is a faster, easier way to protect and beautify.

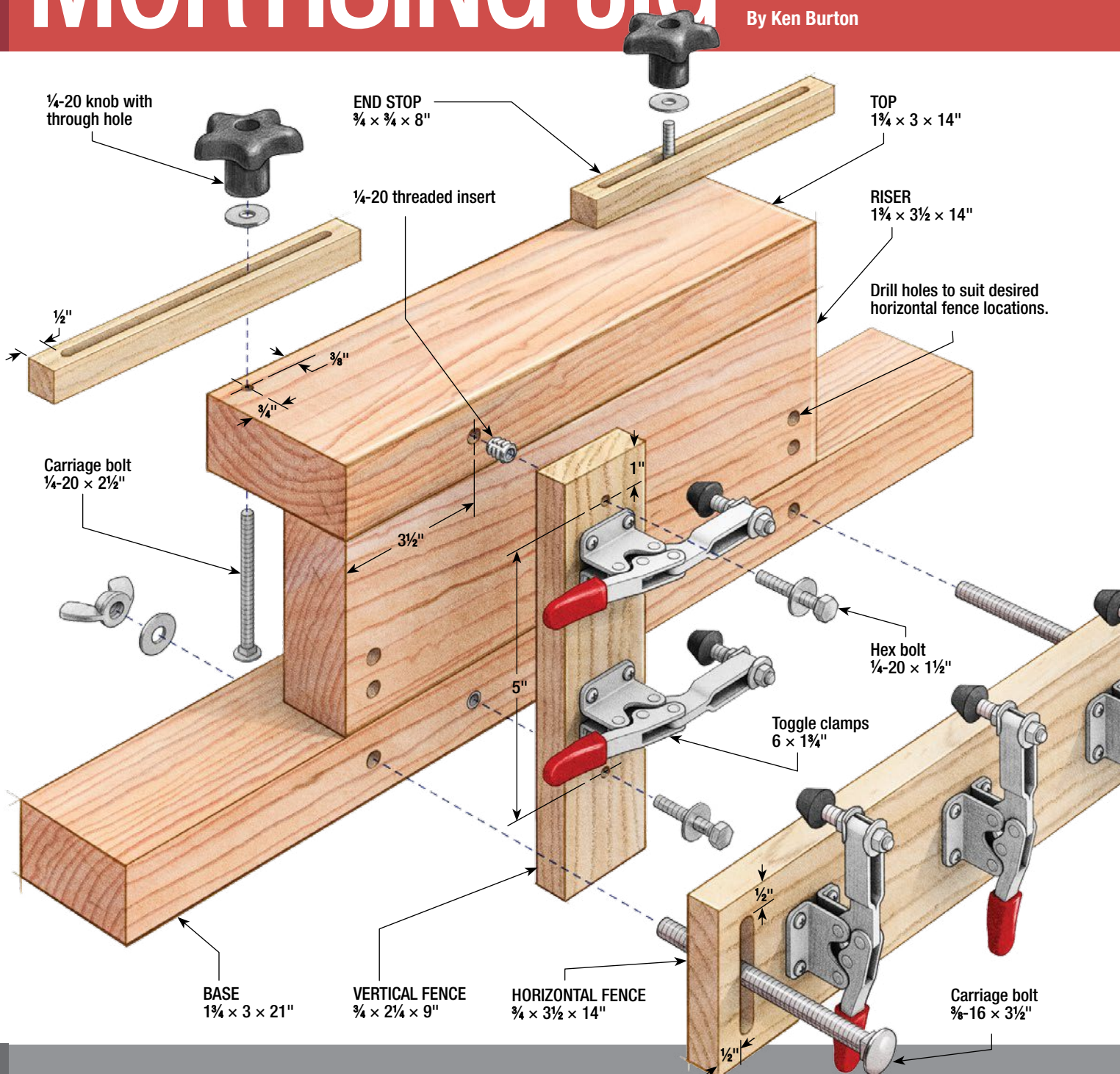


Four-clamp assembly. Start the glue-up by joining the bottom and ends to the lower sides. Then slide the dividers into their dados and attach the upper sides. Position clamping cauls to apply pressure on upper and lower sides.

MORTISING JIG

Rout end and edge slots quickly and easily

By Ken Burton



Loose tenon joinery, like that used in the Easy Chair on page 50, is a great alternative to traditional mortise-and-tenon joinery. The latter requires cutting an integral tenon in one of the parts to fit in a mating mortise cut in the other part. But with loose tenon joinery, the tenon is a separate element that spans

the joint to fit into a mortise cut in each part. Because this “loose” tenon is an easily machined strip of wood, making the joint tends to be more efficient than taking the traditional approach. However, loose tenon joinery typically requires the ability to cut mortises into the ends of workpieces as well as

their edges. That’s where this jig comes in. Used in conjunction with a plunge router outfitted with an edge guide, you can efficiently and accurately cut perfectly matched mortises in both the ends and edges of workpieces. In use, toggle clamps secure the work to the jig, and the end stops control mortise length.

Take care to build it square

The jig's dimensions aren't critical, so feel free to size it to suit your particular work. What's important is that the top's rear edge is parallel to the face, and that the face and top surfaces are square to each other. To ensure this, first run the glued-up assembly facedown over your jointer to bring the parts into one plane. Then run the jig upside down with the front face against the jointer fence to square the top surface to the face. Finally, run the whole jig upside down through your table saw to ensure that the rear edge of the top is parallel to the jig's face.



Setup

Set up the jig. Outfit your plunge router with an edge guide and an upcut spiral bit, adjusting the router's depth stop for the depth of your mortise. Clamp your workpiece to the jig with the marked "show" face oriented outward. Adjust the router's edge guide to position the bit at the mortise location, and set the jig's end stops to control the mortise length.



End Mortising

Using the vertical fence. Be sure that your workpiece is secure and flush with the top of the jig. Rout each mortise in a series of subsequently deeper passes, beginning with the router registered against the right-hand stop, and moving to the left until contacting that stop. Fully retract the bit at the end of each pass before beginning the next pass. For proper part alignment, mount all mating pieces with their "show" faces outward.



Edge Mortising

Using the horizontal fence. Install the jig's horizontal fence, with toggle clamps attached. After setting up for the first cut using a marked-out mortise, pencil mortise-extent lines across the top of the jig for setting up subsequent cuts. When routing, bear down with your left hand to prevent router tipping, and make sure to keep the edge guide in contact with the jig.



Dressing STOCK

*An accurate, organized approach
to straight, flat, and square*

By Paul Anthony

The vast majority of parts we prepare for woodworking projects need to be *dressed* straight, flat, and square. Well dressed stock is ready for the party, and everything you do becomes more fun. Edge-gluing boards to create panels is a snap. Parts tend to automatically align. Assemblies square themselves better when parts are pushed together. Sweet.

This process of dressing stock involves jointing, planing, and sawing parts in a particular sequence to ensure accurate geometry. I'll walk you through an approach to milling stock that is both efficient and effective. For our pur-

poses here, we'll be taking the machine approach, using the holy trinity of table saw, jointer, and thickness planer. If you decide to use hand tools instead, the same basic procedures and sequences apply.

Note that I'm using rough-sawn lumber here, which is the preferred material for furniture projects and other fine woodworking. That's because the extra thickness allows enough material removal to dress even warped boards straight and flat. Badly warped pre-milled lumber from home centers often can't be flattened without losing too much thickness for the job at hand.



Milling Stock: The Basic Sequence

- Trim away end checks
- Rip boards to rough width
- Joint one face
- Plane to thickness
- Joint one edge and rip to final width
- Crosscut to final length

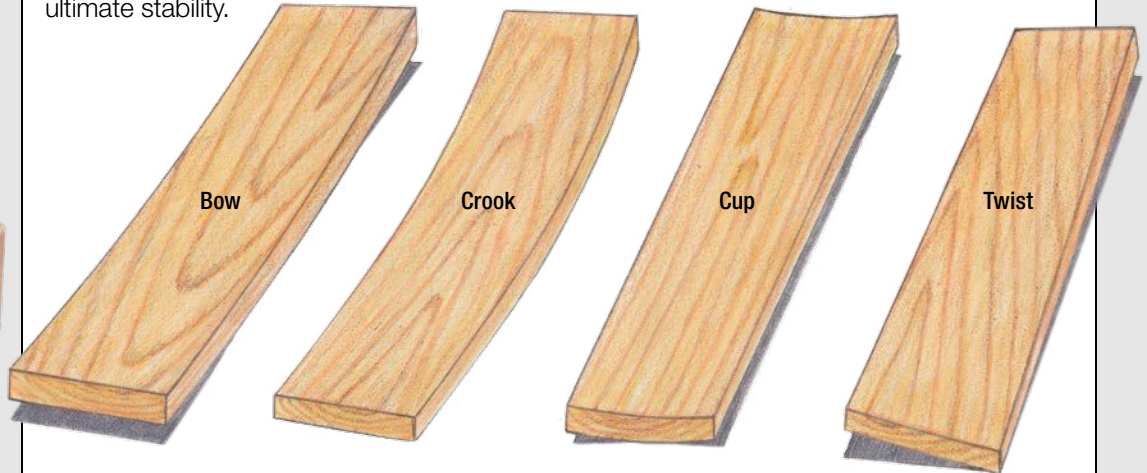


onlineEXTRA

- Jointer Fundamentals
- A Pro's Guide to Cut Lists

A few words about warp

Warp is a deformation resulting from internal stresses in the wood, often caused by the way the tree grew and/or by a change in the cell structure during the drying process. For a discussion on dressing stock, it's important to recognize the four major forms of warp: bow, crook, cup, and twist. It's also important to understand that whenever a board is cut, it can release some of the stress, causing the wood to move further. That's why letting rough-sized pieces "relax" for a few days to a week before dressing them to final size helps ensure their ultimate stability.



Check for hidden surprises

The first order of business is to check your boards for any lurking defects, and either mark them or cut them away. This includes any subtle cracks or splits that may compromise the finished piece. Make sure to scrutinize for *checks*, which are splits at the ends of boards. Sometimes they're obvious; sometimes not. If a board is deeply checked in only one area, try to lay out around that check to maximize stock usage.



Flex for checks. After sawing away any obvious checks at the end of a board, take one more thin slice. Gently flex the slice; if it bends, you've cut away all the checks. If it snaps easily, remove more wood, and test again until all the checks are gone.

Rough-size the parts, then let 'em relax

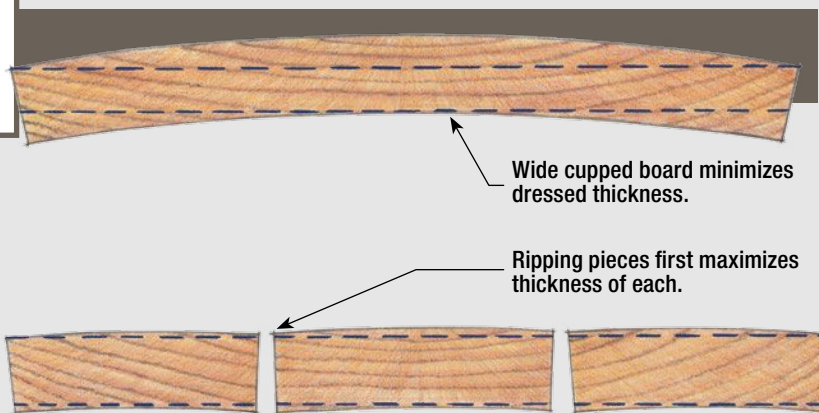
Lay out your parts, making them at least ¼" oversize in width and a couple inches oversize in length. To maximize yield, look to cupped boards as a source for narrow parts, and try to use bowed boards for shorter pieces. As for pieces shorter than about 8", gang them end-to-end to produce rough-size parts long enough for safe machine feeding. (You can cut them to final length after jointing and planing the blank to finished size.)

To ensure safe feeding when ripping, it's important that the fence-bearing edge of the stock be straight. A slight crook can be removed with a couple passes across the jointer. For extremely crooked boards, either cut to a gauged line on the bandsaw before jointing, or tack a wooden panel to the board to establish a straight fence-bearing edge, as shown. When ripping cupped boards, feed them with the convex face against the saw table.

Sticker all your freshly rough-sized pieces for at least a few days to let them "relax" before milling to final size. (See "A few words about warp," page 29.)



Safe, straight ripping. Feeding a crooked edge against your table saw rip fence is begging for trouble. When ripping live-edge planks or other boards with crooked edges, always begin by establishing a straight edge. One good approach is to tack a plywood strip to the edge of the board to serve as the initial fence-bearing edge.



Wide cupped board minimizes dressed thickness.

Ripping pieces first maximizes thickness of each.



Concave face

Convex face down. When ripping cupped boards, feed them with the concave face up, pressing down firmly near the fence. That way, the offcut will safely fall away at the end of the cut. If you feed with the concave face down, the two halves of the board may collapse near the end of the cut, and pinch against the blade.



Stickered to relax. Sawing stock can release internal stresses, causing pieces to warp further. Therefore, it's important to stack the boards after they've been cut to rough size, inserting stickers between them to allow air circulation. A few days of this (a week is better) lets the wood attain equilibrium before dressing the pieces to final size.

Joint one face to create the primary reference surface

Begin milling pieces to final size by dressing one face flat on the jointer. However, before reaching for the switch, organize all of your pieces by orienting them so that the jointer knives will cut with the slope of the grain. And, for stability, a cupped face is typically fed against the jointer table. (For more on jointer fundamentals, see onlineEXTRAS.) As final preparation, transfer any part-identification marks from the face of a board to its end.

Take enough passes to entirely flatten the face. Finally—and this is important for efficiency—as you lay the parts down afterward, keep them oriented as they were leaving the jointer. That way, everything will be organized for feeding in the same direction through the planer in the next step.



Flattening the first face. When jointing, cut with the slope of the grain, and orient the board's concave face against the table for feed stability. For best control, use a long pushblock with a heel that hooks over the trailing end of the board. For twisted boards, try to balance the board on its two high spots for the first pass or two.

Mill to consistent thickness with the planer

Next, you'll use your planer to bring the stock to final thickness. But first, if you have any resawing on your agenda, now's the time to do it. Then, in preparation for thickness planing, sort the pieces in piles of common target thicknesses, keeping boards oriented as they were when they left the jointer. Then ready the stacks for feeding into the planer, orienting them for cutting with the slope of the grain. Set the cutting depth for the thickest board, and feed all boards of similar thickness. Creep up on the final cut, carefully measuring the thickness. Make your final passes light, and feed all stock across the same section of the bed to ensure consistent stock thickness.



Planing the second face. Plane the pieces to final thickness, orienting the previously jointed face downward. Feed pieces randomly across the width of the planer bed to prevent excessive sectional wear on the knives. However, on the final passes feed all stock through same section of the knives to ensure consistent stock thickness in spite of uneven knife wear or adjustment.

Joint one edge, and cut to final width

Now you're ready to cut your pieces to final width. Begin at the jointer, having made sure that the fence is perfectly square to the table. Again, before hitting the switch, orient your boards for feed direction. If a board has a crook, you'll want to feed it concave edge down for stability. Then joint one edge of each board, checking occasionally with a square to make sure you're cutting accurately. As you stack the pieces afterward, make sure to always orient the jointed edge to the same direction for the sake of organization.

Next, cut the pieces to width. If a cleanly sawn edge is adequate for the piece's application, just set your rip fence to yield the final finished width. For truly clean edges, I typically set the rip fence for finished width plus $\frac{1}{32}$ ", removing the extra afterward with a single pass on the jointer.



First finished edge. Before ripping a board to final width, joint one edge straight and square. Make sure to hold the piece firmly against the jointer fence and table throughout the whole pass.



Final rip cut. Feeding the first finished edge against the fence, either rip the board to final width, or leave $\frac{1}{32}$ " excess to be removed on the jointer for a very clean edge.

Crosscuts complete the job

It's time to finish up by crosscutting your pieces square at each end. For efficiency, arrange the pieces before you start cutting, orienting the "best" ends all to the same side. Then trim those ends first as shown. Lastly, cut the parts to final length, preferably registering them against a stop, which ensures accuracy of common sized pieces, and minimizes cutline layout.



Trim the best end first. If there is a "better" end to a board, trim it first, as your second cut will then remove more of the "bad" end. When trimming, make sure there is material on both sides of the blade. Otherwise, it can deflect, causing a slightly out-of-square cut.



Final cut. When crosscutting parts to final length, it's best to register the previously squared end against a stop. Then cut all similarly sized pieces against the stop for dead-on consistency of length.

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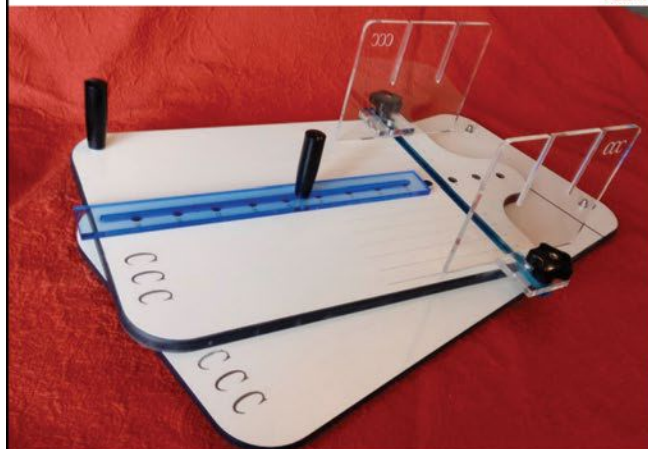
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A man wearing a plaid shirt, jeans, safety glasses, and headphones is using a hand router to shape a thick wooden slab on a workbench. The workshop background is filled with various tools hanging on a pegboard and other workbenches. In the foreground, a finished coffee table is shown, featuring a live-edge wooden top with a dark, wavy river-like inlay of resin and wood chips, supported by dark, square legs.

River TABLE

Combine a live-edge slab and tempered glass to create a topographic top

By Brendan Whitehead

A few years ago, my wife fell in love with a unique slab-topped table. What she loved most was the way the glass followed the grain of the wood. This clever combination resembled a topographic map of a river, while the live edge (flipped inward) seemed to rest just beneath the water's surface. Unfortunately, the table had an equally impressive price tag. I've seen a few similarly designed dining tables sell for as much as \$10,000.

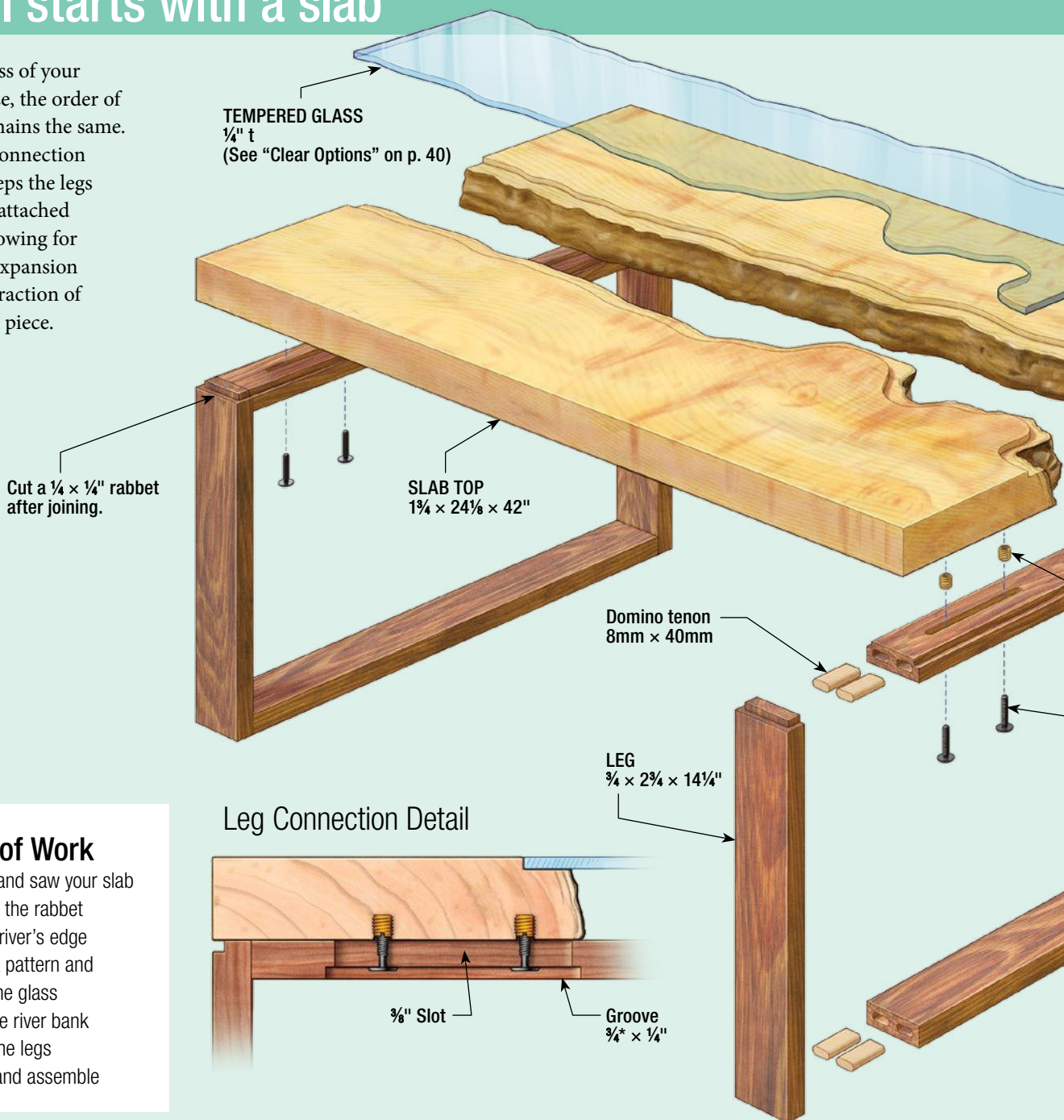
Inspired by that design, I decided to build one for myself. Not too long after that, I began teaching others how to make their own one-of-a-kind tables at the Denver Woodcraft store.

What I like most about this project is that no two tables are ever alike. In this story, I'm building a 24 × 40" coffee table, but the size is up to you (and the slab you select). I've helped students employ the same techniques to make everything from small end tables to large dining tables. My largest project to date measures 33 × 50".

The project may appear difficult, but once the glass has been cut to the pattern (see "Clear Options," p. 40) most students can complete the top and base by the end of my 3-day class.

It all starts with a slab

Regardless of your table's size, the order of work remains the same. The leg connection detail keeps the legs securely attached while allowing for normal expansion and contraction of each slab piece.



Order of Work

- Select and saw your slab
- Lay out the rabbet for the river's edge
- Make a pattern and order the glass
- Rout the river bank
- Make the legs
- Finish and assemble

Unlike typical projects, providing dimensioned parts and exact step-by-step instruction doesn't really work with this project. That's because no two slabs are exactly alike. I think this creative freedom is part of the fun.

To build your table, first determine the desired dimensions, and then start shopping for a slab. To narrow the selection, start with slab thickness.

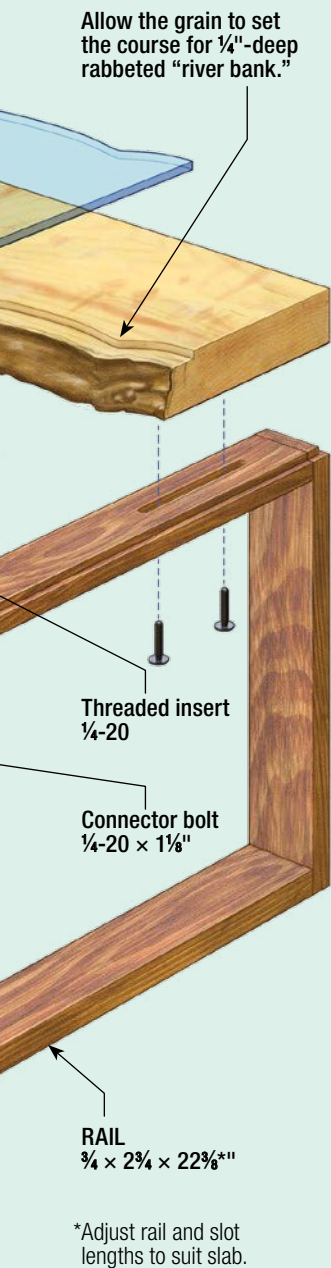
My tables vary from $1\frac{1}{4}"$ -to $1\frac{3}{4}"$ -thick, depending on the size of the project.

Next, study the slab's grain pattern and the shape of its live edge (see "Slab Secrets," opposite page). I favor boards with wild figure and bumpy live edges for more meandering streams, but straighter-grained slabs can be used to create more of a canyon look. Note that the grain determines the shape

of the glass. You can create a wider table by using a wider glass panel, but forcing a wavy edge on a straight-grained board won't look natural.

The width of the table will determine the width of the base, but you can modify the other dimensions. I typically use $\frac{4}{4}$ stock for the legs, but for dining tables, I'll use $\frac{8}{4}$ stock, and mill just enough to flatten and remove mill marks.

Slab Secrets



To attach the leg assemblies to the top, I use connector bolts and threaded inserts. This pairing keeps the parts firmly connected, but permits the slab top to move in response to seasonal changes in humidity. As a final detail, I make a small rabbet around the top of the leg assemblies so that the top appears to float above the legs.

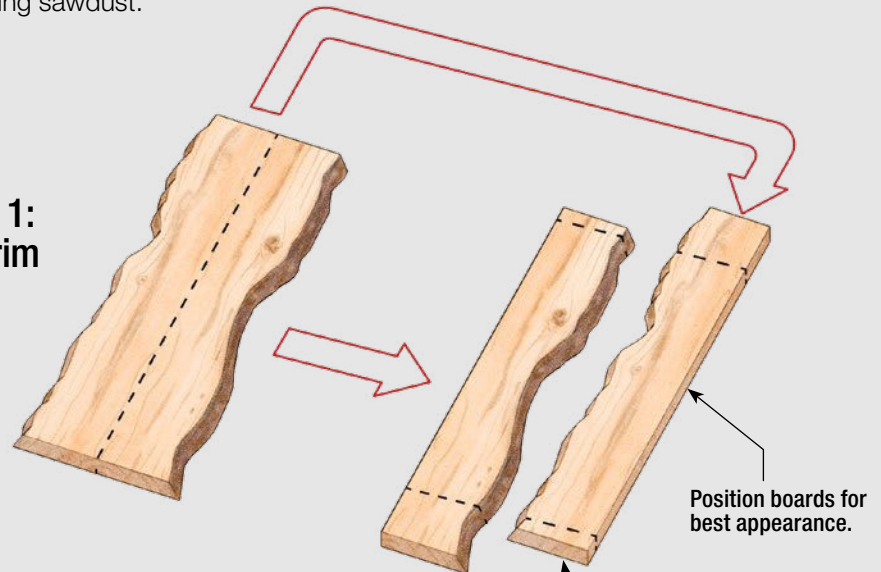
Illustrations: John Hartman

There are a couple of different ways to turn a live-edge slab into a river table. If the slab is wide enough, I'll simply rip it in half and flip the outside edges inward. (If you can afford to sacrifice a little length, you can shift the halves to create better looking river bends.) For longer, narrow boards, I'll crosscut, position the desired live edges in the center, rip the outer edges, and then trim both boards to length.

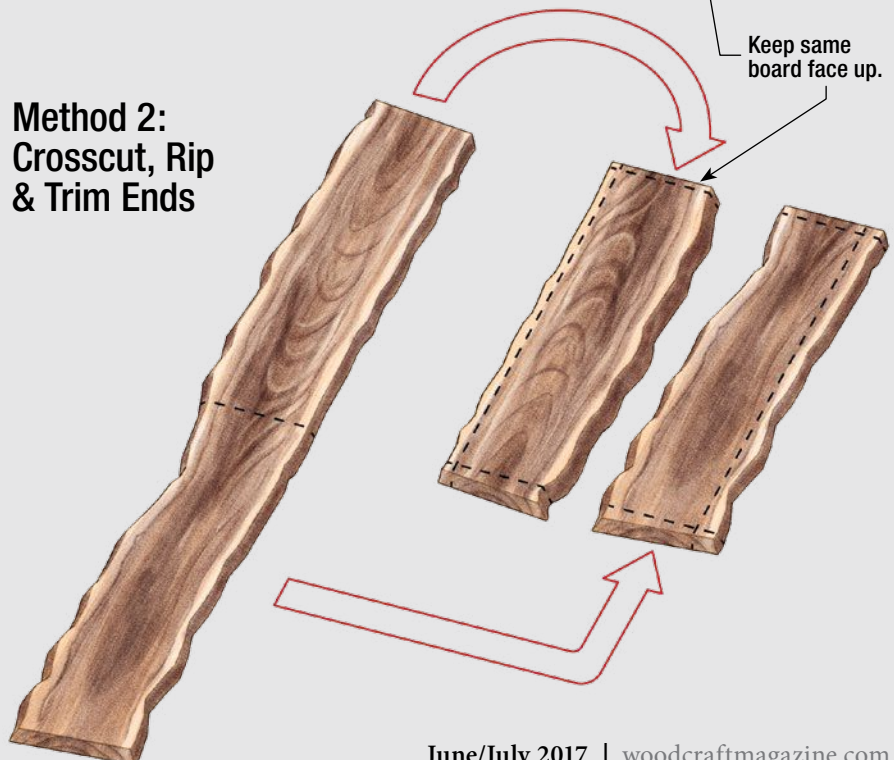
For large tabletops, you may need to use two slabs. In this case, it's important that the boards are from the same tree; otherwise, the halves of your top may look very different when finished.

Until you've built a few tables, envisioning how the live edge will look can be difficult. I suggest taking a snapshot of the board and test-cutting a few printouts of the image before making sawdust.

Method 1: Rip & Trim



Method 2: Crosscut, Rip & Trim Ends



Slice the top and set the stream



Make the cut. Ripping the slab and trimming the outer edges so that the grain runs parallel with the length of the top helps direct your eye down the length of the table. If the grain were to run out along the edge, it would pull attention away from the center.



Lay out the river's edge. Register the boards against a straightedge to set the width of the top and river, then sketch the rabbet for the glass. To ensure that the glass panel is well supported, aim for a 1"-wide rabbet. Following the grain line creates the illusion of water-cut curves.



Put it on paper. Tape tracing paper across both boards and trace the river's outline. Use this paper pattern to make your template from hardboard or MDF.



Test the template. Make sure the ends of the pattern align with the top. Label the template and the boards for future reference.

After deciding how to slice up your slab, use a track saw, or circular saw with a rip guide, to make your initial cut. Then, mill the boards to final thickness, joint the sawn edges, and cut the ends to length.

After milling, align the pair against a straightedge and set them apart to the desired width of the finished table. Make certain that the boards are parallel and

square to each other. If they aren't now, they won't be once the table is assembled. Clamp them in place so that they can't shift, sketch out your stream, and then make a tracing paper pattern.

To order your glass, you'll need a rigid template. (For small tables, $\frac{1}{4}$ " hardboard is fine. For larger tables, I prefer $\frac{1}{2}$ " MDF because it's stiffer and easier to handle.) To start,

cut the panel to the length of your top, and a little wider than your river. To transfer the pencil lines onto the template, I flip the tracing paper over, insert a sheet of transfer paper, and run over my lines with a dull pencil. After rough cutting and sanding back to the lines on the template, check it against the layout lines, and then make a trip to your local glass supplier.

Route your river



Go with the glass. Because your glass cutter might not follow your pattern perfectly, do not rout until you have your glass in hand. Sand away your previous pencil marks and make fresh lines.



Rabbet the river bank. Start by routing away from your layout lines, and then rout in as close you feel comfortable. An offset router sub-base provides an extra measure of stability.



Chisel back the river bank. Finish up with chisels and gouges to sneak up on a perfect fit. Take your time when test fitting.

Because the cut glass often varies a little from the pattern, sand away the previous pencil marks and make a fresh set of lines. As before, make certain the ends of the top boards are square, and the edges parallel. Then clamp them to your bench.

Because most students aren't used to freehand routing, rabbeting the top to fit the glass takes time, but it's not difficult. Rabbeting

involves setting the bit depth (aim for a hair more than the thickness of the glass) and then gradually working your way up to your line. A few tips can help, starting with the bit. To quickly rout the rabbet, I often use a 1/2"-dia. bit, but I suggest stepping down to a smaller 1/4"-dia. spiral bit for added control. To keep the router from tipping or veering over your lines, use a large offset

base, and maintain a solid two-handed grip. Last but not least: take regular routing breaks. Hunching over a router can be exhausting.

Don't expect the glass to fit perfectly on your first try. Simply mark the offending edges with a pencil, and cut them back with additional routing, or pare with a chisel.

Clear Options

The ¼"-thick tempered glass used to make the table's river section is too thick to cut in my shop, but any commercial glass company can do the job. I simply provide my supplier with the custom river template, on which I note my color selection and indicate that both ends should be cut ¼" shorter than the pattern. This ensures that the glass will not be longer than your top.

Choosing the perfect color can be challenging. (I compared 50 different shades of blue before finding my favorite.) A few of my other favorite shades are shown below. The color you select depends on not only preference and availability, but also on the wood. As a rule of thumb: the darker the wood, the lighter the glass. You don't want to hide your rabbeted river bank.

In order to find the best pairing, I suggest finishing a scrap cut from your slab and bringing it to the glass shop. If you plan to make multiple tables, ask your supplier for glass samples.

Azuria

Solex

Pacifica

Mortise the legs



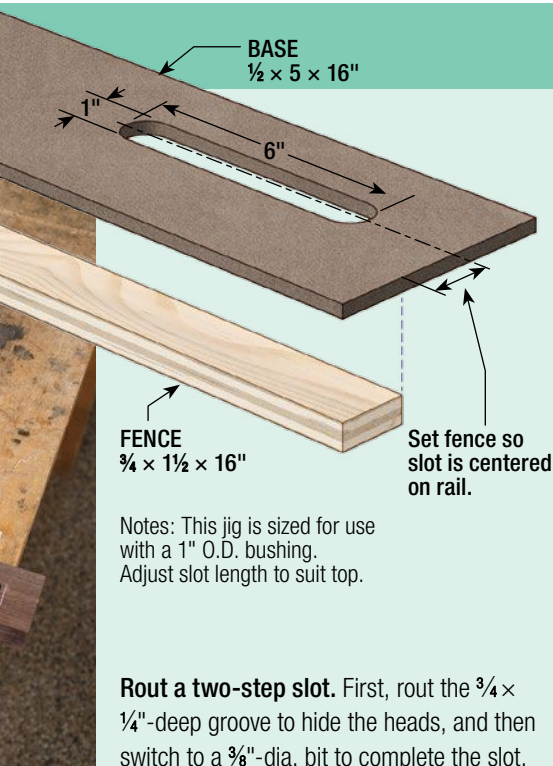
Mark and install the inserts. Use the slots to determine the location for the threaded inserts. To avoid damaging the soft brass, drill oversize holes and lock the inserts in place with epoxy.



As shown in the main figure on page 36, the connector bolts are concealed in counterbored slots in the rails. To rout this slot I often cobble up a simple jig like the one shown above. Using a 1" bushing and ¾"-dia. straight bit, rout a ¼"-deep groove to hide the bolt heads. Next, replace the bit with a ⅝" spiral bit, and rout the

through grooves. If your boards are narrower at one or both ends, shorten the slots so that they don't show through the glass.

To join the legs to the rails, you can simply use dowels or rout for loose tenons. Alternatively, you can show off your joinery skills with dovetails or finger joints. For the sake of my class, it's hard



Domino the legs and rails. Clamping two legs together, inside faces out, simplifies layout and offers a wider base for the machine's fence.

Rout a two-step slot. First, rout the 3/4 x 1/4"-deep groove to hide the heads, and then switch to a 3/8"-dia. bit to complete the slot.



Making a final connection. Loosely bolt both top sections to the leg assemblies, set the glass in the rabbet, squeeze the top together, and then tighten the bolts.

to beat the speed and convenience of the Festool Domino. Following assembly, rout or saw a 1/4 x 1/4" rabbet around the top edges and ends of the rail/leg assemblies.

To locate the holes for the threaded inserts, clamp the leg assemblies flush with the ends of the top boards and set the glass in place. Working underneath the table,

make two marks about 3/8" in from the ends of the slots. Next, drill the holes into the top, and drive in the inserts. To prevent damaging the inserts, I often drill oversized holes and set the inserts in epoxy.

Your table's almost done. I don't think that highly-figured wood needs a fancy finish to look good. After sanding the parts up to 320

grit, I wiped on a coat of natural Danish oil to enhance the color of the wood. After giving the oil time to cure (a week is good), I applied four coats of General Finishes HP waterbase polyurethane with a HVLP sprayer. The finish needs a few weeks to fully cure, but you can reassemble the parts and put your table to light use within a day or two.

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WELDING for Woodworkers

*Mixing steel and wood
is easier than you think*

By Asa Christiana

Of all the materials that can be mixed with wood, it's hard to beat steel. Strong, sleek, and versatile, steel has its own proud tradition. A growing number of woodworkers are combining wood and steel. Evidence of this creative combination is abundantly available online and in furniture catalogs. If you want to join in, the tools and techniques in this article will get you started.

I haven't welded since trade school, but I've been making wood furniture for 20 years. I needed an intense refresher course in welding, and I found exactly the right instructor. Kari Merkl (Merkled.com) has been a professional welder for 16 years, teaching the craft for six. Follow Kari's expert advice on welding safety, tools, and techniques. I'll provide the construction details for a small table that's an excellent starter project for combining wood and steel.



Expert advice. Based in Portland, Oregon, Kari Merkl teaches welding and takes on a variety of projects, including furniture that combines wood and metal.



Steel + wood = strength, beauty, and plenty of design possibilities

If you're new to welding, it's smart to stick to mild steel, which comes in standard profiles like rectangular tubes, L-shaped angle, and flat bar stock. The projects shown here are all made with these standard profiles. Make sure to remove any rust or oily residue from steel before welding. Finishing options for steel can be as simple as paste wax or spray enamel.



Jacob Wener, of Modern Industry in Chicago, built this low stool (modernindustrydesign.com).



These side tables are by Matthew Philip Williams (matthewmatthewmatthew.com) of Portland, Oregon. The legs are powder-coated, which is a very durable color finish.



This outdoor table is by David Bertman of Portland, Oregon. (DavidBertmanDesigns.com).



Our welding expert, Kari Merkl, made this rolling kitchen cart from tubular steel and a section of butcher block.



This side table, made from walnut and powder-coated steel, is by Audi Culver and Ivy Siosi (siosidesign.com) of Bloomington, Indiana.

Work safe and smart

There are some important safety issues that won't be familiar to "wood-be" welders. To avoid accidents, pay attention to the following safety guidelines.

- ⚠️ **Don't work in a combustible environment.** If you can't set up a separate welding space apart from your woodshop, you can hang plastic welding curtains to isolate your welding area from combustible items. Alternatively, you can do your welding outside.
- ⚠️ **Get a metal welding table.** This welder's work surface gives you a platform that's safe, stable, and flat. The all-metal table makes it easy to ground your work and keep joining parts aligned for welding.
- ⚠️ **Wear protective gear.** Merkl recommends a welding helmet with an auto-darkening lens, a leather apron, work boots, and gloves designed for MIG welding.
- ⚠️ **Protect your lungs.** To avoid inhaling welding fumes, use a half-mask respirator with P100 filters.
- ⚠️ **Get the right fire extinguisher.** For working around electrical equipment, like a welder, get the dry-chemical type, rated ABC.
- ⚠️ **Clean steel before welding.** Simple Green or similar cleaning solutions will remove grease and grime for cleaner welds.
- ⚠️ **Avoid welding these materials:** plated, galvanized or painted steel.



Protection against light, sparks, and fumes. Gearing up for welding calls for the basic safety items shown at left.

Metalwork 101: cutting steel

Before beginning to weld, you need to gain proficiency in cutting mild steel and doing some basic metalwork. Don't mount a metal-cutting blade because a wood-cutting bandsaw runs at least 10 times too fast for cutting steel. Your least-expensive option for clean cuts is a metal cutoff saw, a metal-friendly chop saw equipped with a built-in work clamp and an abrasive wheel. You can find new models for under \$100, but expect to pay a bit more for quality and durability. Abrasive wheels leave a good-sized burr on cut edges, which you'll have to sand or file off afterward.

The best option for clean, square cuts on steel is a horizontal bandsaw (see photo, top right). A basic model costs around \$300. For drilling and shaping mild steel, a drill press and stationary belt sander will work as well on metal as they do on wood, but remember never to combine sparks and sawdust. You probably have a lot of the other tools you'll need: files, pliers, squares, etc. You can even use woodworking clamps with metal jaws to hold workpieces in place while you weld.



Cutting and drilling. A horizontal bandsaw excels at cutting tubular steel (top photo). To drill mild steel, clamp the work, use a slow speed, and lubricate the bit with machine oil.

MIG: the best way to start welding

There are different ways to weld, and each technology has its advantages and limitations. For basic welding of mild steel, you can't beat MIG (metal inert gas), a form of wire-feed arc-welding that works by causing a consumable wire electrode and the metal workpiece to melt and fuse together.

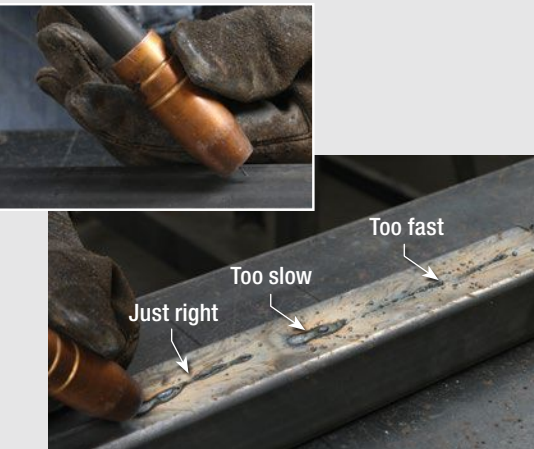
A solid, entry-level MIG welder costs around \$500, and will do both MIG (with gas) and flux-core (without it). This type of welding rig will work on common 115-volt power. Kari has had good results with Hobart and Craftsman welders; she doesn't recommend super-cheap welders from bargain outlets.



Key components. Most welders include a spool gun that feeds the wire (and gas in MIG mode) and a ground clamp that attaches either to the metal table or the parts being welded. It's helpful to buy a few extra tips for the gun, as these degrade over time and start adhering to the weld.

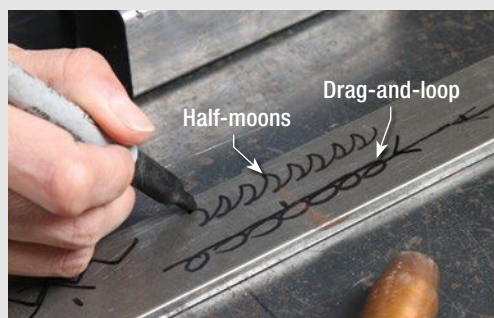
Practice makes perfect

Welding is a simple process: An arc of electricity creates high heat that melts the wire and the steel on both sides of a seam. The parts are fused together when the molten puddle cools. It takes practice to master the movement and learn to see through the helmet lens. Before working on a welding project, practice your welding techniques on some scrap steel, as shown below. To learn more about welding, check out video instructions on YouTube, and the free instructional content at hobartwelders.com.



Practice straight lines first.

Hold the nozzle and protruding wire at a 60° angle. Pull the trigger and drag the gun in a straight line to dial in your pace and the rate the wire is being fed. The photo shows the results of different feed rates.

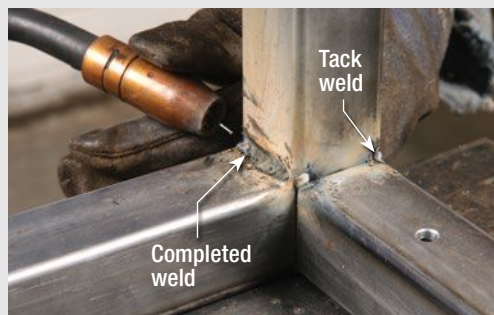


Add the swirl. Welders build up a strong bead by swirling the tip of the gun as they drag it along. Some use a half-moon swirl, while others prefer a drag-and-loop method. Try both and pick your favorite.



Use welding magnets.

You can use metal woodworking clamps and braces to hold parts in place for welding. But the welding magnets shown here are quick and effective to use on a steel-topped table.



Tack joints, then weld in between.

Since the heat of a full-on weld can cause metal to expand and throw a joint out of alignment, start by tack-welding all the joints in an assembly. Then return to each joint to complete the welds.

Starter project: build

To put some basic welding techniques into practice on a typical frame, Kari and I built a project together. Kari welded the base for a Parson's-style coffee table, and I added a solid wood top. To make the table frame, Kari went with the most basic



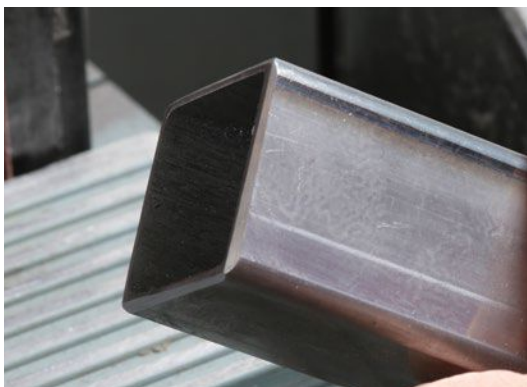
Clamp and cut. Use a horizontal bandsaw (as shown), or an abrasive cutoff saw to cut all parts to finished length.



Weld the end assemblies. Brace the 3-part assembly square, and tack-weld each leg-rail joint together at tubing corners. Then weld to fill in between tack welds.

a Parson's-style coffee table

version of arc welding, using wire with a flux core to eliminate the need for an argon gas supply. Flux-core welds are a bit rougher than MIG welds, but this type of welding is a better choice if you're working outdoors, where there's a breeze.



Prepare the ends. Deburr the ends of your parts with a metal file or stationary belt sander, and make a small chamfer that will be filled by melted metal during the welding process.



Drill for attaching the top. Drill and countersink the aprons while they are still separate. Slightly oversize holes allow for seasonal movement of the top.



Join long rails to end assemblies. Use clamps to keep parts aligned. Start with tack welds to lock parts in place. Let the heat dissipate before returning to do the full welds.



Clean up your work. It's normal for a welded joint to have heat discoloration, as well as small beads of splatter and a residue of "slag." Remove the splatter with a dull chisel. Then clean the weld area with a wire brush. Turn the page to finish the table.

Finish the table: wax for the steel, wood for the top

There are as many wonderful ways to finish metal as there are wood, maybe more. From industrial-quality paint to powder-coating to chemical treatments for

beautiful patinas—try *BirchwoodCasey.com* for those. But we'll go with clean and simple: a basic cleanup and buffing, followed by two coats of paste wax.



Final cleaning. Use abrasive pads—rough, then fine—to remove the rest of the heat marks and scratches.



Top it off. I made the top from Port Orford cedar, a hard type of cedar native to the Northwest and known for its beautiful grain. I made it 1 $\frac{5}{8}$ " thick, with a $\frac{1}{8}$ " rabbet on the underside to make the top appear to float. That left 1 $\frac{1}{2}$ " of visible thickness to match the metal parts.



Caps and feet.

There are different caps and feet available online for all sorts of steel tube sizes and shapes. We used the type that tap in firmly with a mallet and are threaded for leveling feet.



Basic protection. A couple of coats of paste wax provide a measure of rust projection and give the metal a dull sheen. Apply the wax generously, then buff off the excess.



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Easy CHAIR

Loose tenons and tapered parts combine for easy-to-build elegance

By Ken Burton



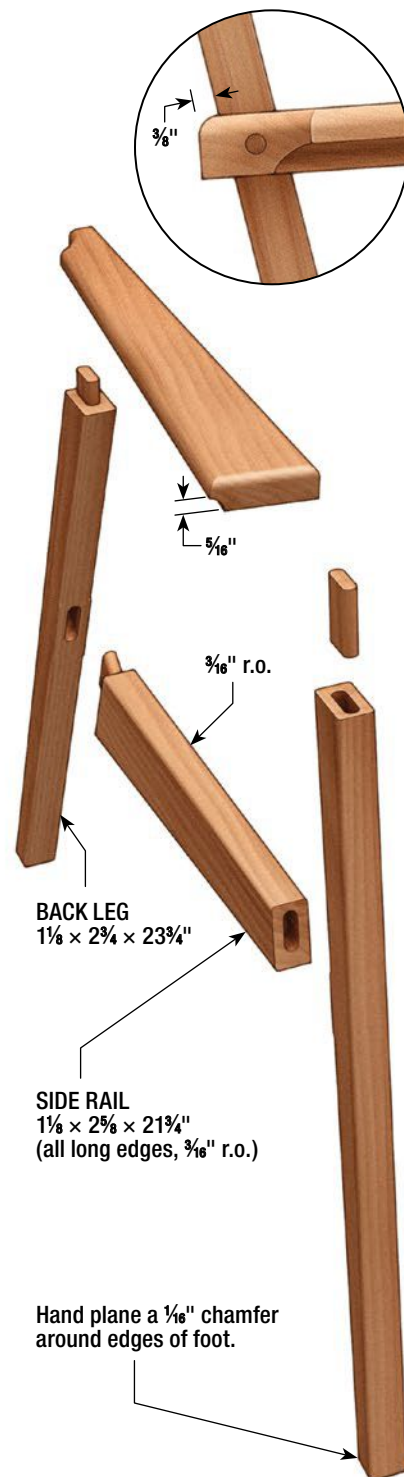
All-wood chairs are great, but sometimes you want to settle into something a little cozier. I designed this cushioned easy chair to serve for comfortable reading or TV viewing. For the wood, I used sapele, a beautiful mahogany substitute. (See “WoodSense: Sapele,” on page 64.) The green cushion covers provide the perfect complementary color to the reddish wood. That said, by carefully choosing your fabric and wood species, you can suit your version to almost any décor. Because the cushions are separate, there’s no expensive fixed upholstery involved. If you don’t have a local upholstery shop, you can custom order

the cushions and covers online.

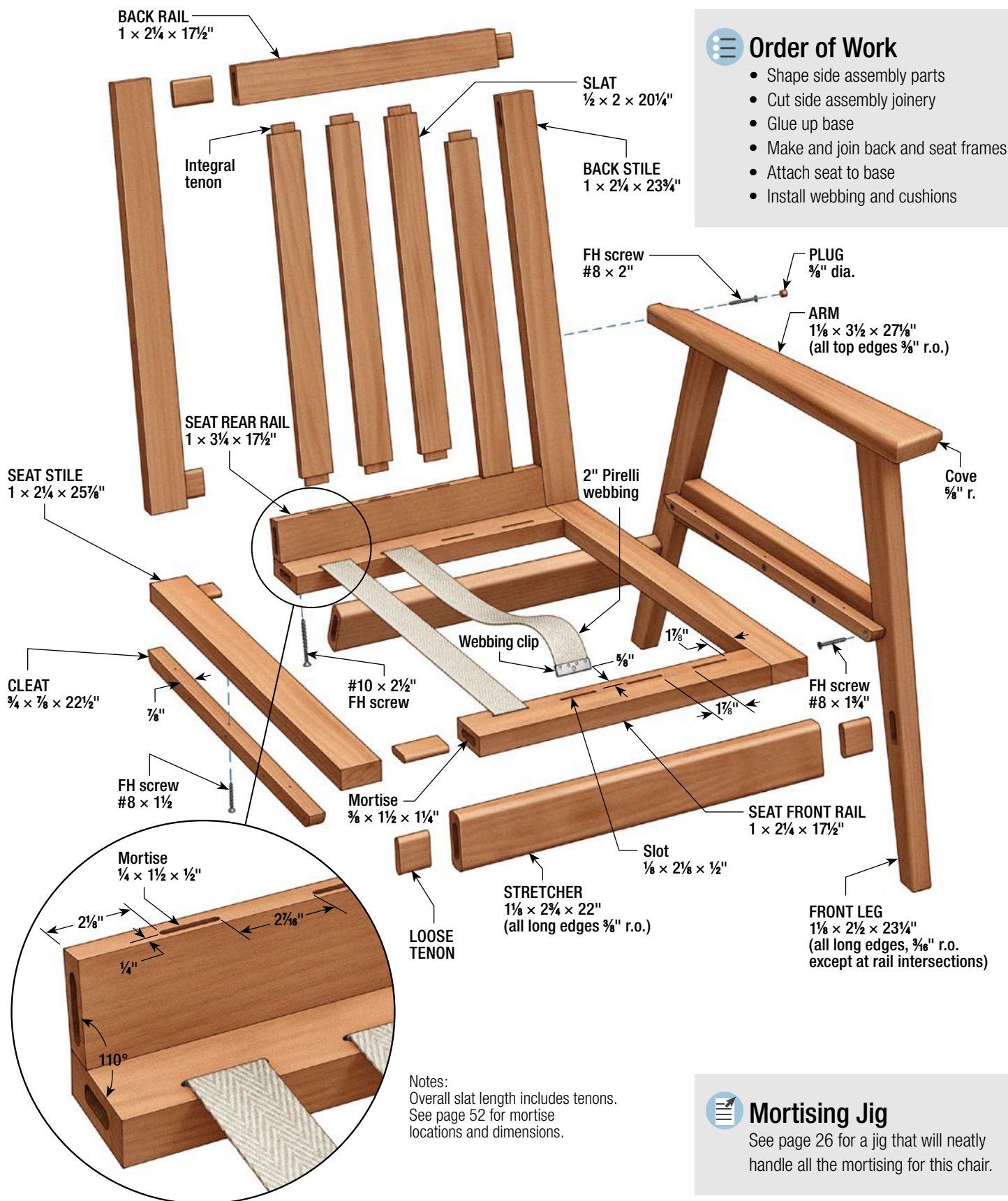
As with most good chairs, part of the comfortability stems from thoughtful details: the angles of the back and seat frame put your body into a relaxed, but attentive lean, and the perfectly sized cushions ensure that you won’t be trying to squirm into a better position. Even the ends of the arms are tapered to match the angle of your palm as you wrap your fingers around the end of the arm, which is literally a nice touch. Finally, the rock-solid mortise-and-tenon joinery ensures that this heirloom will be comforting family and friends for a long, long time.

A seat with all the

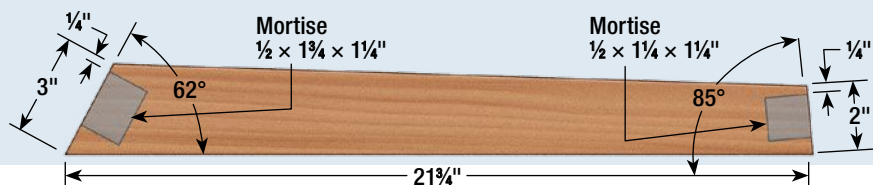
Although there are a few non-90° joints in this chair, it has none of the compound angles that often make chairs really tricky to build. The primary shaping is done with tapering jigs on the table saw, with a little router work to finish things off. Loose tenons hold all the main components together, while integral tenons on the back slats better suit that thin stock.



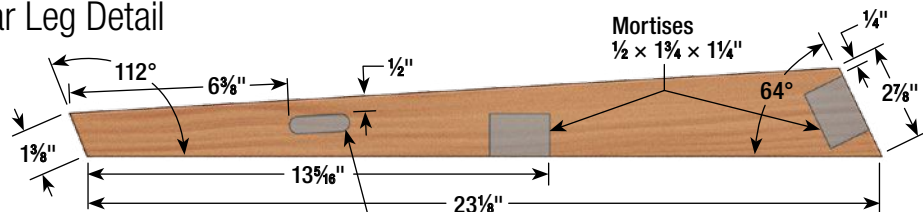
right angles



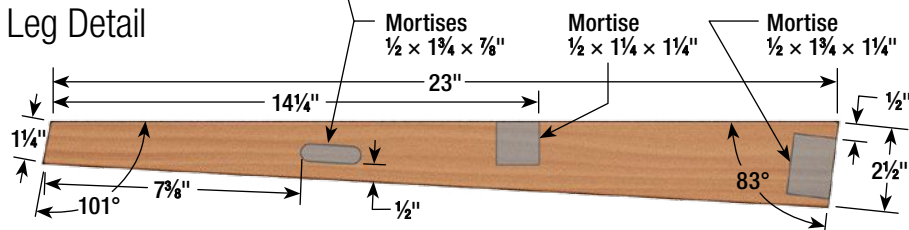
Side Rail Detail



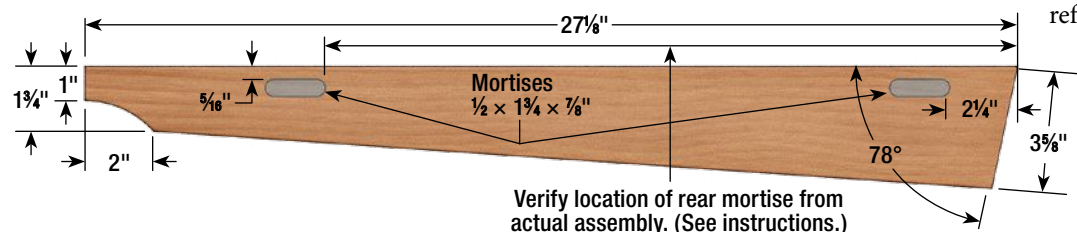
Rear Leg Detail



Front Leg Detail



Arm Detail

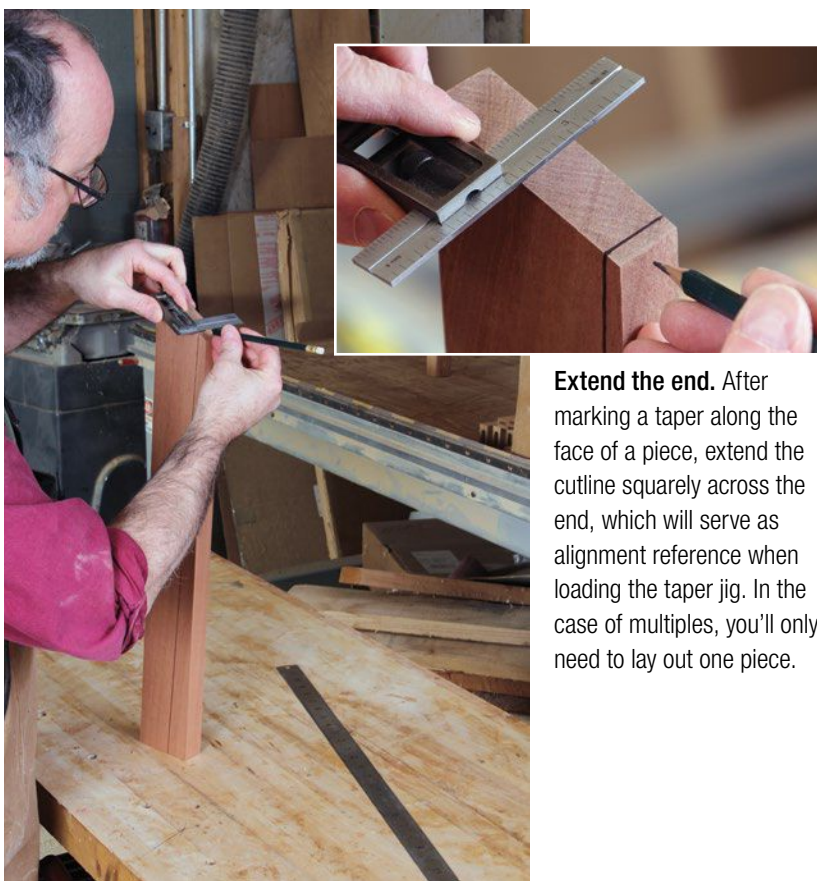


Get the side assembly parts into shape

To make the parts for the pair of chair side assemblies, mill each leg, rail, and arm to the thickness and width shown in the main drawing. However, leave the pieces about 1/2" oversized in length for now. Also cut the front and back stretchers to final size (including length.) Cut the ends of the legs and rails to the angles shown in the drawings. Arrange one trio of two legs and their connecting rail on the bench in proper relation to each other, with the front leg to your right. Then, mark the upward face of each piece to serve later as jig setup reference. Finally, mark out the tapers as shown, and cut them on the table saw. Save the arm offcuts, as you'll use them as jig-mounting cauls later.



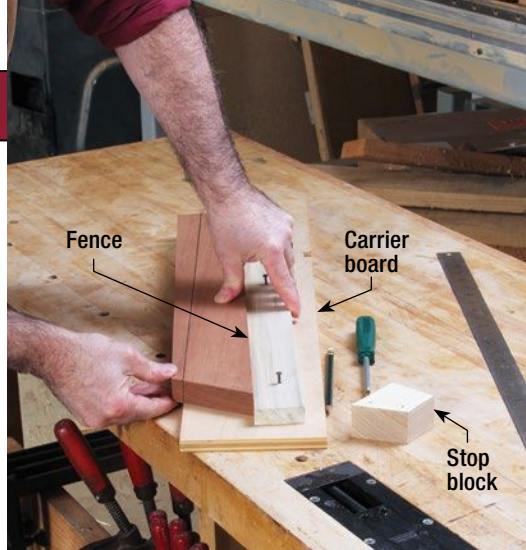
Stop for accuracy. Cut the pieces to their final lengths by making angled cuts at both ends. Use a stop to maintain consistency.



Extend the end. After marking a taper along the face of a piece, extend the outline squarely across the end, which will serve as alignment reference when loading the taper jig. In the case of multiples, you'll only need to lay out one piece.

10-minute tapering jig

Here's a sweet tapering jig you can cobble together in 10 minutes from scrap and toggle clamps. It's reconfigurable for different tapers by simply relocating the fence. Start by making a $\frac{1}{2}$ "- or $\frac{3}{4}$ "-thick plywood carrier board that's 6" to 8" wide and a few inches longer than the workpieces to be tapered. Also make a straight fence and a short stopblock. (In the case of pieces with angled ends, as seen here, cut the stopblock to an angle complementary to the end of the workpiece.) Then set up and use the jig as shown.



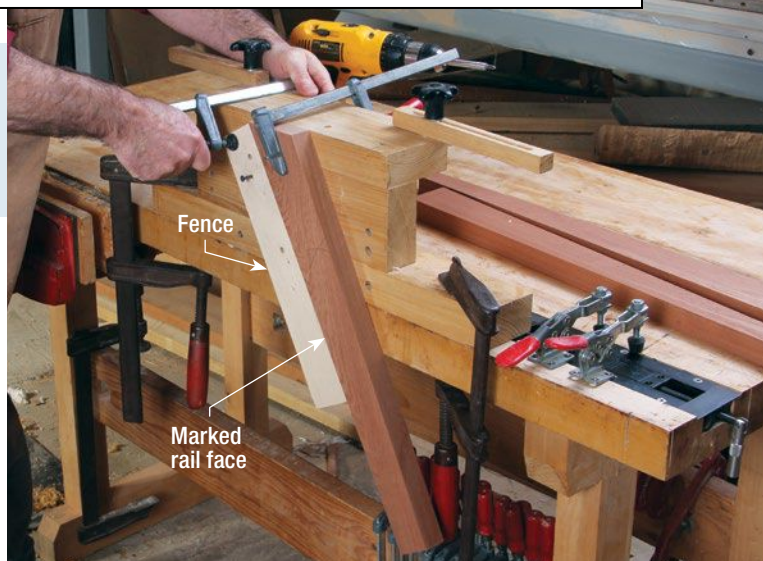
Simple setup. Align the taper outline with the edge of the carrier board, and screw the fence and stopblock in place against the workpiece. Leave a gap between the stopblock and the fence to prevent a sawdust trap.



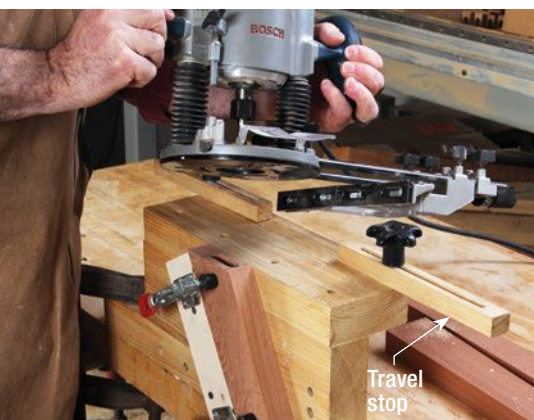
Safe, secure cut. After attaching toggle clamps to the jig, adjust your rip fence to align the edge of the carrier board with the saw blade. Then make the cut.

Chair side assemblies begin with the rail-to-leg mortises

You're ready to rout the mortises that join the rails and legs. (If you don't already have a mortising jig, see page 26.) To ensure that the parts in each side assembly align properly, follow the jig-loading instructions carefully. Working with the set of previously marked pieces, lay out the mortises on the ends of the rails and edges of the legs. (See drawings, facing page.) Mount the marked rail on the jig as shown, chuck a $\frac{1}{2}$ "-dia. spiral upcut bit in your plunge router, and rout the mortise in the end of the rail. Rout the wide end of the unmarked rail with the same setup. For the narrow ends of the rails, reposition the jig fence as necessary. Again, use the marked rail (marked side out) as a guide to locate the fence. Then cut both rails with this setup. To edge-mortise the legs, mount the fence horizontally. Use the marked rear leg—marked face outward—to locate the jig fence for routing both rear legs. Then reposition the fence to rout the front legs in the same manner.



Mount the rail. Clamp the marked rail to the jig, with the marked face outward and the wider end flush with the top of the jig. Then screw a predrilled supporting fence to the face of the jig. Afterward, screw toggle clamps to the fence to secure the work.



Rout the rail end mortises. Adjust the router edge guide to center the mortise across the thickness of the stock, and set the router travel stops. Rout the mortise in several passes, cutting from right to left.



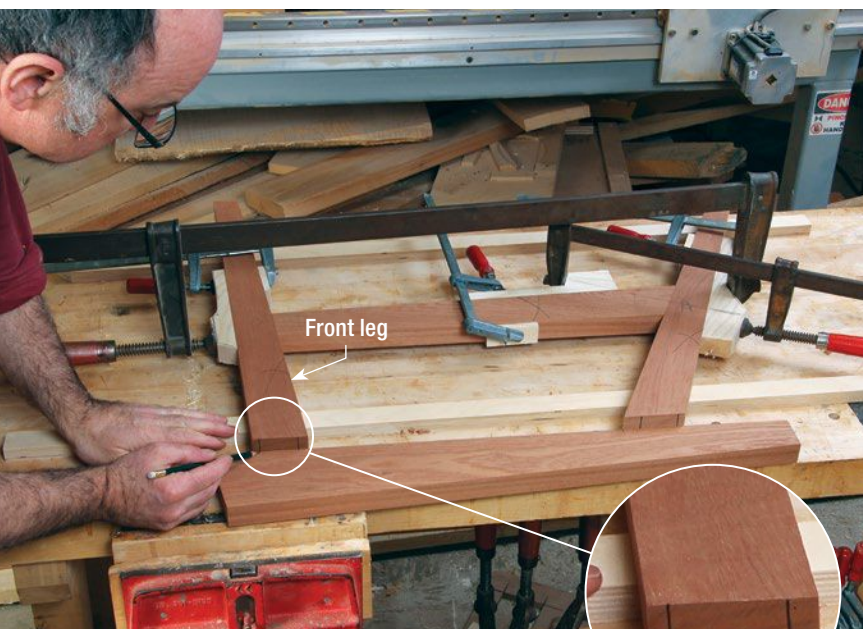
Mount the leg. When mounting a leg on the repositioned fence, make sure the edge is dead-flush with the top of the jig to prevent positioning errors and router tipping.



“Loose” only in name. Inserting tenons into their mortises should require firm hand pressure. If they need hammering, they’re too tight; if they fall out, they’re too loose. Reduce tenon thickness with a finely-set block plane and/or sandpaper. Resist the urge to power-sand.

Make tenon stock

Because you’ll need to dry-fit the leg-to-rail joints next, it’s time to make some tenons. For the two completed side assemblies and the stretchers, you’ll need two widths of tenon stock. Start by making one strip $1\frac{1}{16}$ " wide by 25" long, and one strip $1\frac{3}{16}$ " wide by 10" long. This should yield enough material plus a little extra. Rip or plane the stock to thickness, and bullnose all edges using a $\frac{1}{4}$ " roundover bit in a table-mounted router. For now, cut to length the tenons for the leg-to-rail joints, making them twice the depth of a mortise minus $\frac{1}{16}$ ".



Mark the joints. In order to accurately locate the leg-to-arm mortises, place the arm against the dry-fit side assembly, with the front end of the arm 2" forward of the front leg. Use custom clamping blocks that direct the clamping pressure perpendicular to the joint shoulder lines.

Locate the leg-to-arm-joint mortises based on reality

With all of the angles involved, your chair may vary slightly from the drawing. No problem. However, the leg-to-arm joint placement should be based on what you’ve actually made. So, dry-clamp the two leg/rail assemblies together—using all of the marked pieces for one, and the unmarked pieces for the other. Designate one assembly as the left, and one as the right, and mark the outward faces of the legs as such. Then place the appropriate arm against the tops of the legs, and mark the joints as shown, also referring to the leg and arm detail drawings on page 52. Now, rout the mortises in the ends of the legs as you did those in the ends of the stretchers. This time, however, you’ll need to mount each leg with its designated outward face away from the jig. This means each leg will require its own individual fence setup. Then rout the mortises in the underside of each arm, mounting it in the jig as shown.



Mount the arm. Using the tapered offcut as a clamping caul, secure the inner edge of the inverted arm against the jig, making sure that the arm’s underside is flush with the top of the jig. Use the same router edge guide setting as you did for the leg mortises to ensure that the inside edge of each arm sits flush with the inside faces of the legs.

Now for some pre-glue-up finessing

At this point, it's time to do a bit of shaping to some parts, and fine-tune the leg-to-arm joints. First, use a bandsaw and spindle sander to create the scoop at the rear end of each arm, as shown in the Arm Detail on page 52. Then rout a $\frac{3}{8}$ " roundover completely around the top face of each arm, cut a $\frac{5}{8}$ " radius cove under the outer edge, and bevel the front end of each arm as shown. Finish the shaping by routing a $\frac{3}{16}$ " roundover on the long edges on all of the legs and rails except where they intersect.

The leg-to-arm joints will probably need some adjustment, which isn't unusual in a piece with so many angles. Dry-fit the legs, rails, and arms together again, but standing this time. If you see a tapered gap at the top of one (or both) of the legs, use a bevel gauge to mark for the correction. Then hand plane to this cutline to fix the joint.



Bevel the arm. To saw the bevel at the front end of an arm, lean your blade over 30°, and set your miter gauge angle using the arm itself. The bevel should intersect the bottom end of the roundover, at about $\frac{3}{8}$ " down from the top face of the arm.



Standing dry-fit. To apply clamping pressure perpendicular to the leg-to-arm joints, you can use your workbench as a stout caul to bridge the space between the legs.



Marking for the correction. Use a bevel gauge to mark a cutline at the top of leg that will bring it parallel to the underside of the arm.



A clean fix. When hand planing the top of the leg, clamp a scrap at the trailing end of your cut to prevent tearout.

Cut the stretchers, and glue up the base

You're almost ready to glue up the chair base. But first, rout the mortises in the ends of the stretchers, then take apart the side assemblies and rout the stretcher mortises in the legs. Now, glue up the two side assemblies. Finally, rout a $\frac{3}{8}$ " roundover on all the stretcher edges, and glue the stretchers between the side assemblies.

Final base glue-up. Glue the stretchers between the previously assembled chair sides, using clamping blocks to protect the legs. Make sure to check the assembly for square under clamp pressure.



Mortise for the slats. For the slat mortises, adjust the jig's travel stops for the length of one mortise, cut it, then reposition the rail on the jig fence to rout each subsequent mortise.

Make the seat & back frames

The seat and back frames should fit snugly between the chair sides, so double-check that distance. If it's not precisely 22", make the frames to suit what you have. If necessary, make the frames a bit oversized in width, and trim them to perfect size after assembly. Cut the rails and stiles to size. Then outfit your router with a $\frac{3}{8}$ "-dia. upcut spiral bit, and mortise the ends of the rails and the edges of the stiles, as shown in the drawing on page 51. Make loose tenons to suit. Next, mortise the inner edges of the back rails to accept the slats, and mill the slats to size, measuring for their length directly from the dry-fit frame. Cut the tenons on the table saw as shown. Then glue up the seat and back frames. Afterward, lay out the seat webbing slots, referring to the drawing on page 51. Then chuck a $\frac{1}{8}$ "-dia. straight bit in your plunge router, and rout the slots as shown. Finally, ease the front edges of the seat frame and the top edges of the back frame with fine sandpaper.



Saw the slat tenons. Cut the tenons on the back slats by guiding the pieces past a dado head on the table saw. Use the fence to control the length of the tenons, and the blade height to control the tenon thickness.



Rout the webbing slots. Using a plunge router equipped with an edge guide, make each slot in several passes, limiting the router travel with a stop clamped to each side of the tool.

Put it all together

Bevel the bottom edge of the back frame at an 80° angle. Then attach the seat frame to the back frame using glue and five #10 × 2½" evenly spaced screws driven through the rear seat rail up into the lower back rail. Cut the cleats to size, and then glue and screw them to the chair sides as shown. Set the seat frame assembly in place atop the cleats, with the seat back ⅜" forward of the rear ends of the arms. (See drawing on page 50.) Drill a pilot hole through each arm into the back frame stile for a #8 × 2" flathead screw. Then follow up with a clearance hole and counterbore in each arm. Screw the frames in place through the arms and cleats, and plug the counterbores in the arms. Apply a finish of your choice. I used a red mahogany stain to darken the sapele slightly before wiping on several coats of urethane.

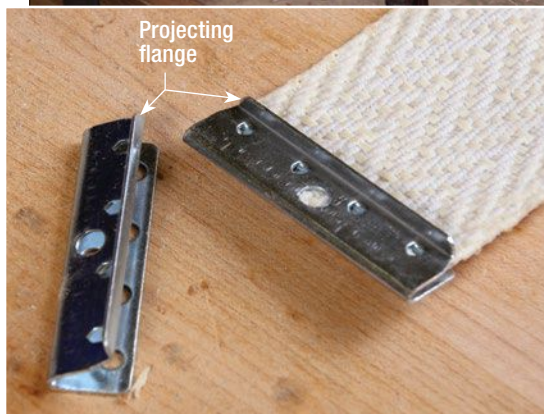


Attach the seat cleats. After predrilling 5 countersunk clearance holes through the inner edge of each cleat, glue and screw them in place with #8 × 1¼" screws. Use an adjustable square (or spacer block) to offset the cleats 1" from the upper edge of the side rails.

Attach the webbing, add cushions, and have a seat!

All that's left is to add the webbing and cushions. First, cut 9 feet of "Pirelli" webbing (see the Buyer's Guide on page 60) into 4 equal pieces. Crimp a metal clip to one end of each strip as shown, and then insert it into a rear seat slot. Pull the strip taut (but not stretched) across the seat frame, and mark a cutline ⅜" past the front seat slot. Cut the strips to length, and attach the remaining clip. Tuck the clips into the slots with the projecting flange oriented toward the inner edges of the seat rails.

This chair requires two "box cushions." You can get them from your local upholstery shop or from a number of online sources including *cushionexpress.com*. You'll need two cushions. The one for the seat uses high density foam and measures 4" thick × 22" wide × 25" deep. The one for the back uses medium density foam and is 4" thick × 22" wide × 20½" tall. Both cushions have piping, or *welt*, around the seams.



Crimp the clips to the webbing. To crimp the metal clip on the ends of the webbing strip, insert the clip into the tab and squash the two together in a vise. Make sure that the projecting flange on each clip is on the same side of the strip.

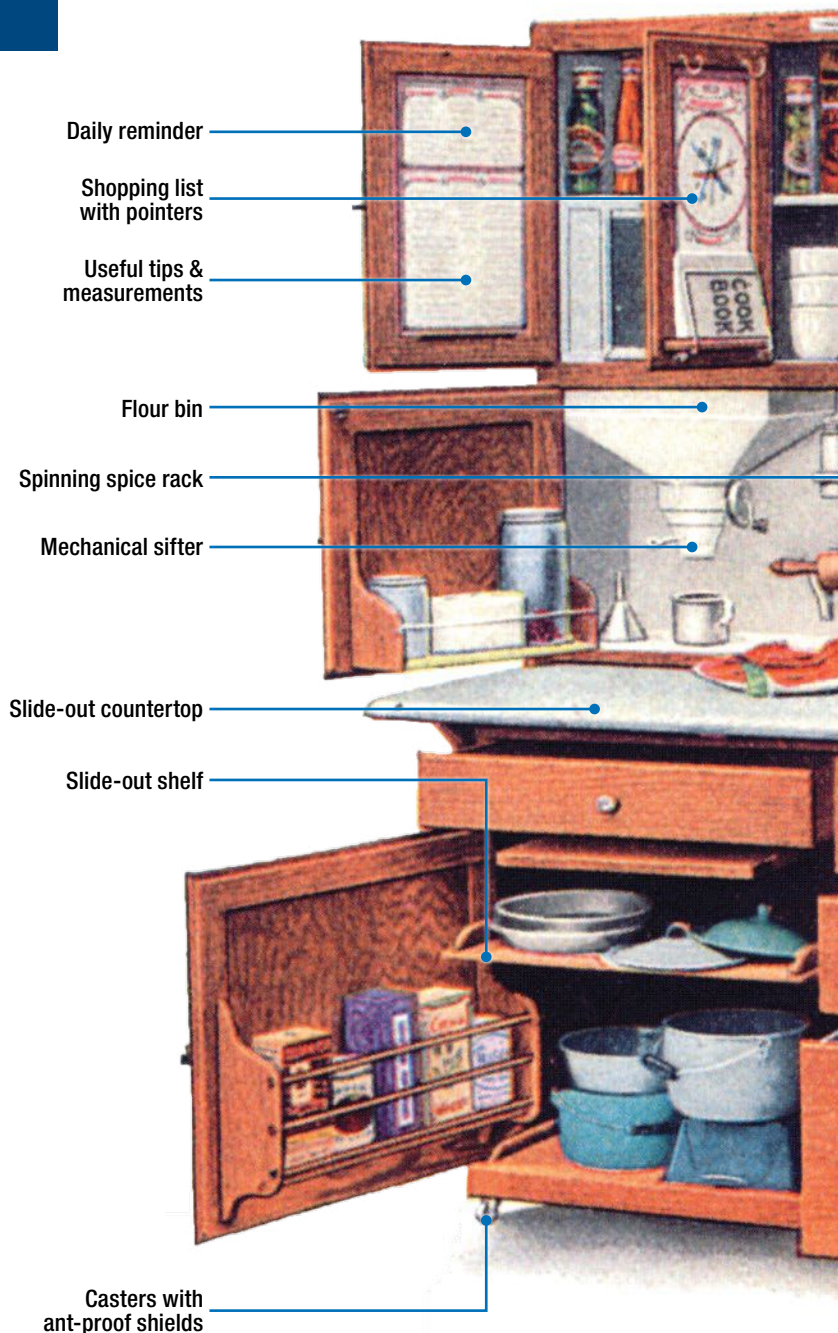
HOOSIER CABINET

By Nancy Hiller



fastFACTS

- Hoosier cabinets were manufactured from the late 1890s through the 1930s. By the time production peaked in the 1920s, more than one in ten American households owned a Hoosier cabinet.
- Although the Hoosier Manufacturing Co. was the largest and best-known company associated with Hoosier cabinets, other major manufacturers included Sellers, Napanee, Boone, and McDougall. All of these cabinetry companies were located in Indiana.
- Hoosier cabinets included some of the features found on present-day premium cabinets, like pull-out shelves in base cabinets, and rotating lazy-Susan racks.



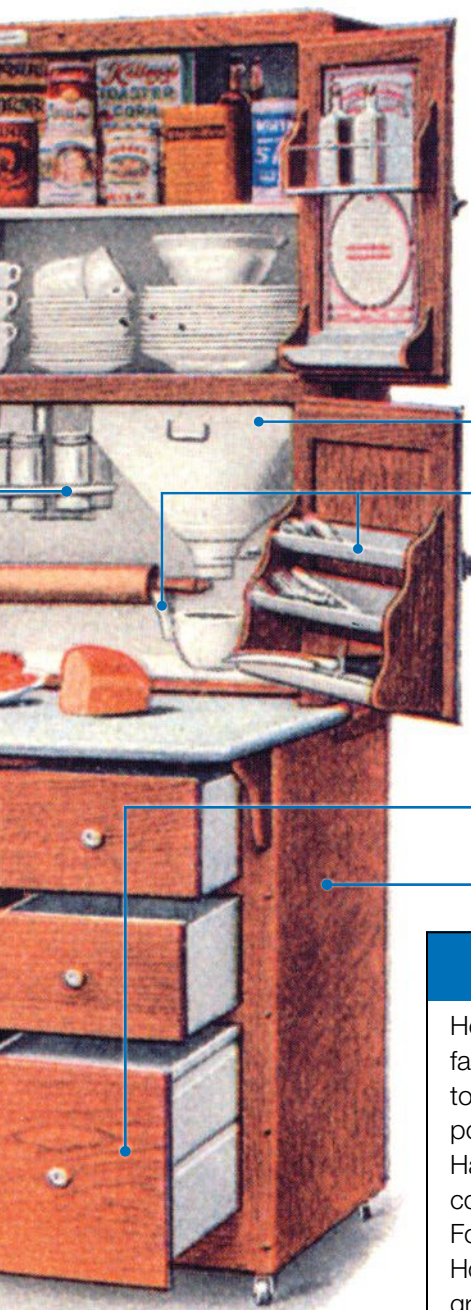
It would be difficult to find a piece of American furniture with more historical significance than the Hoosier cabinet. The cabinet's built-in sifters, ant-proof casters, slide-out countertop, tin-lined bread drawer and homemaker's "Daily Reminder" to-do list (just to name a few noteworthy features) hold clues to many details of domestic American life, especially female life, in the late 19th and early 20th centuries.

The Hoosier was initially developed to take the place of servants, common

in households of the middle and upper classes until industrialization lured them into factories. The disappearance of domestic help left housewives with an overwhelming workload, and (to make matters worse) a distressing ignorance of basic baking, meal preparation, and kitchen management tasks.

Though the heyday of the Hoosier cabinet occurred during the first 20 years of the 20th century, the origins of its design can be traced back to Catharine Beecher (1800-1878), a noted author, educator,

and social reformer who belonged to a family of luminaries. Determined to do her part to save middle-class American families from divorce, sickness, and other increasingly common perils, Beecher lectured and wrote books about all aspects of what she and her fellow reformers called domestic science. As part of this project she rethought the fundamental layout of the kitchen. Previously, middle-class kitchens were sprawling areas furnished primarily with a work table, sink, stove, and open shelves. A separate



Sugar bin

Built-in racks

Tin-lined bread drawer

Deep base cabinet

HOOSIER
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**“My best Christmas gift—
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EVERY home should have its Hoosier, for every housewife deserves the many benefits it brings. And there's no more fitting time to get it than at the Christmas season.

The gift of a labor-saving Hoosier expresses the intimate thoughtfulness every home-maker appreciates. It makes her work easier and more enjoyable all year. It makes her workshop more attractive and adds to the pride of home.

Surrounded by many patented conveniences found only in the Hoosier, the housewife sits at her work instead of walking to and fro. Thus she saves miles of steps.

Because utensils and supplies are centralized in the Hoosier, much work is saved. By preventing waste in measuring and mixing, foods are saved.

Hoosiers are sold almost everywhere. If your kitchen still lacks this greatest convenience when Christmas has passed, be sure to visit the home of the Hoosier in your town and see an actual demonstration. If you don't know this merchant's name, please write us.

The Hoosier Manufacturing Company, Main Office, 1219 Jackson Street, New Castle, Ind.

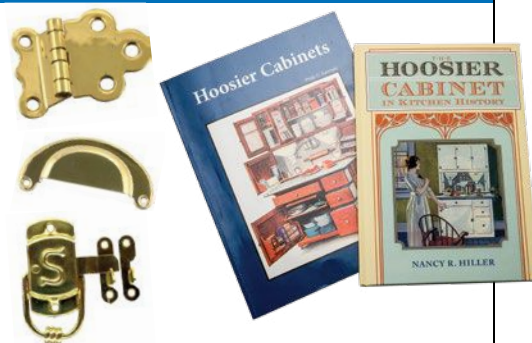
BRANCHES
THE HOOSIER STORE, Houston, Texas; Pacific Building, San Francisco, California
THE HOOSIER STORE, 361 Pungo Avenue, Waukegan, Illinois

"How Kitchen Short Cuts" is the Hoosier book of helpfulness in housework. Write for a copy and learn how work can be saved.

Marvelous marketing. Magazine ads like this *Ladies' Home Journal* example were immensely successful in selling Hoosier cabinets. The sales pitch always focused on the cabinet's many labor-saving features.

Need help with your Hoosier?

Hoosier cabinets haven't been manufactured for many years, but the restoration of antique versions is hugely popular. You can count on Kennedy Hardware (kennedyhardware.com) for a complete selection of restoration parts. For a fascinating look at the history of Hoosier cabinets, get your hands on two great books—one by Phillip Kennedy, the other by Nancy Hiller.



pantry stored canned food and dry goods. Beecher advised reducing the kitchen's size and compressing all tasks into a single room furnished with a built-in cupboard that would keep everything handy and also provide preparation space.

The Hoosier cabinet performed all the roles that Beecher recommended, packing an impressive array of functions into a typical footprint just 24" deep and 48" wide. Totally self-contained and portable, it could be made in a factory, then shipped across the nation. Sold on

credit for \$50, with payments of a dollar a week, Hoosier cabinets quickly became the standard in American homes. Good design wasn't the only reason for this success. Hoosier cabinets (and similar versions made by other manufacturers) benefitted from a national marketing campaign that is impressive even by today's standards. "The Hoosier Cabinet Saves Steps," and "The Hoosier will help me to stay young" were popular tag lines used in magazine ads. What housewife wouldn't want a labor-saving device that

would leave more time in every day for socializing, family fun, and marital bliss?

Built-in cabinetry brought an end to the Hoosier's dominance in the kitchen. But the cabinet's nostalgia value, combined with its novel features, continue to prolong its popularity. It's a good bet that every family has a Hoosier cabinet somewhere in its history. If you're a woodworker, as I am, you'll find valuable design lessons in the functionality, durable construction, and pleasing proportions of this classic piece. ■

Buyer's Guide

Hot New Tools (p. 14)

Carter Products Axe Carbide Turning Tools

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1. WTX Router Guide.....#866260, **\$49.99**
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3. WTX 50" Modular Clamp Edge.....#863607, **\$54.99**
4. WTX 100" Modular Clamp Edge.....#866259, **\$99.99**

Desk Caddy (p. 21)

1. WoodRiver Straight Router Bit, 1/4" SH, 1/4" D, 1" CL.....#151178, **\$13.50**
2. WoodRiver 10-Piece Router Bushing Set with Case.....#144625, **\$42.50**

Mortising Jig (p. 26)

1. WoodRiver Low Silhouette Toggle Clamp, 6" x 1 1/4" (4 needed).....#143938, **\$14.50**
2. WoodRiver Knob, Five Star with Through Hole, 1/4"-20 Insert.....#27R13, **\$1.75**
3. Threaded Insert, Slotted, 1/4"-20 (8-piece).....#159282, **\$6.99**

River Table (p. 35)

1. Jumbo Graphite Transfer Paper, 18 x 24" (6 sheets).....#143766, **\$8.95**
2. Whiteside Downcut Spiral Router Bit, 1/4" SH, 1/4" D, 1" CL.....#812126, **\$18.44**
3. Freud Double-Flute Straight Router Bit, 1/2" SH, 3/4" D, 1 1/4" CL.....#835497, **\$22.97**
4. Freud Upcut Spiral Router Bit, 1/2" SH, 3/4" D, 1 1/4" CL.....#828779, **\$51.47**
5. HIGHPOINT Threaded Insert, Brass, 1/4"-20 (8-piece).....#159290, **\$6.99**
6. Stafast 1/4"-20 x 1 1/8", Connector Bolt (10-piece).....#06M40, **\$4.19**

7. T-Wrench, 1/4"-20.....#12K55, **\$5.50**
8. Watco Danish Oil, Natural, Pint.....#159438, **\$12.99**
9. General Finishes HP Polyurethane Top Coat, Semi-gloss, Quart.....#148413, **\$27.50**

Welding for Woodworkers (p. 42)

1. Central Machinery Metal-cutting Band Saw.....harborfreight.com, #93762, **\$249.99**

Basic welders and welding supplies (including safety gear) are available from Tractor Supply (tractorsupply.com), Harbor Freight (harborfreight.com), Craftsman (craftsman.com), and other tool and equipment dealers. Go to hobartwelders.com to find suppliers of Hobart welders and welding supplies.

Tubular steel and other mild steel stock are available from local metal merchants and tubular steel suppliers.

Easy Chair (p. 50)

1. WoodRiver Low Silhouette Toggle Clamp, 6" x 1 1/4" (2 for taper jig)#143938, **\$14.50**
2. Freud Upcut Spiral Router Bit, 1/2" SH, 1/2" D, 1 1/2" CL.....#844646, **\$63.99**
3. Whiteside Roundover Router Bit, 1/2" SH, 3/8" R, 1 1/4" D, 3/4" CL.....#24C24, **\$24.58**
4. Freud Cove Router Bit, 1/2" SH, 3/8" R, 1 1/4" D, 3/4" CL.....#834594, **\$49.97**
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7. Freud Straight Router Bit, 1/4" SH, 1/8" D, 1/2" CL.....#857856, **\$32.47**
8. Pirelli Rubber Upholstery Webbing, 2" Width, Tan
(Sold by the Foot, 9 ft. needed).....amazon.com, **\$4.19**
9. Metal Clips for Pirelli Webbing (10 pack).....amazon.com, **\$10.88**
10. Covered Cushions, (2) (See page 57 for sizes.)...cushionexpress.com, about **\$120** for both

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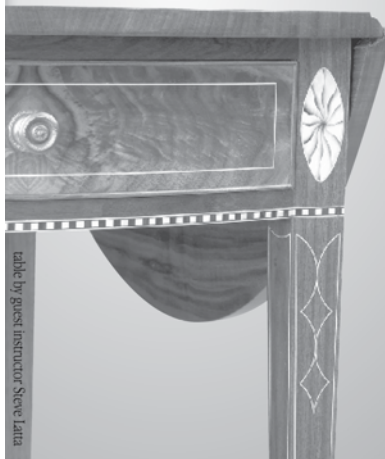


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Spotlight on SAPELE

*A shimmery
mahogany substitute*

By Ken Burton

Since the days of Thomas Chippendale, woodworkers have enjoyed a love affair with mahogany. Sadly, over the course of two centuries, genuine mahogany (*Swietenia macrophylla*) has been listed as an endangered species. As a result, this Cadillac of cabinet woods has become extremely difficult to find and prohibitively expensive. In response, lumber dealers have relabeled several sustainable substitute species as “mahogany.” Of the bunch, sapele—pronounced sah-PELL-ay—(*Entandrophragma cylindricum*) stands out from the rest.

Although a member of a different species, sapele (a.k.a. sapelli or sapeli) has a similar reddish-orange color as mahogany. When quartersawn, sapele boards exhibit a uniform ribbon pattern that shimmers in the light. In flatsawn boards, this squirrely grain makes for wild swirls and surfaces that shift color depending on how the light strikes. This beautiful pattern occurs because sapele’s grain is “rowed” or interlocked, which can make planing and shaping tricky. Despite some challenges, sapele’s color and lively grain make this wood worth the effort it takes to tame. Read on to learn how to select the best boards and make the most of them.

Where the wood comes from

Sapele comes from a large tree in tropical Africa that is commonly referred to as aboudikro. Its range includes Sierra Leone, Angola, Congo, and Uganda. Aboudikro is a deciduous tree that commonly reaches a height of 130 feet. At this time, sapele is not on the endangered species list, though many of the countries where it grows have established protected populations and restrictions on lumbering. The IUCN (International Union for Conservation of Nature) lists the species as “vulnerable” due to a decline in its natural range and exploitation.

History in woodworking

Until recently, sapele was used mainly for veneer in decorative plywoods—its uniform ribbon stripes create a beautiful and predictable pattern that’s prized by designers. General Motors uses sapele for the interior trim in Cadillacs. Luthiers use it to make guitars and ukeleles. High-end carpenters rely on sapele as a mahogany substitute for floors, staircases, and trim work. Highly figured boards are often reserved by furnituremakers for door panels and tabletops.

How to select the best stock

Good sapele is easy to find. It is commonly available in 4/4 stock, and because the lumber is harvested from large trees, you can often find wide planks (48" and wider) and in thicknesses up to 16/4. Prices for typical stock (4/4 or 5/4, up to about 8" wide) range from \$6-\$8 per board foot; about 50% less than African mahogany. Of course, you’ll pay at least twice that for highly figured stock and/or wider pieces. Most trees are quartersawn to showcase sapele’s distinctive ribbon figure, where each stripe seems to change from dark to light as you walk around a finished project.

Sapele Quick Take

DENSITY	40 lbs./ft ³
HARDNESS	Hard
STABILITY	Moderate
ROT/INSECT RESISTANCE	Heartwood: Moderate-high Sapwood: Low
TEXTURE	Medium
TOXICITY	Moderate
USES	Furniture, boxes, turnings, musical instruments, staircases

Mind the Grain

Aromatherapy

It has been over three weeks since I finished the chair featured on page 50, but every time I enter my shop, I can still smell sapele's distinctive aroma. The wood's fragrance is sometimes likened to Spanish cedar, but I find it darker and more exotic. Whatever you think, it is certainly long lasting. Although the dust seems to stick to everything, I'm tempted to wait a few more weeks before cleaning up my shop.

Sapele is a beautiful hardwood in its own right, but is generally lighter than true mahogany, (see "Mahogany's Mimic," below) and has more color variation. While you're likely to find many rich, reddish-orange brown boards, there can be quite a bit of difference from one to the next. Boards ranging from tan to a deep burgundy are common. Bring your block plane when buying roughsawn stock, and ask if you can plane a small area to see what the color actually looks like.

Working sapele in the shop

Although sapele resembles mahogany, you'll find that jointing, planing, and routing can be more difficult because of its rowed grain. With most woods, if a board suffers tearout when you run it one way, running it the opposite direction usually solves the problem. Not so with sapele. Freshly sharpened jointer and planer knives and light passes can help. However, because of the interlocked grain, accept that you'll have some

tearout no matter which way you cut. Just settle on the direction that minimizes the damage. When edge jointing boards, you may find that you get better results from the table saw than from your jointer.

As for hand tools, you're likely to find that scrapers work better than hand planes. When carving, say, a ball-and-claw foot for a Chippendale chair, invest time keeping your chisels extra sharp. And pay close attention to what the grain is doing.

Sapele scrapes and sands easily, but note that sanding and machining produce a fine dust that will stick to everything. While severe allergic reactions are rare, sapele is still considered a skin and respiratory irritant. To minimize the chance of an adverse reaction, try to collect dust at its source, wear a dust mask, and plan on spending extra time vacuuming the shop at the end of the build.



Flatsawn

Riftsawn

Finishing

Sapele tends to darken as it ages, so its natural color may suffice, but if you look to hasten the process, you'll find that the wood stains well. The interlocking grain and its resulting shimmer and color-shifting qualities won't be obscured by anything other than the darkest stains. There's no definitive best finish for sapele. As with many attractive exotics, less is more. Simply sand up to 220 grit, and apply your favorite topcoat.

Note that sapele is a diffuse porous wood with relatively large pores. To replicate the mirrored finish typical of period furniture, you should fill the surfaces with a commercial paste wood filler—add stain to the filler to match the color you're after—and then apply a film-forming topcoat such as shellac. ■



Check out the sapele easy chair on p. 50

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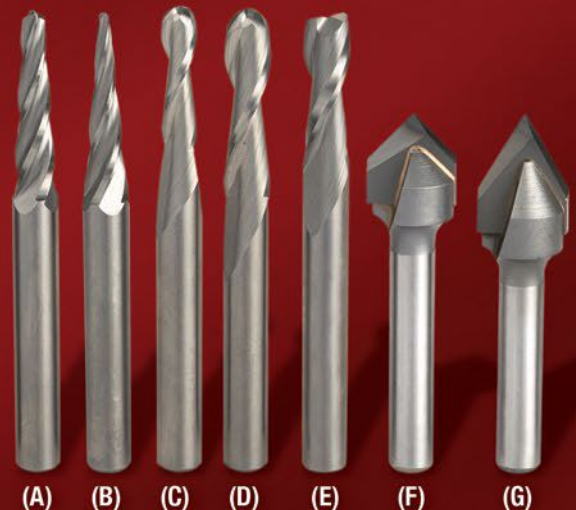
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Simple saw blade cleanup

Q For clean, burn-free cutting at the table saw, I understand that it's important to keep your blades clean. So what's the best way to remove the hardened pitch that builds up from regular use?

A During use, blades gradually become contaminated with pitch and other materials that cling to the teeth. This buildup (as shown, top right) can make a blade perform as if it's duller than it is. In addition to affecting cut quality, the buildup increases friction, which attracts more pitch, which in turn diminishes cut quality. In the worst case scenario, pitch buildup can affect a blade's working life.

Like other remedies, an ounce of prevention is worth a pound of cure. I've tried lots of products to clean blades, including mineral spirits, lacquer thinner, and oven cleaner, and discovered that there's no need to resort to toxic chemicals. You'll get great results from environmentally friendly cleaners like concentrated citrus degreaser (sold at home supply stores) or commonly available Simple Green concentrated cleaner. The cleaning process only

takes about 10 minutes and results in better cuts and longer blade life because the teeth don't overheat.

To clean a blade, place it on an aluminum pizza tray or a scrap of plywood. Spray undiluted cleaner on the teeth, let the blade sit for a few minutes, and then scrub the teeth with a brass bristle brush (photo, bottom right). Afterward, rinse the blade well with warm water to remove the cleaner and gunk residue.

As a final step, dry the blade well and spray it with a metal protectant to prevent rust. There are plenty of rust protectants on the market for this purpose, and WD-40 works fine too. Spread the protectant all over the blade, and then wipe off the excess with a clean, soft rag. ■

—Paul Anthony, author of Taunton's
Complete Illustrated Guide to Tablesaws



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