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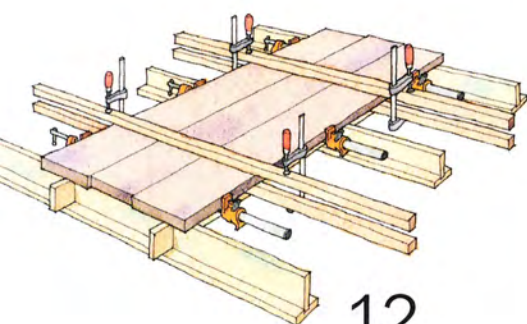
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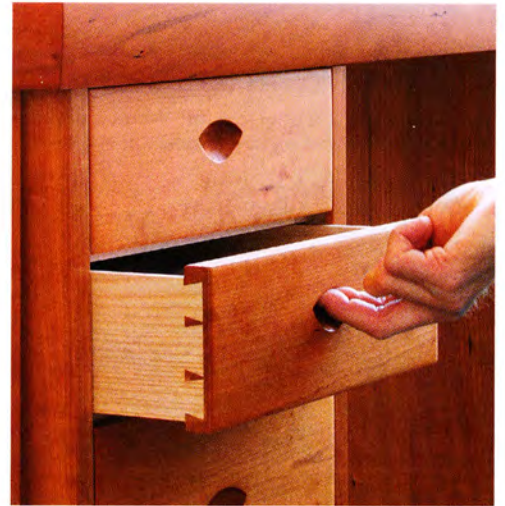


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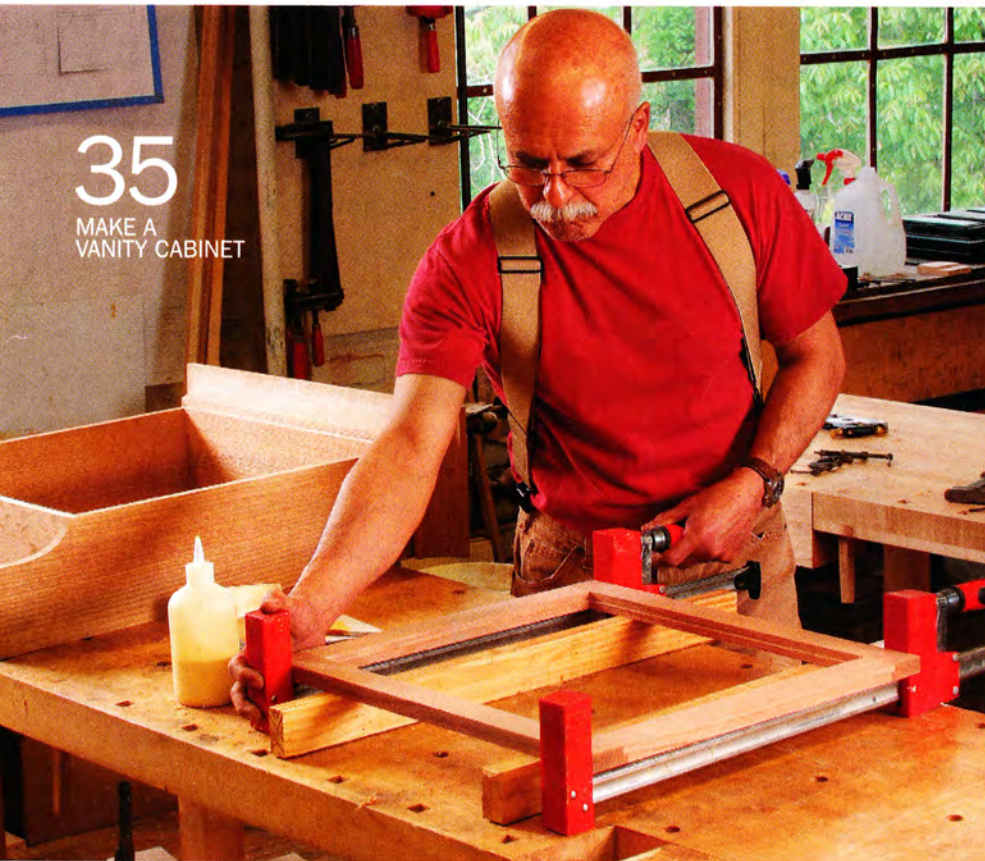
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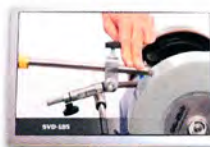
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contributors

Daniel Chaffin (*"A Trestle Table with Modern Appeal"*) started Daniel Chaffin Furniture Makers with Matt Frederick and Amy Edgington in 2005. Since then they have purchased and renovated a beautiful three-story building in downtown Louisville, Ky., which now contains the shop, design studio, and two living spaces. Their company has grown to six people over the years with the addition of Vince Heichelbech, Carl Bakanowski, and most recently Derek Burke. (Photo, from left: Frederick, Chaffin, Edgington, Heichelbech, Burke, Bakanowski) **Best thing about living in Louisville?** "The restaurants!"



Tim Coleman (Master Class: *"Carved pulls give a handmade touch"*) is a well-respected furniture maker and designer. Though you can see hints of his teacher, James Krenov, in his furniture, the designs are all his own. His work often is inspired by nature, with delicate but sturdy frames and plentiful curves. You'll also see stunning scrollsaw work and hand-stamped textures that are inviting to the touch—details that have become his signature. **Favorite quote from Jim Krenov?** "Talking about special wood: 'This stuff doesn't grow on trees, you know.'"



Scott Ernst (*"Reviving the Tambour Door"*) has been building custom furniture in northern New Mexico for more than 20 years. When he isn't in his pine-shaded shop, you might find him parasailing, scuba diving, or looking for a bowl of green chile stew in nearby Santa Fe.

Done any interesting repair work lately? "Yes. I'm working on the wood-and-fabric wing of a friend's home-built airplane."

Tony O'Malley (*"Biscuit Joiners, Head to Head"*) works in a huge industrial shop in Emmaus, Pa., with lots of space and light, high ceilings, and a big Oliver jointer and a sliding tablesaw. He's been building furniture for more than 20 years, starting his own business after a first career as woodworking-book editor for a local publisher. He specializes in custom built-ins and cabinets.

Where did you first get the woodworking bug? "Started out self-taught during college, when I needed some bookcases. Used salvaged skid wood for my first table."



For more information on our contributors, go to FineWoodworking.com/authors.

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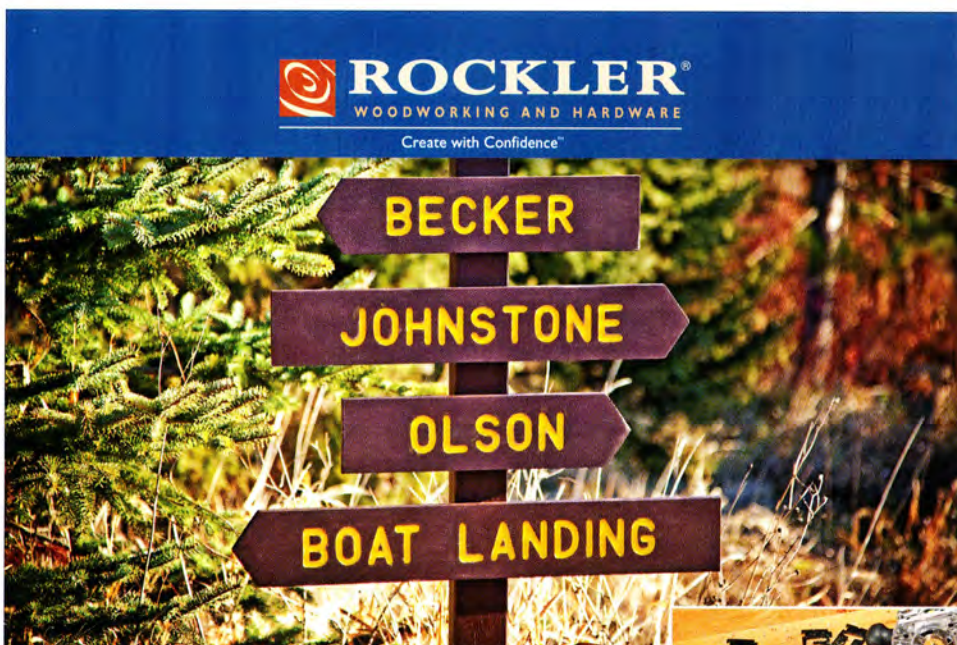
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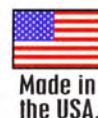
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Spotlight

ISSUE NO. 233
May/June 2013
p. 68

ARE CUTTING BOARDS “FINE WOODWORKING?”

I was dismayed to see six pages devoted to a cutting board. And with an online extra to boot (the author's free video of the process). Other magazines have the crafting segment pretty well covered. Please stick with the finer-woodworking end.

—JAY COOPER, Orlando, Fla.

I really liked the look of the cutting board in *FWW* #233. I decided to make my own and was surprised at the simplicity of adding the curved banding. In my case, I used roasted maple with a strip of normal maple. The contrast only improved once I applied cutting-board oil and the roasted maple became almost an ebony color.

—STEPHEN MACDOUGALL,
Guelph, Ont., Canada



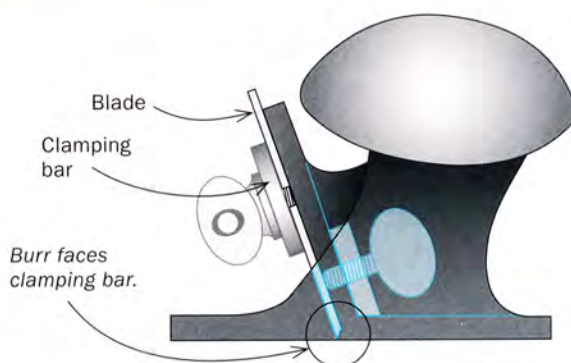
Dark and handsome. MacDougall used normal and “roasted” maple to create a unique look. He bought the latter at Exotic Woods (Exotic-woods.com). The roasting process changes the color throughout a board, and is widely available for a variety of woods, at a slight premium.

Corrections

In a recent Handwork department (“You Need a Cabinet Scraper,” *FWW* #234), we incorrectly described which direction the hook (cutting burr) on the blade should face. It should face the clamping bar, which is on the front of the plane.

The Grip 32106 Small Edge Clamp shown in Fundamentals (“Gear Up for Glue-Ups,” *FWW* #234) is out of stock, perhaps permanently. Bessey's KF2 One-Handed Edge Clamp is a great alternative, though pricier at roughly \$40 online.

In “Make Shellac Your Go-To Finish” (*FWW* #234) we misstated the proportions for making a 1½-lb. cut from SealCoat premixed shellac, which comes in a 2-lb. cut. A 1½-lb. cut requires three parts SealCoat to one part of denatured alcohol.



Old trick for stuck router bits

The latest Q&A (“Gentle Taps Release Stuck Router Bits,” *FWW* #234) missed an old millwright's trick, using the router's wrenches. After loosening the collet, put the open end of one wrench around the shank of the bit, touching it. Then use the other wrench to tap the end of the first one. Just a couple of sharp taps and it pops loose.

—MONROE J. MECHLING, Steubenville, Ohio

Tablet edition coming to Android devices

I would like to subscribe to the digital version of the magazine, mainly to get access to all of the archives. But now I see that I am unable to do what I and potentially thousands of others like me would like to do: view it on a tablet other than an iPad.

—NATHAN RENCH, Temecula, Calif.

Editor replies: Sorry for the delay, Nathan. We rolled out the tablet editions for the iPad first, but an Android version is on the way.

Clarifications

In “Tool Chest with Drawers” (*FWW* #234), we gave a source for the side handles (identified on the drawing) but not the other hardware used. The hinges are item No. PB-407, the drawer locks are item No. LK-2, and the lid lock is No. LK-7, all from Horton-Brasses.com. The ring pulls are item No. 81EUP5, from Whitechapel-Ltd.com.

The router bit used to make the finger pulls on p. 73 of “A Unique Cutting Board” (*FWW* #233) is a Woodline ¾-in. edge-fluting bit (WL 1475, \$26.50) from Woodline.com.



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Best Tip



John Jacobs has been woodworking for 15 years and has built about 40 furniture pieces ranging from bookcases to beds to bow-front chests. His latest is a sleigh bed.

Clamping frame knocks down for storage

For me, woodworking is a time of relaxation—except when gluing up. Then it is a race against the clock involving sweaty palms, bad language, and an occasional airborne clamp.

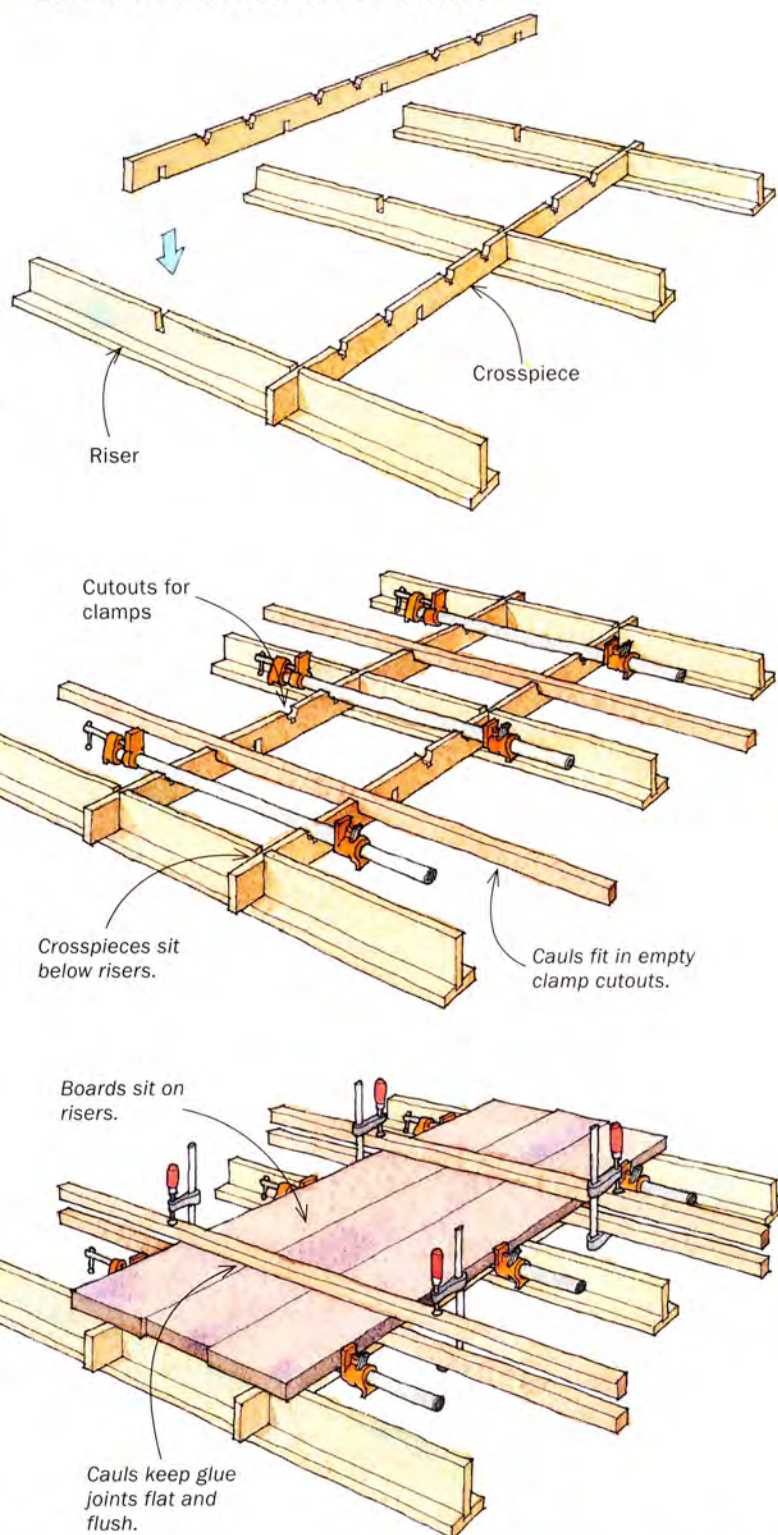
At first I thought a set of simple risers would ease my panel glue-ups by lifting the boards off the benchtop and letting me position clamps freely underneath. But I soon realized that much of the chaos came from the clamps tipping over and otherwise changing positions while I applied glue and aligned the boards. I needed a way to keep the clamps still until I could tighten them. That led to the clamping frame shown here.

In addition to the risers, the frame uses a pair of crosspieces with matching cutouts to accept either bar clamps or pipe clamps. When placed in their cutouts, the clamps stay put. The risers and crosspieces are joined with simple cross-laps, with the crosspieces notched in several places to vary the frame's length. Better yet, I made some slightly arched cauls and sized them to fit snugly into the clamp cutouts. These help keep the joints flush.

To ensure that the frame doesn't interfere with assembly, I cut the joinery and cutouts so that the panel being glued registers only against the tops of the risers. The tops of the crosspieces, as well as the bars or pipes of the clamps, sit slightly lower.

Using this clamping frame is worlds better than laying clamps directly on the bench, and it takes only a minute to set up and makes glue-ups nearly stress-free. When not in use, the components take up minimal storage space.

—JOHN S. JACOBS, Weston, Mass.



A Reward for the Best Tip

Send your original tips to fwmow@taunton.com or to Methods of Work, Fine Woodworking, PO Box 5506, Newtown, CT 06470. We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was a DeWalt router kit.



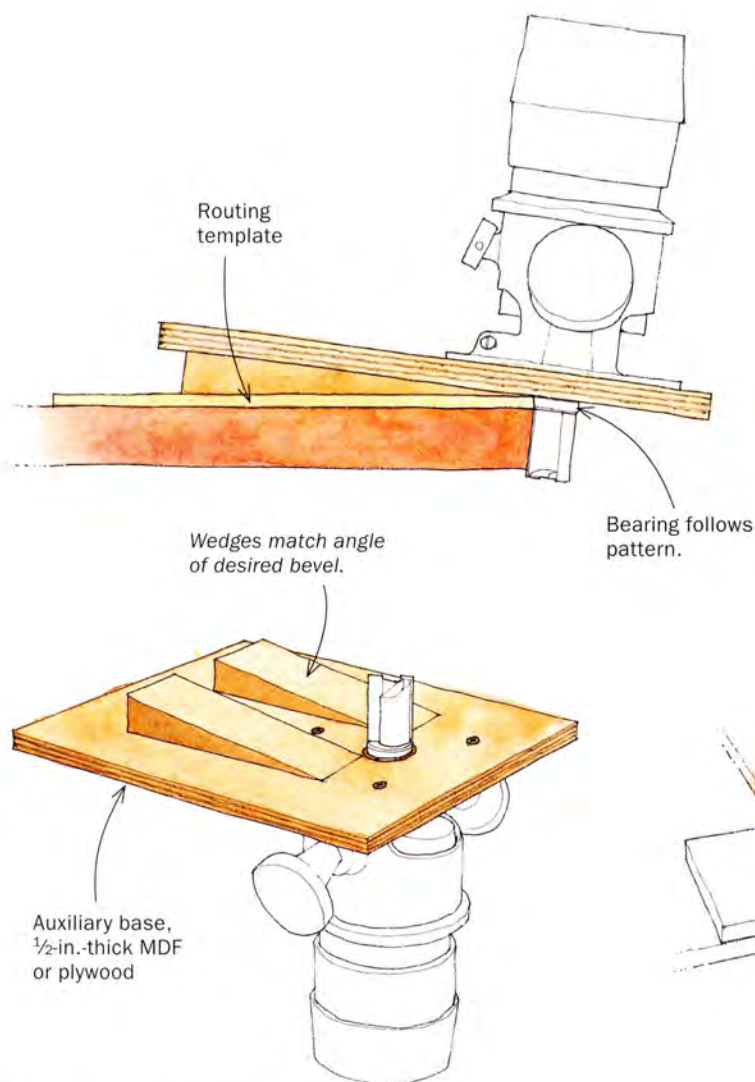
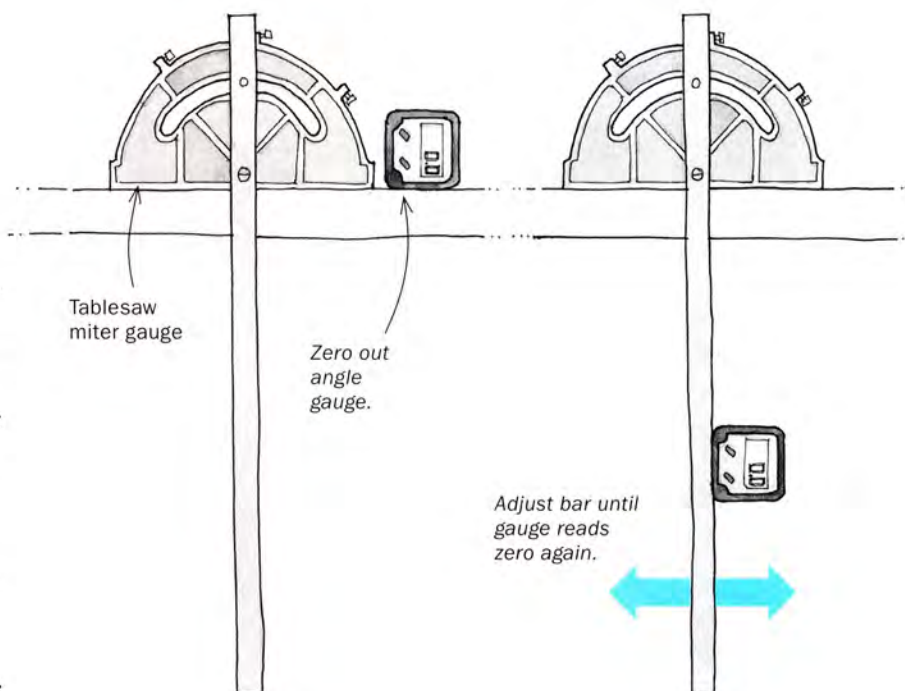
Another great use for a digital angle gauge

The digital angle gauge is one of the most used tools in my shop, after the tape measure and the utility knife. Here's how I use it to perfectly square a tablesaw miter gauge.

Place the miter gauge facedown on your saw table (or any other flat horizontal surface) with the bar hanging down. Now place the angle gauge's right side on the horizontal surface as shown and zero out the gauge. Move the angle gauge low on the bar of the miter gauge, snapping the gauge to the bar with its magnets. Now adjust the bar until the angle gauge reads 0° and lock the setting.

As long as the tablesaw blade is parallel to the miter-gauge slot, the setting will be perfect. You can also set the miter gauge at 45° or any other angle this way.

—JEFF PETERS, Redgranite, Wis.



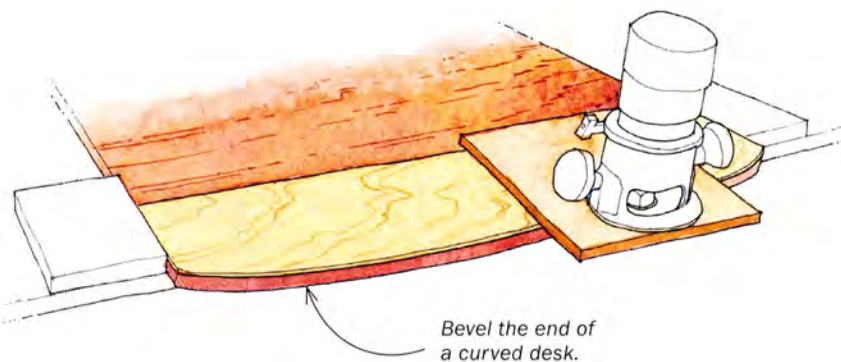
Router jig for custom bevels

For a recent desk project, I wanted a beveled edge on the writing surface. Because the desktop was gently curved at each end, I couldn't create the bevel on the tablesaw. So I tackled the problem with my router instead, using a shopmade angled baseplate.

First I cut a pair of wedges that matched the bevel angle I wanted. Then I glued the wedges to the bottom of an auxiliary base and installed it on my router.

To cut the bevel, I created a template to match the top's shape, clamped it in place, and used a pattern-cutting bit in my router. By following the template with the angled base, I was able to get the shape I wanted quickly and accurately.

—MARK STECKEL, London, Ont., Canada



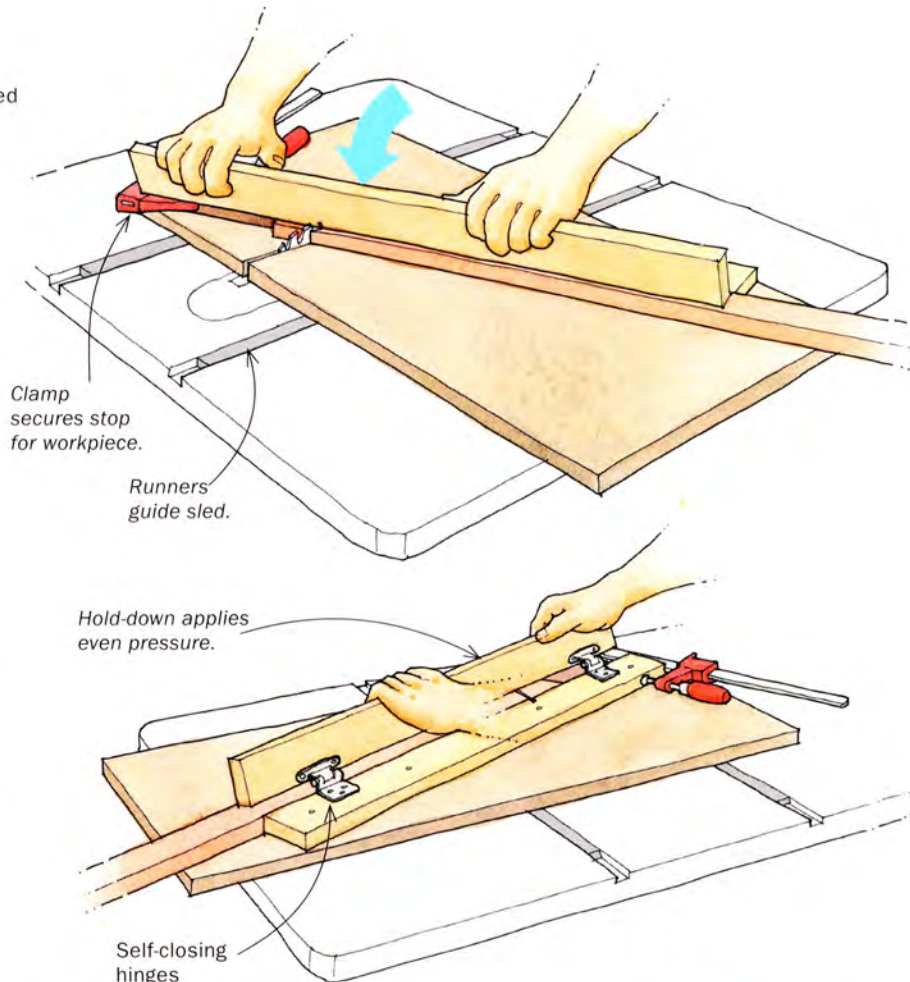
Tablesaw sled hold-down

I came up with this idea while cutting pieces for a segmented bowl on a tablesaw sled. I was doubtful I could hold the workpiece and the cutoff securely without getting my fingers too close to the blade. So I came up with this simple solution.

I mounted two self-closing cabinet door hinges on the fence of the jig and connected them to a single piece of wood I call a hold-down bar. The bar acts as both a hold-down and handle. The self-closing action of the hinges causes the bar to apply pressure to the stock, which I supplement with pressure from my hands. When I use the hold-down to push the jig forward, it applies even pressure to pieces on both sides of the blade and keeps my fingers safely clear. Be sure to push the workpieces all the way past the blade and remove them before pulling the sled backward.

With this jig, I can cut small workpieces safely all the way to the very end. And since it is hinged, it accommodates various thicknesses of stock from very thin to more than 1 in.

—MIKE HARMAN, Beavercreek, Ohio



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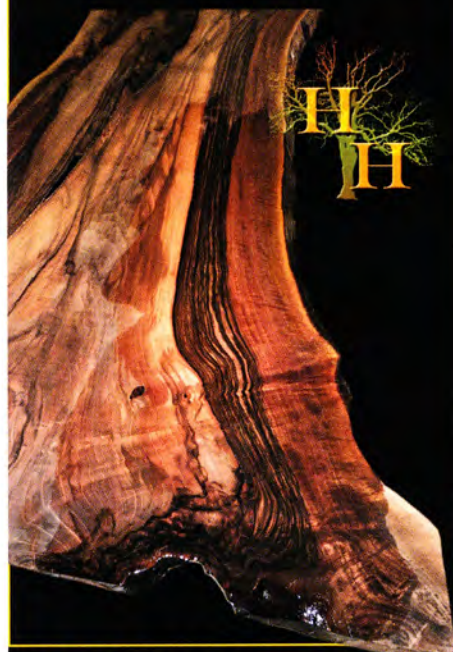
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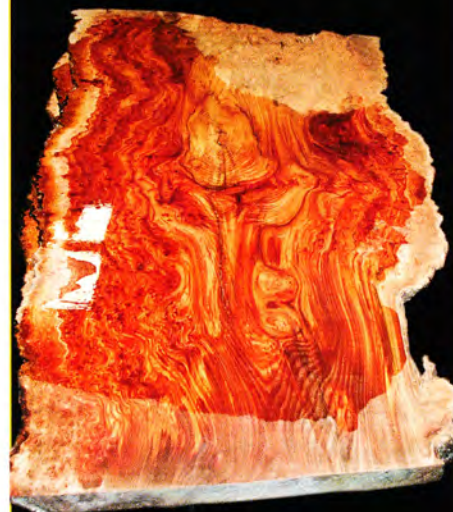


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■ ACCESSORIES

Perfect dowels on demand



Dowel plate
by Lie-Nielsen

\$55
lie-nielsen.com

THE TOOL THAT GETS BORROWED MOST OFTEN by my co-workers at *FWW* is not one of my many prized handplanes but my old, beat-up dowel plate. This tool does a great job of turning scrapwood into dowels and pegs just by hammering square stock through one of the holes. My dowel plate has long been out of production, which is one reason why it's so in demand. Now two companies have stepped up and filled the niche.

The Lie-Nielsen dowel plate, made from hardened A2 steel, is ready to make dowels in diameters ranging from $\frac{1}{8}$ in. to $\frac{5}{8}$ in. (There is also a metric version.) My original

only went down to $\frac{1}{4}$ in., and I really like the option of making smaller pins. Veritas has a different



Dowel plate
and formers
by Veritas

\$39.50 for set
(plate plus $\frac{1}{4}$ -in.,
 $\frac{3}{16}$ -in., $\frac{3}{8}$ -in.,
and $\frac{1}{2}$ -in. inserts)
leevalley.com

take. Veritas uses individually sized inserts, or "formers," made from A2 steel, that snap into a steel plate. You can buy a set that includes the plate and four standard-size inserts (imperial or metric). Or you can buy the plate (\$11.50) and just the inserts you need (\$9.50 apiece).

Both products worked well and created accurately sized dowels. I found that pre-chamfering the corners of the stock and tapering the end in a pencil sharpener made the process easier and yielded better results. Each plate can be mounted to a bench or support block, but I typically just put the plate over a dog hole in my bench and pound away.

Which one to buy? It depends on the number of sizes you want. The Veritas system is a good value if you only need a few, but the Lie-Nielsen plate is a cheaper way to go if you want them all.

—Michael Pekovich is *FWW*'s art director and resident dowel technician.

■ POWER TOOLS

Big sander is easy to handle

I USED TO HATE THE THOUGHT of sanding a big tabletop with a pad or belt sander—the noise and dust were off-putting to the extreme, and the vibration killed my hands.

Bosch's OS50VC half-sheet sander dispels all the old stereotypes associated with big sanders. It's lightweight, with a lack of vibration that is very kind to my hands. But what really knocks my hat in the creek is the dust collection; it's nothing short of amazing, with the canister or hooked up to a vacuum. Plus you can use standard

Half-sheet orbital sander
by Bosch

Model OS50VC
\$380
homedepot.com



sandpaper; Bosch provides a punch plate to perforate the abrasive. Ergonomics are good, too, with easy-to-operate sandpaper clamps on the base, variable speed, and comfortable grips.

The Bosch has the oscillating action and finish quality of a random-orbit sander but almost double the sanding area. For big jobs, this sander is hard to beat.

—Roland Johnson has driven lots of sanders in his career.

■ MACHINES

High-end jointer-planer with a small footprint

HAMMER IS THE SMALL-SHOP, VALUE-ORIENTED wing of the Felder Group, intended to bring Austrian engineering to a broader audience. Hammer's latest offering is the A3 series of jointer/planers, which packs state-of-the-art convenience and industrial milling capacity into a small footprint.

I recently tried the 12-in.-wide A3 31, equipped with the optional "Silent Power" segmented (\$800 extra) cutterhead with carbide teeth. It's a fantastic upgrade. This is a true helical head, with the teeth sharpened on a curve for a shearing cut. It's quiet, and its shearing action left negligible tearout on the most ornery woods: quartersawn white oak, figured maple, and super-hard jatoba with interlocked grain. This cutterhead is also designed for better chip ejection, which might be the reason this machine has the best dust collection I've seen on a jointer or planer.

It takes roughly one minute to convert the Hammer from jointing to planing or back again, time mostly spent cranking the planer bed out of the way so the dust hood can rotate. That's not bad.

The machine is a delight to use in either mode. The tables and bed have specially machined surfaces for very smooth sliding action, and the 4-hp motor teams up with the segmented head to power easily through cuts up to 1/8 in. And unlike some planer-jointer combos, this one has a very heavy extruded aluminum fence, machined dead-flat and straight. I was particularly impressed by the feed system on the planer: No matter the board or the depth of cut, the machine grabbed it and fed it smoothly out the other end, with no help from me.

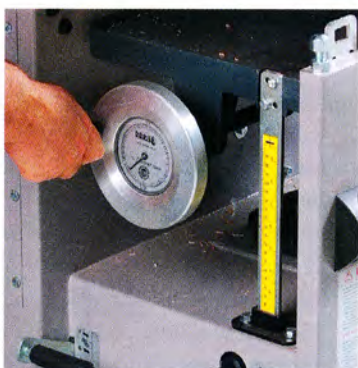
—Asa Christiana is editor of FWW.

12-in. jointer-planer by Hammer

Model A3 31
\$3,395
(Add extra for
cutterhead)
hammerusa.com



Silent power. The Felder-Hammer segmented cutterhead packs in tons of teeth (inset), all sharpened on a true helix, and is shockingly quiet. The European-style guard is no problem for edge-jointing, but you'll have to work around it when face-jointing (above), or move it out of the way of your push pads (shorter sleeves would be a good idea).



Arm workout. The changeover goes quickly, except for the need to move the planer bed all the way to the 6 3/4-in. mark to allow the dust hood to flip over (left). The dial for planing thickness is an invaluable feature, and reads in 0.001-in. increments (above).



■ ACCESSORIES

Up-and-coming woodworkers turn out handmade shop gear

IF YOU WEAR FLANNEL ON YOUR BACK and sawdust in your hair, you have a friend in Nick Offerman. He keeps woodworking on prime-time television, as the lovable throwback Ron Swanson in the NBC comedy *Parks & Rec*. He also quietly runs a woodshop in L.A., where he gives a number of up-and-coming pros a home. Aside from furniture commissions, Offerman's "elves" sell a range of gift items and shop gear, kicking back just 10% to overhead. For an entertaining look at life in the Offerman Woodshop, go to FineWoodworking.com/extras.

Serious shop aprons. Offerman Woodshop also makes tough denim shop aprons, with over-the-shoulder straps that don't hang on your neck.



I recently tried their tool roll, and found it to be thoughtfully designed and solidly made. The outside is tough denim, the inside corduroy, and the tool pockets lined with leather to resist razor-sharp edges. It holds chisels and gouges up to 1½ in. wide. This tool roll is pricier than mass-produced models, but as Offerman says on a hand-stamped card: "Dear champion of shop fashion, thank you for supporting our small operation, where honest Americans make beautiful woodcrafts with our bare hands."

—A.C.



Rolls up tight. The tool roll cinches up nicely for safe transport.

Tool roll by Offerman Woodshop

\$85, offermanwoodshop.com
(click "For Sale," then "Kindlin.")

■ POWER TOOLS

Super-sharp chisels help any mortiser cut better

HOLLOW-CHISEL MORTISERS CAN DRILL accurately square holes to an easily established depth with clean edges on the entrance. But the chisel and bit can plug, burn, squeal, rattle, and generally be a royal pain if you don't take care to tune up the assembly. That's why it is so refreshing to find one that works great right out of the box, like the set from Charles Schmidt and Company. I tried their ½-in. set. The drill bit was cleanly sharpened, and the chisel was nicely refined on the outside and inside faces, with some of the best machining of any mortise bit I've seen. The chisel easily sliced through hard maple with the chips flying out of the bore opening.

No muss, no fuss, and less downward pressure than I typically need to cut a mortise in maple. If you own a hollow-chisel mortiser, these bits won't disappoint.

—R.J.

Mortising and chisel bit set by Charles Schmidt and Company

\$56 to \$99
depending on size



■ HAND TOOLS

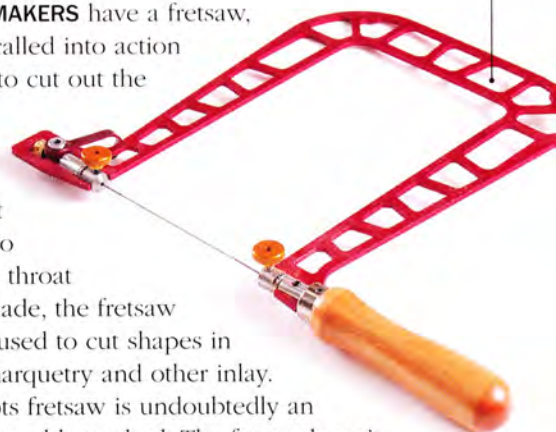
Space-age design for an old-world tool

MANY FURNITURE MAKERS have a fretsaw, and typically it is called into action like a coping saw to cut out the waste between dovetails. Although it works well for that basic task, it can do more. With a large throat and a fine-tooth blade, the fretsaw is an age-old tool used to cut shapes in thin material for marquetry and other inlay. The Knew Concepts fretsaw is undoubtedly an improvement on the old standard. The frame doesn't flex as much as a coping saw, so you can up the tension for better control. And the tension is easy to set and lock. The saw is thoughtfully engineered and well made. For a host of fine cuts in small spaces, this is a great tool.

—Tim Coleman is known for fantastic scrollwork in his furniture.

Fretsaw by Knew Concepts

\$103 (8 in.)
leevalley.com



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Never lose track of parts again

THERE IS NO MARKING SYSTEM MORE EFFICIENT THAN THE TRIANGLE

BY MICHAEL PEKOVICH

They say that good joinery starts with good layout. I'd add that good joinery and good layout require clear orientation marks. If you've ever spent half a day dovetailing a drawer only to cut the last set of pins in the wrong direction, you know how important it is to mark your parts clearly and refer to the marks often.

As your projects become more ambitious, and doors and drawers multiply, so do the opportunities for mix-ups. Without a system for quickly identifying and orienting all those otherwise indistinguishable parts, you're inviting mistakes.

Power of the pyramid

Drawing one triangle across multiple parts tells you how each one should be oriented for joinery and glue-up.



Not just for tabletops. You've probably used a carpenter's triangle to keep track of the boards in a tabletop glue-up. But if that's all you're using it for, you're leaving a great tool in your toolbox.

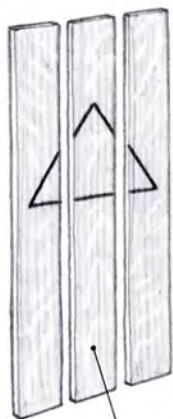
MAKING SENSE OF CASEWORK



A simple case piece. Even if the piece has just one door and drawer, using consistent, unambiguous orientation marks will help you build it faster, with fewer mistakes.

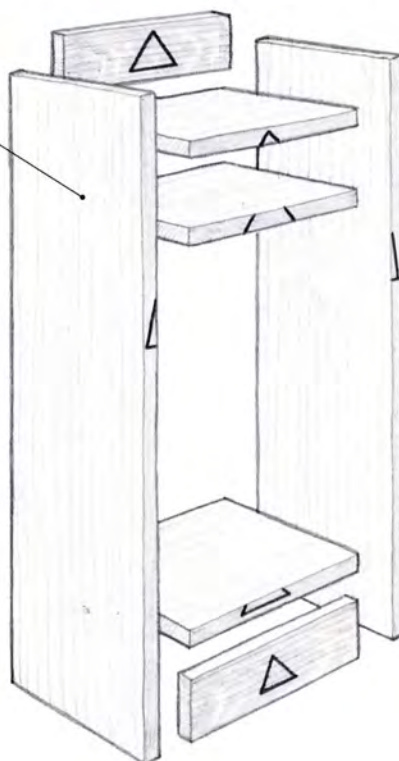
CASE PARTS

Sides and shelves get marks on the front edges with the triangles pointing up.



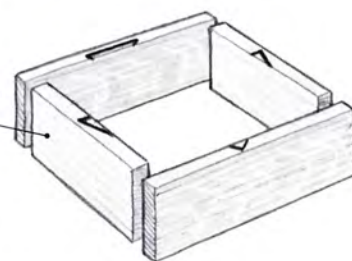
BACK PANEL

Mark the front face with a triangle pointing up.



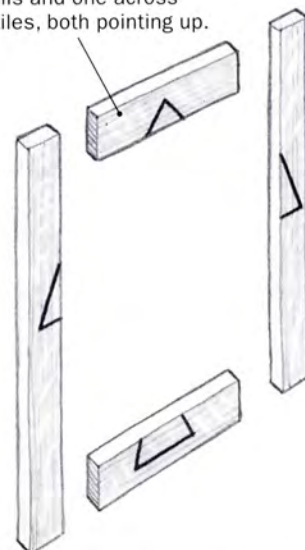
DRAWER

Draw a triangle across the top edges of the sides, and one across the back and front, both pointing forward.



DOOR

Draw one triangle across the rails and one across the stiles, both pointing up.





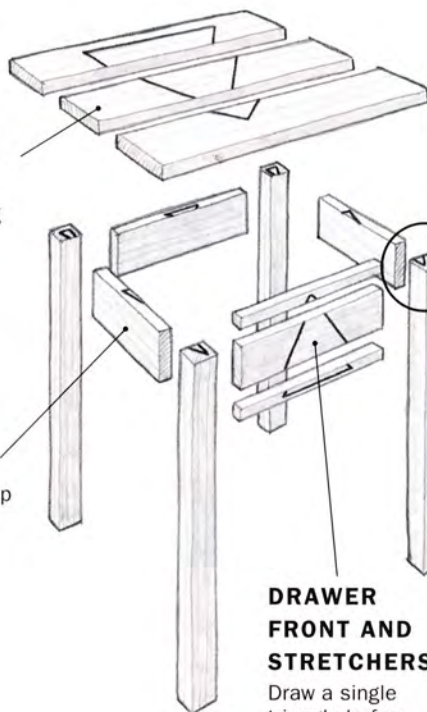
ORIENTING TABLE PARTS

TABLETOP

Draw one big triangle facing forward.

APRONS

Mark the top edges.

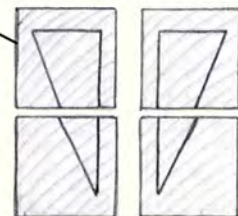


DRAWER FRONT AND STRETCHERS

Draw a single triangle before they're ripped.

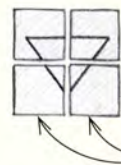
Right triangles make sense of multiples

For doubled doors and drawers, or table legs, a single triangle isn't enough. If using one triangle would create confusion, a pair of right triangles helps distinguish left- from right-handed parts.



MARK LEGS IN PAIRS

Avoid confusion by marking the left and right legs with one right triangle on each pair.



Using one triangle would leave just a single mark on the two front legs, making it easy to confuse them with each other.

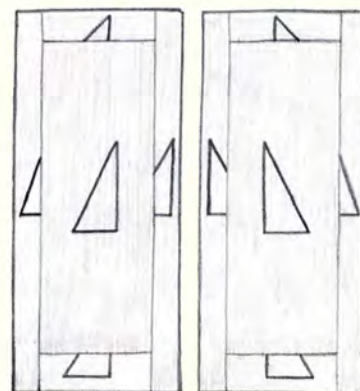
One approach tackles any table. Whether it's this simple side table or a dining table that seats 12, the same intuitive system applies to tops, aprons, and legs.

To avoid the pain and suffering of miscut joinery, I use the carpenter's triangle, a deceptively simple mark that magically unravels the DNA of every part I'm working with, and heads off mistakes before they happen.

Unlike more complicated marking systems that use matching numbers, letters, or hieroglyphics, the simple triangle gives you all the information you need for every part—which face and edge go out and up, and which joints go where. Whether you're doing a simple tabletop glue-up or making a complicated case piece with lots of parts, using the triangle is the easiest, most intuitive way to keep track of all of them.

How triangles help

Every part gets marked with a partial or complete triangle on its face or top edge, with points facing forward or up. For a frame-and-panel door, for example,



A more complex case piece. A second door and drawer mean more potential for mix-ups. Right triangles clear up the confusion.

Gang up parts for marking



1

Points up. For a frame-and-panel door, start by laying out the parts as they will be assembled. Then, gang up the rails and draw a triangle pointing up (1). Next, pair up the stiles and do the same (2). Finally, mark the panel (3). Now each part has a unique mark.



2



3

Construction: Here's where the marks pay off

MACHINE WORK

For frame-and-panel doors like this one, referencing workpieces consistently at every machine means the joints on the door's face will come together flush, regardless of any slight variations in the thickness of the parts.



Cut grooves with marks against the fence. When cutting panel grooves at the tablesaw, the half-triangle on every rail and stile indicates the front face, which goes against the fence, and the inside edge, which gets the groove.

you'd start by ganging up the stiles. Mark one triangle, pointing up, across the front face of both pieces. Then gang up the rails and mark them with another triangle that points up. Finally, mark the panel. Each part now has a mark to identify its placement on the door, its front face, and its vertical orientation.

Instead of their faces, drawers get triangles across their top edges, pointing forward. Draw one across the tops of the sides, then another across the tops of the front and back. Treat case assemblies and table aprons the same way, with triangles on the front and top edges.

Table legs get a different approach. If you mark one triangle across the top of all four, the front two legs will get just a slash each, making it easy to confuse them. Instead, mark the tops in pairs, using right triangles to distinguish the left legs from the right. This way, you have enough information to taper the legs and cut the joinery with confidence. Right triangles also come in handy anytime you have two of the same elements in a piece, like drawers or doors. If you have more than two, number them in the most straightforward, systematic way possible.

For quality joinery, eyes on your marks

A few seconds spent marking triangles really pays off when you lay out and cut your joinery.

No matter how patient you are setting up your machines and dimensioning stock, no two pieces of wood will ever be identical. The dimensions of any piece can vary slightly over time. By



Same for mortises. Place the triangles against the fence and set up the mortiser so the chisel falls in the groove.



For tenons, triangles on the table. When cutting tenons with a dado set, make the critical front cheek cuts first on both rails. With the front face down and the blade height even with the groove, success is guaranteed.



HANDWORK

Keeping track of your parts' orientation is just as critical for handwork, where you can waste a lot of time and effort cutting joints in the wrong place.



Mind your pins and tails. Before you scribe the pins, a quick peek at the marks confirms that both workpieces are oriented correctly—and you can attack the pins fearlessly.



referencing off your triangles you can make sure that at least one face (usually the front) of each assembly ends up flat and flush.

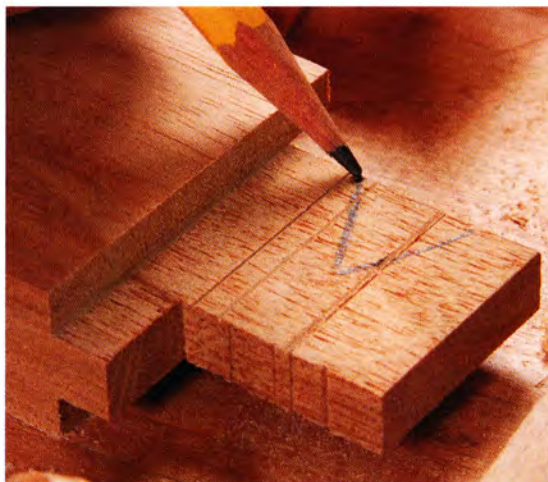
Here's how it works. To get all the joints of a frame-and-panel door flush on the front face, orient the show faces of the rails and stiles against the rip fence when you cut the panel groove, and orient those same faces against the fence of the mortiser when you cut the mortises. This ensures that the distance from the show face to the panel groove and from the show face to the mortise are the same. Any variations in the thickness of the parts will be apparent on the back of the door, not the front. The same goes for cutting tenons. Make the front-facing cheek cuts first, at that same distance from the face of the rail. Then, if you need to make any adjustments for fit, make them on the back-facing cheek.

As you move from machine to machine, it can be easy to flip-flop a piece without realizing it. But keep an eye on the triangles, and they'll let you know if you're about to cut a part the wrong way.

When hand-cutting joinery—for example, dovetailing a drawer—triangles help you keep faces and edges straight. This is especially helpful when you're scribing the pins on the drawer front and back.

It's important to locate and orient your parts correctly during glue-ups, too. So before you plane or sand off the triangles, be sure to re-mark them on the joinery where they'll be out of the way. □

Michael Pekovich is FWW's art director.



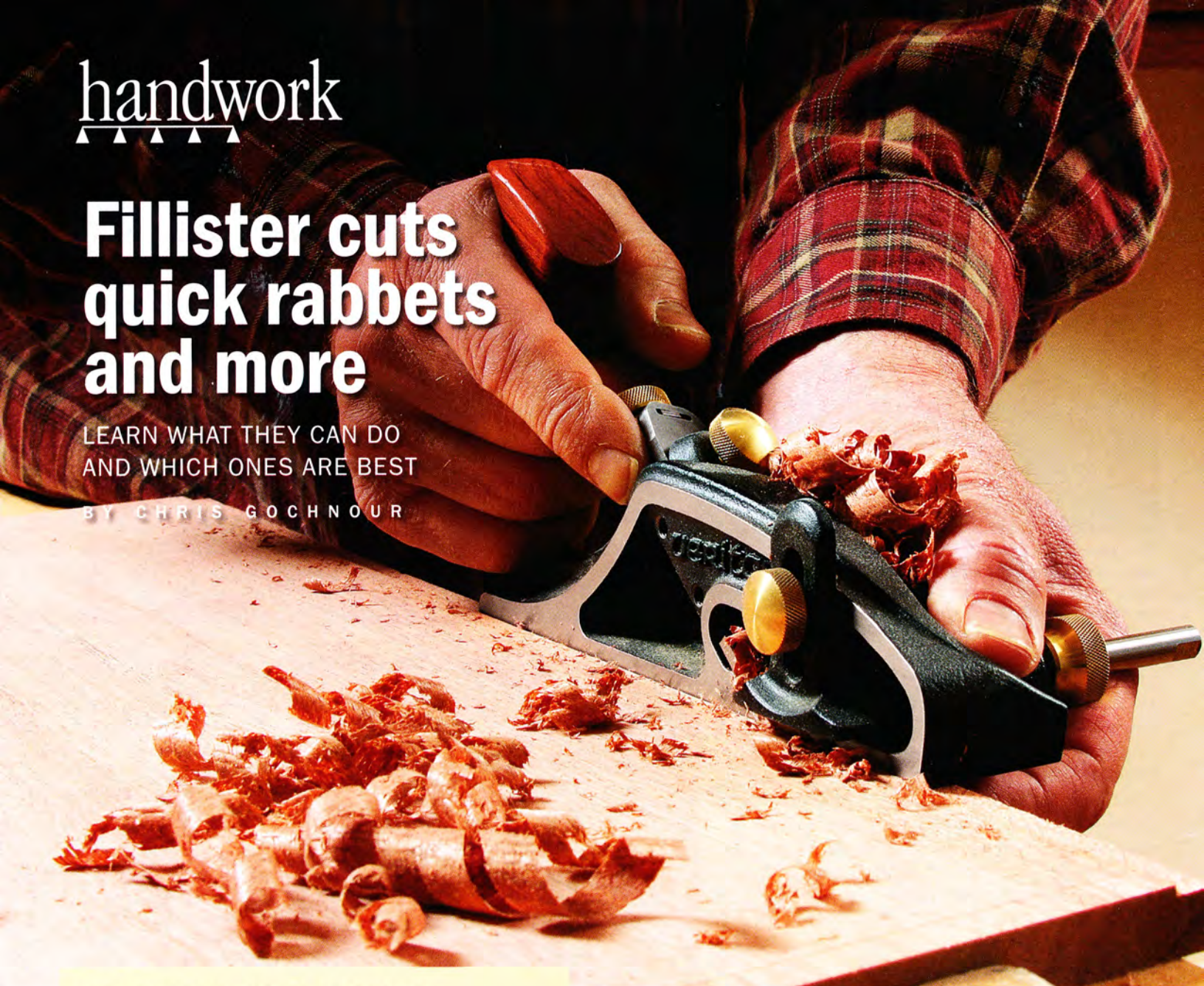
Replace before you erase. When you prepare parts for assembly, you'll eventually plane or sand away the triangles. Since you'll want to refer to them during assembly and glue-up, re-mark each part somewhere inconspicuous. On the rails, I put new marks on the tenon cheeks, and on the stiles, in the panel groove.



Fillister cuts quick rabbets and more

LEARN WHAT THEY CAN DO
AND WHICH ONES ARE BEST

BY CHRIS GOCHNOUR



THREE JOBS THEY EXCEL AT



Perfectly suited to creating a rabbet from start to finish (top photo), the fillister plane is versatile enough to cut the angled rabbets on a raised panel (left) and to trim wide tenons, like those on a table with breadboard ends (right).

When you think “hand-cut,” you probably envision dovetails and mortise-and-tenon joinery. But you may be surprised by how easy it can be to cut rabbets by hand, too—as long as you have the right tool. That, my friends, is the fillister plane, sometimes called a rabbet plane. With it you can cut a rabbet very quickly, without all the hassle of changing blades or bits and setting up the tablesaw or router table. But the fillister plane isn’t a one-trick pony. You also can use one to create a raised panel and to trim tenons.

A few years ago, finding a fillister plane was often difficult, as you had to scour flea markets, antique stores, or auctions. But not any more. There are at least four companies manufacturing fillister planes. I recently tested them, and I’ll tell you what I learned (see p. 26). I’ll also demonstrate how to cut a rabbet, from setting up the plane to cutting to depth accurately and consistently.

Chris Gochmour is a professional furniture maker, teacher, and avid user of hand tools. He lives in Salt Lake City, Utah.

Set up the blade and nicker

To work properly, the nicker and blade must be set up to work in unison: The nicker cuts ahead of the blade, severing the fibers to reduce tearout, essential on crossgrain cuts. It should be set slightly deeper than the blade is cutting and perfectly in line with its outside edge.



Line them up. On some planes, the nicker is proud of the body. On these, lay a pocket rule on the nicker and blade, and adjust the blade until the rule is parallel to the body. If the nicker is flush with the plane body, just make the blade flush, too.



Set the depth. After setting the blade to its typical cutting depth, adjust the nicker to cut about 0.003 in. deeper. Any deeper and it acts like a depth stop, preventing you from cutting the rabbet. If it's shallower than the blade, it won't sever the wood fibers deeply enough and tearout is likely. To check the setting, pull the plane backward. The nicker should cut a very shallow line, while the blade should lightly burnish the wood.

How to cut perfect rabbets

The same basic technique applies to cross-grain rabbets, raising panels, and trimming tenons.

Set the fence. Use a marking gauge to lay out both the width and the depth of the rabbet (right). Now place the plane on the board, with the nicker in the scribed line. Press the fence against the board's edge and lock it in place (far right).



Cut the first rabbet and set the depth. Don't use the depth stop at first, just work down to the gauged line marking the rabbet's depth (right). After you hit the line, put the plane in the rabbet, lower the depth stop to the board's surface, and tighten the knob or screw that holds it in place (far right). Now you can cut yards of identical rabbets.



Fillister planes put to the test

A fillister is a rabbeting plane equipped with width and depth stops. How easy it is to adjust that fence and stop is just as important as how well the plane cuts. So, I evaluated

these planes for ease of setup, as well as how they performed when cutting long- and crossgrain rabbets. I also considered fit and finish.



Veritas
Skew Rabbet Plane
\$240
leevalley.com

The Veritas plane is comfortable to hold and use. It has the best fence and depth-stop adjustability of all the planes tested. After the blade has been aligned with the nicker once, setscrews in the body make it easy to return the blade into alignment after sharpening. Finally, the skewed blade cuts with minimal resistance and pulls the plane into the cut. Available in a right- or left-handed versions.



Stanley 78
\$56
amazon.com

The 78 has been around for decades. It's comfortable, and did a good job at every task given to it. The machining on the sole was flat, but coarse. Everything else was clean and accurate. It's not as refined as the Veritas, but it is a very good value.



Anant A078
\$140
highlandwoodworking.com

This plane came up short because of poor manufacturing. The fence was misdrilled and out of alignment with the body, making the tool unable to perform its most basic task.



Anant 78
\$90
highlandwoodworking.com

The sole on this plane slanted 0.015 in., which made the blade project unevenly and the nicker too deep.



E. C. Emmerich
Moving Fillister Plane
\$180
leevalley.com

The Emmerich's wooden body is comfortable to hold, but adjustments to the fence and depth stop are inconvenient, requiring a screwdriver. The blade's depth of cut is set with a hammer. The throat clogged easily.

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Cut Precise Joints on the Tablesaw

And stay safe in the process

BY MARC ADAMS



VIDEO WORKSHOP

See all of these techniques in motion and more, including how Adams builds a crosscut sled, in a members-only video series at FineWoodworking.com/extras.

In my previous article (*FWW* #233), I demonstrated how to get better ripcuts and crosscuts—and stay safe in the process. But the tablesaw can do more than make rectangles. If you add a dado set and a few shopmade jigs and fixtures, it can become your favorite machine for cutting flawless joinery, too. The tablesaw offers an unmatched combination of accuracy, repeatability, speed, control, and endless jig potential.

To produce joint-quality cuts, both across the grain and with it, you'll need two types of blades. You can stick with your normal combination blade, but make sure you keep the teeth clean of pitch buildup. A clean blade will always cut better. For wider notches in wood, whether rabbets, dadoes, grooves, tenons, or lap joints, I use an 8-in. stack dado set. Quality is very important here. You need a set that cuts clean edges and flat bottoms.

A dado set's inside and outside blades have angled teeth designed to eliminate tearout at the edges of the cut. A variety of chipper blades go between, allowing 1/4-in.- to 7/8-in.-wide dadoes. Thin shims go in to fine-tune the width, if necessary. Be aware

that dado sets take big cuts and can cause underpowered saws to bog down, and that the shorter arbors on some portable saws won't allow the full stack to be used.

Add a few key jigs and fixtures

You can cut most of the common joints on the table saw with just four simple jigs and fixtures: a zero-clearance throat plate, a miter-gauge extension fence, a crosscut sled, and a sacrificial fence for rabbeting. I showed how to make the first three in my earlier article, and I'll cover the last one here.

The cool thing about learning the fundamental joints, like dadoes and rabbets, is that the same techniques work for many others, such as laps, tongues, and bridle joints. In fact, the design of a table saw invites a host of joints and jigs. This article is just the beginning. Soon you'll be calling this versatile machine "the variety saw," like I do.

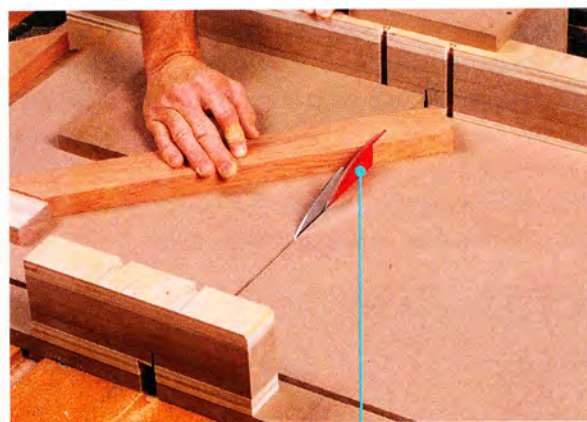
Marc Adams's woodworking school in Franklin, Ind., is one of the largest in the world. Go to MarcAdams.com for a course listing.

Two kinds of blades do it all



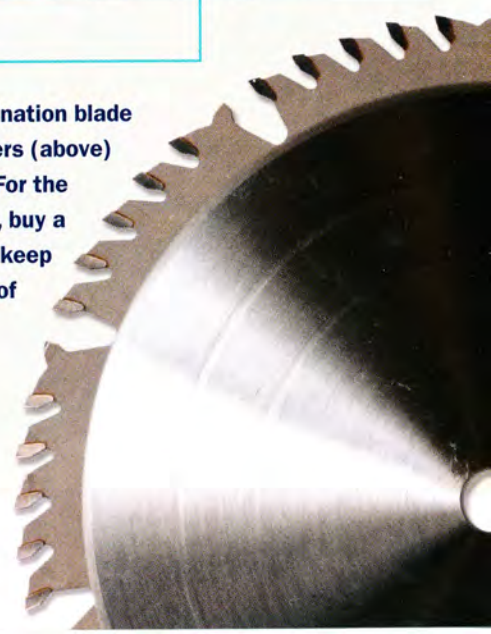
Dado

For many joinery cuts, you'll need a good dado set. Get the best stack-type dado set you can afford. It should cut slots with clean edges and flat bottoms.



Combo

A basic combination blade is fine for miters (above) and grooves. For the cleanest cuts, buy a good one and keep its teeth free of pitch.



The simple groove



Ride the fence. Adams makes grooves with a single blade, making multiple cuts for wider grooves. A long push stick gives better downward pressure and control.



Grooves are the easiest joint to cut. Since they are aligned with the grain, you can use the rip fence to guide the workpiece. I normally use my combo blade, adjusting the fence and taking multiple passes for a wider groove. If the bottom needs to be dead flat, you can also use your dado set.

The advantage of the single blade is that it lets you use a riving knife to prevent kickback. If your saw doesn't have one, you can use a shopmade stub splitter as I demonstrated in FWW #233.

In any case, always use a push stick or push pads to maintain good control while keeping your fingers safe (you can't see the blade until it exits the board). Pay special attention to keeping the workpiece flat at the point of contact.



Use a push pad for short pieces. On these shorter drawer sides, a push pad, lined with rubber and/or sandpaper, gives better control.

Clean dados

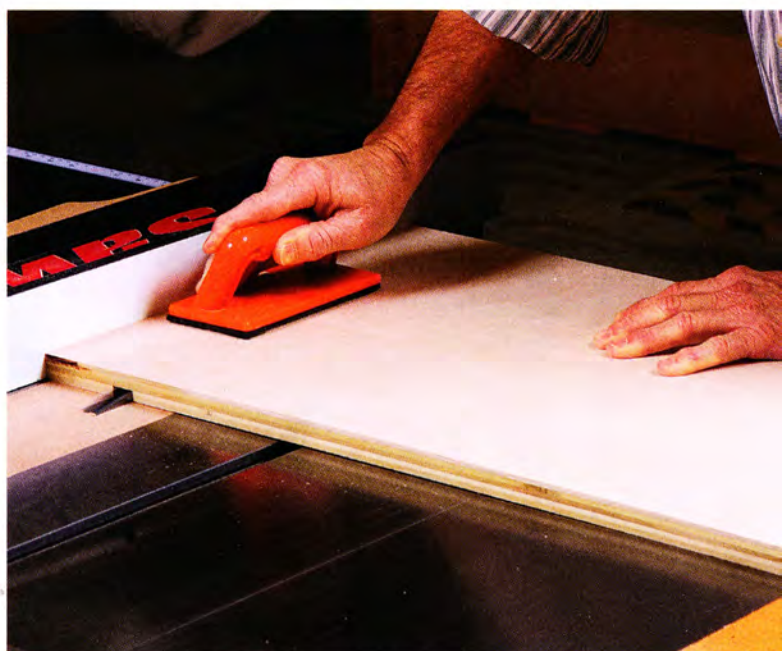


A dado is a groove cut across the grain and is usually sized precisely for a second piece to fit into. Since dados are crosscuts, tearout can be a problem without a zero-clearance surface below the cut. If the back edge will show, you'll need zero clearance there, too. You can use a variety of fences to make a dado cut safely, but it depends on the size of the workpiece and location of

NEAR AN EDGE, RIDE THE FENCE

Tame tearout.

You'll need a fresh throat plate to prevent tearout. Adams showed how to make these in his earlier article (FWW #233). Insert a blank one, position the rip fence to hold it down without getting in the way of the blade, and then bring the dado set up through it.



Push pad stars again. A push pad works better than a push stick to keep a big panel down on the table and tight to the rip fence.

the dado. On wide workpieces with the dado close to the end of the piece, you can run the stock against the rip fence.

But the crosscut sled is my favorite tool for dadoing, because it carries pieces with excellent control and great accuracy. That control is especially important because you can't use a splitter or riving knife in conjunction with a dado set on most saws. A crosscut sled also accepts all types of stops.

IN THE MIDDLE, USE A SLED



Refresh your crosscut sled. To prevent tearout on a sled, tape down a piece of $\frac{1}{4}$ -in.-thick MDF (above). Do the same on the fence (right), and then cut a zero-clearance slot through both.



TIP CARPET TAPE GRIPS BETTER

To add holding power to jigs, Adams uses double-sided carpet tape with mesh inside. It is thicker and far stronger than the thin plastic type.



Why the sled is best. A crosscut sled controls workpieces of almost any size, and is a must for the middle dadoes on these long bookcase sides. A hook-style stop offers a long reach and is easy to attach.

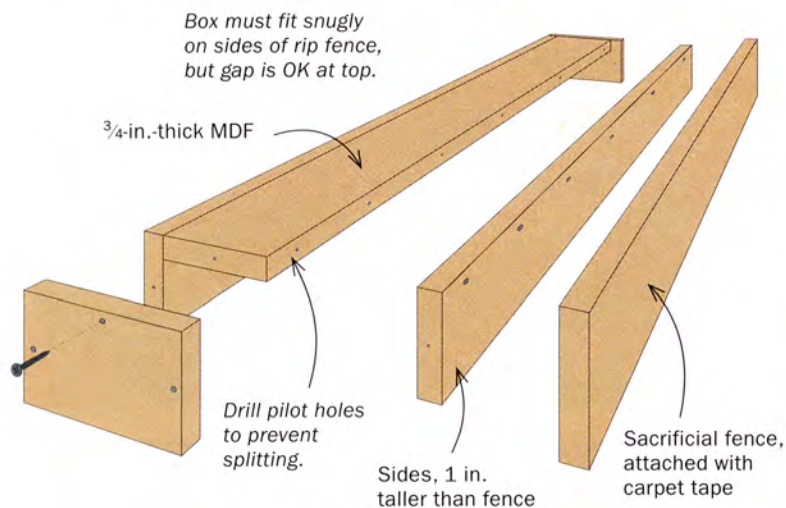


Accurate rabbets

To cut rabbets, you should bury the dado set in a sacrificial rip fence. This makes it easy to adjust the width of the rabbet: You simply nudge the fence a bit instead of fine-tuning the width of the dado stack.

But a sacrificial fence can be hard to clamp to the short sides of a standard rip fence without the clamps getting in the way. My solution is to build a simple MDF box that fits snugly over the fence, and then tape the sacrificial piece to that. The box allows the sacrificial fence to be removed and replaced easily, on either side, so it works with the fence on either side of the blade. And a single piece of MDF can be positioned four different ways to extend its use.

BUILD A BOX TO BURY THE BLADES



How to get a snug fit. Cut the sides 1 in. taller than the rip fence, and long enough to allow clearance for the lever at the end. Clamp the sides in place to measure for the top plate and attach it as shown. Drill pilot holes to prevent splitting. Keep the clamps on as you screw on the end caps.



Add the fence and bury the blades. Use thick carpet tape to attach a tall MDF fence (above), then move the fence over the top of the dado set and bring the spinning blades up into it (left), only as high as needed.



Fast, accurate rabbets. Whether the rabbets are along the edge (left) or end of a workpiece (above), you can run the workpiece against the fence. But you'll need a zero-clearance throat plate to prevent tearout when working across the grain. Push pads do a good job controlling the workpiece, but you'll need to support narrow workpieces with the miter gauge.

Quick tenons

One way to cut tenons on the tablesaw is to first make shoulder cuts with the pieces lying flat, and then make the cheek cuts using a tenoning fixture. But my favorite method is to cut them with a dado set, which is faster and easier and works on larger workpieces. Long pieces are a problem on a tenoning jig, because they have to stand straight up in the air. With a dado set, the workpiece lies flat on the table, where it is easier to control.

You can control the work with a miter gauge and use the rip fence as the stop. You'll need a zero-clearance throat plate to prevent tearout at the shoulders. I stack my dado set to



about $\frac{3}{4}$ in. wide, and I always start with the stock

against the rip fence for the first cut and then nibble away the rest. Do not lift the stock when you finish a cut; just keep a tight grip as you pull it back.

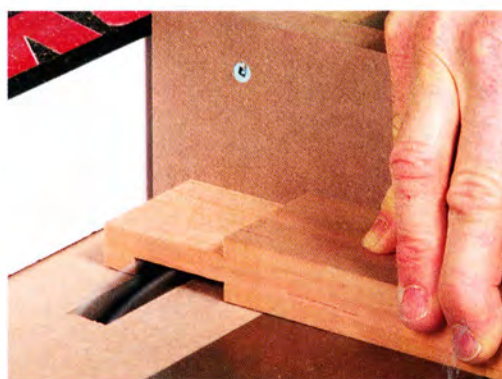
Start with the two opposite cheeks, testing the fit in one of your mortises as you dial in the setup. Then change the blade height to trim the tenons to width. You'll notice that the outside blades leave fine lines on the surface, but these will not affect joint strength. Some woodworkers leave the tenon a bit fat and finish the job with a shoulder or rabbeting plane. Using a test mortise, I am able to get a good fit right off the tablesaw.

TIP

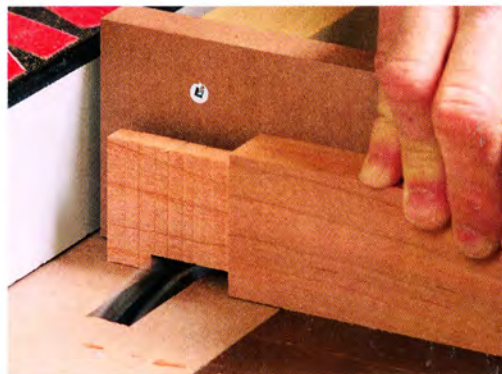
GET SQUARE FIRST



To get even tenon shoulders, you need a perfectly square miter gauge. You can place a square or drafting triangle against the blade to check, but inconsistencies in the fence or blade can throw it off. Instead, do this simple test. It works for squaring up fences and blades for all sorts of joinery tasks. Rip parallel edges on a long piece of scrap, and mark one side for reference. Make a crosscut (above) and then flip one of the pieces. Set both against a straight surface like the rip fence (below). A gap means you need to adjust the miter gauge and try again.



Tenons in minutes. Set the rip fence to position the first cut at the shoulder (above), and make a series of nibbling cuts (center left) to finish the job. To cut the top and bottom of the tenon, change the height of the blades if necessary and just flip the workpiece on edge (bottom left).



Tight miters on a crosscut sled

The most common type of miter is the flat type used to join frame pieces. They often surround a plywood panel to make a door or a tabletop, and standard moldings are cut this way, too.

The challenge with flat miters is the wide cut, which makes it hard to end up with a 90° corner and no gaps. If you rely on your miter gauge, you will struggle with accuracy and repeatability. That's why I cut them on my crosscut sled using a

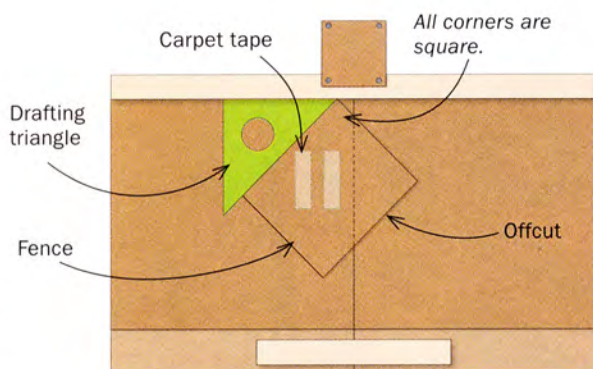
simple 45° fence. You use the sled to make the fence, too, and the whole process is easy.

In this case, with flat stock and zero-clearance below the blade, you could keep the fence in one position for all of the miter cuts, simply flipping the pieces to miter the second side. But if the front of the stock is molded or you are getting chipout on the bottom edge, you'll want to flip the fence to the other side of the blade when cutting the second end of each piece, in order to keep the same side up.

Aside from accuracy, what I love about this setup is how easy it is to attach a stop: You just tape it down.

MAKE AN ACCURATE FENCE

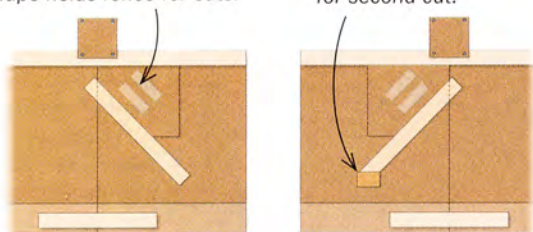
Start with a perfectly square piece of MDF and use your crosscut sled to turn it into an accurate 45° fence.



HOW IT'S USED

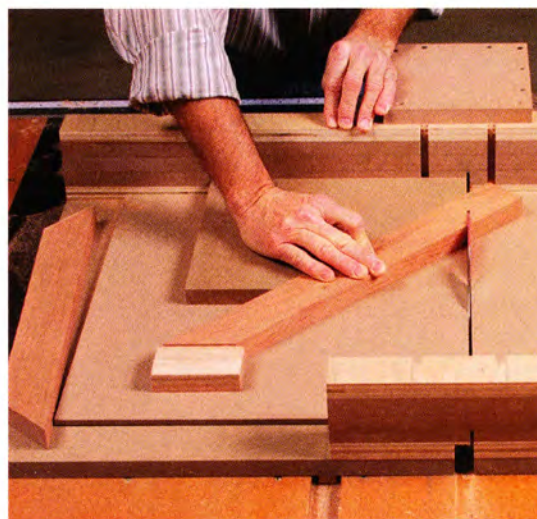
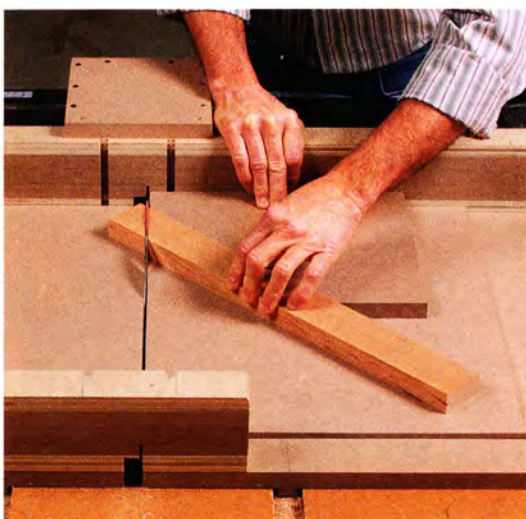
Tape holds fence for cuts.

Add a stop block for second cut.



Easy to make. Use a 45° drafting triangle to position the MDF fence on the sled. Use carpet tape to hold it down, but keep the triangle in place as you cut, to be sure the workpiece doesn't shift.

Miter one end of each workpiece. Put the fence on the left or right, pressing it down very firmly on the carpet tape, and then use it to miter one end of each workpiece. Hold the workpiece firmly to be sure it doesn't drift.



Switch sides. Flip the fence over to set it up on the other side. This time you'll need a stop to set the final length of each piece, but that's as simple as taping a block to the sled. The miters should come out perfect.

Build a Vanity Cabinet



Add a
handcrafted touch
to any bathroom

BY MARIO RODRIGUEZ

Browsing at a country flea market one weekend, I came across a vendor selling interesting architectural pieces. There were fireplace mantels, stained-glass panels, doors, and some odd lengths of ornate moldings. What really caught my eye, though, was a bathroom wall cabinet of Victorian vintage. It was simple and graceful, with a soaring cornice and nearly perfect proportions. Miraculously, it still wore its original finish. Over the years the cabinet had developed a deep, rusty color and a wonderful patina, punctuated by a brass Victorian cupboard latch. This was a piece worth copying.

I took some measurements, snapped a few photos, and then returned to my shop to draw up plans for a similar piece. This cabinet is the result. I made it out of quartersawn white oak. The ray-fleck grain patterns give a nice flair to the simple lines of the cabinet. What's really nifty is how the mirrored door is made. I assembled the parts with slip tenons—nothing revolutionary—but before cutting the joinery, I rabbeted the pieces for the mirror. This method creates half-lap joints and a perfectly square recess for the mirror without any need for chisel work in the corners.

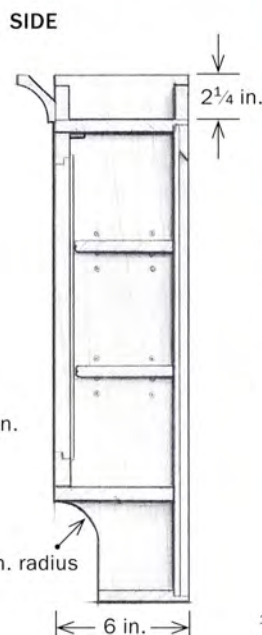
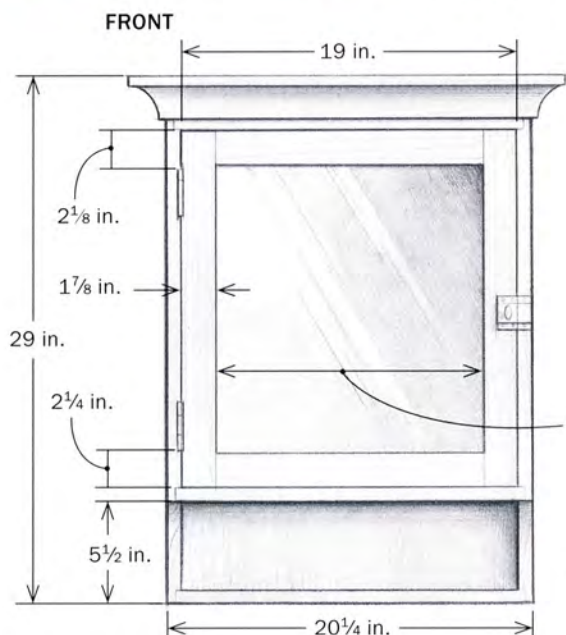
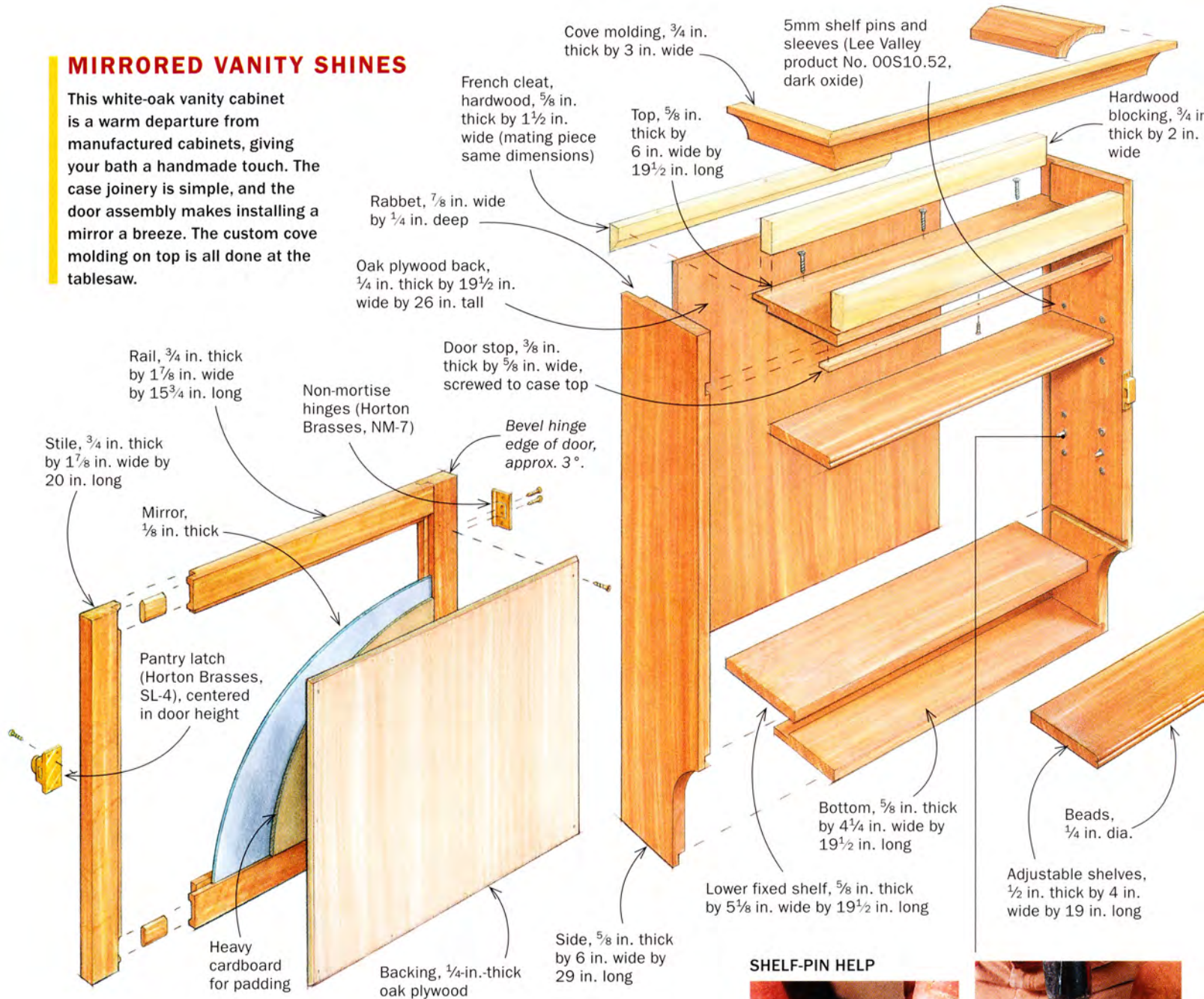
This piece is a popular class at my school, and I understand why. It doesn't take long to build, and it adds a handmade touch to any bathroom.

Case joinery comes first

The joinery is really straightforward, and it's all done at the tablesaw using a dado set. However, all the joints are visible, so make sure they're clean and tight. Once the case joinery is done, use a bandsaw to cut out

MIRRORED VANITY SHINES

This white-oak vanity cabinet is a warm departure from manufactured cabinets, giving your bath a handmade touch. The case joinery is simple, and the door assembly makes installing a mirror a breeze. The custom cove molding on top is all done at the tablesaw.

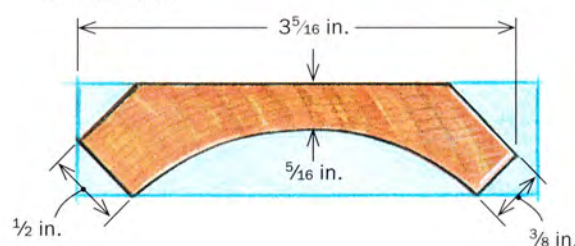


SHELF-PIN HELP



No-fuss shelf supports. To add longevity, Rodriguez chose shelf pins that are housed in hollow sleeves. The easiest way to set the sleeves flush is to use a special punch (leevalley.com, 00K61.02) as shown.

COVE DETAIL



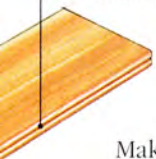
the arc on the bottom of each side. This arc gives the cabinet a slimmer look and provides more clearance to reach items stored on the bottom shelf.

Plane and sand all the parts, then you're ready to glue up the case. After assembly, drill for the shelf pins that will support the adjustable shelves. To ensure the shelf-pin holes were aligned side to side, I made a drilling template out of 1/4-in.-thick plywood. I clamped it to one side of the cabinet, drilled the holes, then slid it to the other side to drill the others.

SHELF EDGE DETAIL



Pretty beads. The two adjustable shelves have a decorative bead routed on their front edges.



Cut the cove for the cornice

Making your own molding is a great way to add a custom touch. Most can be done with a router, but the cove molding for this piece is too large for standard bits, so I used a slick technique on the tablesaw (see p. 38). I passed the stock over the spinning blade at an angle, guiding it between two fences clamped to the saw top.

You don't need a complicated formula to determine the angle of the fences. Simply raise the blade to the full height of the cut and angle the stock until the ends of the arc align with the leading and trailing teeth of the blade. Now clamp the two fences on either side of the stock, raise the blade to about 1/16 in., and run the stock over it. Raise the blade in 1/16-in. increments with each pass. As you approach the finished profile, take smaller, 1/32-in. bites, which will leave a slightly smoother surface that will be easier to clean up.

After finishing the cove profile, make a series of 45° edge cuts on the tablesaw. These cuts project the cove molding at a 45° angle from the cabinet, which looks attractive and presents a solid and stable surface for installation.

Pre-built miters stay tight

Most people fit and miter cornice moldings right on the case, but it can be difficult to get gap-free miters. I have a better way. I preassemble the moldings, ensuring that the corners are tight, then attach the entire

Dado set handles all the joinery

The joinery is really straightforward—nothing more than a few dadoses and rabbets cut at the tablesaw using a dado set.



Dadoes and bottom rabbet. After cutting the rabbet for the bottom, cut the dadoes for the top and fixed middle shelf (left). Any tearout on the back will be removed when you cut the rabbets for the back panel and French cleat (right). Bury the blade in a sacrificial fence when rabbeting.



Bandsaw the bottom curve. The cutout at the bottom of the cabinet gives the case a slimmer look. Smooth the band-saw marks with a spindle sander, a spokeshave, or curved sanding blocks.



Clamp it up. After planing and sanding the case parts, glue them up. Do a dry run first to make sure that everything comes together cleanly and squarely.

Cove-cutting on the tablesaw

You can't cut a cove this big with a router bit, but a time-tested tablesaw technique handles it easily. Take time to set up the cut accurately, and take light passes to creep up on the profile.



Height, then angle.

Raise the blade to meet the apex, or high point, of the arc (above). Now angle the fences so that the ends of the arc align with the leading and trailing teeth of the blade. Mark that angle on the tablesaw top and then clamp the fences in place (right).



SET UP THE FENCES

2. Mark the approach angle on the tablesaw top, and clamp the first fence along that mark.

1. Eyeball the end of the board to align the arc of the blade with the arc on the workpiece.

3. Clamp the second fence in place, sandwiching the workpiece.

4. Make a test pass with the blade down to be sure the stock moves freely between fences.



First pass. After clamping both fences securely, make a test pass with the blade below the table, just to be sure that the stock slides without binding. Then raise the blade to $\frac{1}{16}$ in. high and make the first pass. Use a push stick or pad in your back hand and stop your front hand short of passing over the blade.

The final cuts. Raise the blade in $\frac{1}{16}$ -in. increments until you get within about $\frac{1}{16}$ in. of the profile mark. Then make lighter passes, in $\frac{1}{32}$ -in. increments, until you hit the mark.

Online Extra

To watch a free video of this cove-cutting technique, go to FineWoodworking.com/extras.



Trim the molding. Now make the 45° trim cuts on both edges to finish off the molding.



Clean up before mitering. Use a gooseneck scraper and a curved sanding block to remove the tablesaw marks.

Better way to miter molding

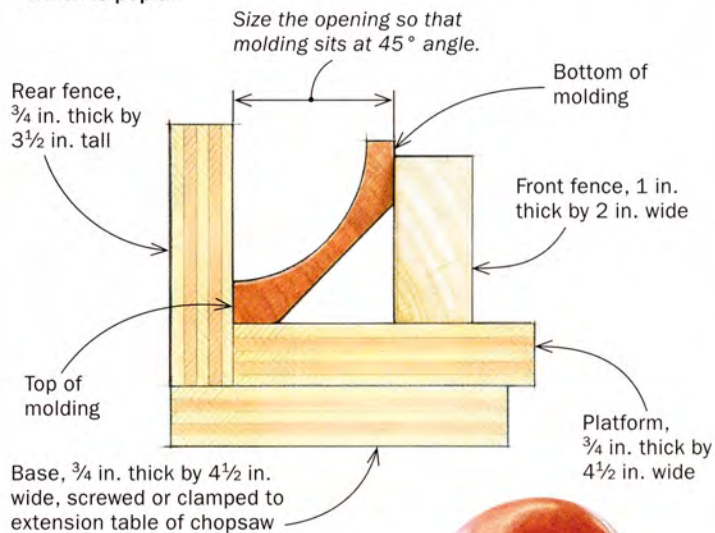
Rodríguez assembles the molding before attaching it to the cabinet. This way he can ensure tight miters with no gaps.



No rocking in this cradle. To turn the compound-angle miters into simple 45° cuts, Rodríguez supports the work in a cradle. He makes both left and right cuts in the front fence first, and then uses those kerfs to line up the molding cuts.

CRADLE MAKES COMPOUND-ANGLE CUTS EASY

With this cradle you can make a compound-angle cut with a simple 45° miter cut on the chopsaw. The key is that the molding is held at its installed angle. All parts are plywood, except for the front fence, which is poplar.



assembly to the case. Attaching an assembled cornice lets me build it square with tight miters, and then coax it into position.

The cornice requires a compound-angle miter. It's common to make this cut with a tablesaw or compound-miter saw. With the tablesaw you need to angle both the workpiece and the blade; with the compound-miter saw you need to angle the blade in two directions and find a way to support the molding. Once again, I have an easier way. I cut the miters on a simple chopsaw, with the workpiece nestled in a cradle that holds it at the correct angle (see above).

After mitering and attaching the crown, install the back panel and French cleat.



From cradle to case. After carefully cutting the miters, using the case as a guide for the length of the front piece, cut the side moldings to final length. Assemble the sections on the bench using glue and a pin nailer (above). Let the assembly dry, slide it onto the top of the case (right), and nail it in place.

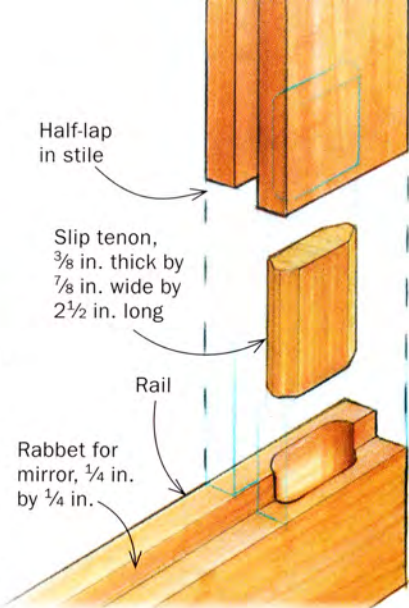
Mirrored door is easy

I could have made a traditional door frame, with mortise-and-tenon joints, and then routed out a rabbet for the mirror. But routing the rabbet after assembling the door often results in tearout when you change direction. It also can be difficult to support the router on the frame without tipping, which leads to a bumpy or wavy cut. And you have to square up the



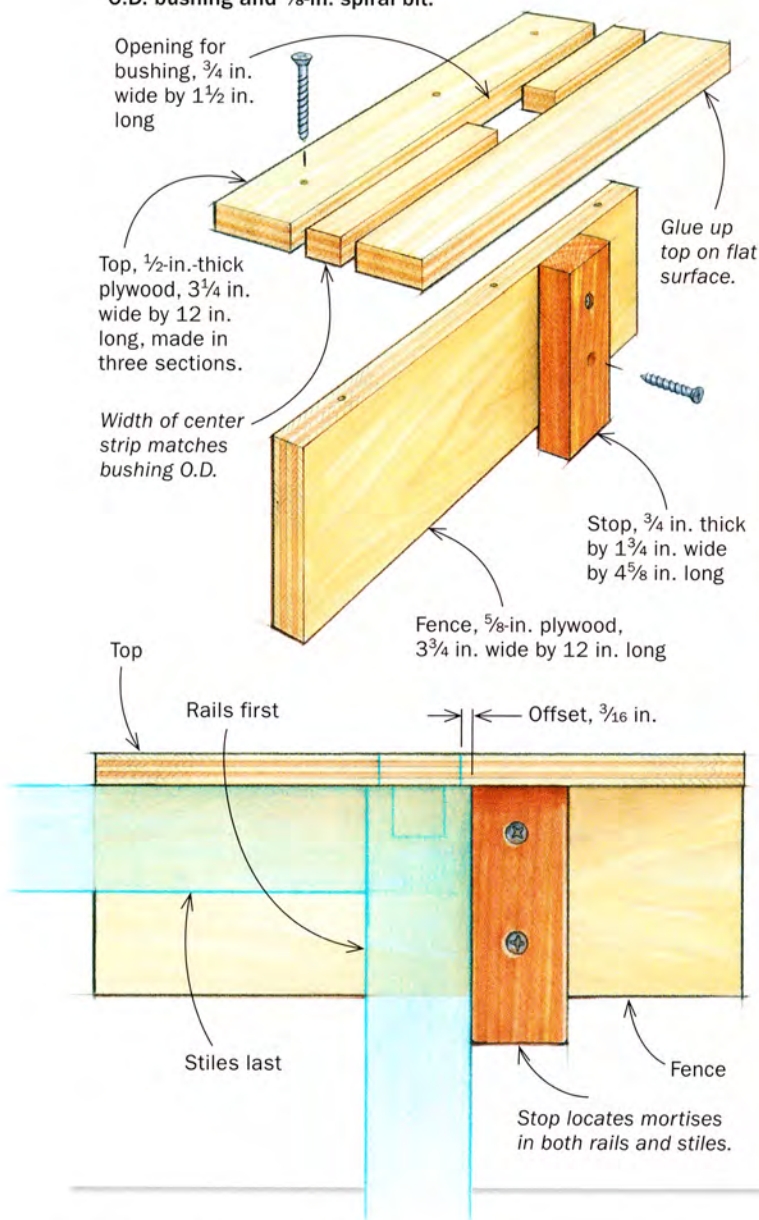
Simple but sturdy door joints

The door is assembled with slip tenons. But before cutting the mortises, Rodriguez cuts the rabbets for the mirror. The process creates a perfectly square recess plus half-laps at the joints.

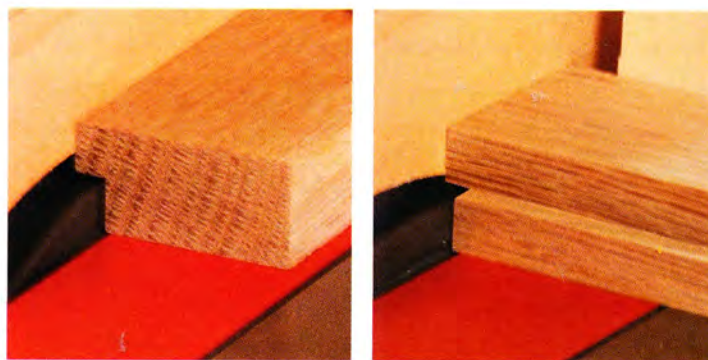


CLEVER JIG FOR MORTISING

This simple shopmade jig makes it easy to center a $\frac{3}{8}$ -in.-wide by $\frac{7}{8}$ -in.-long mortise on both the rails and stiles, using a $\frac{3}{4}$ -in. O.D. bushing and $\frac{3}{8}$ -in. spiral bit.



RABBET FIRST



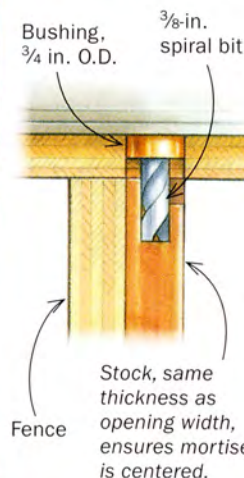
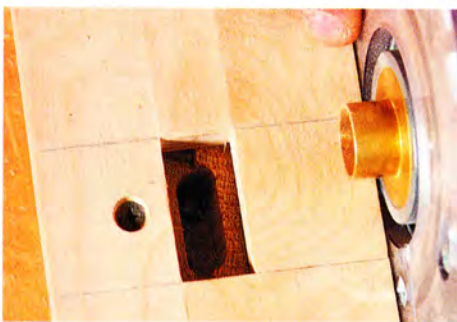
Make way for the mirror. Use the same dado set to rabbet the stiles and rails (left) and to cut half-laps in the rails (right).

ROUT FOR LOOSE TENONS



Route the rail first.

Clamp the jig in a vise, with the bottom of the rail tight against the stop and with the end tight to the top, then rout using a $\frac{3}{8}$ -in. spiral bit and guide bushing.



Stiles next. Butt the end of the stile tightly against the stop and tight to the top.

EASY GLUE-UP

Slip tenons don't slip. Once the mortises are cut, mill slip-tenon stock to precise thickness and width. Chamfer the edges to fit the round mortises and then chop them to length (right). Be sure to check for square as you glue up the door frame (below).



corners with chisels afterward. Instead, I cut the rabbets for the mirror in the rails and stiles first, and I joined the parts using slip tenons. This gives me a strong door with a perfectly square rabbet for the mirror.

For an easy door installation, I chose Horton's non-mortised hinges (NM-7, \$9 a pair; horton-brasses.com). When installed, these hinges allow a generous $\frac{1}{16}$ -in. reveal. After cutting the door to size, allowing $\frac{1}{16}$ in. spacing all around, you have to cut a 3° back bevel on the hinge side/edge of the door to give clearance for the door to open and close without binding. Once the door is hung, install the pantry latch and strike (SL-4, \$17), and then the door stop.

Now cut the mirror and cardboard backing to fit the door rabbet. Then cut and screw the plywood backing over those pieces.

For the finish, you need to choose something that will hold up in a steamy environment. I warmed the oak with amber shellac, then sprayed the cabinet with lacquer. If you don't have a sprayer, any wipe-on varnish or oil/poly mixture will work. □

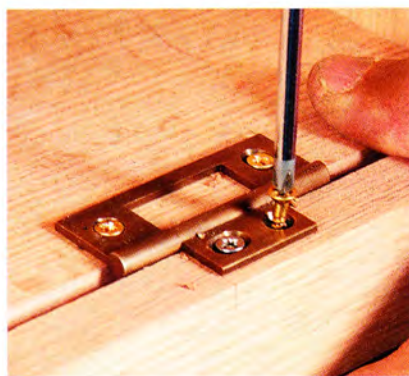
Mario Rodriguez helps run the Philadelphia Furniture Workshop (philadelphiafurnitureworkshop.com).

www.finewoodworking.com

Final touches

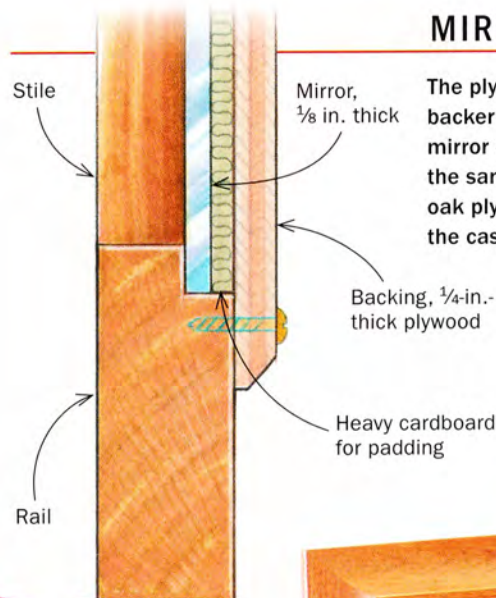
HINGES

Non-mortise hinges are easy to install. And they can be adjusted slightly to dial in the gap. But you have to bevel the hinge side of the door to create clearance for the hinge barrel.



MIRROR

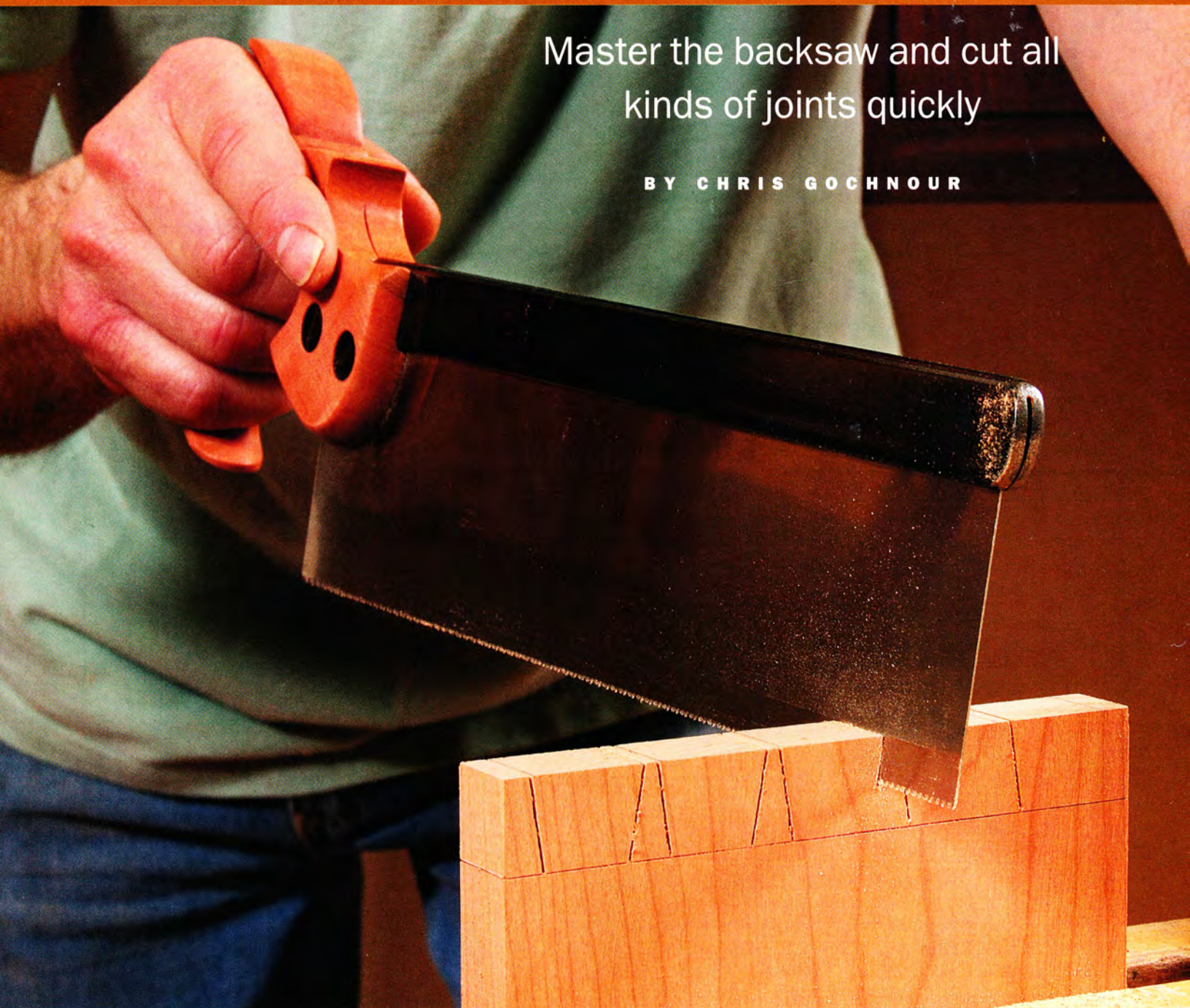
The plywood backer over the mirror is cut from the same $\frac{1}{4}$ -in. oak plywood as the case back.



Saw Like an Old Pro

Master the backsaw and cut all kinds of joints quickly

BY CHRIS GOCHNOUR



There's no doubt that power tools like the tablesaw and router are efficient and put perfect joinery within the reach of even the newest woodworker. But that doesn't mean you don't need a backsaw. With a bit of practice a backsaw can become an extension of your arm, allowing you to make very accurate cuts quickly.

At that point, you'll find that there are times when a backsaw is actually a better option than a tablesaw or router, such as when you're building one piece of furniture rather than several identi-

cal pieces at once. For a one-off table, you can cut tenons on the aprons with a backsaw as quickly as you can with a tablesaw, because you don't spend any time setting up the blade's height, positioning a stop on your miter gauge, or dialing in the settings on your tenoning jig.

A backsaw makes even better sense for difficult joinery like angled tenons, where a tablesaw and routing jigs would require too many fussy setups. And there are parts, like bed rails, that are just too big to tenon on a tablesaw. Also, don't forget that for many

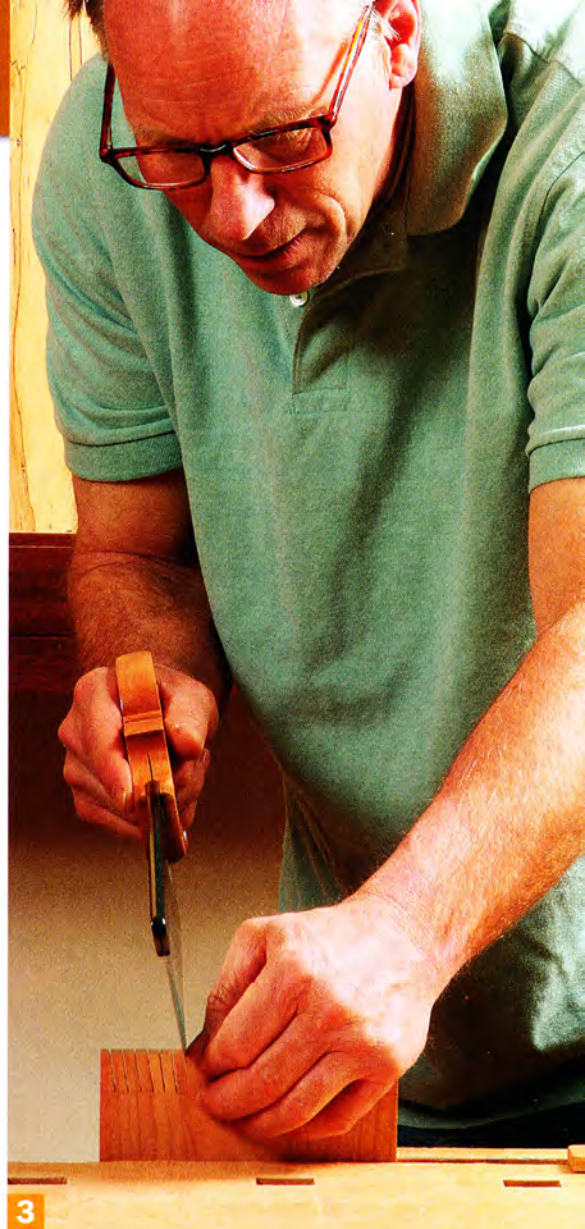
Setup

Start with proper posture

To saw straight lines, the tool must move back and forth in a straight path, like a piston. If you align your body with the saw, that straight cut happens naturally.



Hang on loosely. Grip the handle lightly with three fingers, your index finger pointing forward and your thumb wrapped around the back of the handle (1). For righties, the left foot goes out front (2). For lefties, it's the opposite. And your legs should be slightly bent. Finally, think of the saw as an extension of your hand, with a straight line running along the spine and through your hand, wrist, forearm, elbow, and shoulder, so they all work in harmony (3).



Your first saw should be for ripcuts

The best reason to get a backsaw is to cut dovetails and tenons by hand. Both involve a lot more cutting along the grain (ripcuts) than across it (crosscuts). So, when you get your first saw, choose one that's sharpened for ripcuts. The secret to a great-cutting saw is a great sharpening job. That means a saw from the home center won't cut it. Instead, get one from one of the best saw manufacturers, who do this well. I've had good experiences with saws from Lie-Nielsen, Veritas, Bad Axe, Gramercy, Adria, and Wenzloff & Sons.

Ripsaws come in a variety of sizes. Don't get the dovetail size—they are too small for large dovetails in casework. Instead, get a carcass saw, which can handle tenons and case dovetails, as well as dovetails for drawers and smaller items like boxes. Your first backsaw should be around 11 in. to 12 in. long, have 14 ppi (points per inch), and 2 in. to 2¼ in. of cutting depth beneath the spine. Don't worry about the crosscuts you'll have to make—a rip saw works just fine

for them. I've been using backsaws for decades and I don't own a crosscut saw. I've never had a problem with tearout or rough cuts. However, if you are willing to spend a bit more, there's a new type of saw that handles both rip- and crosscuts extremely well. The teeth have an old-school shape (called a "hybrid cut") that lets them cut across the grain just as well as along it. Both Gramercy and Bad Axe make this type of saw.



Basic technique

Learn to cut straight

The point of learning to saw is to cut joinery, but before you jump into dovetails or tenons, learn to cut a line straight and square to a board's face. That's the essential skill you'll need.



Start on the far edge. Align the cut with your thumb (1). Without putting any weight on the saw, gently push it forward. It's easier to get just a few teeth started straight at the back edge than to get a straight start across the board's entire thickness. Lower the back of the saw as you cut deeper (2). After reaching the front edge, bring the saw horizontal (3) and cut down to depth.



TIP

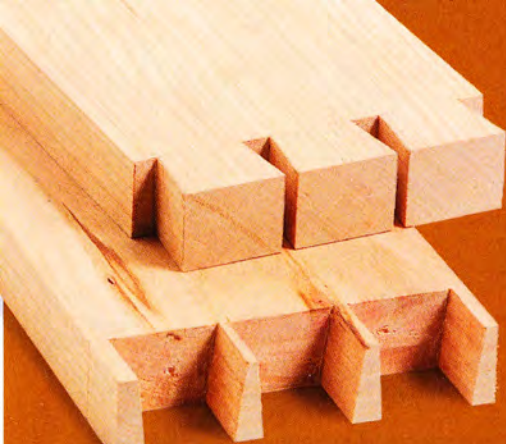
HOLD STEADY



It's difficult to saw fluidly and straight in a chattering board, a common event with cast-iron front vises, which only clamp a board on one edge. To eliminate vibration, clamp the board's other edge to the bench.

woodworkers, making furniture is as much about the journey as it is about the destination, and hand tools connect them to the act of creating a piece of furniture in a way that is more fulfilling than using power tools. Making furniture (and not just the furniture itself) becomes part of the reward.

In any case, to get to the point where you can use a backsaw with efficiency and accuracy, you need to learn proper technique and then practice it. I'll demonstrate how to cut straight, which is the most important skill, and I'll show you some exercises to



Conquer dovetails one cut at a time

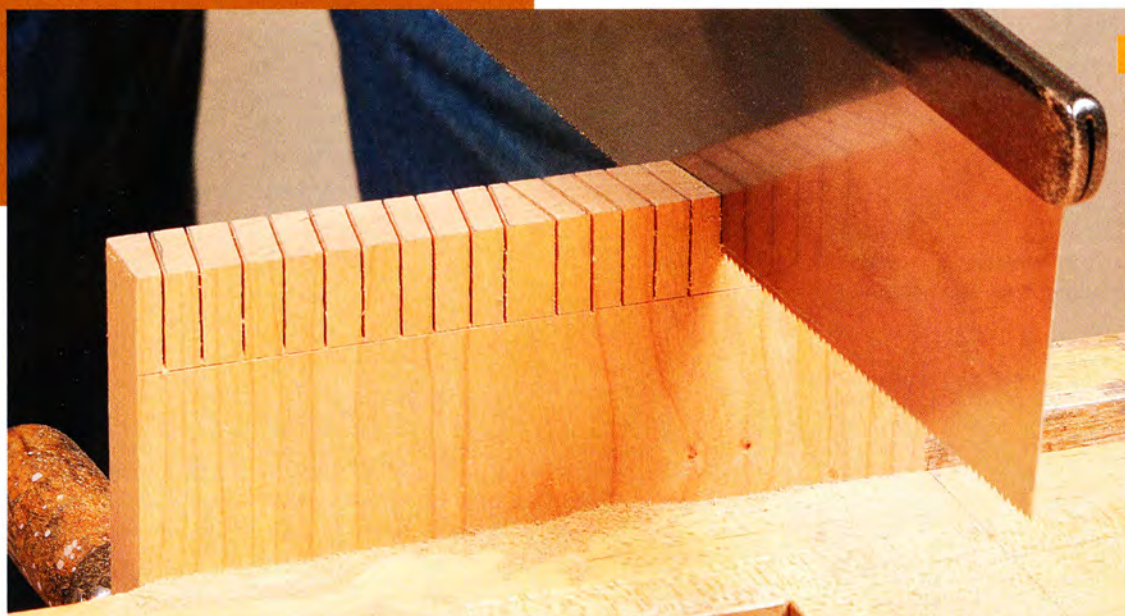
Repetition of good technique is the key to good joinery because it creates muscle memory. Don't worry about complete joints at first. Instead, spend time practicing the individual cuts that make up a tail and pin.



TAILS

Practice should simulate the real thing. Lay out both sides of the tail on the same board. For the cuts right of center, always cut to the right (waste side) of the layout line as you would on real dovetails. On the left side, do the opposite.

Stay to the left of the line. Cut to the right of the line.



PINS

Same goes for pins. Lay out both angles on the same board and cut to the right of the line on the right half and the left of the line on the left half. Line up your body with the angled cuts.

Stay to the left of the line. Cut on the right side of the line.



help you ingrain the correct mechanics in your body. I'll also give you some tips on sawing the two most common joints: dovetails and tenons.

One note before we get started. Although Japanese saws are wonderful tools, I prefer Western backsaws for joinery. I find their pistol grip and D-shape handles are more comfortable and make it easier to control the saw. Also, in my experience, Western saws are less prone to drift and deflect in use, because their blades are thicker and stiffer than those on Japanese saws, which are designed to be pulled rather than pushed.

Good posture is the key to cutting straight

Sawing well is an activity for your entire body, from your feet and legs to your arms and hands. So, before you pick up a saw,



Break down tenons, too

Shoulder and cheek cuts are straight but big, and there's a strategy for handling each one. Shoulder cuts are first. The cheeks follow.



Practice the two basic cuts

It takes crosscuts and ripcuts to make a tenon. Practice them separately.



Here's the drill for shoulders. Use a saw hook and your off hand to keep the board still. To get used to cutting down to a horizontal line, mark the depth on both edges.



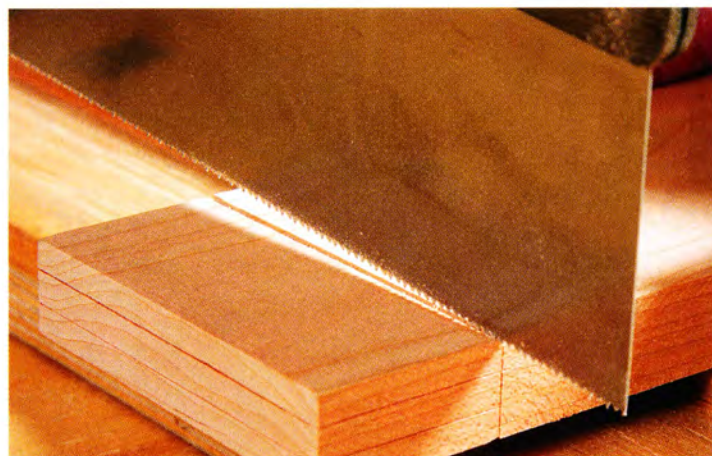
Long cuts for cheeks. It's important that the depth of your test cuts replicate what you'll do for tenons, so they should be $1\frac{1}{2}$ in. to 2 in. deep. Practice following the steps on the facing page.

How to cut clean shoulders

Shoulder cuts are tricky because aprons and rails can be several inches wide. It's hard to track a straight cut across that distance.



Make a track. After cutting your layout lines with a knife or marking gauge, use a chisel to create a V-groove along the shoulder line. You'll get a clean shoulder that will keep the saw cutting straight down.



Shoulder tracks the saw. Set the teeth in the V-groove, against the shoulder. Lower the blade until it rests in the groove across the board's entire width before you begin to cut.



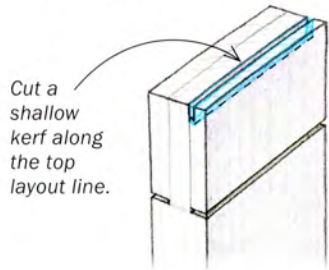
Let the saw do the work. There is no need to put any downward pressure on the saw. Its own weight is enough. The teeth will cut without any resistance or catching.

4 steps to great cheeks

This method lets you cut along just one layout line at a time, with each new cut guided by the previous one.

1

Across the end grain. Make a shallow kerf, starting at the far corner. You'll use it as a guide to keep the saw straight as you continue.



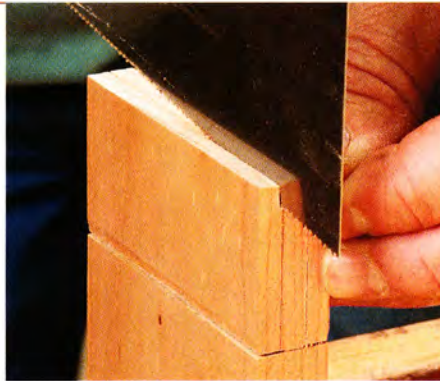
take time to learn how to position your body. Your legs should be spread, one foot in front of the other, with knees slightly bent. Your torso should be turned, too, so that your arm can move forward and back in a straight line. If you have to swing your arm around your body, you cannot saw straight.

The distance between you and the workpiece is also critical. If you're too far away or too close, your arm will curve and your cuts will, too.

When you pick up the saw, hold it gently. And don't put any downward pressure on the saw as it cuts. A sharp saw—which yours should be—needs no more than its own weight to get the job done.

In addition to having the right body mechanics, you also need a bench that's rigid, so it doesn't flex or deflect under use. And it should be heavy or bolted down, so it doesn't skip over the floor. It needs a vise and a saw hook for holding parts. And don't forget to have good lighting around the bench so you can see what you're doing. □

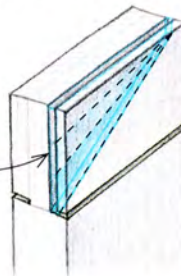
Chris Gochnour has taught many woodworkers to saw straight and clean (chrisgochnour.com).



2

Work down the near edge. Angle the saw up and cut down the layout line closest to you.

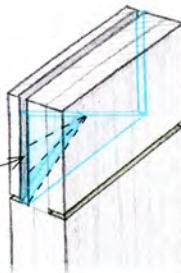
Work down the front layout line without cutting down the back one.



3

Cut down the other edge. Turn the board around in the vise and make another angled cut.

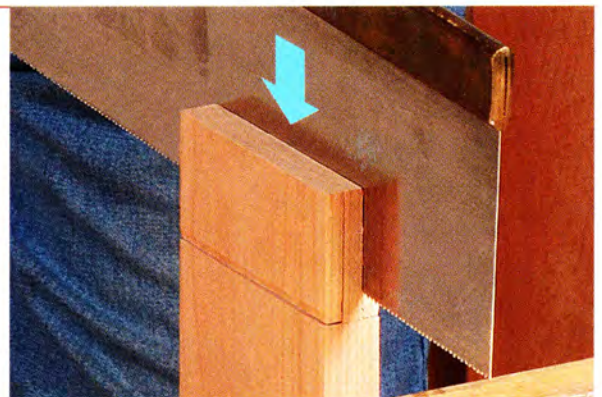
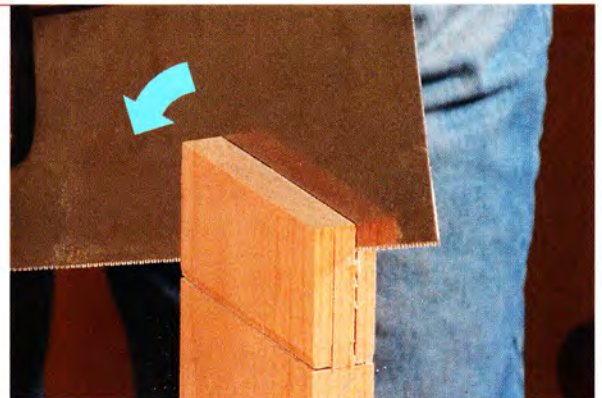
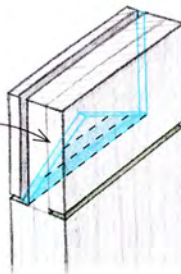
Cut along the layout line.



4

Level out and finish the job. All that's left now is a triangle of waste, but you have three straight kerfs to guide the saw as you cut down the middle.

Cut down to the shoulder.



Biscuit Joiners, Head to Head

We tested eight machines to see which are best for furniture makers

BY TONY O'MALLEY

The biscuit joiner was a relative newcomer in the first cabinet shop where I worked about 30 years ago. Now it's almost as common as the portable drill in professional and hobbyist woodshops alike, and with good reason. I've been using a biscuit joiner daily in my work for years now. It's a versatile and easy-to-use tool for numerous applications, from assembling and attaching face frames to reinforcing miters, and it's also great for building cabinet and drawer boxes.



A biscuit joiner is a pretty simple machine. It has a motor and blade, a spring-loaded plunge mechanism that guides the blade, and a baseplate and fence that locate biscuit slots in the work. Using the tool is a two-handed operation: One hand pushes at the back of the machine to plunge it into the workpiece while the other holds it down at the front end.

I worked with eight machines over several weeks to find out which models performed best. I evaluated all the key components to gauge their accuracy, and

I used all of the machines to cut slots for face frames, miters (standing and flat), and cases. The most important test was to check the accuracy of the slot-cutting.

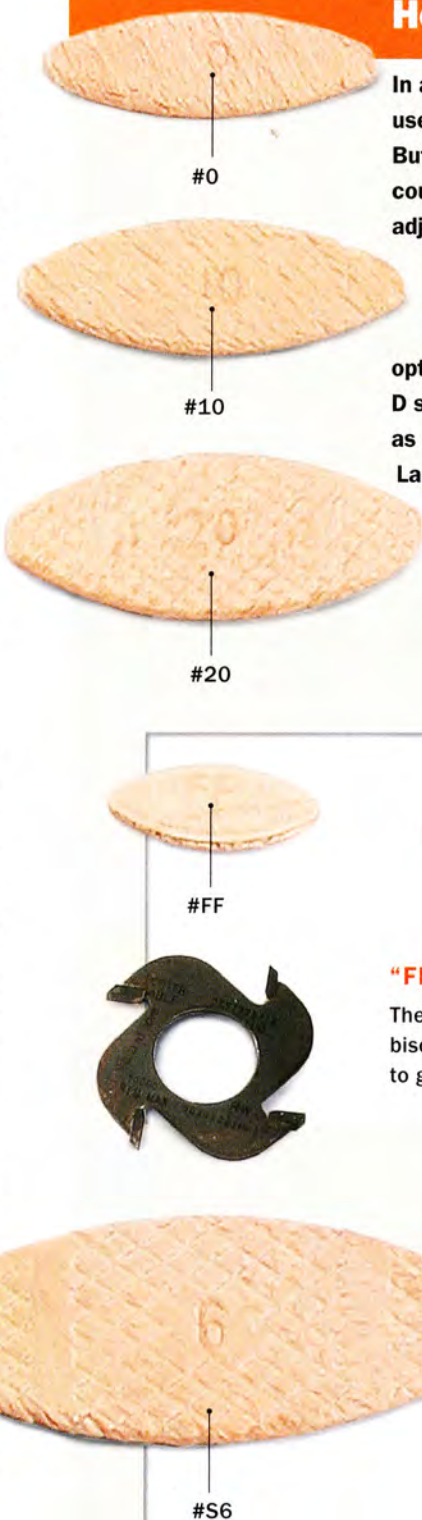
Vertical slot alignment is most important

For a biscuit joiner to perform well, it has to cut slots without excessive slop, so the store-bought biscuits fit snugly for a good glue joint. One of the keys to getting an accurate slot and good fit from joint to joint is a precise plunge mechanism that slides without play or wobble. You also have to hook up the machine to a vacuum because any debris can interfere with the tool's alignment and give you sloppy results. Finally, you need a high-quality fence that holds its settings

while you cut slots. Problems with any of these can cause serious alignment issues.

Although the slots and biscuits are designed with sideways play built in—it doesn't affect strength and actually comes in handy when assembling parts—slots that are out of parallel will give you headaches.

I tested all the machines using a shop-made hardwood "biscuit" that wouldn't be as affected as normal biscuits are by moisture changes. I cut slots both with the fence and with the base as the reference surface. Then I inserted the test piece into each slot and measured from end to end with a dial indicator to be sure each slot was



How big a biscuit?

In all of my years of building with biscuit joiners, I've used only the standard-size biscuits (#0, #10, and #20). But Lamello and Porter-Cable offer different sizes that could come in handy. All of the machines have turret-like adjusters that change the slot size for these different biscuits. In general, you should use the largest biscuit the workpiece can accommodate. By the way, there are also a number of specialty joints and options for biscuit joiners, such as duplex hinges (the D setting) and simplex connectors (S setting), as well as options for making knockdown furniture, such as Lamello's Clamex S system.

—T.O.



"FF" MEANS FACE FRAME

The Porter-Cable 557 has a special FF setting for small biscuits. You need to buy a smaller, 2-in. blade, though, to get the job done (\$50; amazon.com).



LAMELLO GOES BIG—AND SMALL

Both Lamello machines can cut slots for extralarge biscuits (the S6) using the standard blade at the Max setting. They also can cut smaller slots for face-frame biscuits, but you'll need a smaller blade (\$99; csaw.com).

Two types of fences

One type can be adjusted for angles and height. The other can be angled but the height is fixed to center slots in 3/4-in. stock, so height adjustments require an auxiliary fence.

ALL IN ONE

A single fence that adjusts for both angles and height is convenient. It can handle stock of any thickness and be used for miters, too.



Dial in the height. The DeWalt fence is easy to adjust with a thumbscrew (left), with scales that are easy to read.



Online Extra

To get more from your biscuit joiner, check out the free video at FineWoodworking.com/extras.



Two ways to slot a miter. The DeWalt fence doesn't adjust past 90°, so to biscuit a standing miter, you angle the fence to 45° and cut the slot with the workpiece clamped flat (left). But workpieces can shift, so O'Malley prefers to slot these parts while they're clamped in a vise (right). The material won't move, and there are no clamps to get in the way, but you need a fence that adjusts to 135°, like that on the Porter-Cable (shown at right).

parallel with the faces of the board. Except for the Craftsman, all of the machines did well here.

Fence should keep settings locked in

To locate slots vertically in a workpiece, you can use the base or the fence. But because the base is always solid, and guaranteed to center a slot in 3/4-in. material, I find it's more accurate to use it as the reference surface whenever possible. When you need to offset a slot or to cut slots in stock thicker than 3/4 in., you can use a shim to raise the machine (to see this and other tips on using a biscuit joiner, see my article "Biscuit Basics" in *FWW* #165 and Asa Christiana's free video at FineWoodworking.com/extras).

But some people prefer to use the fence, and there are times when it's more practical. I'll use the fence on large cabinet parts, where it's just easier to move the biscuiter around the parts than it is to move the parts. I also use the fence on stock that's thinner than 3/4 in., and it's a must for cutting slots in beveled edges for a standing miter joint.

To be reliable and accurate, the fence must be easy to adjust and remain parallel to the base. And it must hold its settings (you can read about each fence in the individual writeups on pp. 52-53).

Some models have a single fence (see photos, left) that adjusts for both angles and height (DeWalt, Porter-Cable, Craftsman, and Ryobi). The Lamello and Makita machines feature a fixed-height fence that uses an auxiliary fence for height adjustments (facing page).

The winners

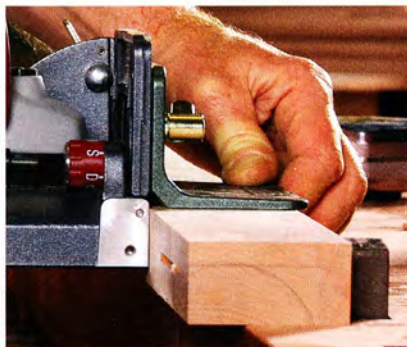
After putting the machines through a few weeks of work in my shop, it was pretty clear that the Lamello biscuit machines were the winners. They are extremely well made—and priced accordingly. As a professional woodworker, I don't mind spending top dollar for certain tools that I use routinely. So I would readily consider buying the Top 21 when it comes time to replace my current

DIVIDE AND CONQUER

Fixed-height fences take the guesswork out of setting the fence to center slots in $\frac{3}{4}$ -in. material. For height adjustments, they have an auxiliary fence. It's less convenient, but it works very well.

Fence finds center.

The Makita and Lamello machines feature fixed-height fences that center slots automatically in $\frac{3}{4}$ -in. stock, at any angle. The Lamello Classic X is shown.



Auxiliary help. These machines use an auxiliary fence for height adjustments. It mounts to the fixed fence in front (left), so you can center slots in thick stock (right) or offset workpieces. O'Malley preferred the Lamello system, which attaches via dovetailed ways and has no play.

Distinct advantage. The auxiliary fence for the Lamello machines can be mounted to the base, which makes it easier to hold the tool vertically.

model. The Lamello Classic X is half the cost with most of the same features, so that would be a more sensible purchase for the serious hobbyist looking for the best machine he or she could afford.

Picking the Best Value was more difficult, as three closely priced tools performed similarly (DeWalt, Makita PJ7000, and Porter-Cable). In the end I picked the DeWalt, because it has a great fence that adjusts easily and holds its adjustments in any position, it's light and comfortable to use, and it's less expensive than the other two. If you don't use a biscuit joiner every day, any of the three would be an excellent choice.

Tony O'Malley, a professional furniture maker in Emmaus, Pa., has cut thousands of biscuit joints over the years.

CUTTING-EDGE ADJUSTER

Adjust the blade height. With the Lamello Top 21, you can move the blade up or down by turning a wheel on the top of the machine (top). The blade moves in 0.1mm steps, allowing you to dial in a desired offset. This feature comes in handy when you are attaching solid-wood edging to plywood and want the edging to sit just proud for flush trimming later (bottom).



Head to head



Lamello Classic X

\$600

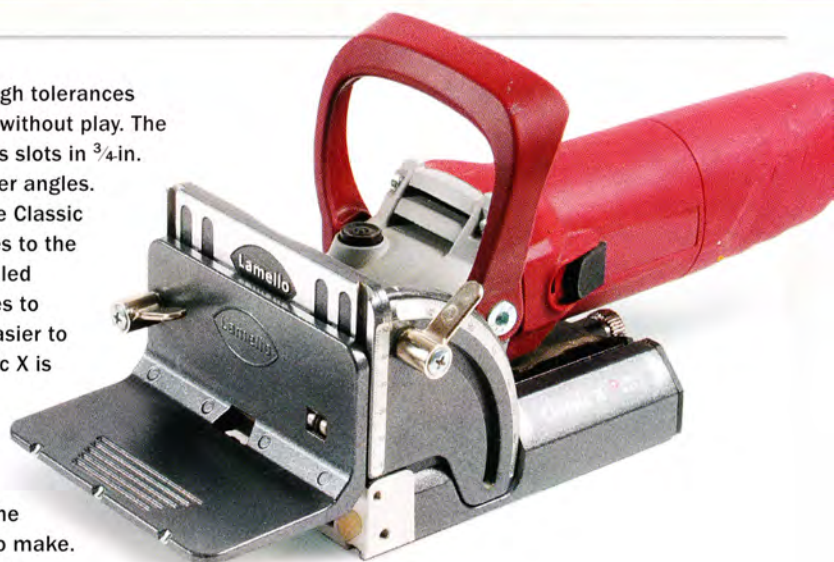
csaw.com

Fence-angle detents:
22.5, 45, 67.5, 90

Cutting-depth indexes:
0, 10, 20, S, D, Max

Weight: 6.2 lb.

This machine is top-notch, made to high tolerances with a plunge mechanism that slides without play. The fixed-height main fence, which centers slots in $\frac{3}{4}$ -in. material, locks solidly at 90° and other angles. To handle other stock thicknesses, the Classic X uses an auxiliary fence that attaches to the main fence via well-machined dovetailed ways. The auxiliary fence also attaches to the base of the machine, making it easier to use the machine vertically. The Classic X is versatile and can use a number of Lamello joinery options, such as the knockdown Clamex S system (requires a special blade). The depth stop is clearly visible on the front of the machine, and adjustments are easy to make. The tool is well-balanced and a joy to use.



Lamello Top 21

\$1,195

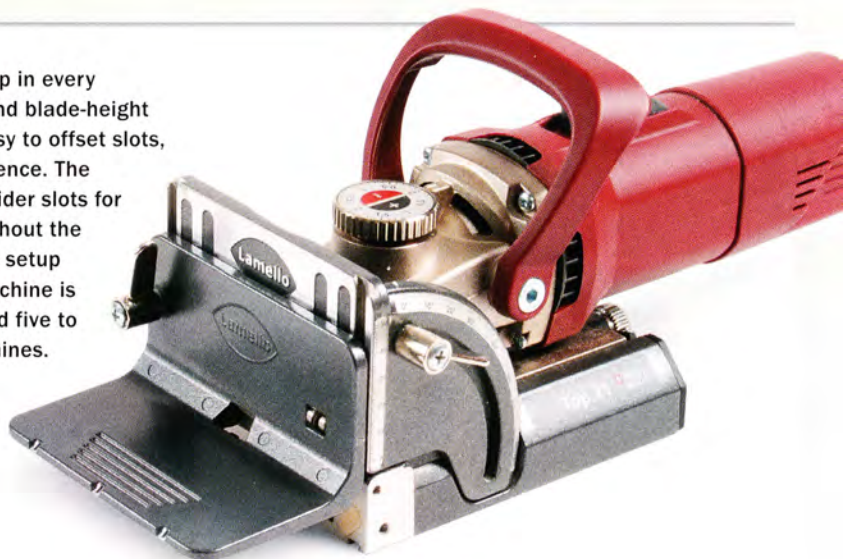
csaw.com

Fence-angle detents:
22.5, 45, 67.5, 90

Cutting-depth indexes:
0, 10, 20, S, D, Max

Weight: 7.2 lb.

This machine is the cream of the crop in every aspect. The Top 21 has a one-of-a-kind blade-height adjustment feature that makes it easy to offset slots, with the fence or the base as a reference. The adjuster also allows you to cut the wider slots for the Clamex S knockdown system without the need for a specialty blade. The fence setup is the same as the Classic X. The machine is twice as expensive as the classic, and five to six times as much as the other machines. But if you use a biscuiter daily, or would benefit from all the various joinery attachments available, the tool is worth the investment.



DeWalt DW682K

\$170

homedepot.com

Fence-angle detents:
90

Cutting-depth indexes:
0, 10, 20, Max

Weight: 6.2 lb.

I picked the DeWalt as Best Value. The fence is simple, reliable, and comfortable to use, even for long sessions. It features a rack-and-pinion height adjustment that keeps it parallel, and a height gauge that's easy to read. The fence has solid, accurate stops at 0° and 90°. But it's the only fence in the group that doesn't have angle detents beyond that, a minor inconvenience that's easy to overlook because the fence locks solidly at any angle. The barrel grip is very comfortable, with a conveniently positioned lock-on trigger switch on the bottom.



Craftsman

315.175390

\$90

sears.com

Fence-angle detents:
45, 90, 135

Cutting-depth indexes:
0, 10, 20

Weight: 7.8 lb.

The plunge mechanism in this machine has a lot of play, and the machine cut very loose slots that didn't allow me to get an accurate reading during the parallel test. It's heavy but well balanced, and features a comfortable pistol grip; however, the grip makes the tool harder to use in the vertical orientation. The fence is large and has an easy-to-grip handle in front that I like. But it was hard to keep the fence parallel when locking it after adjustments.



Makita

PJ7000

\$200

homedepot.com

Fence-angle detents:
45, 90

Cutting-depth indexes:
0, 10, 20, S, D, Max

Weight: 5.8 lb.

The Makita is the lightest of the machines reviewed. Its plunge mechanism is tight and smooth with zero play. Like the Lamellos and the other Makita, it uses a fixed-height main fence, with an auxiliary fence that adjusts in height. The 90° stop on the fixed fence is inexact, and it's easy to lock it a degree or two past 90°. When attached, the auxiliary fence had a bit of lateral play in it, so you have to be careful to check that the fence remains parallel to the base.



Makita

LXJP02

\$410

amazon.com

Fence-angle detents:
45, 90

Cutting-depth indexes:
0, 10, 20, S, D, Max

Weight: 6.8 lb.

This is the same machine as the Makita PJ7000, with the overall fit and finish about the same. It is powered by an 18-volt lithium-ion battery (two batteries are included, along with a charger) that can be shared with other 18-volt lithium-ion tools made by Makita, but the battery pack makes the machine a bit back-heavy. It has sufficient power, but it bogs down more easily if you plunge too quickly. This tool is quieter than any other machine tested.



Porter-Cable

557

\$225

woodcraft.com

Fence-angle detents:
90, 135

Cutting-depth indexes:
FF, 0, 10, 20, S, D, Max

Weight: 7.2 lb.

This machine has the largest fence of this group, which is an advantage for general use. But the large opening near the blade makes the tool unwieldy on small workpieces. Fence-height adjustments are slow, but the fence remains parallel and holds its settings. The plunge mechanism is smooth and solid. A unique feature is that the top handle is attached to the front of the machine—not to the moving barrel—which gives you better control as you plunge.



Ryobi

JM 82

\$100

homedepot.com

Fence-angle detents:
45, 90, 135

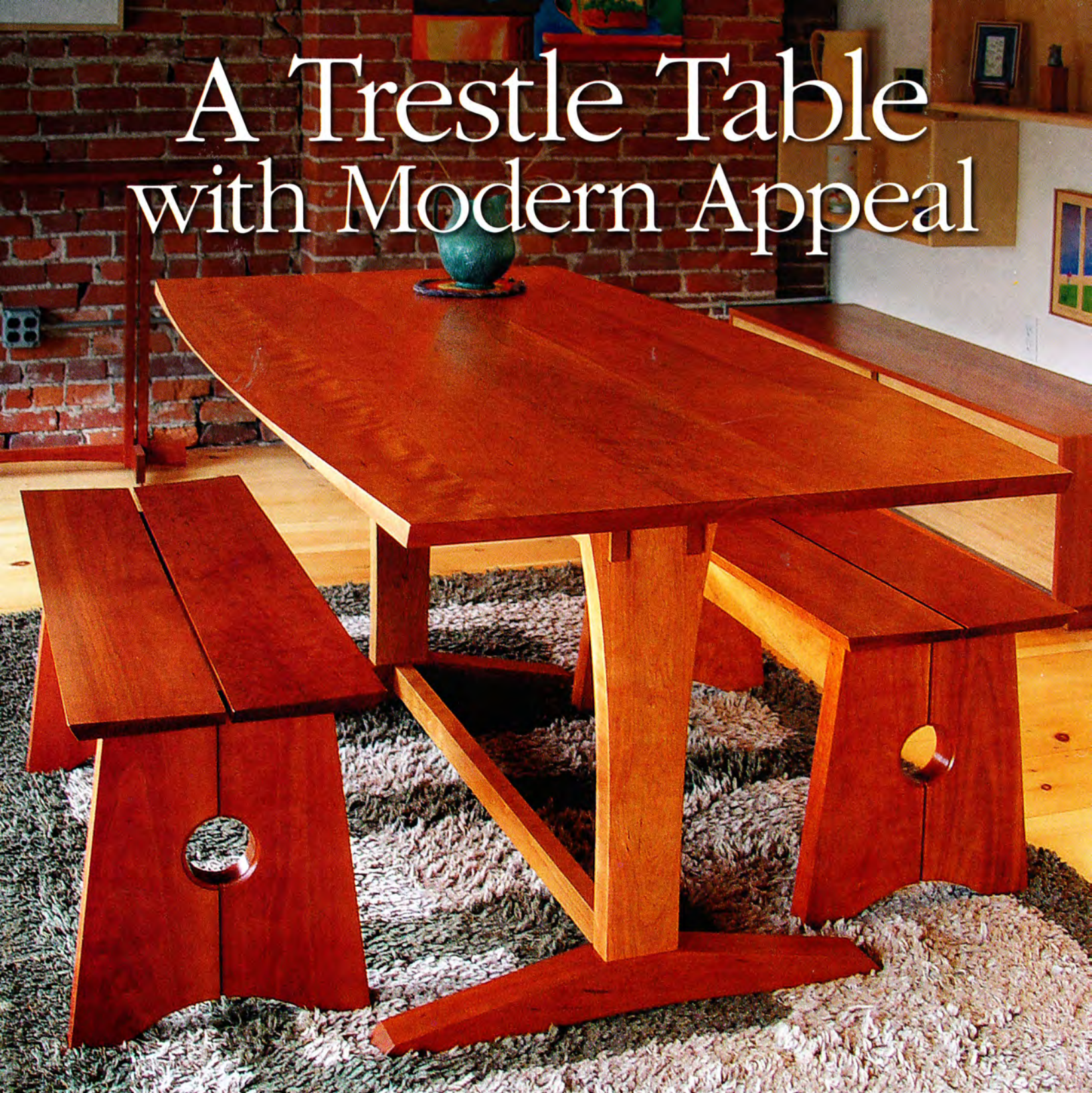
Cutting-depth indexes:
0, 10, 20

Weight: 7.6 lb.

The Ryobi is well balanced and features a comfortable pistol grip; however, the pistol grip makes the tool harder to use in the vertical orientation. The fence is large and easy to grasp. Its height adjusts on tongue-and-groove ways and is guided by a double rack-and-pinion, but the fence tended to shift up or down when it was locked. The plunge mechanism has too much play, which resulted in sloppy slots and loose biscuits.



A Trestle Table with Modern Appeal

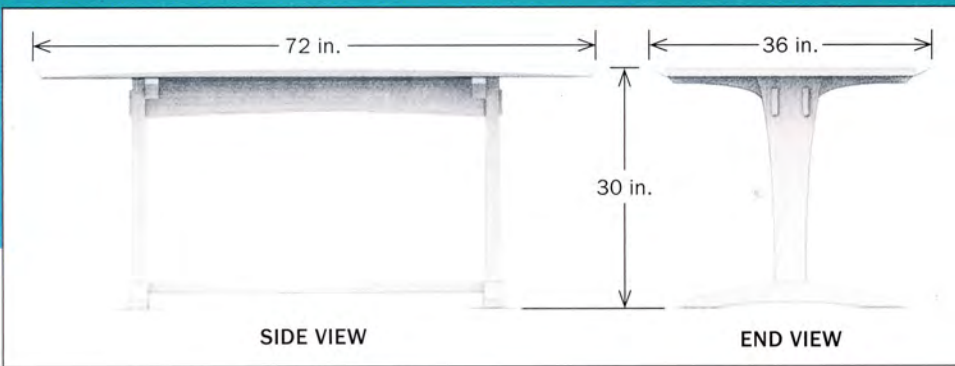


Graceful edge
highlights clean lines

BY DANIEL CHAFFIN

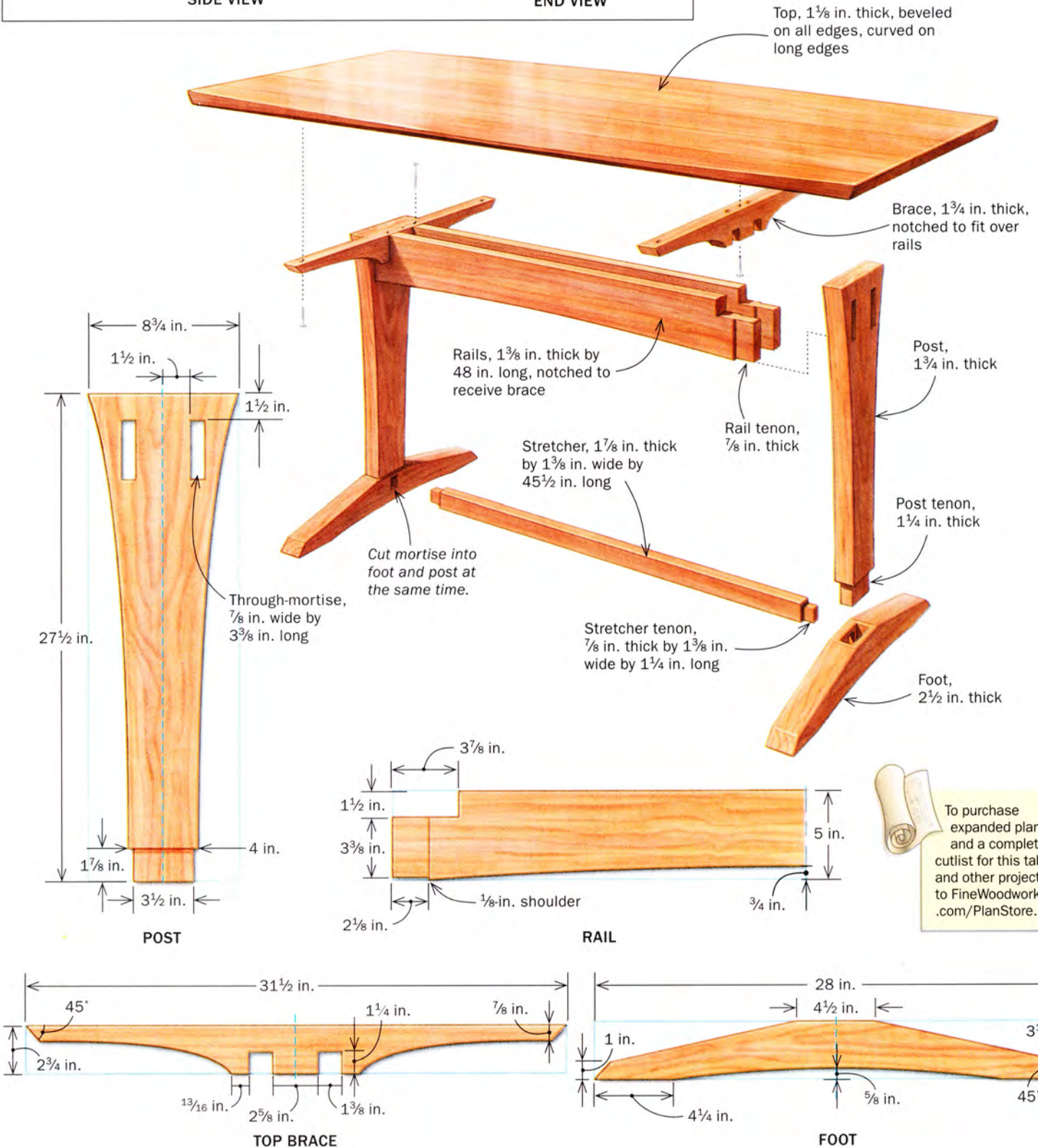
Several years ago, I wrote an article about a bench with clean, contemporary lines that I've made many times ("A Bench that Fits Every Room," *FWW* #207). In the article the benches were photographed alongside one of my tables, which they often accompany. Since then, many readers have asked about the table, requesting a follow-up article on how to build it. I'm flattered, and happy to oblige.

Like the bench, the table has traditional roots with a modern feel. Its most distinctive feature is the top's gently curved edges, which seem to vary in thickness. What's surprising about the effect is that even though it looks



A CONTEMPORARY TURN ON A DOWN-HOME CLASSIC

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



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

Cut the joinery while parts are square

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



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

complex, it's very easy to create. I'll show you how. I'll also demonstrate how to make the trestle base using a hollow-chisel mortiser, an invaluable tool. If you don't have one, dig into the *FWW* archive for other mortising methods.

I also use a sliding tablesaw and shaper, but you can use a crosscut sled (or miter gauge) and router table instead. Normally, *FWW* wouldn't show commercial and industrial tools like these, but the truth is when you make furniture for a living as I do, you cannot compromise on your machinery. These machines have features (like the mortiser's X-Y table) that allow me to work more efficiently.

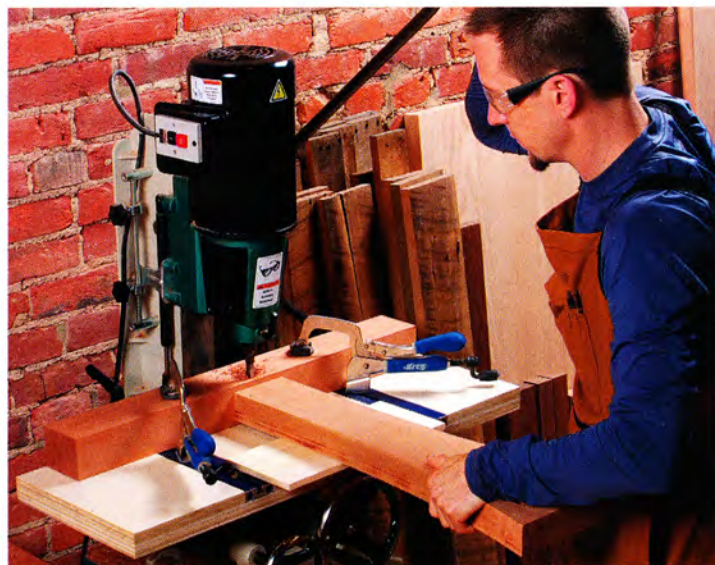
In terms of construction, this table is identical to the one shown in the bench article, but it is smaller. The earlier version was sized for a dining room and could fit two benches on a side; this one is the right size for a breakfast table and fits one bench per side.

GET CREATIVE WITH YOUR MORTISER

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



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



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

The base is a lesson in big mortises

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

Start with the mortises, which present a few problems. First, they are all at least $\frac{7}{8}$ in. wide. Second, the posts are too wide to fit between a mortiser's fence and clamp. The solution to the first problem is to use a narrow bit ($\frac{5}{16}$ in. or $\frac{3}{8}$ in.) and cut along the outside walls first, then go back and remove the waste in the middle. For larger parts, take off your mortiser's clamp and replace it with a large plywood auxiliary table. Mine has two T-tracks, so I can use hold-down clamps to secure parts for mortising.

If your mortiser doesn't have a sliding table, then don't bolt the auxiliary fence to the mortiser's table. Instead, leave it unclamped so that you can move it between cuts and adjust the fence. There

STOPS ARE THE SECRET TO ACCURATE LAP JOINTS

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



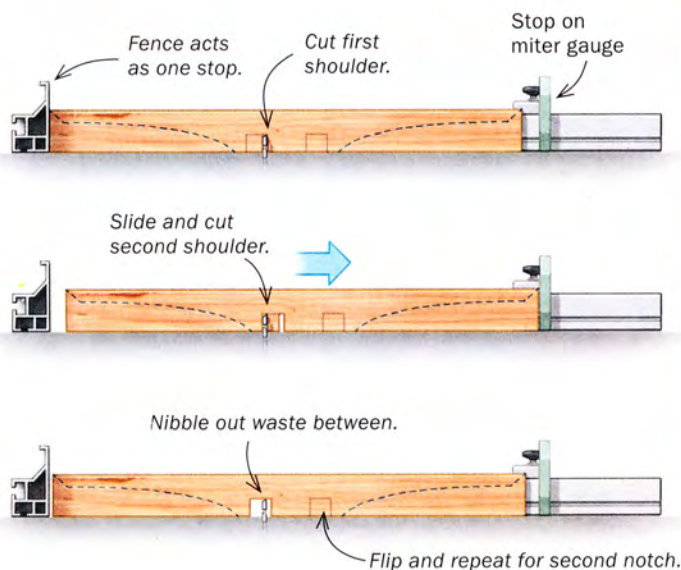
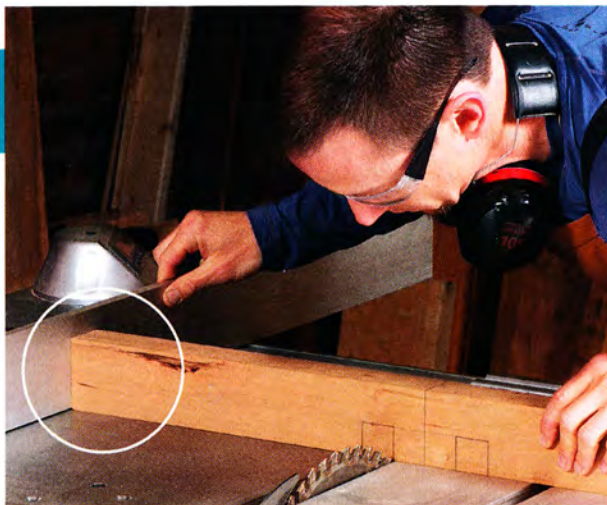
One stop for the notch in the rail. Use the rip fence as a stop to control the notch's width. Cut the shoulder first, and then remove the waste with a series of cuts.



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

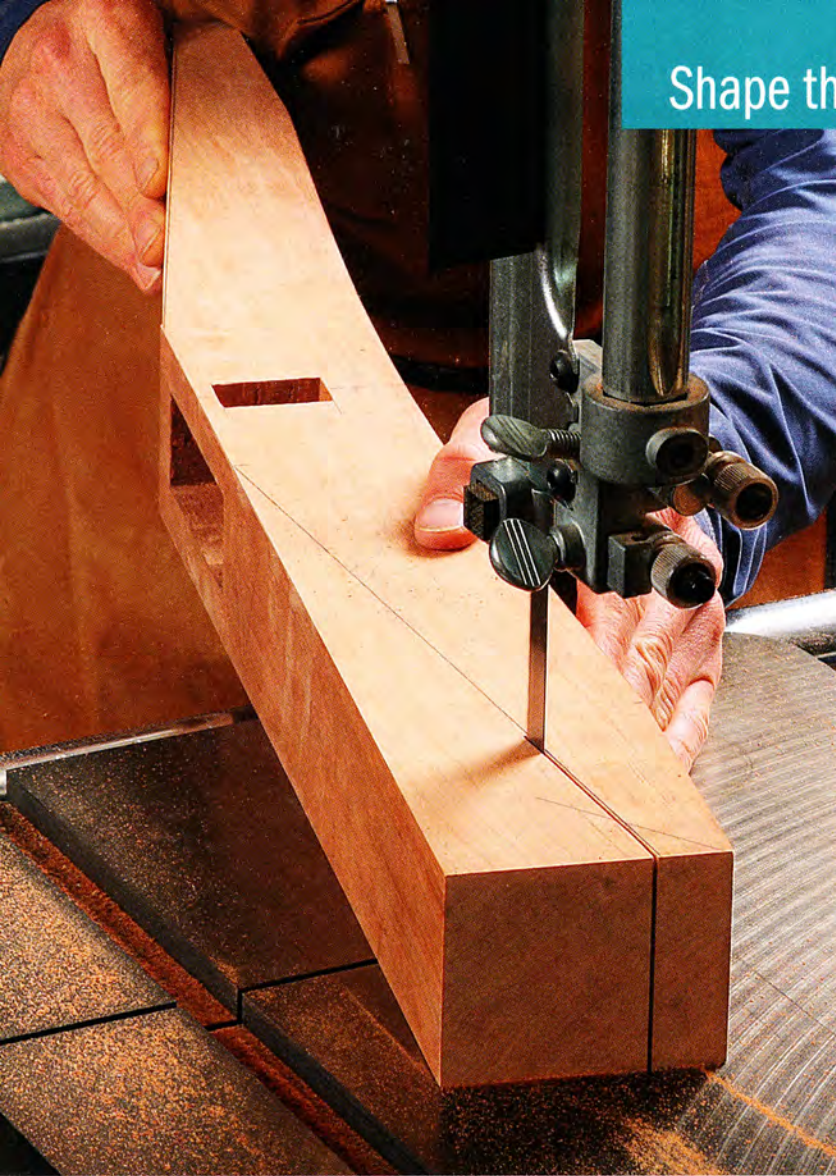
TWO STOPS NEEDED FOR THE BRACES

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



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

Shape the parts with power and hand



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

is one mortise that you can't cut now. It's on the inside edge of the foot and goes partway through the tenon on the bottom of the post. You'll cut it after dry-fitting the tenon into the foot.

Compared to the mortises, the tenons are a breeze. I cut them with a dado set and miter gauge (with auxiliary fence) on my tablesaw. Because this is not a through-cut, you can use your rip fence as a stop to control the tenon's length. All of the wide cheeks can be cut with a single setup. Then, after a quick blade-height adjustment, all of the narrow edge cheeks can be cut. After fitting the tenons, dry-fit the post into the foot and cut that last mortise.

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

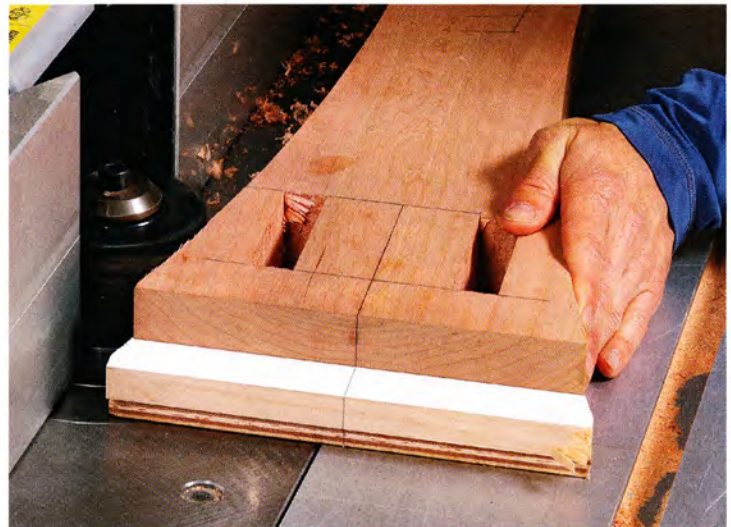
Shape the parts before assembly

After all the joinery has been cut, start cutting the curves. For the posts, rails, and support braces, I use a template to lay out the curve. I rough out the part on the bandsaw, and rout it flush to

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



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



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



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

Glue up the base

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



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

the template. I bevel the ends of the feet and support braces with a chopsaw followed by a block plane. But the feet are too thick to rout in a single pass, so I rough out the curves at the bandsaw and use a spokeshave to clean up the cut. I cut the tapers on the top edges of the feet at the bandsaw, too, cleaning up with a jack plane.

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

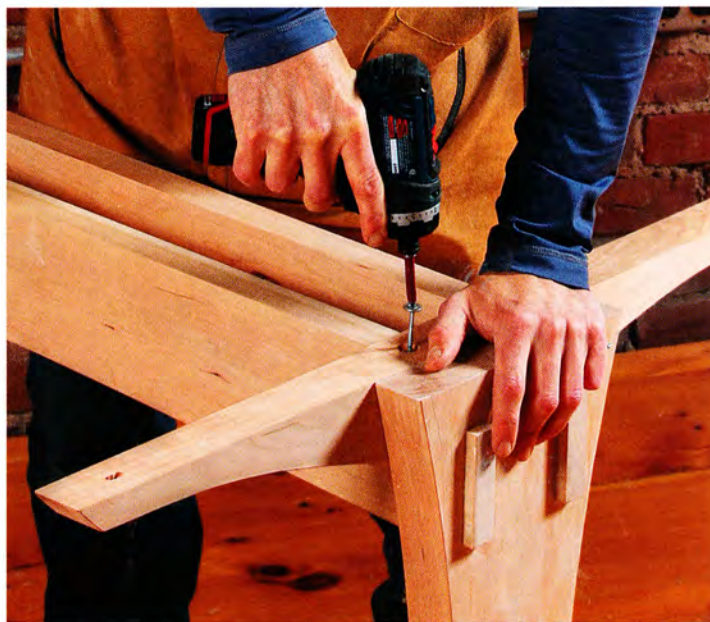
Prepare all of the parts for finishing, sanding through P320-grit and easing the edges. Now glue up the base. Start by gluing the post into the foot. After the glue is dry, glue the stretcher and rails between the posts. Finally, glue the braces to the rails, and drive the screws into the joint (see photo, right).

Edge profiles on the top

With the base assembled, turn your attention to the top. After gluing up the boards to make it, the top should be 36½ in. wide and



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



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

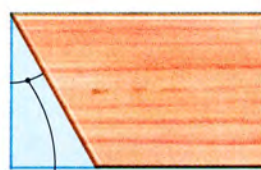
The top gets an elegant edge profile

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

BEVELS FIRST

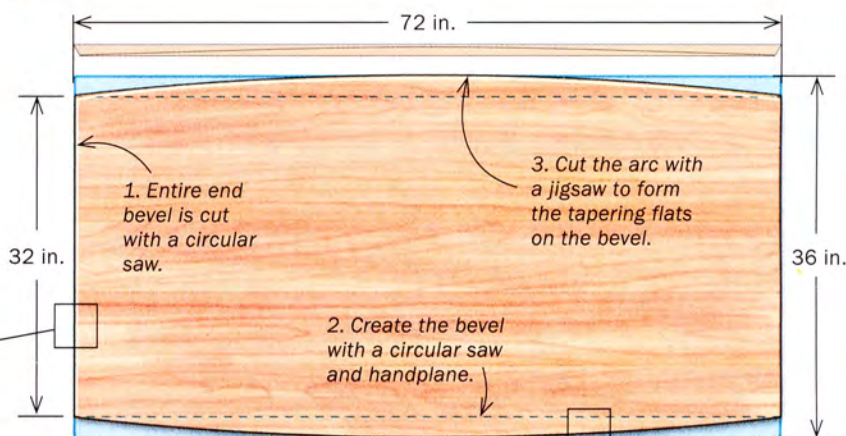
Track saws are great for these cuts, but if you don't have one, just make a plywood straightedge for your circular saw.

BEVEL TABLE ENDS FIRST

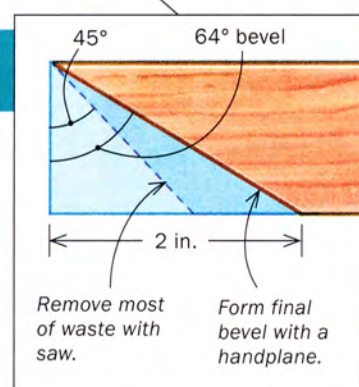


30° bevel

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



BEVEL THE TABLE SIDES IN TWO STEPS



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



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



NOW THE CURVE

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



Cut the curve and clean it up. Use a jigsaw with the blade set at 90° (top). Because jigsaws can create severe tearout, cut at least $\frac{1}{16}$ in. away from the layout line. Clean up the sawn edge with a block plane (bottom).



a few inches too long. To get the side profile correct, you must first cut the top to length. The ends are beveled, and it's easiest to cut the top to length and bevel the ends at the same time. The top is too big to do this on a tablesaw, so use a circular saw and straightedge. Tilt the saw's blade to 30° and cut one end. Move to the other end of the top and cut it to final length. Clean the bevels with a block plane, and sand them to P320-grit.

The edge profile on the sides is created with a two-step process. You'll bevel the straight edge first and then cut a gentle arc into it. Because it's a 64° bevel, you can't cut it completely with the circular saw, so cut a 45° bevel along the edge, and then use a jack plane to remove the remaining material. Next, lay out the arc with a long, $\frac{1}{4}$ -in.-thick batten. At the centerpoint of the table, the arc should pass through a point $\frac{1}{4}$ in. from the edge. Rough out the arc with a jigsaw, with the blade set at 90°. Use a block plane to smooth the cut and work down to the layout line. Sand the edge and the rest of the top, too.

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

Dan Chaffin is a professional furniture maker in Louisville, Ky. To read more about his woodworking business, see Jonathan Binzen's article on pp. 62-65.

Attach the top. The holes at both ends of the brace are elongated to allow for seasonal movement. The one in the center is not. Chaffin uses $1\frac{1}{4}$ -in.-long FastCap PowerHead screws.



Dreaming of Going Pro?

Five recipes for success in a difficult business

BY JONATHAN BINZEN

Once you've taken a few sweet shavings with a well-tuned plane, cut a few tight-fitting dovetails, and built a few sturdy cabinets or cradles admired by friends and family, it's probably inevitable that the thought occurs: Could I make a living doing this?

The answer is, probably not—at least, not the kind of living you're used to. The math is despairingly simple. Building extremely labor-intensive objects in an era of extremely high labor costs results in prohibitive prices.

It's been evident since the craft's revival started some 50 years ago that even for the most talented furniture makers, it's a struggle to make a living. And in the wake of the economic meltdown of 2008, which seemed to target furniture makers with special force, an already bleak picture got even grimmer.

And yet ... the desire for fulfillment in one's work, the passion and the pleasure to be found in working wood continue to prove irresistible to some, overcoming cold-eyed assessments of profit and loss.

Those who try the rough waters and succeed seem to arrive at designs for their businesses that are as various as their styles of furniture. One thing that unites them is a willingness to work at the business as hard as they do at the bench.

I've collected a handful of exemplary ones here. Best of luck!

Jonathan Binzen, a senior editor, worked in two shops that folded soon after he left. Coincidence?

Online Extra

For more stories on going pro, go to FineWoodworking.com/extras.

Think local.

Tom Throop set up his shop in downtown New Canaan, Conn., aiming to be as convenient as possible to a prosperous clientele.



TOM THROOP The Local Craftsman

When Tom Throop was looking for a furniture-making school in the late 1980s, the Connecticut native chose John Makepeace's Parnham College in Dorset, England, because the program was geared toward making a successful business as well as beautiful furniture. "I got into this to make a life—and to make a living," Throop says. "The two things go hand in hand."

These days, Throop works in a one-man shop tucked just off the bustling downtown shopping streets of New Canaan, Conn. Early in his career, Throop shared shops with other furniture makers in out-of-the-way industrial buildings. He enjoyed the camaraderie with fellow craftsmen, but felt cut off from customers. So when he decided to set up a solo shop, he bought a building right in the heart of New Canaan, where he'd be visible and accessible to potential clients. "I plunked myself down into a population that can afford my work," he says.

"It's been a 20-year evolution for me,"

Throop says of his career, "and it hasn't been a linear one. But from the start my goal was to have a shop in a town where I was the local furniture maker."

Throop continues to do several craft shows each year, which garners him customers from elsewhere and keeps him designing fresh work. But he works hardest at

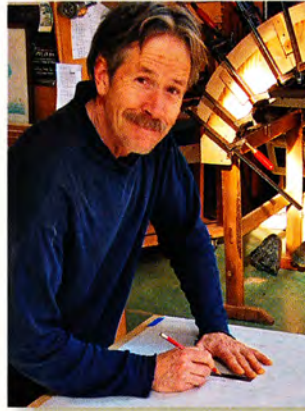
increasing his local exposure. He advertises in local publications and works with architects and designers active in the area.

For years he had a fruitful relationship with a nearby gallery,



GEOFF WARNER

One Piece Leads the Way



Maine furniture maker Geoffrey Warner calls the downturn of 2008 “a serendipitous event.” It forced him, after 25 years in business, “to work really hard and think really creatively.” Warner, who studied under Tage Frid at Rhode Island School of Design, had spent his career building custom furniture and custom kitchens. As he saw the economy shifting, Warner had two thoughts: “How can

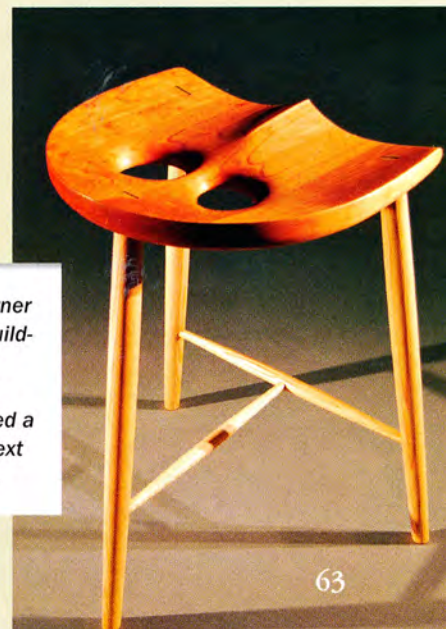
I address this in terms of my survival? And can I do that by building something really affordable—not just for the wealthy, who have always been my clientele?” He set out to design something attractive and as simple as possible. Scanning the history of furniture, he focused on the three-legged stool, “the fastest way of putting legs onto a seat.”

By the spring of 2009, Warner had his first batch of finished Owl Stools—and they immediately began to sell. To keep the stool as inexpensive as possible, he had the seats carved by a CNC shop, and he had another shop turn the legs. Assembly, finishing, and shipping were handled in-house. Warner also offered the stools in kit form, and held workshops where people could assemble their stool kits.

As sales through shows and his website continued to surge—doubling from 170 stools in 2011 to 360 in 2012—Warner and a business consultant created a plan for selling the stools wholesale through reps and retailers. To make the wholesale model work, Warner had to raise prices dramatically, and sales through his website slowed.

“This is a risky experiment,” Warner acknowledges. The growth of his business is exciting, he says, but with new employees, subcontractors, and consultants, it can also seem chaotic and unsettling. Speaking of the days when he did one commission at a time, he muses, “It used to be so seat-of-the-pants and easy.”

Wholesale change. Warner spent his whole career building custom furniture and kitchens, but since 2008 he’s successfully marketed a line of stools, which he next intends to sell wholesale.



The Throop Gallery ... temporarily.

When he finds a vacant storefront downtown, Throop sets up shows of his furniture until a tenant is found.

but it closed several years ago, leaving no prominent local venue for showing his work. So he took matters into his own hands. Now every year or two he creates his own pop-up gallery. If he sees a well-located storefront for rent, he’ll propose a deal to the landlord: In exchange for use of the space until a new tenant is found, Throop will spruce it up and turn it into his own personal gallery, filling it with his furniture. He’s done it several times now with notable success.

Throop produces superbly designed and crafted furniture, but that’s only half his job. “Selling the work is a big aspect of what I do,” he says. “I’m often asked, ‘After putting so much care into a piece, do you have trouble letting it go?’ No! I like making the stuff, but I like selling it, too. They’re two parts of the same equation—it’s electrifying to make something and then sell it.”



JEFF MILLER

Diversify and Thrive

Writer, teacher, furniture maker. Miller began writing and teaching in part to rekindle his passion for woodworking. Years later, these secondary pursuits carried him through the recession.



By the mid-1990s, Chicago furniture maker Jeff Miller had been working wood for a decade. He had plenty of work but was growing frustrated with his career. "It seemed the only way to make more money was to work more hours," he says. And with two young children, he could no longer put in the enormous overtime he had relied on to build his business. At the same time, Miller, a Yale graduate with a brief previous career playing classical music, wanted a work life that was "more challenging, more diverse, and more mentally stimulating."

He considered a career change, but chose instead to stick with furniture making and start writing about the craft as well as practicing it. At about the same time, he began holding weekend classes in his shop and elsewhere in the Chicago area.

Furniture making continued to provide the lion's share of his income, but writing and teaching gave his career the added depth and interest he was seeking.

When 2008 arrived, Miller's supplemental activities took on added importance. Most of his furniture commissions dried up, but with a reputation earned through three books and dozens of articles, he was able to greatly expand his teaching, giving workshops at schools, guilds, and woodworking clubs across the country. Prior to 2008, Miller made 70% to 80% of his income from furniture making and the balance from writing and teaching. By 2012, for the first time, teaching and writing produced more than half of his income.

Miller feels that writing and teaching saved his career twice—first by making it more complex and interesting, and later by providing the financial flexibility to continue in hard economic times. There are other options, Miller says, to writing and teaching. "You could design for industry, do furniture repair, restore antiques, sell wood, or build other people's designs. But I think that finding a way of branching out and diversifying on your strengths is a necessary adjunct for survival as a woodworker."



A good balance. Frederick (left) and Chaffin (center) have moved from building furniture to designing and marketing it. Edgington (right) handles the books.



Photos, clockwise from top left: Jon Binzen, Matthew Frederick, Matt Kenney, Matthew Frederick, Jeff Miller



DAN CHAFFIN & MATT FREDERICK Creative Partnership

With its light-filled bench room at the front, well-equipped machine room at the back, and airy design studio upstairs, Dan Chaffin and Matt Frederick's handsome shop in downtown Louisville, Ky., seems an ideal place to work wood. And their six-person company's output—stylish and soundly crafted built-ins and solid-wood furniture—is equally impressive. But if the bustling business has the air of inevitability about it, perhaps it shouldn't. Just eight years ago the building was “a terrifying wreck,” and Chaffin and Frederick, having recently picked up woodworking as a hobby, were entirely untutored in the craft. Building commissions for friends, they worked in a cramped, low-ceilinged, often-flooded basement with a scavenged assortment of tools and machines.

What the pair lacked in woodworking experience and training, however, they compensated for with energy and a history of creative collaboration. Friends since grade school, they had played in bands together and after college founded a company that specialized in editing video and composing music for soundtracks. After building several commissions, they decided to take their woodworking business full-time. Along with Chaffin's wife, Amy Edgington, who is a partner in the business and handles accounting and public relations, they bought a three-story brick shell and spent a year renovating it while Frederick kept some money coming in through the video company.

For the first three years, Chaffin and Frederick designed and built kitchens and other cabinetry as well as freestanding furniture, a mixture they maintain today. Even as the economy went south, business was good. “We had so much work that we were snowed under at times,” Chaffin says. “The scale of the projects was increasing and we were working very long hours to get jobs done.”

So they decided to hire employees. True to their bootstrap backgrounds, they didn't go looking for highly trained craftsmen. “We were hiring for temperament, not experience,” Chaffin explains, “and they picked up the craft quickly.” Now, with three craftsmen working for them, Chaffin and Frederick devote their time to design, marketing, and running the business.

They would like the company to focus entirely on making furniture, but the economics are bruising. “With custom furniture you're creating something that's never been built before—it's very difficult to do that profitably. It takes a long time to refine a design—and more time to work out how to make it efficiently.” So they are planning to start building furniture in batches and selling it through retail stores. Other makers have struggled to establish a retail market for their furniture, but I wouldn't bet against this team finding a creative way to make it work.



Dream shop downtown. Chaffin and Frederick, who switched careers from video production to woodworking, renovated an abandoned building in Louisville. They set up their workshop on the ground floor and a design studio upstairs. Eight years in, they employ three craftsmen to do the building and concentrate their own time on design and marketing.



DON GREEN One-Man Factory

Don Green's furniture is a marriage of elegance and efficiency. Green, who has a one-man shop, has the eye of a designer, the skill of a craftsman, and the whip-cracking practicality of a factory foreman. He may work alone, but he builds like a team, producing large stacks of parts and making his pieces in production runs. He avoids custom work, instead selling from a series of pieces designed as a cohesive line of furniture.

Green sees no reason why a good craftsman shouldn't also be a good businessman. His furniture carries a clear message of fine craftsmanship, but he doesn't want to suffer financially for it. "I make concessions," he says. "The minute I go to hand tools, I can't make any money. So I design based on how close I can get to a finished piece right off the machine." When he's designing a piece, he says, "I edit out processes that are too time-consuming." Too much finicky work, he says, "will bury you."

Efficiency begins at the drawing board. While conjuring a design that he hopes will be aesthetically successful, Green is guided not just by concerns about how he will produce it, but even how he will ship it. "Often, I design around the size of the UPS box," he says. Green begins the design process on paper, then builds full-scale mockups using 2x4s and sheetrock screws. A design doesn't get finalized, though, until he has built it a few times and made adjustments based on how his concept really goes together.

Green's wife, Jenifer, runs the sales and marketing side of their business—Greentree Home—from the hilltop Victorian house Don restored in Delhi, N.Y. Jen ships inventory, handles client contact, runs their outstanding website, and takes the furniture to shows. She also augments their income with a bustling business in custom candles and small accessories.

Speaking of his furniture, Don says, "We're tuned in to what I can sell. Our marketing plan used to be, 'If I make it, they will come.' But that really is a field of dreams."

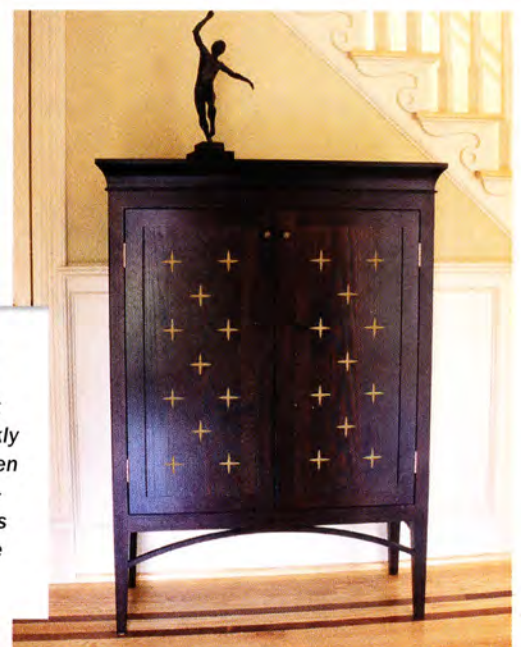


He's a tough boss. Green works alone but operates like a team, building furniture in batches and keeping processes as efficient and economical as possible.



Fast furniture.

So that he can build his elegant designs as quickly as possible, Green minimizes hand-work and prefers not to customize his pieces.



Reviving the Tambour Door

Mid-century favorite goes where other doors can't

BY SCOTT ERNST



Unique design solution

Tambours follow curves and work in spaces where a swinging door won't. And unlike sliding doors, they allow full access to the interior. Also, the fine shadow lines lend a subtle visual variety to a piece.

There are many reasons, functional and aesthetic, to use tambour doors in a cabinet. In the old days when people had gigantic, fat TVs that they didn't want to look at, they hid them in cabinets with pocket doors. Now, people have gigantic, thin TVs that they don't want to look at. They want lower-profile cabinets to hide them in, and often there isn't enough depth to the cabinet to slide in a pocket door.

Tambour doors are a sweet solution, because they slide open, wrapping around the inside of a shallow cabinet, and hide in the back. Tambours are a good option when a door that swings would be in the way. They are also an elegant and easy way to close a bowfront cabinet, since building and fitting curved doors is challenging. They are also a nice design tool. Depending on whether the slats are flat or profiled, solid or veneered, tambours can give your furniture different visual and tactile textures.

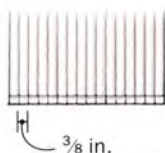


Designing for tambour doors

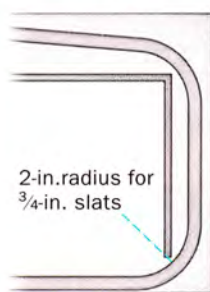
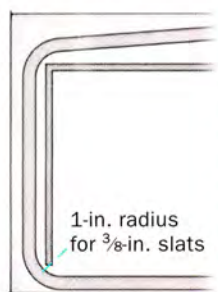
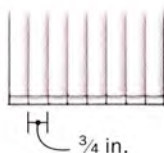
A case with tambours needs false sides. If the case is shallow or the opening is wide, the tambours will travel past the sides, and a false back is a nice way to hide them.

PLAN THE CURVE AND TAMBOURS

NARROW SLATS
MAKE TIGHT TURNS



WIDER SLATS
NEED MORE ROOM



TIP MAKE A TEST TRACK



Can it handle the curves? Mock up a section of tambour and a groove to test whether the groove is wide enough, and its curves gentle enough, to avoid binding the doors.

A tambour door is made from a line of slats set snug against each other. A sheet of artist's canvas glued to the back holds them together and acts as a hinge between the slats. The slats slide in grooves in the top and bottom of the cabinet. When you open the door, they scoot around the corner to hide between the actual side of the cabinet and a false side. Details matter, of course, but tambours are not hard to make.

Design and drawing

I like to design tambour doors in pairs that run in a shared groove and meet in the center of the cabinet opening. Two short doors

are easier to operate and conceal than one long one. Try to avoid extreme proportions. A door that's very tall and narrow tends to cock in its opening and bind up.

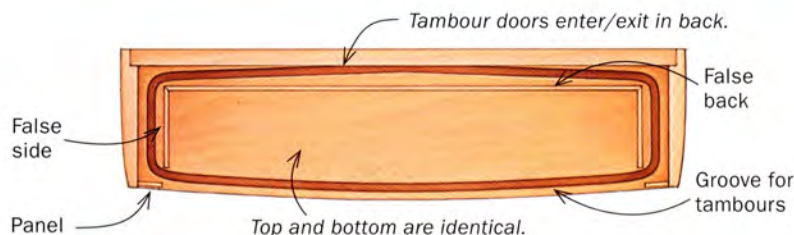
The classic tambour has bullnose profiles on its show face, similar to the ones shown here, but you can use other shapes or leave the faces flat. I make the slats between $\frac{3}{8}$ in. and $\frac{3}{4}$ in. wide.

I make a full-scale plan drawing of the cabinet's interior, including all the details such as the false sides and back. I mark centerlines from front to back and side to side. I also mark out the template used to rout the door grooves, drawing a paral-

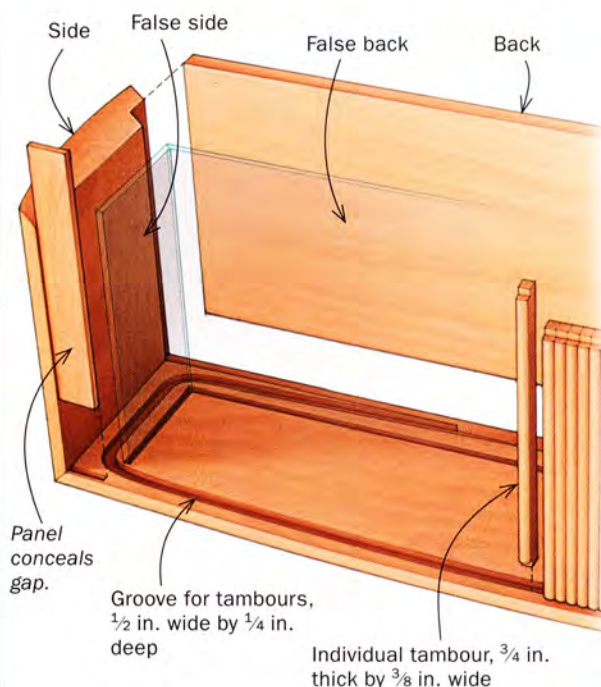
lel line $\frac{1}{16}$ in. inside the groove location. This accounts for the offset created by the router's guide bushing.

Create the path

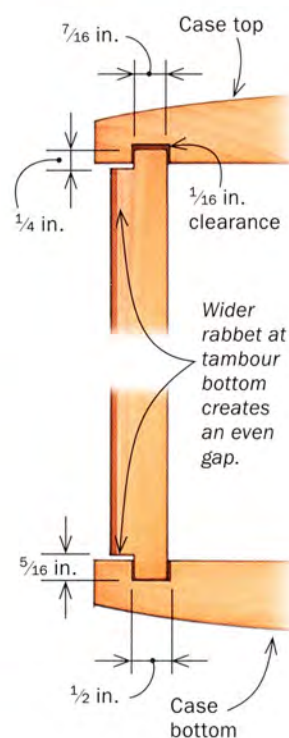
Mill the case components to dimension and cut the joinery. Then draw centerlines on the inside faces of the top and bottom panels. To create the groove template, tape your drawing and carbon paper on a piece of plywood or MDF and transfer the template outline to the plywood. Transfer the centerlines and locations of the false sides as well. Cut out and fair the template, checking its accuracy against the drawing.



TRACK LAYOUT



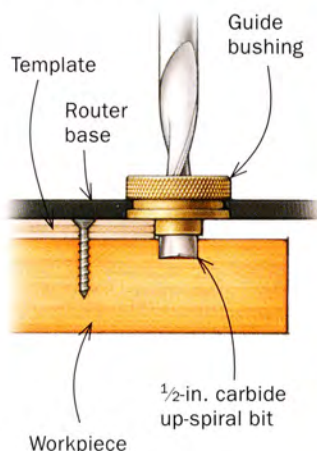
CASE CONSTRUCTION



TAMBOUR RABBETS

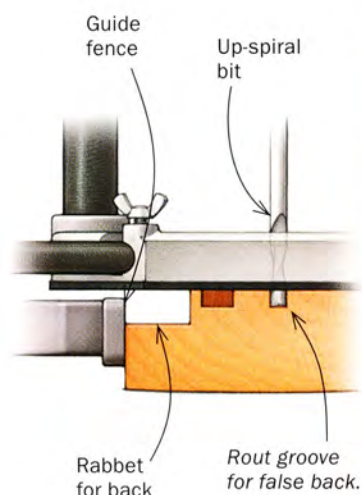
Groove the case for doors and panels

TEMPLATE-ROUT THE TAMBOUR TRACK



Ride the template. Orient the template using centerlines and screw it down to the workpiece. Flip it end-for-end when switching the case top to bottom. Ernst uses a guide bushing and a 1/2-in. carbide up-spiral bit.

ROUTER FENCE GUIDES CUTS FOR INTERIOR JOINERY



Ride the fence. To cut the straight slots for the false sides and false back, Ernst uses the router fence to guide the tool.

Pre-finish. Coat the interior portions of the case that will be inaccessible after glue-up. Ernst uses shellac because it dries quickly and provides a good vapor barrier.



Carry the centerlines to the opposite side and label the two sides "top" and "bottom," for orienting the template to each workpiece.

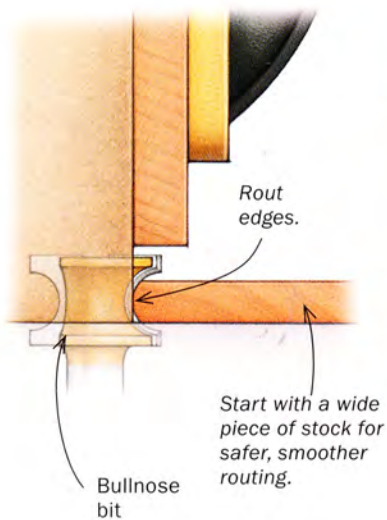
The template is screwed to the workpiece. I locate the screws inside the false sides, where they won't be seen. Putting the top of the template against the top panel, align the centerlines, screw it down, and rout the tambour groove. Repeat the process with the bottom panel, putting the bottom of the template on the panel this time. That way, even if your template isn't perfectly symmetrical, the top and bottom grooves still line up nicely when you're done. With the grooves routed, cut the joinery for the back and the interior case components.

Before glue-up, sand the inside of the grooves with folded P220-grit paper to remove any fuzz that will keep your tambours from running smoothly. Now apply finish to the parts that you won't be able to reach later. I also sand and wax the grooves after finish and before assembly.

Make the slats

To roughly calculate how many feet of slats you need, divide the width of your opening by the width of one slat. Then multiply the result by the height of the opening. Say you have an opening 48 in. wide by 24 in. high and your slats are 3/8 in. wide. Dividing 48 by 0.375 tells you that you need 128 slats to get your width. If they are 24 in. high, the math says you need 256 ft. of slat material to fill your opening. Now add 15%

Make the tambour slats

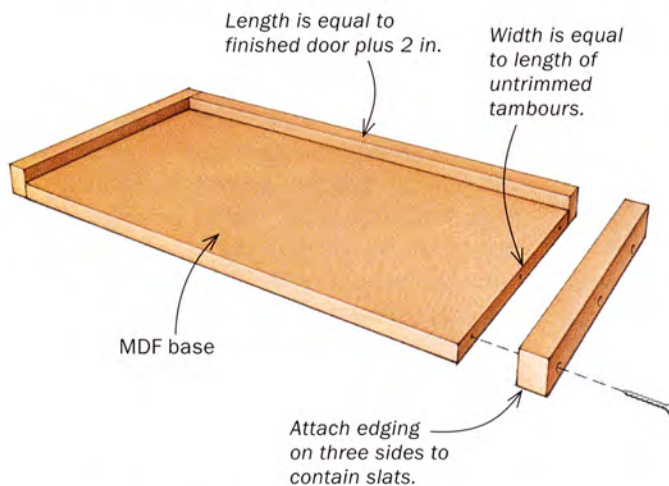


Rout, rip, repeat. Profile both edges of the wide stock and then rip away each edge to the thickness of the slat. Repeat the process until you have enough slats for your door.



JIG DOES TRIPLE DUTY

This simple tray holds the slats for sanding, gluing, and trimming (see p. 72).



Prepare for glue-up. Ernst loads the slats into a shop-built tray, backs facing up. He sets aside any that aren't straight; those will cause gaps in the finished door.

to account for tearout, snipe, poor color, and other defects.

It would be dicey at best to rout a profile on the edge of a thin, narrow slat. Instead, mill up a pile of wide stock in lengths that are multiples of the finished slats, plus a half foot or so. That leaves room to trim any snipe off the ends. Take your wide stock to the router table and profile both edges. Then bring it to the tablesaw and rip off the profiled edges to the depth of the tambour slats. Keep profiling and ripping until you have what you need.

Now it's time to sand. I've tried flap wheels and abrasive brushes for this, but nothing works as fast or as well as simply sitting down for a few hours with some



Secure the slats. A scrap spacer inserted between the tray and last slat holds the assembly snug. Avoid fitting the slats too tightly.



Sanding. With the slats held firmly in place, Ernst uses a random-orbit sander to level and smooth the backs.

Glue the panels



Don't use yellow glue. Carpenter's white glue will stay flexible, allowing the doors to bend more freely. Ernst spreads a thin layer with an old credit card (above) before laying down the artist's canvas (right).



good music and a roll of P150 grit. Once you have those miles of slats sanded, cut them to rough length. I typically leave an extra $\frac{1}{2}$ in. or so.

Glue up the doors

To hold the slats squarely in place while gluing them to the canvas back, I build a simple three-sided tray on a piece of plywood or MDF. Make it nice and square because it determines how square the door is and, consequently, how seamlessly the two doors meet in the middle.

Fill the tray with slats, discarding any that aren't straight. They go in back sides up. Insert a filler strip at the end of the run to snug the slats together. Don't make it too tight or the door won't lay flat after it's glued up.

Draw a line about 1 in. from each end of the slats to mark out for the canvas, then cut the fabric to fit. Attach the canvas with carpenter's white glue. I use a vacuum bag to clamp the canvas to the slats. If you don't have one, use a plywood platen instead. Clamp across it with cauls every 6 in. or so. A layer of closed-cell, $\frac{1}{8}$ -in. packing foam between the platen and slats helps distribute the pressure.

Either way, take the assembly out of clamps before the glue really sets up.



A vacuum bag is best. You can use clamps and broad cauls, but the bag excels at applying even pressure to an uneven surface. Be sure to remove the assembly before the glue sets completely.

Bend the door at each joint to be sure the slats are free from each other. Sometimes a little prying with a chisel is necessary. Then stand up the doors in a barrel shape to let the glue dry completely.

The same jig that held the slats for gluing now serves as a sled on the tablesaw to trim the door to height. After trimming one end of the door, turn it 180° in the jig and cut it to its final length.

Lastly, use a dado set to cut the rabbets that form the tongues at the top and bottom of the door. For the thickness of the

tongue, it's better to be too loose than too tight. To get even reveals at the top and bottom of the door, the rabbet's height is different on the top of the door than on the bottom.

Fit and finish

After all the preparation, you are now ready to slide the doors into your cabinet and see how it looks. But wait—the doors slide like you're pushing a brick! Don't panic. Until both doors and cabinet have finish and wax on them, they are going to

Trim and rabbet



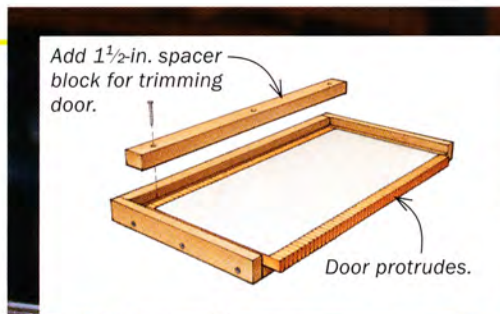
Keep it flexible. After the tambour comes out of the bag, use a chisel or putty knife to gently pry apart any slats that are sticking together. Leave the assembly standing with the slats separated while the glue finishes drying.

drag. Once you get them lubed up, they should run nice and smooth.

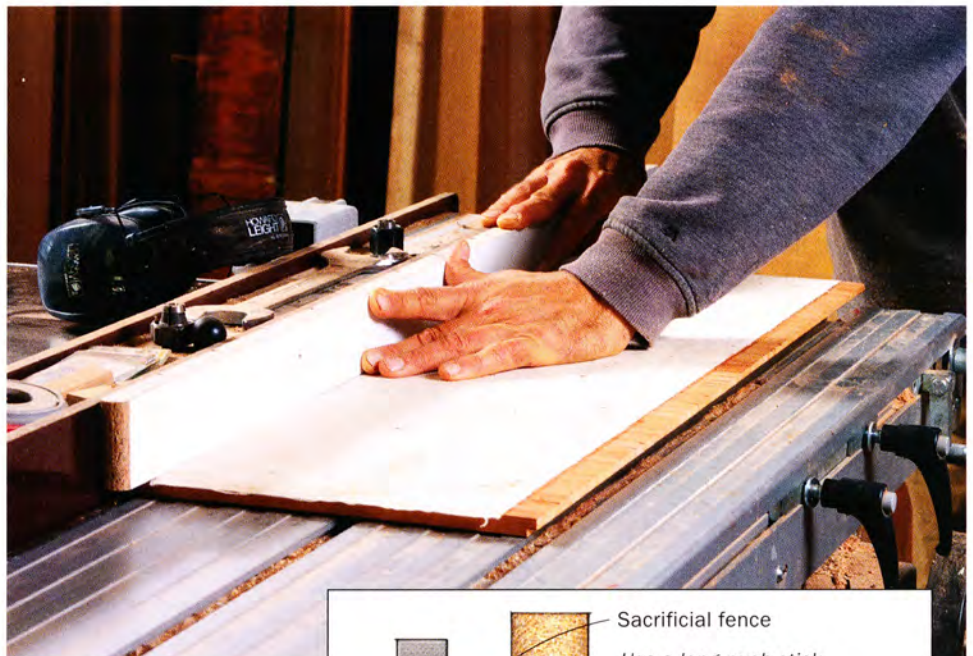
Applying the finish—Arrange the tambour in a cylinder while the finish is going on and drying, so the slats don't stick together. It can be stood up or laid over something cylindrical, like a garbage can on its side. Sprayed finish is the easiest to apply, but you could brush or wipe on a good finish. Avoid waterborne finishes; they raise the grain and you'll have to sand all the slats again. When the finish is dry, use an abrasive pad or steel wool to smooth the grooves and the tongues on the doors, and then wax them.

Personally, I like the look of tambour doors without pulls; but if you are adding pulls, do it after the doors are installed (see bottom left photo, opposite). I use a narrow chisel to create a flat on the slat where the pull will be installed, and drill a pair of screw holes into the slat at the drill press.

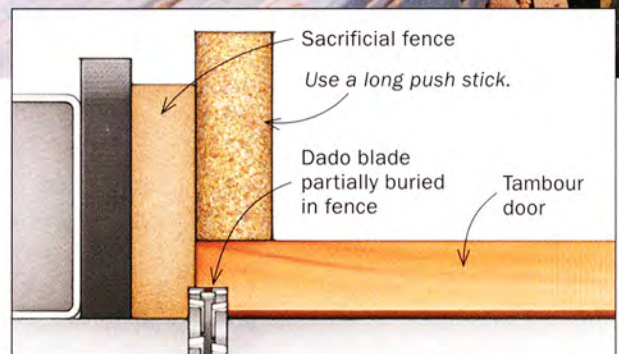
For the stops, make a small block of wood $\frac{1}{4}$ in. thick, as wide as the tambour groove, and as long as the width of two slats. This gets countersunk and screwed in place in the center of the top groove. Then cut off the tongue on the top of each door's first slat, so the two center slats can



Glue-up tray becomes a sled. Run the tray against the fence to trim the door to finished height. Ernst screws a spacer into the tray along the door's length to make it overhang the edge.



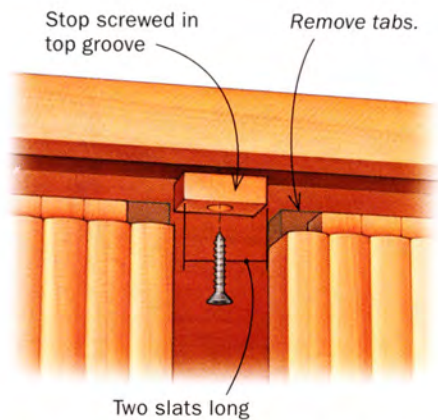
Rabbet the door. Ernst uses a full-length push stick to hold the array firmly to the saw table as he cuts the rabbet with a dado set.



Install the doors

PLACE THE FRONT STOP

The stop fits into the groove at the top of the cabinet and is as long as the width of two slats. This lets the two cutaway slats meet in the middle.



close against each other. To locate the stops in the open position, slide the doors open until there are a few slats exposed in the opening. If the rear of the door is in a bad spot, going around a corner or sticking out the back for instance, slice off a slat or two. Mark the location of the rear of the door and install a stop there.

Once the doors and stops are in the cabinet, you can install the back. I generally use shiplapped planks nailed into the back rabbet, but a frame-and-panel or plywood back works fine as well. □

Scott Ernst builds custom furniture in Glorieta, N.M.



Install the doors and front stop. Slide the doors into the groove from the rear of the case (above). Center the front stop in the top groove and screw it in place (left).

ADD THE HANDLE AND REAR STOP



Pulls are optional. If you do add them, they go on after the doors are installed. Ernst attaches the last two or three slats together with a trim-head screw to keep them from twisting.



Set the range of travel. Ernst positions the door for installing the rear stop (left), ensuring that the door will stop before the pull bangs into the side of the opening. Then he screws the rear stop in place in the groove at the rear of the cabinet (right).

readers gallery

MIKE OGDEN

East Boston, Mass.

Ogden built this mahogany and redwood-burl mirror (4 in. deep by 24 in. wide by 42 in. tall) while he was a student at North Bennet Street School in Boston. To make the fretwork at the top of the mirror, Ogden first laminated three sheets of redwood burl veneer to create a workpiece that was $\frac{3}{32}$ in. thick. He then roughed out the pattern with a gouge and finished it with a scrollsaw. The columns were turned, carved, and then split. Ogden finished the mirror with shellac, Danish oil, and wax. PHOTO: LANCE PATTERSON



Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For submission instructions and an entry form, go to FineWoodworking.com/RG.



ANDY KEARNEY

Conway, S.C.

This coffee table (22 in. wide by 42 in. long by 18 in. tall) has a curly maple top and laminated mahogany legs and rails. Kearney didn't want the top to have plain square edges, so he beveled them, making the top look thinner than its actual $\frac{13}{16}$ in. He originally used a tree branch as the long stretcher but didn't like the look so he changed the design of the base, replacing the branch with the elegantly curved stretcher shown here. He finished the table with catalyzed varnish.

PHOTO: PORTRAIT INNOVATIONS

DESIGN SPOTLIGHT

AL LADD

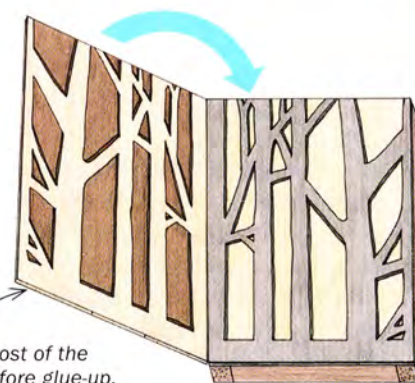
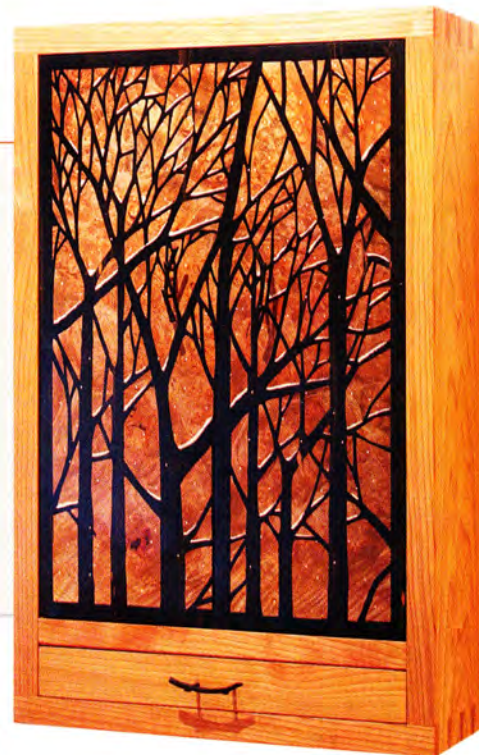
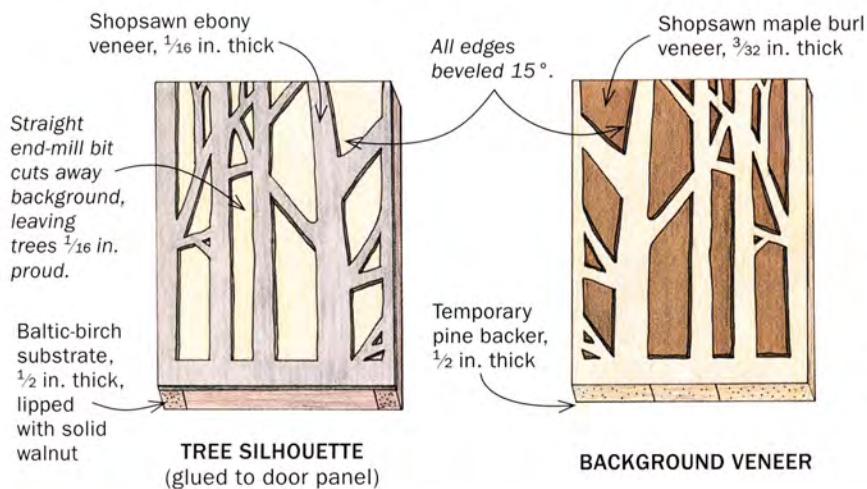
Colrain, Mass.

Ladd designed and made the marquetry pattern on the doors of his jewelry cabinet (5½ in. deep by 15 in. wide by 24 in. tall) with the help of a CAD program and his shop-built CNC router. Rather than cutting hundreds of small pieces of veneer and fitting them together to make the image, as you would with traditional marquetry, Ladd used the CNC rig to cut positive and negative shapes in full sheets of shopsawn veneer and then sandwiched them together.

He began by gluing a sheet of ebony veneer to the door-panel substrate. He routed away all the background, using a V-bit to bevel the edges of the ebony. To make the mirror-image infill pattern, Ladd glued an extra-thick sheet of maple burl veneer to a temporary backer of solid pine, glued that on, and then sanded away the pine to reveal the picture. To add the holly snow, he repeated the process. Ladd's neighbor, blacksmith Justin Morrell, made the twig pulls.

CNC ROUTING CREATES A NEW KIND OF MARQUETRY

This is how Ladd combined the ebony tree pattern with the maple-burl background. After sandwiching them together as shown, he cut away pockets for the snow on the branches, and married that with the snow pattern, which he routed from a sheet of holly veneer on another pine backer.



Saw off most of the backer before glue-up. Sand away the rest later to reveal the image.

FLIP AND LAMINATE



MITZ TAKAHASHI

Montreal, Que., Canada

When Takahashi was in art school, he fell in love with mid-century Scandinavian design. Later, while in cabinet-making school, he discovered a large box of offcuts and realized he could recycle these offcuts while creating furniture. This cabinet (10 in. deep by 40 in. wide by 46 in. tall) combines the two discoveries. He made the front panel with thin strips of scrap walnut, cherry, mahogany, birch, and maple. He glued the strips together, planed the resulting board to 3/16 in., and then laminated it to a piece of MDF. The cabinet is finished with Danish oil and water-based polyurethane.



JOHN REXROAD

Killingworth, Conn.

Rexroad made this spice box as a wedding gift for his wife. But the box (10 in. deep by 15 in. wide by 19¾ in. tall), made of walnut with holly and cedar stringing and bird's-eye maple drawer fronts, was also an opportunity to expand his woodworking skills. He had never done string inlay before, and a class with *FWW* contributing editor Steve Latta got him started. The finish includes grain-filler, stain, glaze, shellac, and wipe-on varnish. PHOTO: MICHAEL PEKOVICH



DAVE HELLER

Charlottesville, Va.

When Heller wanted to make a computer table a couple of years ago, he remembered a table he'd seen in this magazine in 1984 (*FWW* #48), built by the English Arts and Crafts furniture maker Sidney Barnsley. After seeing another Barnsley table, Heller added curves to the hayrakes on his version. The chip-carving decorating the legs and the tabletop took close to 15 minutes per foot, but Heller says it was worth the effort for the visual and textural treat it provides. The table is made of quartersawn white oak. It is 34 in. wide by 80 in. long by 27 in. tall and is finished with Waterlox.



REID ERIC ANDERSON

Seattle, Wash.

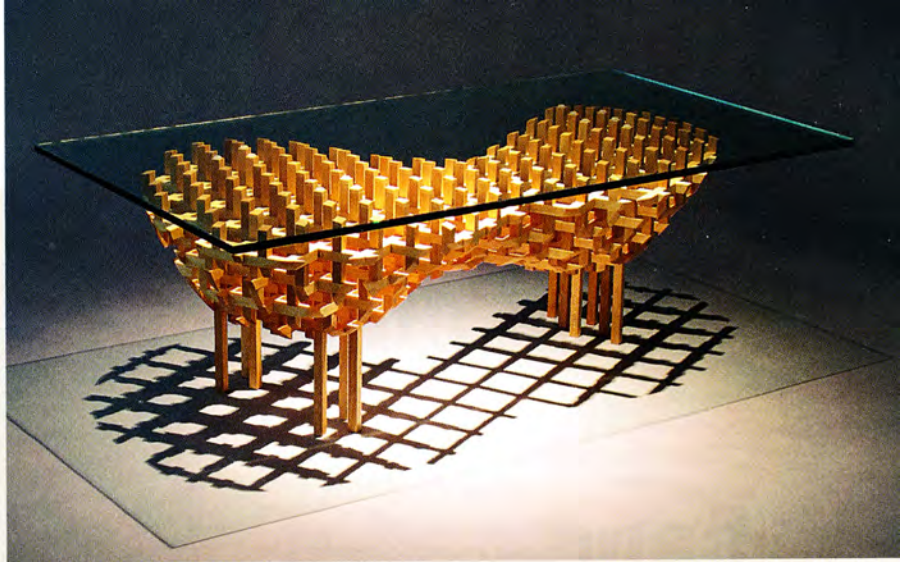
This chair (30 in. deep by 60 in. wide by 26 in. tall) is based on Frank Lloyd Wright's barrel chair from the Darwin Martin House in Buffalo, N.Y. (right) After building replicas of the original chair with his father, Anderson experimented with the design and eventually created this playful version in white oak. The chair has 100 mortise-and-tenon joints. The curved hoops are bent laminations, each using seven pieces of oak. The finish is shellac. PHOTO: DARTON DRAKE



WINNING WOODWORKERS IN TEXAS

For 13 years, the Texas Furniture Makers Show has been promoting the talents of the state's woodworkers with an annual exhibit in Kerrville. The show last November featured the work of 42 furniture makers. Here are some of the award winners.

PHOTOS, EXCEPT WHERE NOTED: CHRIS KEMLER



DANNY KAMERATH

Dallas, Texas

Judges' Special Award

Kamerath cut nearly 900 half-lap joints—one at a time—while building this afzelia and glass coffee table (26 in. wide by 48 in. long by 15½ in. tall). After constructing the basic form of the table, Kamerath used a handheld grinder with a saw-wheel attachment, followed by a sanding disk, to attain the final shape. The 12 legs touching the floor also support the glass top. He finished the table with Danish oil.

PHOTO: DANNY KAMERATH

JAMES BREAU

San Antonio, Texas

Best Contemporary

When creating this mahogany coffee table (32 in. dia. by 18 in. tall), Breau started with a round marble top he had bought several years ago and used SketchUp drawings to design the base. He used bent laminations to form the counter-curving stretchers and finished the table with wipe-on polyurethane.



JOHN BURTON

Arlington, Texas

Best Apprentice

The Homestead Heritage School in Elm Mott, Texas, offers a class on building a blanket chest. Although Burton didn't attend the class, he admired the chest and adapted the design, adjusting the base and the dimensions. The chest (18 in. deep by 36 in. wide by 20 in. tall) is made of cherry with a curly maple panel in the top. Burton has been woodworking for less than three years, which qualified this piece for the apprentice award. He finished the chest with an oil-varnish mix on the outside and shellac inside.



BERT RAY

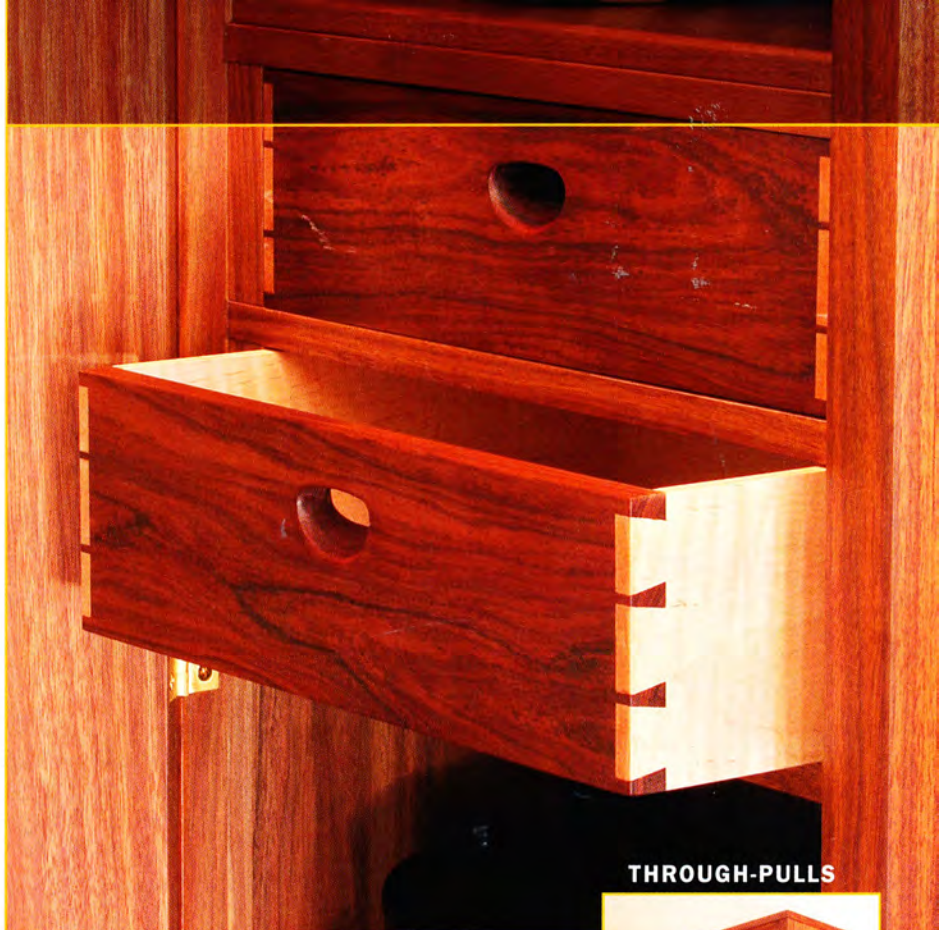
Third Place

The five floral inserts on the top of this hall table (18 in. wide by 54 in. long by 30 in. tall) are made of 1,380 small veneer segments from 11 different species. The centers are Sugilite, a semi-precious stone. Ray constructed the table with hand-cut veneers of mahogany for the base and Honduran rosewood for the top, all over a birch plywood substrate. He takes pride in the fact that he doesn't use any stains, tints, or dyes in his work, letting the natural colors speak for themselves. Ray finished the table with hand-polished cellulose lacquer.

master class

Carved pulls give a handmade touch

USE THEM BEHIND DOORS
OR LET THEM BE A FOCAL POINT



THROUGH-PULLS



STOPPED PULLS



BY TIMOTHY
COLEMAN

Handmade drawer and door pulls are the perfect finishing touches on a fine piece of furniture. Yes, they do the job

of opening and closing, but they do much more. They can create a focal point, add a contrasting dash of color or texture, or add a touch of whimsy.

The usual approach is to make a projecting pull or handle of some kind, but there are times when that pull just doesn't seem right, or is not practical, as in drawers located behind doors. For these situations, a pull that is carved into the surface can be an ideal solution. It's a technique I learned from Jim Krenov, my teacher in the 1980s.

Two approaches I've used numerous times over the years are pulls that go all the way through the drawer front and pulls that are carved only into the surface—I call them stopped pulls. Both designs are sloped at the top to make it easy to catch hold with one or two fingers and pull the drawer out.

In this article, I will guide you through the process of carving the through-pull, which is the most basic approach. You won't need a bundle of carving tools for the job. Although a carving



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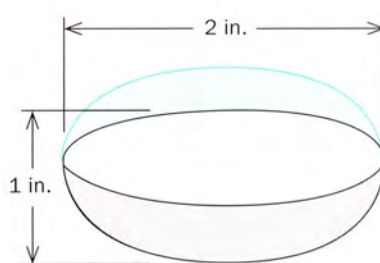
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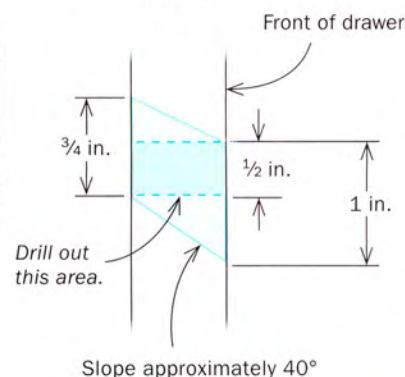
Through-pulls

Coleman begins the through-pull with some drilling and uses a large carving gouge to waste away material quickly. He uses narrower gouges to get into the tight spots, but you don't really need them. You can finish the job with files.

FRONT VIEW



SIDE VIEW



WORK FROM THE FRONT



Trace it. Use a combination square to locate the pull from the top edge of the drawer. Align the centerline of the template with the centerline of the drawer front. Because the inside surfaces slope upward, mark the orientation of the drawer front.



Drill out the waste. Drill all the way through to waste away material in the middle.



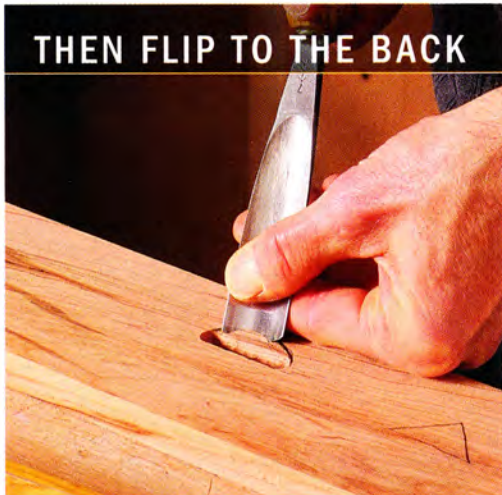
Tenon prevents blowout. With the drawer front faceup, insert a short tenon, which acts as a stop for the gouge.



Start at the bottom rim. With the drawer front faceup, Coleman uses a #8-20mm gouge to rough in the slope that starts at the bottom and goes up toward the back (see side-view drawing above). Once most of the material is removed, he removes the tenon and uses the same gouge to cut with the grain along the top (right).



THEN FLIP TO THE BACK



Same tools, same methods. With the drawer front facedown, use the same wide gouge to carve the top portion of the pull. Work against the grain and then with it to create an easy-to-grasp undercut.



Check by feel and by eye. The undercut at the top is difficult to measure as you work, so you need to check how it feels with your fingers (inset). You want enough undercut that your fingers can pull without slipping out. You also need to see how it looks from the outside (above).

gouge with a moderate to severe sweep is necessary to start the curved excavation, you can finish up with rasps, files, and sandpaper, if needed. I'll also show you how to do the stopped pull, which does require a few more carving tools. In each example, I carve the pull with the drawer front cut to size but before the joinery is cut.

Trace first, then rough it in

I begin by making a full-size template that shows the outline of the pull on the surface. This is a simple cardboard cutout that I use to transfer the outline from one face to another. I also draw a cross section that shows the thickness of the drawer front, the slope of the pull, and the undercut needed for fingers to grab onto. The undercut is the most important part of the pull, and while a drawing can be a rough guide, it is mostly worked out in the process by feel.

If I'm making more than one pull, I lay out all of them at the same time but carve each pull, one at a time, close to completion. Then I'll compare the lot and fix any distracting variations. I want the pulls to look alike, but it's important for me to retain the handmade look and feel.

My pulls are primarily created with carving tools, but with a through-pull I drill a mortise all the way through to waste away material. Then I insert a stub tenon into the mortise to act as a stop for the gouges I'll use to begin roughing out the recess.

I typically start by shaping the lower part of the pull, with the front faceup. Working in this order gives me more room later to maneuver the tools for the upper part. I use a wide carving gouge with a wide sweep (#8-20mm) to waste away material quickly. I then move to a #7 gouge, which has a shallower sweep (27mm), to refine the interior. With both tools I work across the grain first, and then with it to minimize tearout.

Once I have the lower slope roughed out with enough room to slip in a finger or two, I flip the piece over to work on the top portion, which slopes upward from the face of the drawer front to the back at about 40°. This undercut is



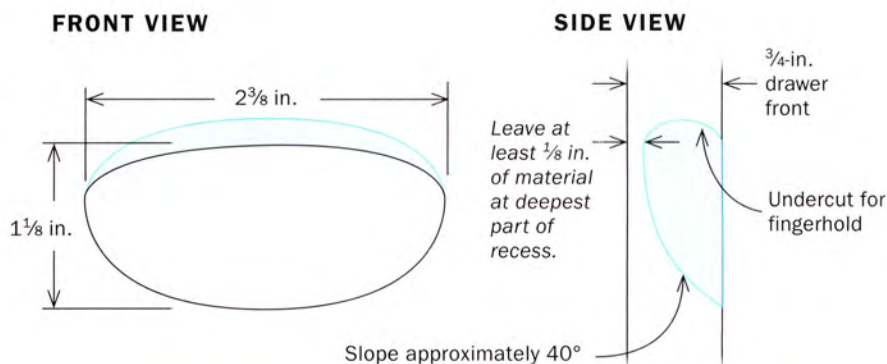
Finish with files. Though narrow gouges are handy for tight areas, files work, too. A 6-in. half-round file handles the broad surfaces (left). Needle files can handle the inside corners (right).



Kiss with sandpaper. Finish by easing the edges with P400-grit sandpaper, but don't remove the tool marks.

Stopped pulls are trickier

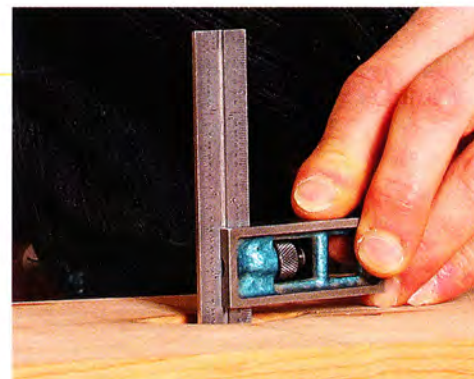
With a stopped pull, you can't clear the waste by drilling. The biggest challenge is carving the undercut at the top, where the confined space requires a greater variety of gouges, especially smaller ones. The drawer front must be at least $\frac{3}{4}$ in. thick to hold a pull that's deep enough to grasp firmly.



DIG IT OUT



Work around the rim. Use a #8-20mm and #7-27mm gouge to rough in the perimeter. Work across the grain first (left), then with it (above).



Check the depth. Use a combination square or a caliper with a depth gauge to measure the depth. This will help you avoid making an accidental through-pull.

difficult to measure as you work, and it is only by feeling it with my fingers that I get it right. I want enough undercut for my fingers to catch onto comfortably so they don't slip out when I pull. Sometimes this means digging out more material at the undercut, sometimes it's a matter of deepening the recess below.

Refine, but leave the facets

Now I have the outline of the pull clearly established and the bottom slope and undercut above where I want them. There still is some roughness to the surfaces and irregularities that need to be smoothed out with files.

When using the files, I don't want to fully erase the tool marks made by the gouges. These subtle facets are not only a sign of fine craftsmanship, but a delight to feel as well. When making multiples, it's here that I compare all of them and use the files to fix any major mismatches on the front. Inside, slight variations don't bother me. They can't be seen, and they only add to the hand-worked character.

Finally, I use P400-grit sandpaper around the perimeter to break any hard edges and to smooth the leading edge and surface of the undercut. Again, I don't want to erase the tool marks.

The pull is done at this point, and the drawer is ready to be joined and assembled. □

Tim Coleman is a renowned furniture designer and maker.



Get under. You need a smaller gouge to create the undercut at the top of the pull (left). Coleman uses a #8-4mm gouge there. In the middle (right), he uses a #8-10mm and a #5-10mm.



Get a feel for it. Gauge your progress by feeling the pull. You want to be able to grab the undercut comfortably with two fingers.

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Go for comfort when picking a shooting-board plane

Q: I'd really like to start using a shooting board to trim end grain and clean up miters. Do I need a special plane or can I use my No. 4 smoother?

—WALT NEWSOME, Atlanta, Ga.

A: YOU CAN USE YOUR SMOOTHER, or any traditional bench plane, with a shooting board. However, these planes are not very comfortable to use on their side, as you need to do with a shooting board. I started out using my smoother—and it worked—but I would often end up with cramps and bruises because the frog interfered with my grip. Switching to a low-angle jack plane solved that problem. The bevel-up design eliminates the frog, so the plane is very easy to grip and use in shooting position. Plus it has a bevel-up blade bedded at a low angle that cuts through end grain a bit more easily.

—Matt Kenney is a senior editor.



Good grip. Low-angle, bevel-up planes slice end grain better than bench planes, but what makes them truly great for shooting boards is that they are comfortable and easy to hold when riding on their sides.



Two options. Planes like the Veritas low-angle jack plane (right; \$225, leevalley.com) are great for both shooting-board use and regular use. Lie-Nielsen makes two dedicated shooting-board planes: the iron miter plane (shown; \$375) and the No. 51 shoot board plane (\$500; lie-nielsen.com).

How to install a bandsaw fence

Q: Based on Asa Christiana's recommendations ("Bandsaw Fences," *FWW* #230, p. 55), I bought the Grizzly resaw bandsaw fence. However, I am not clear on how to set the fence's cursor because the fence can be set up three different ways. Also, should I put the fence on the right or left side of the blade?

—IKE WEATHERHOLTZ,
Falling Waters, W.V.

A: MOST WOODWORKERS USE THE FENCE on the left side of the blade, because it gives unlimited room out to the right for a large workpiece. Set the cursor with the aluminum fence in the tall position. That's how you'll use it most often.

Start by setting up the blade and guides. Then square the table to the blade. Bring the fence lightly against the blade's teeth. Finally, align the fence's cursor with the "0" on the tape.

—Asa Christiana
is *FWW*'s editor.



Attach the fence in the "tall" position. Slide it over to the blade, so that it just barely touches the teeth (left). Now align the cursor to the scale's "0." Simply loosen the screws and move the cursor, which has oversize holes for the screws, right or left.

Make veneered doors look like solid wood

Q: Michael Fortune says that when making curved doors, you should first glue together the flexible plywood plies that make up the door's core and then, in a separate step, glue the face veneers to the core ("Curved Panels Made Easy," FWW #210, p. 69). However, wouldn't it save time to glue up the core and the face veneers all at once?

—MICHAEL KAPLIN,
Santa Fe, N.M.

A: YOU WOULD SAVE TIME by gluing up the core and face veneers at the same time, but the resulting door would not be as attractive as one glued up in stages. In order for the door to look like it was made from solid wood, its edges must be covered with a thin solid-wood banding, and that banding must go on before the face veneers.

If you glue up the core and face veneers at the same time, then you'll be forced to add the banding afterward, and you'll see the glue lines on the front of the door. However, if you glue up the core by itself, you can add the banding next and then cover it with the face veneers in a third step. The door front and back will be seamless, and even the glue line on the door's edge will disappear when you lightly chamfer the corner.

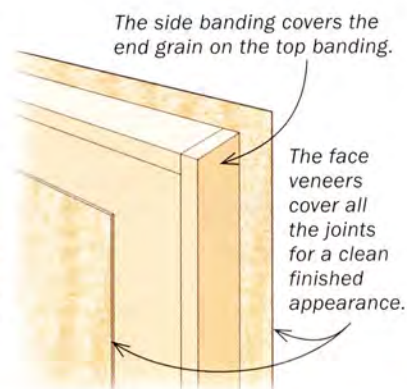
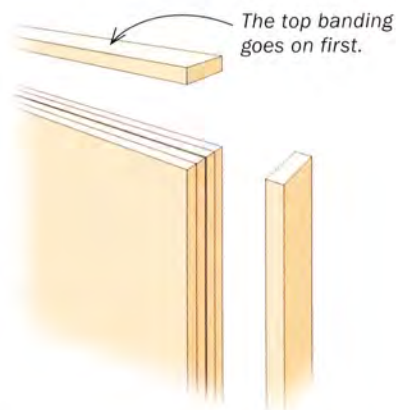
—Michael C. Fortune is
a contributing editor.

SOLID WOOD HIDES THE EDGES

A glued-up curved panel looks like a piece of plywood. And layered edges are out of place in traditional furniture.

FACE VENEERS HIDE THE GLUE JOINTS

Commercial veneer is so thin that when you chamfer the panel's edges, the glue joint between the veneer and panel disappears. The joint between the banding and core is completely hidden, too.



Have you heard?

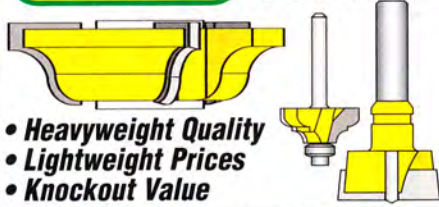
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Revive dull auger bits in three steps

Q: I bought a set of double-flute auger bits that I'd like to put to use, but they're all kind of dull. How do I sharpen them?

—JIMMY CLEMENT,
Jamestown, N.Y.



A: WHEN SHARP, AUGER BITS slice cleanly and quickly through wood with minimal effort. There are three things to check before you can use the bits. The lead screw, which pulls the bit into the wood, must be straight and have clean threads. The cutting spurs, which cut the outside of the hole, must be sharp and the same height as one another. Finally, the ramps, which clean out the interior of the hole, should be sharp.

If the lead screw is bent, straighten it with a pair of needlenose pliers. Clean up the threads and correct minor damage to them with a feather file.

Next, sharpen the two cutting spurs with a small

triangular file, taking care not to cut into the ramps. Work only on the inside face of the cutters. If you file the outside face, you'll change the bit's diameter. And be careful to keep the spurs the same length (the bit won't cut straight and clean if they are different lengths).

Finally, sharpen the ramps. These ramps function like plane blades, except that they turn around an axis. Sharpen them by moving the triangular file in an upward motion along the ramp and toward the flute. Take care to maintain the ramps' angle and to remove the same amount of material from each one.

—Michael Cullen is a furniture maker in Petaluma, Calif.



Start with the spurs. File the inside edge only, maintaining the slope that's already there.



Same for the ramps. Work the inside of the ramp, maintaining the existing angle and working up into the flute.

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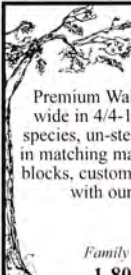


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Not-quite-secret drawers

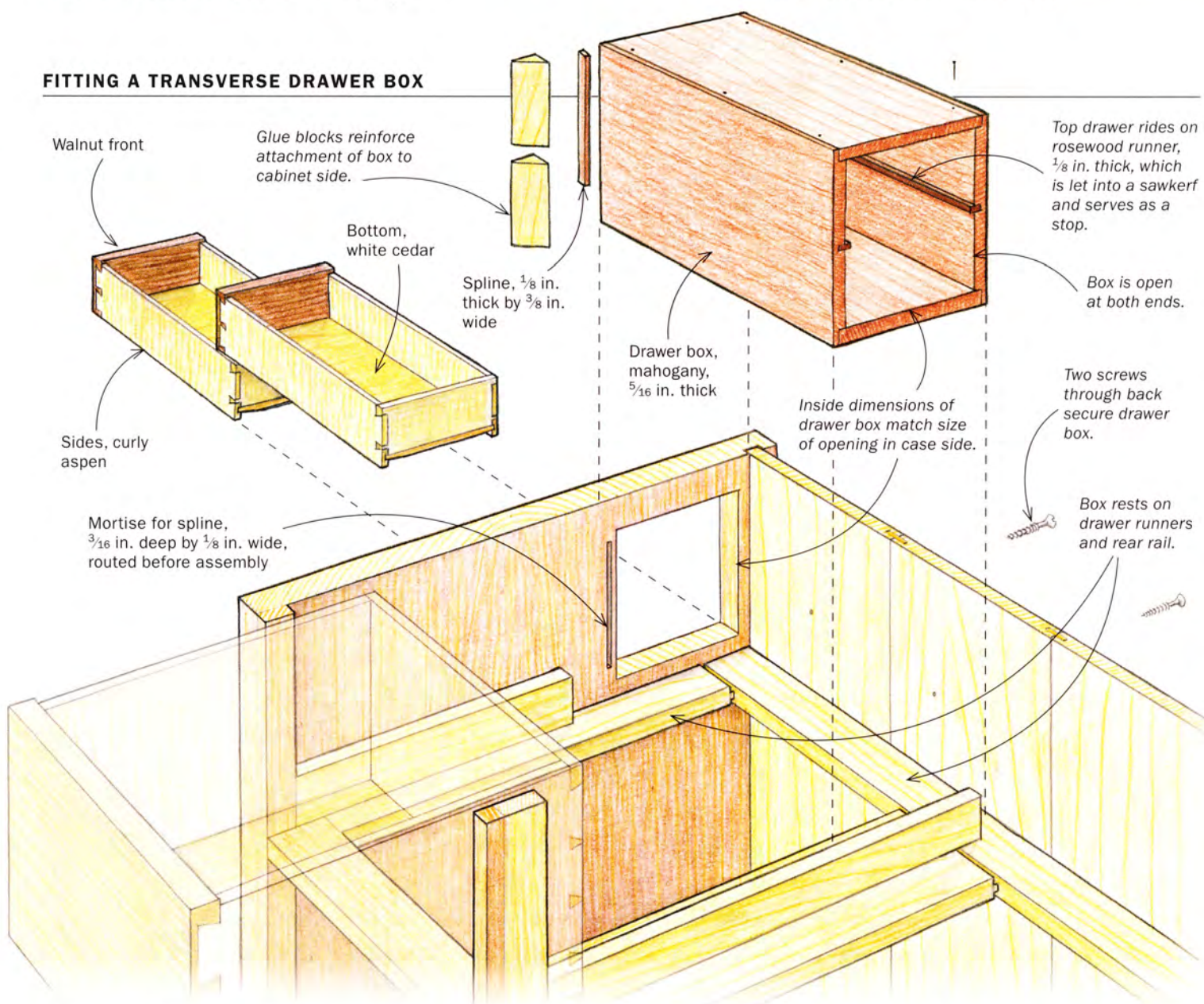
BY JONATHAN BINZEN

Garrett Hack initially considered building a secret compartment into his butternut bureau (see the back cover). But he chose instead to add a pair of tiny drawers to the side of the chest. He made a special drawer box for them and fitted it to the inside of the carcass side. The box is supported by the runners for the bureau's top left drawer, which Hack shortened. What the little drawers lack in secrecy, they deliver double in playfulness and delight.



I'll have two drawers on the side. The diminutive drawers travel through a hole in the solid butternut case side and rest in their own drawer box.

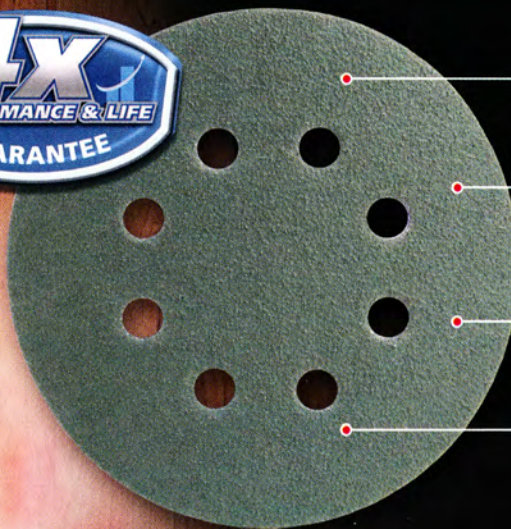
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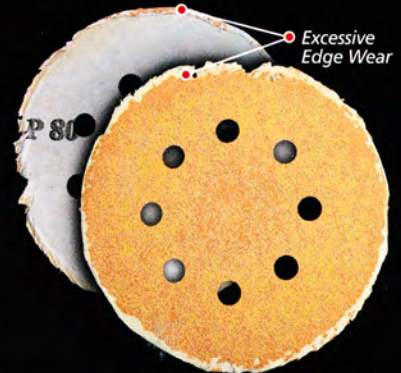
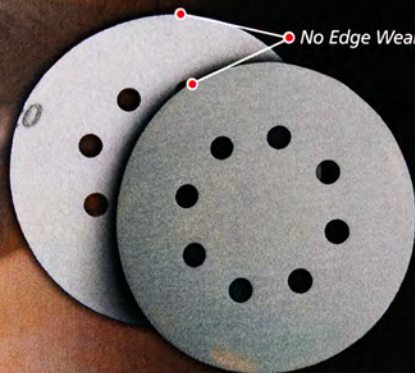
Coating resists material build-up on the abrasive surface

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Unlike traditional paper discs, Shopsmith's Film Back Discs resist tearing and edge wear providing 4X longer life.

The samples below demonstrate the durability of Film Back Discs compared to paper discs of a typical brand.



*Each disc tested in a controlled environment with the same surface type, speed, and time.

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Butternut Beauty

In Garrett Hack's furniture, Shaker lines blend with Federal classicism.

But there's also playfulness in proportions, richness in materials, and usually a decorative surprise or two.

In this new bureau he's combined butternut—walnut's fraternal twin, which

Hack calls "a joy to work"—with rosewood pulls, ebony cock beading and

quarter-columns, and two pairs of tiny drawers in walnut, one with wavy inlays of abalone, the other tucked around the side of the case in another deviation from the standard script.



Built for a client in Charleston, S.C., and destined to travel up a narrow staircase to the third floor of a 200-year-old house, Hack's new bureau was fashioned to be as light as possible. He assembled the case with sliding dovetails, which saved weight by enabling him to dispense with a subtop

and a separate base. And he used light secondary woods—pine for the back, bottom, and center divider, white cedar for the drawer bottoms—and made these parts as thin as practical. He proved in the process that less bulk can mean more beauty.

—Jonathan Binzen



Photos: Bill Truslow

How They Did It Turn to p. 90 to see how Hack designed the tiny side drawers on this bureau.

Slide Show To see a slide show with more exceptional work from Hack, go to FineWoodworking.com/extras.