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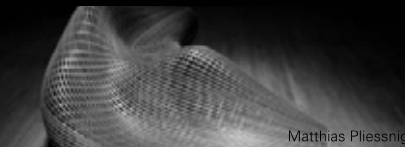
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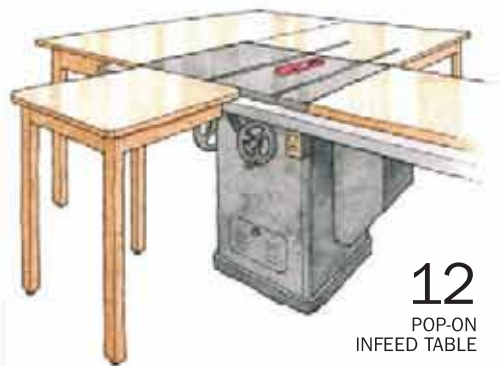
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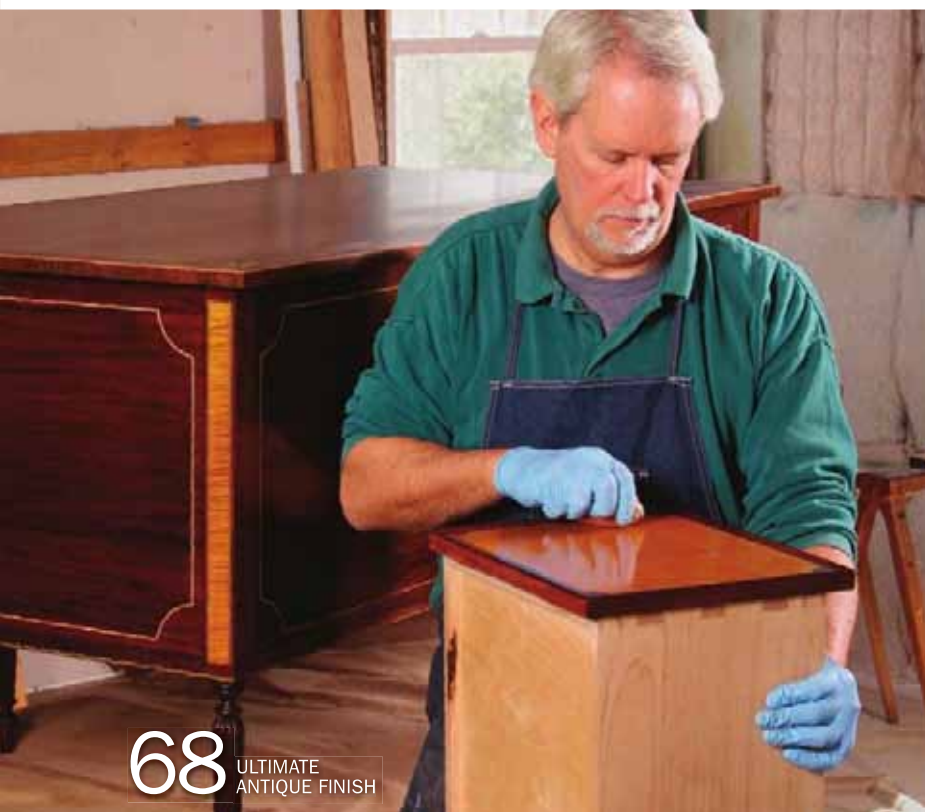




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VIDEO: Scratching the Surface

Routers are the tool of choice for profiles, grooves, dados, and more. But they have limitations. A simple scratch stock (pp. 50-54) can deliver custom details that a router can't. Watch the author make and use these versatile hand tools.



VIDEO: Sizing Up Trim Routers

A new breed of compact routers (pp. 38-43) is perfectly suited to furniture making. Find the features that are right for you.



VIDEO: Tackling Tearout

See five easy techniques for taming router tearout from furniture maker Gregory Paolini.

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Beautiful Butterflies

See more of Michael Fortune's butterfly table designs (pp. 60-67).

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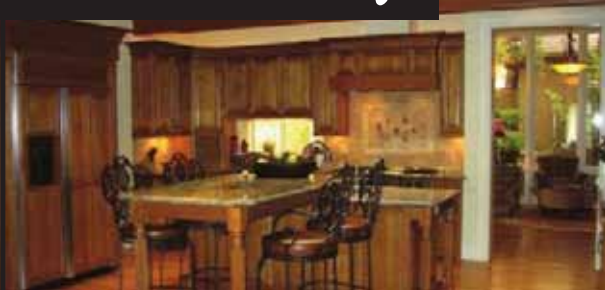
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contributors

Dan Faia (“*Period-Perfect Bracket Feet*”) is a custom furniture maker and the head of the Cabinet and Furniture Making department at Boston’s North Bennet Street School. When he’s not building furniture, he teaches occasional workshops at various woodworking schools in New England. Faia likes to get outdoors to hike, fish, or paddle a canoe. He and his wife share their home with an Irish terrier and a snowshoe cat.

What is the most unusual piece you’ve made? I was commissioned to carve a codfish, about 38 in. long. The client had it gilded and hung on the outside of her house (there is a “legend of the golden cod” in fishing communities).



David Moore (“*The Power of the Simple Scratch Stock*”) works as a custom furniture maker in his hometown of St. Louis. His shop also serves as practice space for Kid Scientist, the pop quartet he performs with (Moore plays drums). You might also find him preparing with his brothers for the MR340, an annual canoe race on the Missouri River. The Moore crew came in 13th last year in a field of more than 200 boats.

Last thing you made: A tattoo shop sign, a coffee table, and mahogany veneered seat rails for an antique chair I am repairing.



Clark Kellogg (*Handwork: “Cut better dovetails with shopmade tools”*) is a furniture maker from Houston. After graduating from the Center for Furniture Craftsmanship’s Nine-Month Comprehensive Program in Maine, and the College of the Redwoods’ Fine Woodworking Program in California, he’s glad to be home, even though life in Texas means he may encounter a huge spider or two.

If you weren’t a furniture maker, you’d be: A weatherman, masked avenger, or world-champion break-dancer ... one of those three.

A short stint working in a furniture restoration shop led **Peter Gedrys** (“*Antique Finish that Holds Nothing Back*”) to open his business, Architectural Finishes, 24 years ago. In addition to restoring 18th and 19th century furniture, his repertoire includes fine interior work and, as seen on pp. 68-75, reproducing classic finishes on new furniture. He also teaches classes on a wide range of finishing subjects. His work can be seen at petergedrys.com.

Proudest achievement? Restoring the furniture in the J.P. Morgan Library and Museum in New York City.



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

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Spotlight

ISSUE NO. 218
March/April 2011
p. 14

FOAM BOARD MAKES A POOR SLED

I have been a reader of your fine magazine since my college days (that adds up to quite a few years, I hate to say). The recent suggestion in *Methods of Work* involving a piece of teak, a rigid-foam sled, tape, and 10 fingers (going on 9) prompted me to voice my concern.

I own a custom architectural woodworking company, and if I witnessed one of our folks attempting this, it would be fodder for a significant discussion at our weekly meetings.

In my opinion, using a light piece of foam and a few pieces of tape is sketchy at best. Get that workpiece well-secured, using clamps and/or stops, to a piece of plywood or MDF of sufficient length and weight to prevent kickback.

Save the tape for masking, and please keep your fingers out of alignment with that blade!

—MICHAEL DROBET, Mattituck, N.Y.

Editor's note: Point well taken, Michael. Note that the wood in question was a short, thin piece of teak paneling, and there was a warning not to use the technique for "long workpieces," but I would expand that to include thick or wide workpieces, too. Following on your point, it doesn't take much longer to make a more solid jig than the one shown. I would screw some De-Sta-Co clamps to a piece of MDF or plywood.

—Asa Christiana

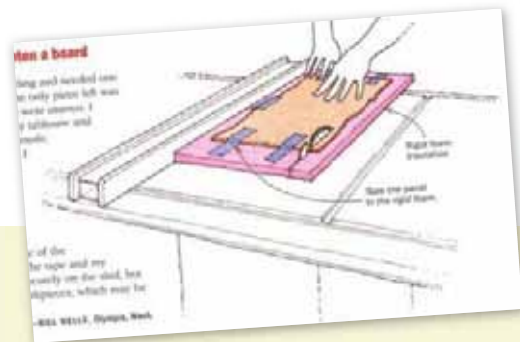
Will steel wool stain wood?

In "Wiping Varnish: The Only Finish You'll Ever Need" (*FWW* #218), Michael Pekovich uses steel wool to rub out the finish, first dry and then with water as a lubricant. I learned early on that steel wool or any ferrous metal will stain certain woods by reacting with the tannic acid within. And even if the wood is sealed, there's still a chance of a reaction, or the steel wool fibers rusting, defacing an otherwise beautiful piece of woodwork. That's why I use a non-metallic buffing

pad like 3M's Scotch-Brite ultra fine, or bronze wool.

—BRUCE HORKEY, Windom, Minn.

Michael Pekovich replies: *I never use steel wool on unfinished wood, only on finished surfaces. In 30 years of finishing, I've never had a problem with rust or discoloration, but I use only oil-based finishes. I've read that when using water-based finishes, steel wool should be avoided and bronze wool is a good option.*



Correction:

The description of Annette Koehnen's chair in *Readers Gallery*, *FWW* #219, was for one of her other chairs. The correct description is shown here.

Koehnen built this European ash chair (28 in. wide by 17 in. deep by 40 in. tall) as part of a commission for a dining table and 12 chairs. The challenge was to design a handsome, comfortable chair at a reasonable price. All of the curved parts are steam-bent, and the finish is Osmo Polyx-Oil.



I've used Scotch-Brite pads on occasion, but I don't like their inflexibility, especially when working into corners or molded profiles, and the scratch pattern doesn't seem to be as uniform as that of steel wool. By the way, I like the results I get with Liberon steel wool over the steel wool available from the hardware store.

Setting up a lock-miter bit

In "Dial In Setups with a Height Gauge" (*FWW* #218), Richard Babbitt used the gauge to set up a lock-miter bit. His method works well if the steps on the bit are flat, for easy measuring. But other bits, like the MLCS Katana No. 17850 bit that I own, have angled steps. Fortunately, there is a solution: Just measure right at the tip of the angled surface, and then follow Babbitt's approach. It's a little bit harder to do but it works. Keep up the great articles and great magazine.

—TERRY V. HASLETT, North Hills, Pa.

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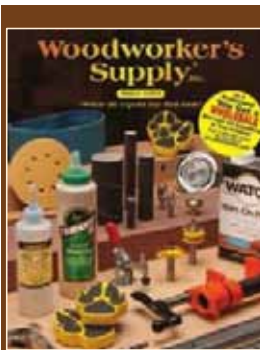
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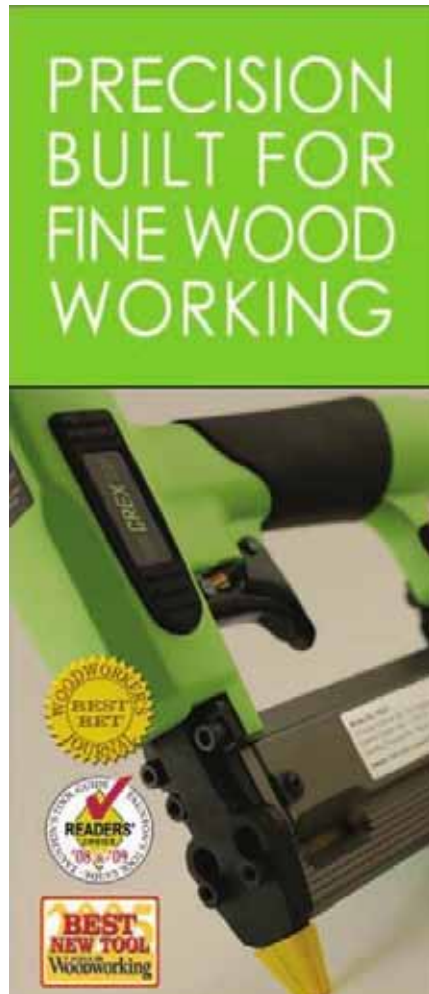
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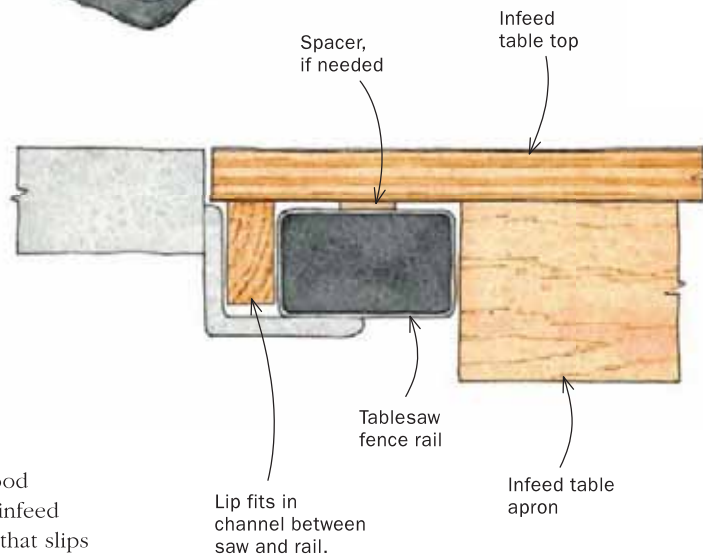
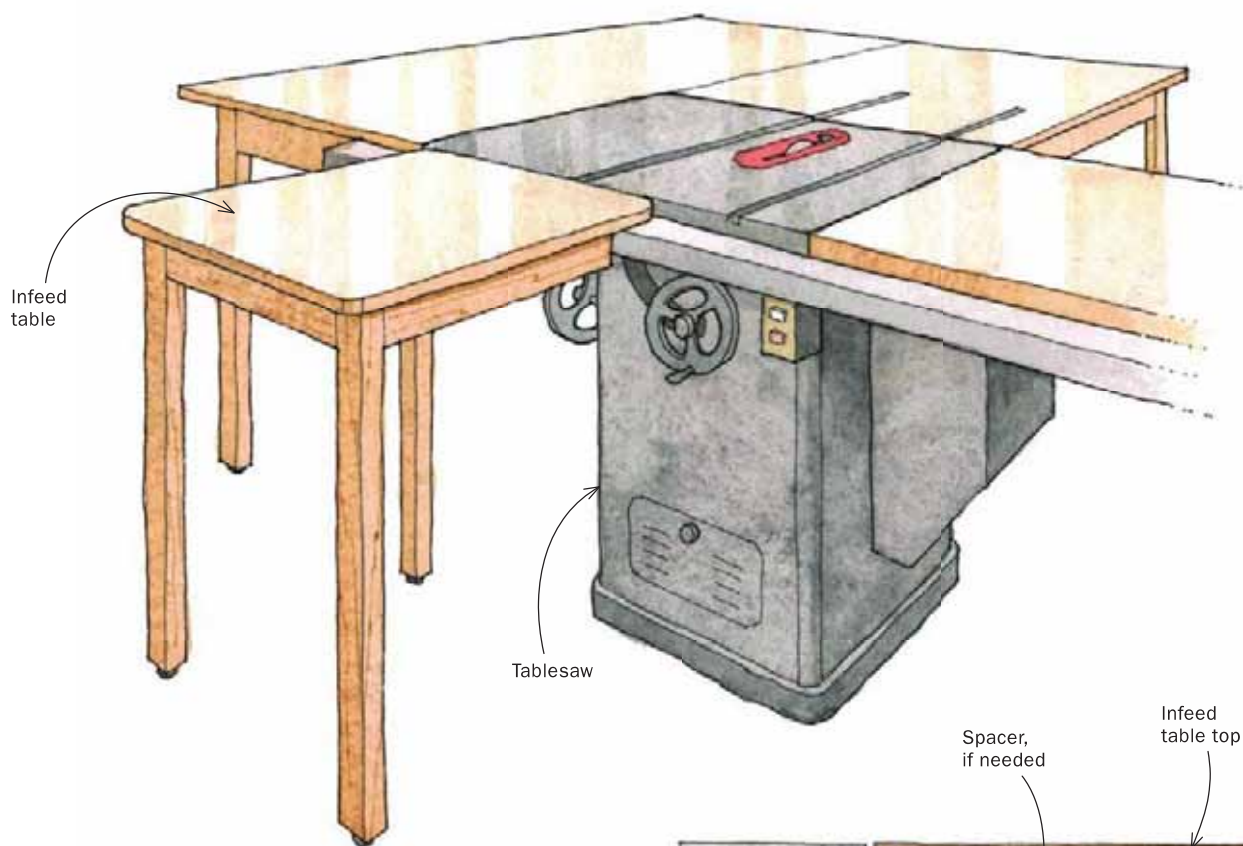
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Best Tip **Pop-on table makes plywood easy to cut**



Charles Riccardella, an aerospace professional, says he uses woodworking as an outlet for his stress at work. According to his wife, he spends all of his free time woodworking and creating furniture for their home, children, and friends.

To handle large, unwieldy sheets of plywood on the tablesaw, I use this simple pop-on infeed table. The table features a lip on the front that slips into the channel between the fence rail and the tablesaw. My saw has a Biesemeyer fence, but I imagine the same concept could be adapted to most other fence designs. With the table in place, I can focus my attention on keeping the stock against the fence instead of also struggling to support a heavy sheet.

You can slide this compact table to any position on the front of the saw. This allows you to push it aside to finish the cut comfortably.

—CHARLES RICCARDELLA, Springboro, Ohio

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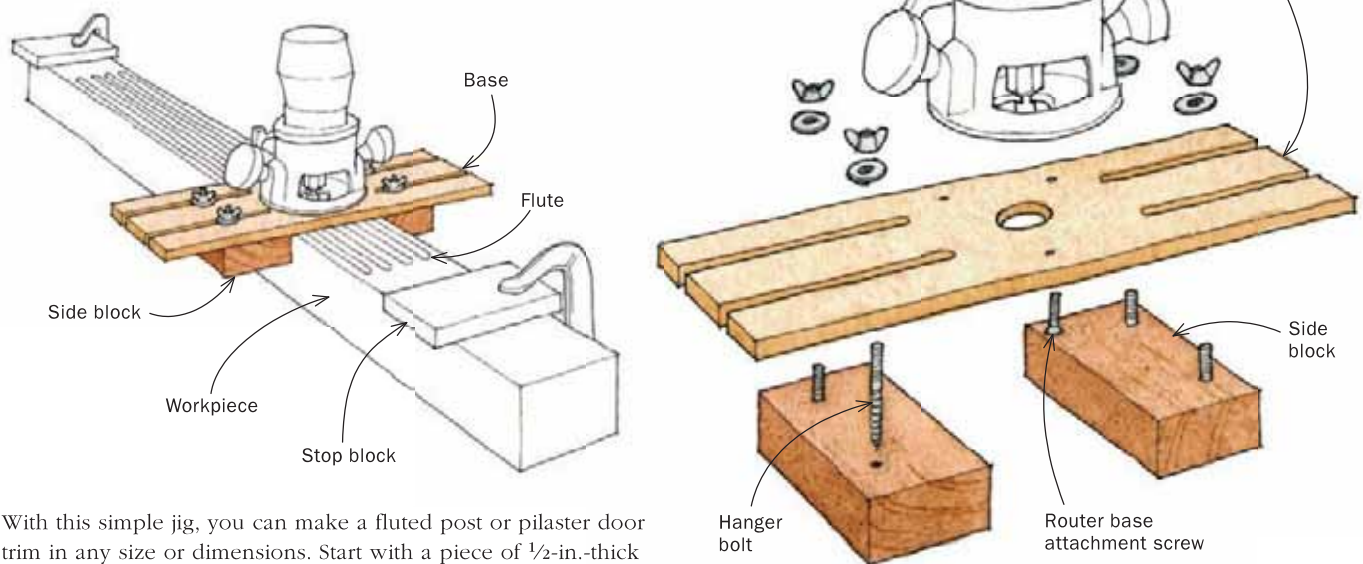
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Router jig for fluted posts and trim



With this simple jig, you can make a fluted post or pilaster door trim in any size or dimensions. Start with a piece of 1/2-in.-thick Baltic-birch plywood as wide as the base of your router and at least 18 in. long, to handle a workpiece 6 in. wide or less. Remove the baseplate from your router and, using the mounting screw holes as a guide, drill mounting holes in the plywood base. Now use a bandsaw or router to cut two slots in each end of the base, right up to the edge of the router location. Finally, drill a center hole in the base for the router bit.

Make two adjustable side blocks. To rout flutes in a square post, these blocks should be at least 1 1/2 in. thick. If you are making pilaster trim, the blocks should be the same height as the workpiece thickness, probably 3/4 in. The blocks need to be wide enough to extend under the router base so you can cut

flutes near the edge of the workpiece. Install two hanger bolts near the outside edge of each block, spaced the same width as the slots in the base. Add a washer and wing nut to each bolt and the jig is complete.

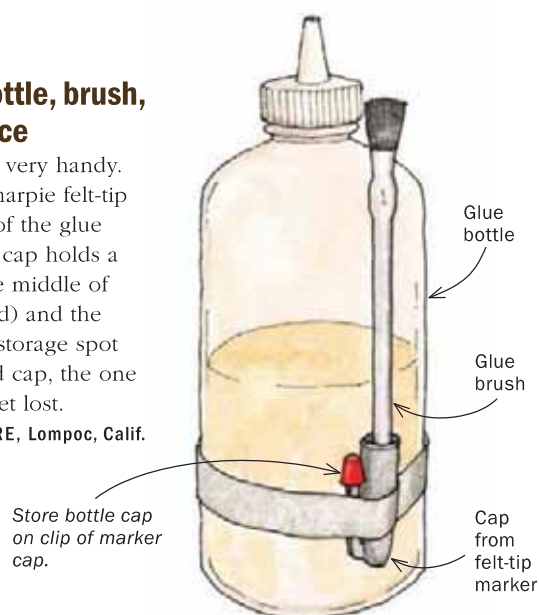
To use the jig, simply position the router at the flute location, bring up the side blocks to the edges of the workpiece, and tighten the wing nuts to lock the side blocks. Make sure the jig slides freely but without any side-to-side play. Install a stop block at the beginning and end of each flute run for accuracy.

—FRANK PROFITI, Toronto, Ont., Canada

Keep your glue bottle, brush, and lid in one place

This idea is simple but very handy. It's just a cap from a Sharpie felt-tip pen taped to the side of the glue bottle. The hole in the cap holds a glue brush (both in the middle of glue-ups, and afterward) and the clip provides a handy storage spot for the bottle's little red cap, the one that always seems to get lost.

—NICK OBERMIRE, Lompoc, Calif.



Quick Tip

I've been a professional woodworker and CNC operator for years. When we send our blades and bits out to be sharpened, the sharpening service first dips them into a strong industrial metal cleaner. It turns out that this cleaner is chemically identical to Easy-Off oven cleaner (I use the kind in a pump spray bottle). Keep some in a jar for router bits. Drop them in and let them soak for a few hours if they're really bad. For a sawblade, spray each side and wrap the blade in heavy plastic. Rinse in clean water, add a little oil to the router-bit bearing, and you're good as new.

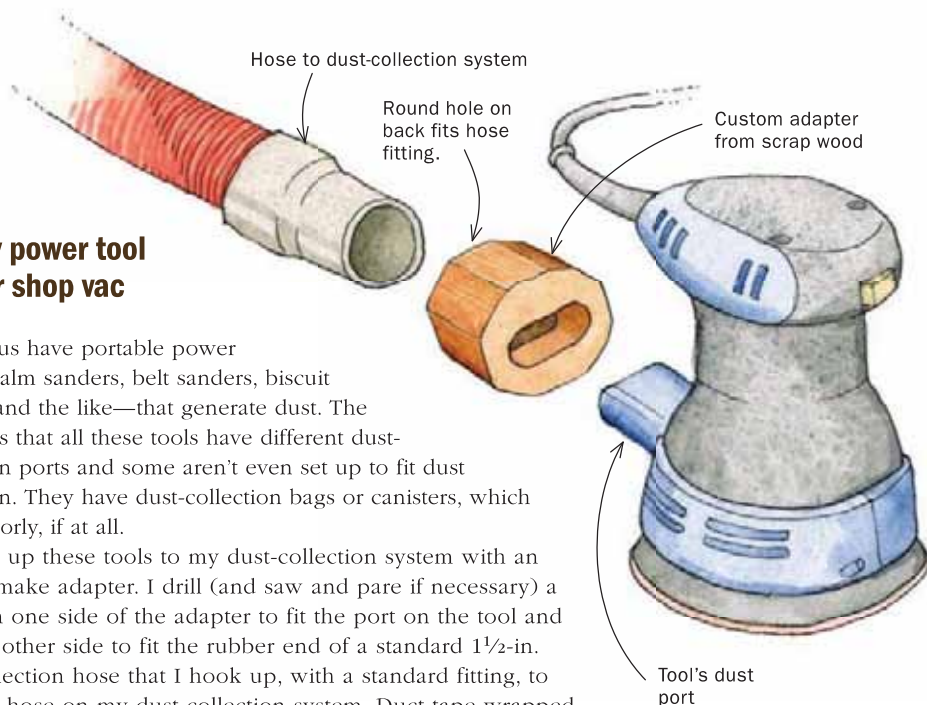
—BRIAN ROBERTSON,
Oshawa, Ont., Canada

Fit any power tool to your shop vac

Most of us have portable power tools—palm sanders, belt sanders, biscuit joiners, and the like—that generate dust. The trouble is that all these tools have different dust-collection ports and some aren't even set up to fit dust collection. They have dust-collection bags or canisters, which work poorly, if at all.

I hook up these tools to my dust-collection system with an easy-to-make adapter. I drill (and saw and pare if necessary) a recess in one side of the adapter to fit the port on the tool and drill the other side to fit the rubber end of a standard 1½-in. dust collection hose that I hook up, with a standard fitting, to the 4-in. hose on my dust-collection system. Duct tape wrapped around the joint helps seal any gaps if the fit isn't perfect.

—HOWARD HATCH, Brunswick, Maine



Quick Tip

A zero-clearance tablesaw throat plate will wear through over time, widening the space next to the blade. Rather than making a new insert, just use an automotive body filler, like Bondo, to refurbish the old one. Fill the saw slot solid with body filler, sand the surface smooth, and raise the blade through the insert. Body filler is also great for filling blade cuts in radial-arm-saw tables and restoring the missing parts of sacrificial fences.

—FRED TIETZE,
Gainesville, Va.

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tools & materials

■ FINISHING

Start spray finishing for under \$100

I WAS TAUGHT NOT TO JUDGE a book by its cover, but I broke that rule when the CommandMax HVLP sprayer arrived. This small, lightweight unit didn't look very promising. But after using it for a couple of weeks with a variety of finishes, I was pleasantly surprised by its performance.

I first sprayed a waterborne finish and then shellac. The waterborne finish required a little thinning, but the shellac (SealCoat) needed none at all. Both materials laid down very nicely.

The aircap has positive stops when rotated from horizontal to vertical to con-

ical patterns, a feature common on more expensive sprayers. Although the fan pattern is small, only about 3 in. to 4 in., I was able to spray a small table and chair. Overspray was easy to reduce by adjusting the fluid control.

Make no mistake: This is not the tool to spray dining-room tables with. However, for smaller projects you'll be impressed with its balance, performance, and versatility. Plus, you can't beat the price.

—Peter Gedrys finishes furniture in East Haddam, Conn.

CommandMax HVLP Sprayer

\$90

homeright.com



Plug and play. With a built-in motor, the CommandMax doesn't need a compressor.

■ MACHINES

Jointer-planer with no compromises

LIKE MANY WOODWORKERS, MY SHOP IS RELATIVELY SMALL, and I'm always looking for ways to optimize floor space without sacrificing utility. Enter the Rikon 12-in. combination jointer-planer (model 25-200), which provides big utility in a small footprint (19 in. by 26 in.) for a reasonable price.

One of the reasons a combination machine is so useful is that you get a wide jointer. In

this mode, the Rikon did not disappoint. A pair of 23¾-in.-long feed tables provides good support for long workpieces (overall length is 49 in.). The tables were very flat and coplanar. The 6-in.-tall aluminum fence offers good vertical support for edge-jointing and remained square to the table. The fence is easy to lock in place at any desired angle up to 45°. Switches are easy to access in both modes,



Big capacity jointer. With 12-in.-wide, 49-in.-long tables, the Rikon combo machine can mill almost any piece of rough lumber.

Quick change. Switching from jointer mode to planer mode, and vice versa, takes just 30 seconds.



■ HAND TOOLS

Small planes are a boxmaker's dream

SOME TOOLS ARE SO WELL CRAFTED that I keep them on my desk and fiddle with them as I contemplate things to be written or read. But if a pretty tool doesn't also function well in the shop, I'd just as soon forget it. The new detail rabbet planes from Veritas are at home in both places.

The planes are available in both imperial ($\frac{1}{4}$ in., $\frac{5}{16}$ in., and $\frac{3}{8}$ in.) and metric sizes (6mm, 8mm, and 10mm). They have a ductile iron body, with a brass tongue and palm rest, and a fixed



Veritas Detail Rabbet Planes

\$70 each

leevalley.com

mouth. Blade adjustments—depth and lateral—are made by loosening the blade clamping screw and moving the blade with your fingers or a small slotted screwdriver, which takes some getting used to. Another learning curve is sharpening the small blade, which has to be done freehand (fortunately, it's delivered sharp).

But after that, these tools deliver flawless performance, both with the grain and across it, and are perfect for cleaning up narrow dadoes and rabbets, say for box parts or the dividers in a desk gallery. They are a pleasure to hold and to use, and to keep on your desk.

—Doug Stowe is a boxmaker in Eureka Springs, Ark.

and dust and chip collection is very good.

The blade guard is European style, meaning it spans the width of the cutterhead to give you protection while face-jointing. Called a bridge guard, it takes some getting used to because you have to pass your hands over it. But having the cutterhead covered provides peace of mind. And it's easy to slide the guard out of the way for edge-jointing. In planer mode, the Rikon also is a solid performer. The surface quality was excellent and

the board ends exhibited nearly zero snipe, a real plus.

Changing the machine from jointer to planer mode takes just 30 seconds, which will help you work faster and more efficiently.

All in all, this tidy package represents a pretty darned good deal. For more information, visit rikontools.com. By the way, I'll be comparing this jointer-planer against other models in a future issue of FWW.

—Roland Johnson
is a contributing
editor.

Powerful planer. With a 3-hp motor, the Rikon has plenty of power, easily handling the maximum $\frac{1}{8}$ -in.-deep cut in hard maple.



**Rikon 12-in.
Planer/Jointer**
Model No. 25-200
\$1,700
woodcraft.com

■ BITS & BLADES

Carbide countersinks cut cleanly

WHEN I DRILL COUNTERSINKS FOR SCREWS, I have two goals: zero chatter and a clean rim on top. Amana's new countersink bits (amanatool.com) provide both, but with a twist. Unlike the steel countersinks I've owned, which tended to dull quickly, Amana's countersinks have durable carbide-tipped cutters (the first on the market).

To test their durability and cut quality, I drilled more than 200 countersinks in hard maple, brittle white oak, hardwood veneer plywood, and MDF. Then I used a magnifier to check out the quality of cut. I was impressed. From start to finish, the countersinks were crisp, clean, and chatter-free. The exception was the MDF, which had a bit of fuzz around the rims—easy to clean up, though.

The bits are available for Nos. 4, 6, 8, 10, 12, and 14 wood screws. You also can get countersinks for quick-release hex chucks and versions with tapered drills.

—Tom McKenna is senior editor.



**Amana Tool Carbide-Tipped
Countersink Bits**
\$21 and up (\$23 and up
for tapered drills)
amazon.com

■ PNEUMATIC TOOLS

Go-to nailer for any shop

AN 18-GA. BRAD NAILER is the essential size for most woodworkers. It's helpful for attaching moldings without splitting them, and it's small enough to use inside a case piece, say for attaching drawer runners and guides. It also makes quick work of building any number of shop jigs.

GreX's new 18-ga. brad nailer is a welcome addition to the family, putting all the features you'd want in a nailer into one lightweight tool. The firing-mode switch is precise and easy to reach. Setting the nail depth also is a breeze, with an easily accessible thumbwheel located just below the trigger. The spent air is exhausted through the handle so it's never blowing debris in your face. Plus, a swivel air coupling on the end of the handle makes positioning the nailer more accurate, easing the battle with a typically recalcitrant air hose. A convenient belt hook keeps the nailer close by and an extra no-mar rubber nose tip is stored on the nailer—handy.

The nailer not only has great features that make it a pleasure to use, but it also packs a punch, driving nails from ½ in. to 2 in. with precision and power. To test its mettle, I drove a couple hundred 2-in. nails into white oak using 100-psi line pressure. There were no misfires, and the only jam occurred



GreX 18-ga. Green Buddy brad nailer

Model 1850GB

\$200

woodcraft.com

when I accidentally fired a nail over another one. Fortunately, jams are easily cleared by removing the nose cover using an included hex wrench. To kick up the test a notch, I switched the trigger from single-shot to rapid-fire mode to fire the same-size nails into the white oak. There were no jams or misfires. I tried a number of different brand 18-ga. nails in the gun and they all worked fine. For more information, visit grexusa.com.

—R.J.

■ ACCESSORIES

Router sled makes a variety of valuable joinery cuts

WHEN PROFILING THE END GRAIN of a narrow workpiece on the router table, you need some way to hold the piece. You can use a simple backer block and get satisfactory results, but a coping sled will hold the work more securely, giving you better results with a higher degree of safety.

Woodpeckers' coping sled is robust, simple to set up, and works on any router table. The sled registers against the fence—not by its base but by an acrylic guard on top. The guard has the added benefit of putting another layer of protection between the operator and the spinning bit. Workpieces up to 5½ in. wide are held securely in the sled by two screw clamps. To prevent blowout at the end of the cut, you can place a piece of scrapwood between the sled's fence and the workpiece.

I used the sled to make beautiful tenons and lap joints, and to profile the tenoned part of a cope-and-stick joint (the kind made with matched rail-and-stile bits) and was very pleased with the results.

—Gregory Paolini is a furniture maker in Waynesville, N.C.



Woodpeckers Coping Sled

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The language of furniture construction

BY STEVE SCOTT

An old Czech proverb says that to learn a new language is to gain a new soul. That transformative power also exists in woodworking, where the craft's dialect can seem as bewildering to the newcomer as a foreign tongue. Grasp it, though, and you'll begin to see and think in new ways.

Like any craft, woodworking has specialized terms for its tools and techniques. It is full of everyday words that live different lives in the woodshop—from frogs and fences to stretchers and aprons. A comprehensive glossary could fill a book, and has, but this short one will get you started.

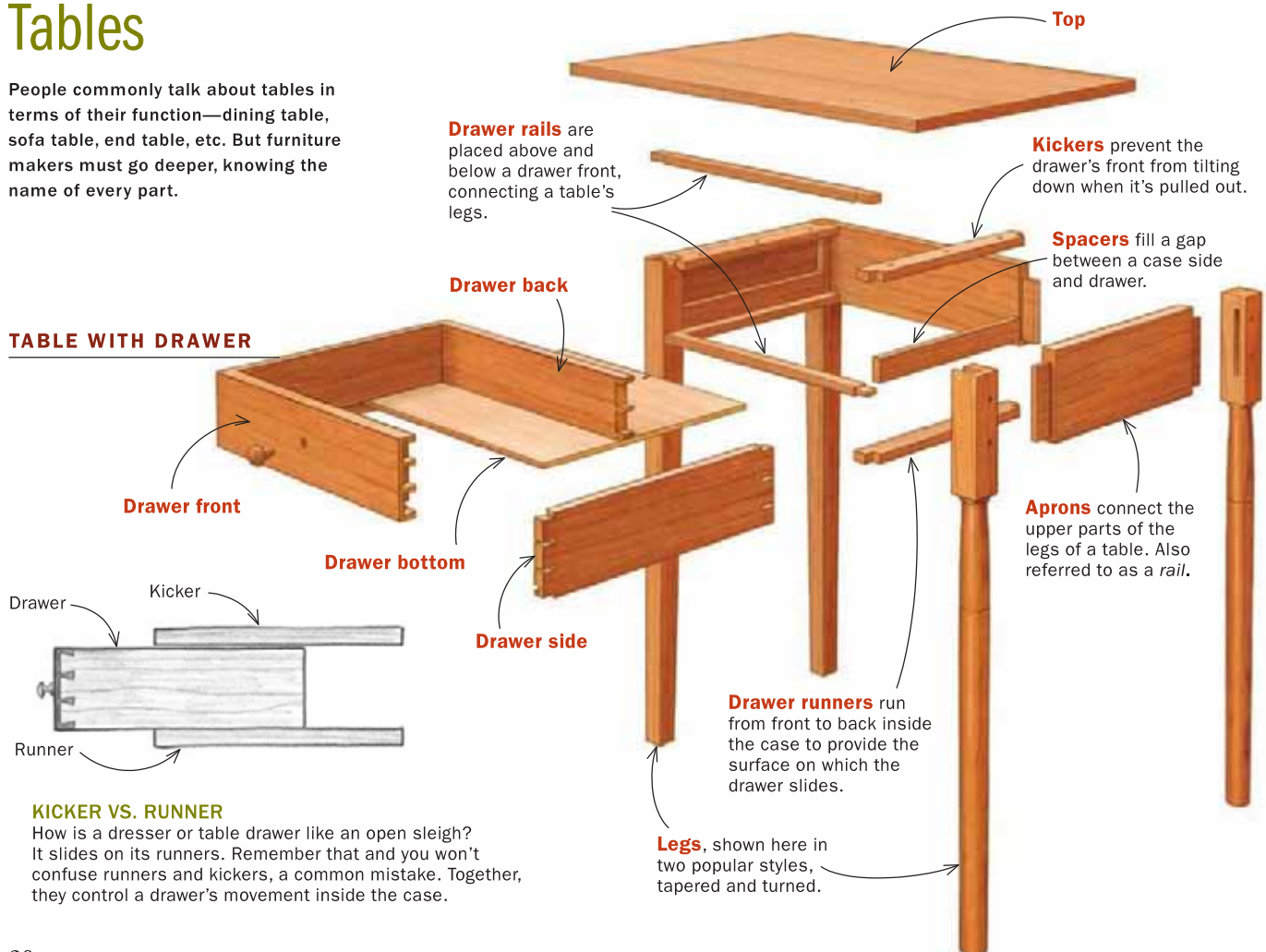
Because the furniture itself is the heart of furniture making, we decided to begin with a visual glossary of furniture parts. When you start researching projects you'd like to tackle, or you find yourself describing what you want to build, this guide will help. It will also act as a reader's guide to *Fine Woodworking* magazine, representing the official terms we have settled on over the decades.

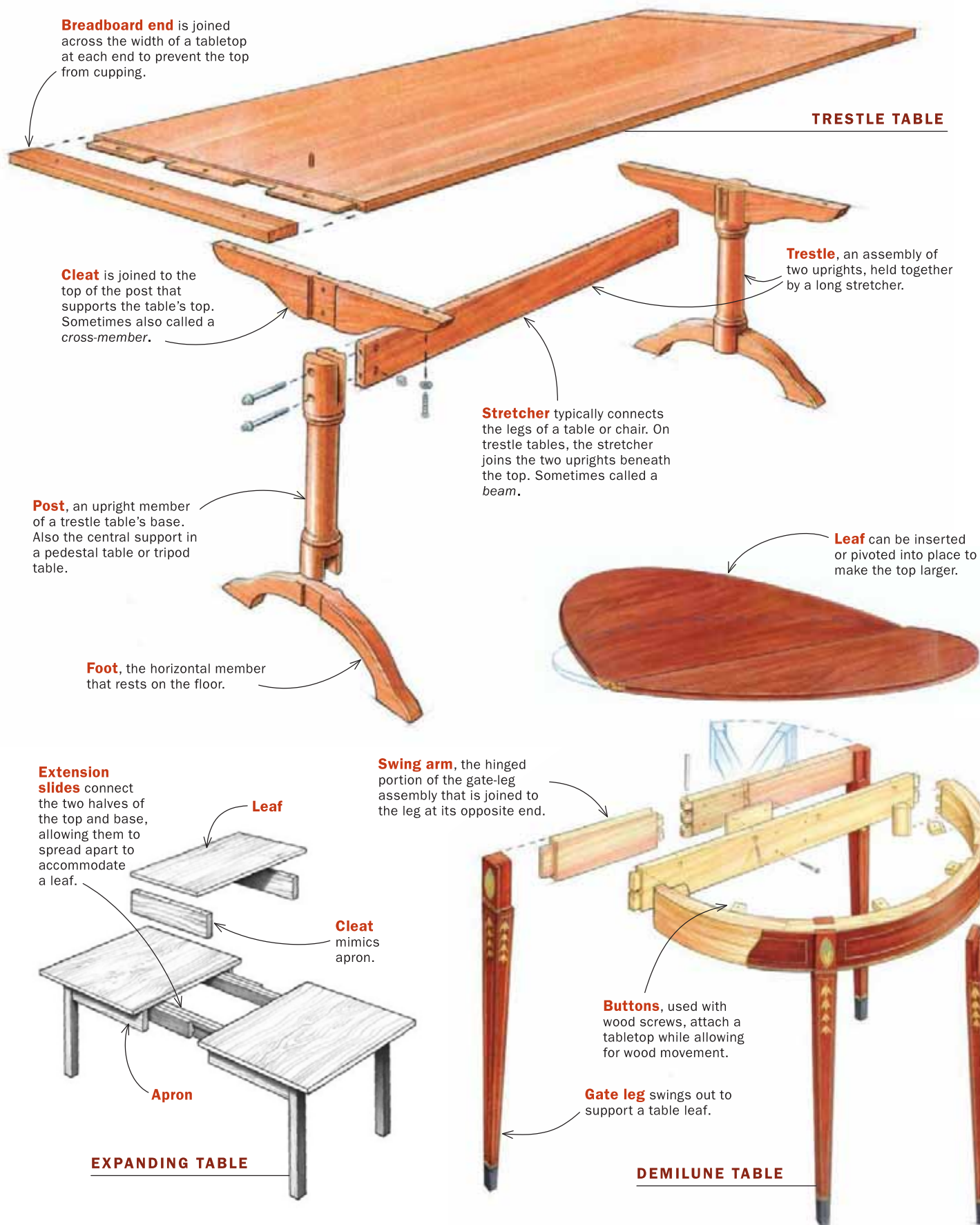
Knowing the language of woodworking won't make you a woodworker, but it can help you learn the craft, share your ideas, and express yourself. It also connects you to the history and tradition of the craft. And there's a lot of soul in that.

Tables

People commonly talk about tables in terms of their function—dining table, sofa table, end table, etc. But furniture makers must go deeper, knowing the name of every part.

TABLE WITH DRAWER

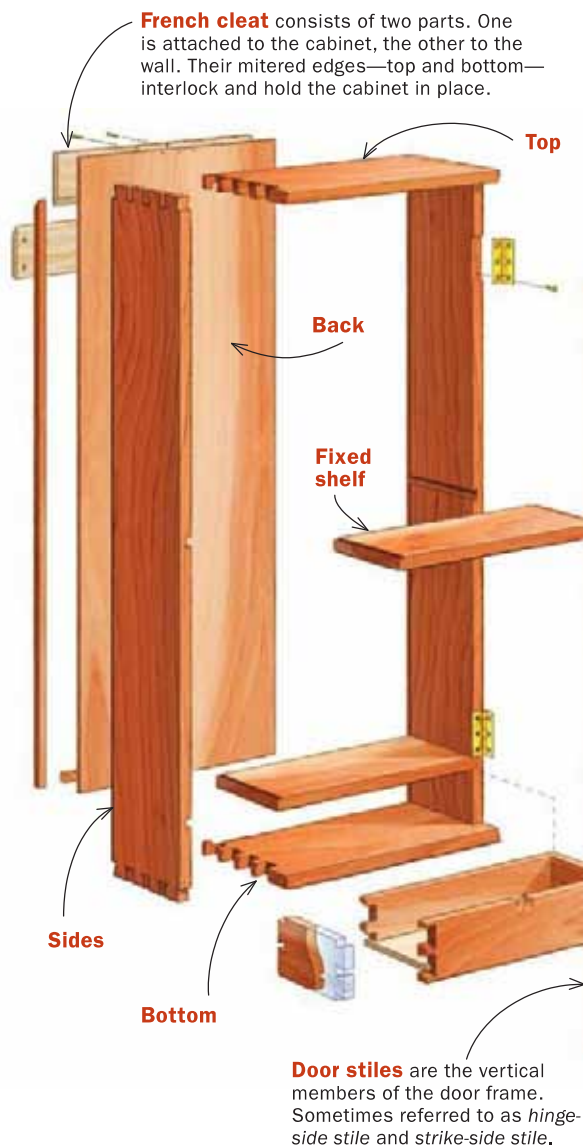




Case pieces

A conversation about a case piece can start out simply enough. After all, it's just a carcass—or box—with the standard top, bottom, back, and sides. But once you get inside the box, things get more complicated.

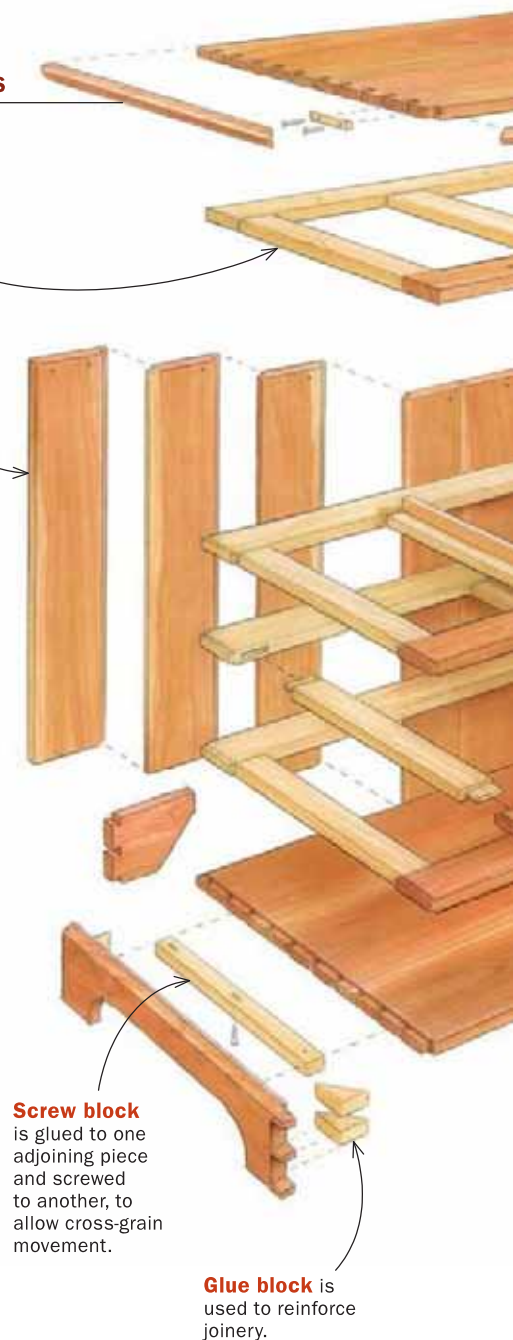
WALL CABINET



CHEST OF DRAWERS

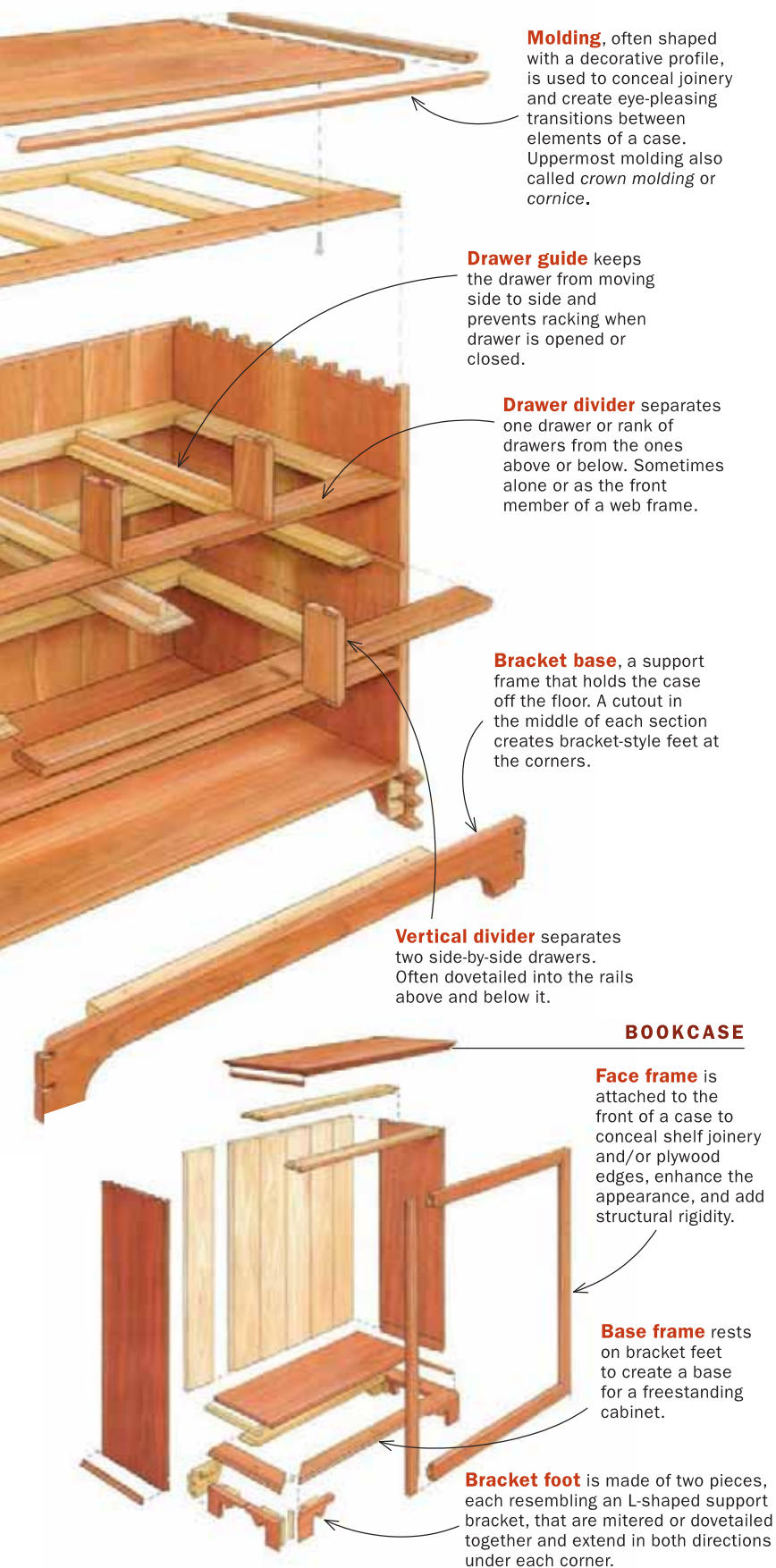
Web frame separates a drawer or drawers from the ones above or below. The frame is made of secondary wood, except for the front rail.

Shiplapped back is screwed or nailed in place.



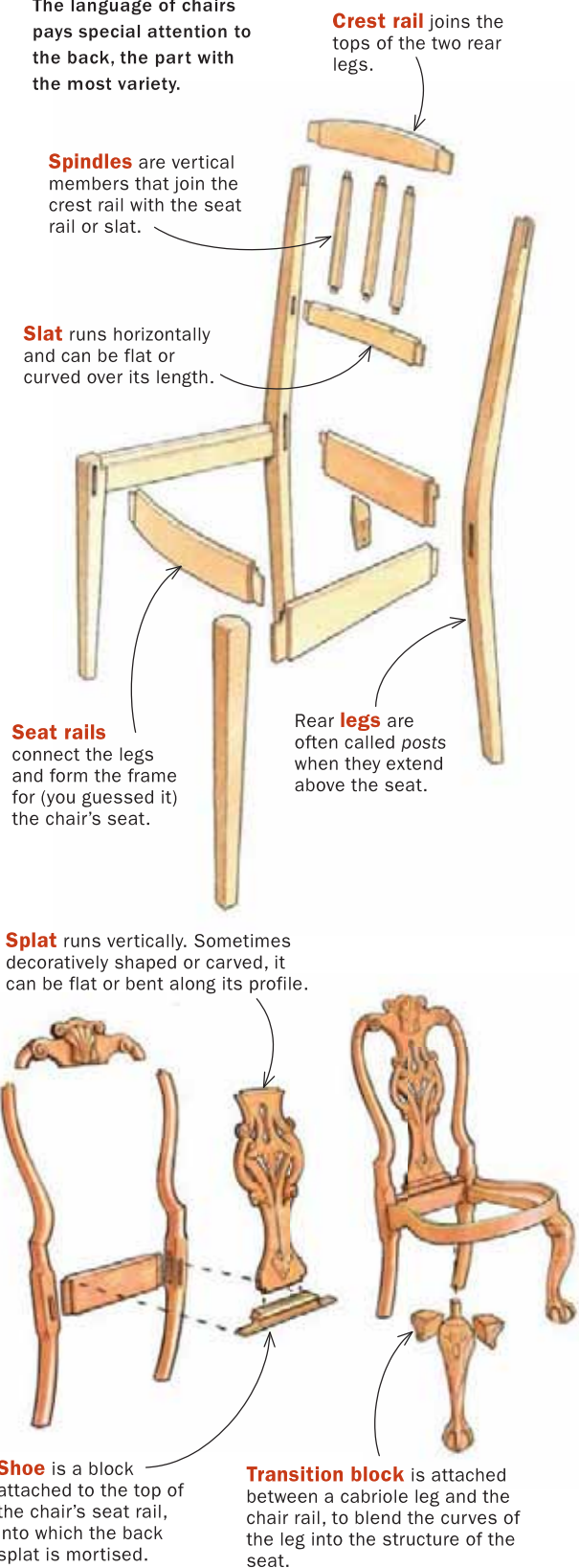
RAIL OR STILE?

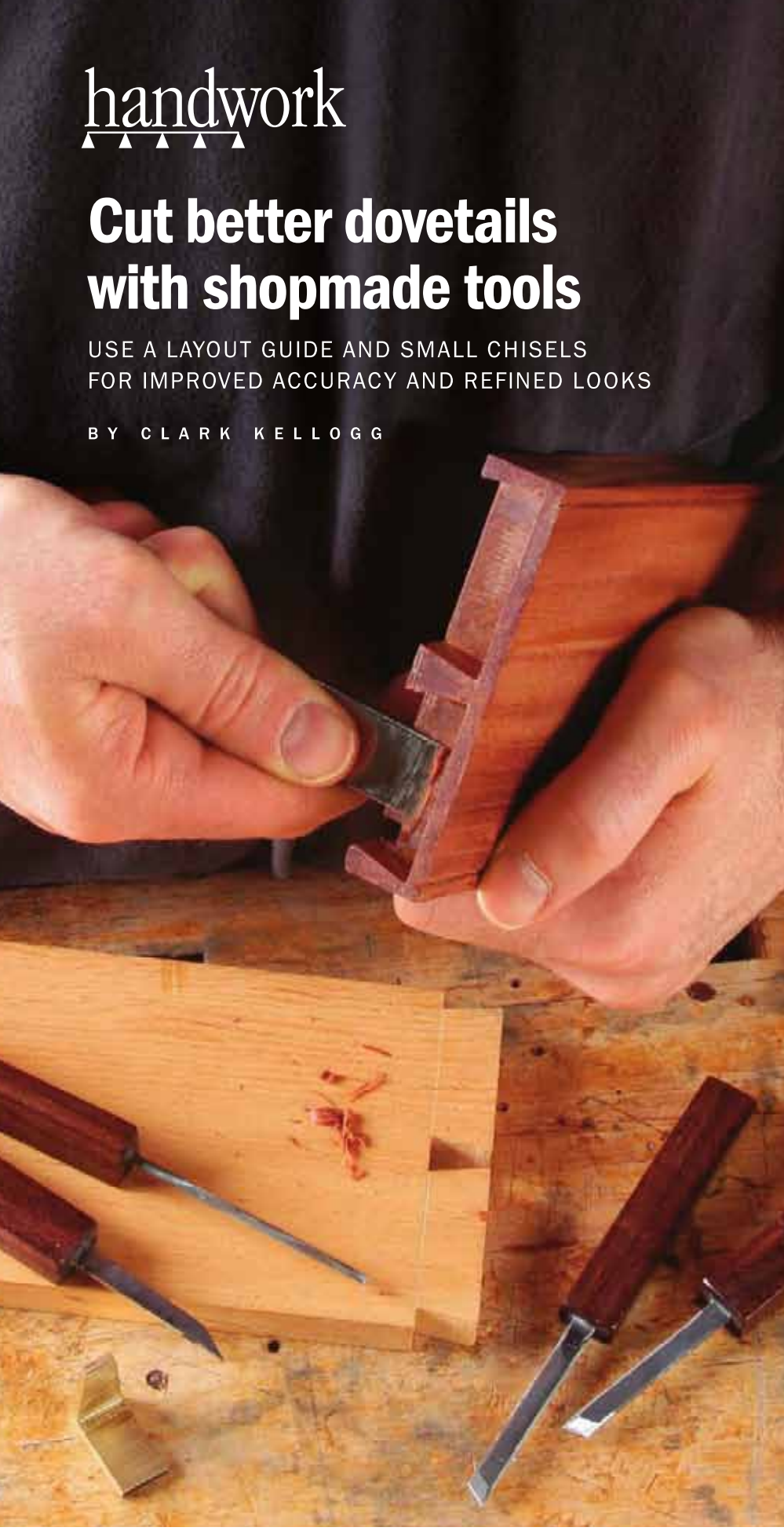
Doors have their own pair of often-confused parts. It's simple enough to say that a door frame is made of rails and stiles, but which are which? A simple way to remember that rails are horizontal is to think of them like fence rails. Also, stile is an old word for post.



Chairs

The language of chairs pays special attention to the back, the part with the most variety.





handwork

Cut better dovetails with shopmade tools

USE A LAYOUT GUIDE AND SMALL CHISELS FOR IMPROVED ACCURACY AND REFINED LOOKS

BY CLARK KELLOGG

For years, I cut dovetails using common layout tools and chisels, usually with what could generously be called lackluster results. Eventually, I figured out that I had two problems. First, I was not able to scribe and transfer layout lines accurately. Second, the chisels I was using, although great for chopping mortises and paring big joints, were too cumbersome for cutting delicate dovetails.

I didn't find a solution until I was a student at the College of the Redwoods, where I learned that the best tool for a task is often one made specifically for it. So, I made a set of chisels and a dovetail marker that enable me to achieve a level of precision and control nearly impossible with "one size fits all" tools.

The dovetail marker lets me lay out both angled and straight lines without moving it. And there are five chisels in my dovetail kit: a 1/16-in.-wide chisel used to remove waste between tails, a 3/4-in.-wide chisel for paring pins and tails, a pair of skew chisels, and a detail chisel that's triangular in cross-section to get into tight corners. All but one of the chisels are made from Hock marking knives, so you won't need to do any heat treating. You can make the entire kit in about one day with a bench grinder, a rotary tool like a Dremel, and a hacksaw.

Sources of Supply

BRASS ANGLE STOCK
onlinemetals.com

No. 385 H02, \$9 for 12 in.

MARKING KNIVES FOR CHISEL BLADES
hocktools.com

Small chisel, skew chisels:
No. MK025, \$28 each;
paring chisel:
No. MK075, \$31 each

Start with a tool for efficient and accurate layout

Regardless of whether you cut your dovetails the right way (pins first!) or some "other" way, laying out dovetails requires marking a line down the face of the board and then extending that line across the end grain. It's common to use two tools to do this: a bevel gauge and a square. But switching layout tools is



Dovetail marker for accurate and easy layout

This handy tool does the work of a bevel gauge and square, letting you mark the end grain and face grain with perfect alignment.

inefficient and opens the door to error. Instead, I use a dovetail marker that allows me to mark both the face and end grain in one shot, which improves accuracy and saves time.

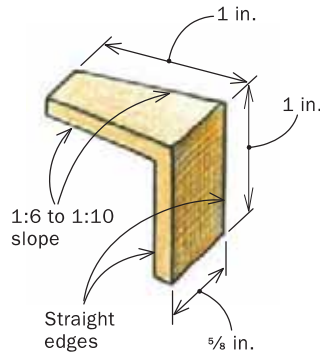
The gauge is made from a piece of $\frac{1}{8}$ -in.-thick brass angle bar (see Sources of Supply, facing page) that has 1-in.-wide legs. I buy a piece long enough to make several markers—hardwoods and softwoods require different slopes (1:6 is typical for softwoods, while 1:8 is common for hardwoods). I work primarily in hardwoods and use a 1:10 slope because I think it looks even better.

One leg of the brass is marked with two sloped lines, and the other has two straight lines. Mark them, and then rough-cut the gauge from the angle stock.

I use a disk sander to smooth the brass down to the layout lines, but you could use a file. To set up a disk sander for the job, angle the bed to match the slope used on the marker. Then clamp a 2-in.-square hardwood fence to the bed of the sander perpendicular to the disk. Because you are making a layout tool, take your time to ensure that everything is set up just right. Also, put a fresh disk on before sanding the brass. A worn or clogged disk will heat up small workpieces and burn your fingers.

Now set the rough-cut brass on one side of the fence, sanding the rough edge. To sand both sides, you'll need to use both sides of the fence.

After sanding to your layout lines, touch up the edges with a small file to remove any sharp burrs. Finally, sand the two outside faces with 400-grit paper, and buff everything with 0000 steel wool and brass polish to bring out the natural beauty of the brass. (Who doesn't like a great-looking tool?)



Cut layout lines into the brass. An etching needle or scratch awl is the right tool.



Cut the marker free. Use a hacksaw and stay outside the layout lines.



Fine-tune it on a disk sander. Use a bevel gauge to transfer the slope to the table.



Sand the marker's edges. Clamp on a simple fence, square to the disk, for the marker to ride on.



Remove the burrs. A small file quickly removes them. Smooth the edges on sandpaper.



Small chisel gets between the tails

Kellogg likes the elegant look of very thin pins, so he needs a chisel that is thin enough to fit in and clear away the waste between the tails. He makes this custom chisel from a Hock marking knife.



Rough-cut the bevel. As is, the marking knife is too long. Use the back end for the chisel. Define the bevel (30°) with a small cutoff wheel.



Flatten and polish the back. Done freehand, the chisel can roll, but the wide jaws of a wood-hand screw keep it flat on the sandpaper.



Homemade handle. Use a drill-press vise or hand screw to hold the blank so that the hole is parallel to the sides of the handle.



Split a dowel. Its diameter matches the hole. The bandsaw kerf is nearly as thick as the chisel, so the two halves wedge the chisel in place.



Glue it in. Kellogg has had good results with cyanoacrylate glue. Put it in the hole and on the dowel pieces.



Grind the bevel. It's easier to hold with the handle on. Draw the bevel on the blade and grind to the line. Hone it like a normal chisel.

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Except for the triangular detail chisel, I use Hock marking knives for all of these chisels. I've found that their carbon steel holds up extremely well under the light use these chisels see. The detail chisel is made from a triangular needle file (available at home centers and hardware stores), and its steel has done well, too. Because the knives and the file are already heat-treated, there is no need for you to do it. Just take care not to overheat them when grinding the bevels. The best way to do that is to dip them frequently into water while grinding.

For the chisels made from Hock marking knives, start by clamping the knife in a vise and cutting off the spear point with a rotary tool and cutoff wheel—a hacksaw would simply skip over the hardened steel. When you cut the knife for the narrow “between-tails” chisel, rough out the chisel's bevel at the same time, cutting at 30°. For the triangular detail chisel, just grind away the narrow taper at the tip of the file.

Next, flatten and polish the chisel's back. I do this by first using P200- and P400-grit sandpaper right on top of my bench, and then work through 1,000-, 4,000-, and 8,000-grit waterstones. Remove the file's teeth the same way.

At this point, the various chisels require different steps to finish them. Because the paring knife has no handle, just use the grinder to form its bevel, and round over its edges. Then hone the bevel.

The remaining chisels do have handles, and now is a good time to attach them,



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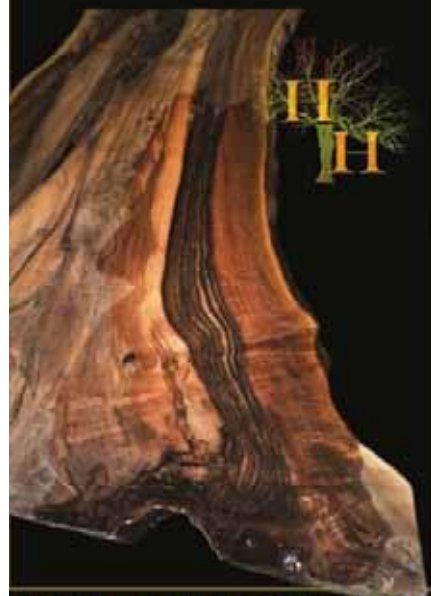
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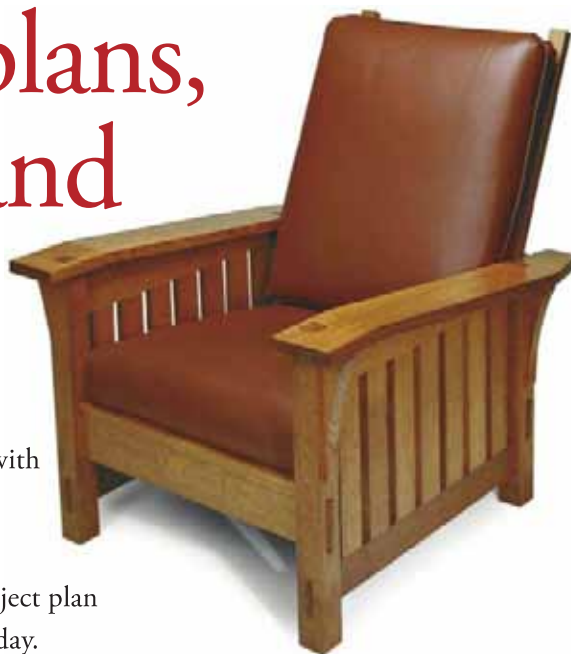
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Paring chisel hugs the line

This chisel comes from another Hock knife. You'll need to use an unusual technique (more like whittling than paring) to use it, but its extremely low angle (about 5°) works great both across and with the grain.



Grind up and down.

Because of its low angle, the bevel is long and you won't get it done by going side to side. Because you can't use the tool support, keep the blade on the top half of the wheel.

because it is safer and easier to grind their bevels with the handles on.

Start by drilling a 1/4-in.-dia. hole in the end grain of a small hardwood blank. I use a drill press and hold the blank in a vise. The triangular detail chisel can be glued directly into the hole, because it has a round tang (I used cyanoacrylate glue and it has held up fine). The skew chisels and the narrow chisel need insert pieces to hold them in

A new angle on skew chisels

Two skew angles are better than one. This pair of chisels provides more clearance to get into the tight corners in half-blind dovetails, and the pointed tips let you cut off those last stubborn fibers.



RELIEF BEVEL DETAIL



place. I make them by sawing a dowel down

the middle. The pieces are sandwiched around the chisel and glued into the handle. Make a handle for the narrow "between-tails" chisel and glue it together. Then head over to the grinder and refine the bevel roughed out when the spearpoint was cut off. Do the same for the triangular detail file. And then put handles on the skew chisels. Grind their bevels and the primary and relief skews. Finally, hone all of the chisels. □

Clark Kellogg designs and makes furniture in Houston, Texas.

Cut and grind. Cut off the tip of the knife at 65°, then grind a 25° bevel.



Then grind a relief bevel. It gives fibers a place to go as you pare them.

Tiny chisel for the hardest place to pare

On half-blind dovetails, there is a sharp little corner where the tail meets the shoulder. The truly triangular cross-section of this chisel (its corners are not rounded at all) gets in there with no problems. Make it from a triangular detail file.



Grind a 30° bevel. The cutting edge of a shallower bevel wouldn't hold up as well. Dip the file in water frequently to keep from overheating it.



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6 Ways to

TRADITIONAL
PENCIL-POST

Beds may be the most important pieces of furniture in the house. Not only do you spend a third of your life in them, but their sheer size makes them the focal point of whatever room they inhabit, and a grand canvas for fine wood and craftsmanship.

Beds also pose unique challenges to the woodworker. Headboards (and footboards) are usually held upright by only two joints, which must also knock down to allow the bed to be moved. Beds are also large and bulky, requiring creative methods to deal with the big workpieces. Furniture makers past and present have addressed these challenges in a wide variety of ways; in fact, supporting a mattress may be the only thing beds have in common. For this article, I scoured the woodworking world to find six of the best approaches to bed design, taking a close look at how their makers managed the dance between looks and construction.

All of these skilled pros started with the same realities: mattress size and the desired mattress height. Then they confronted the knock-down joinery, making the side rails removable. While there

Six smart approaches cover

CONTEMPORARY
PENCIL-POST

FRAME-AND-SLATS

are numerous ways to support a mattress, most custom makers go with some version of ledger strips and simple wood slats. Mattress manufacturers make a lot of money selling box springs, but slats achieve the same end while saving you hundreds of dollars. Either way, the choice affects mattress height.

After you deal with the inescapable realities, though, a bed leaves you plenty of room to express yourself. Some makers rely

Photos: Irion Company (top); Huston & Company (bottom left); Kevin Rodell (bottom right)

Build a Bed

BY MATTHEW TEAGUE



PLATFORM WITH
THICK TIMBERS

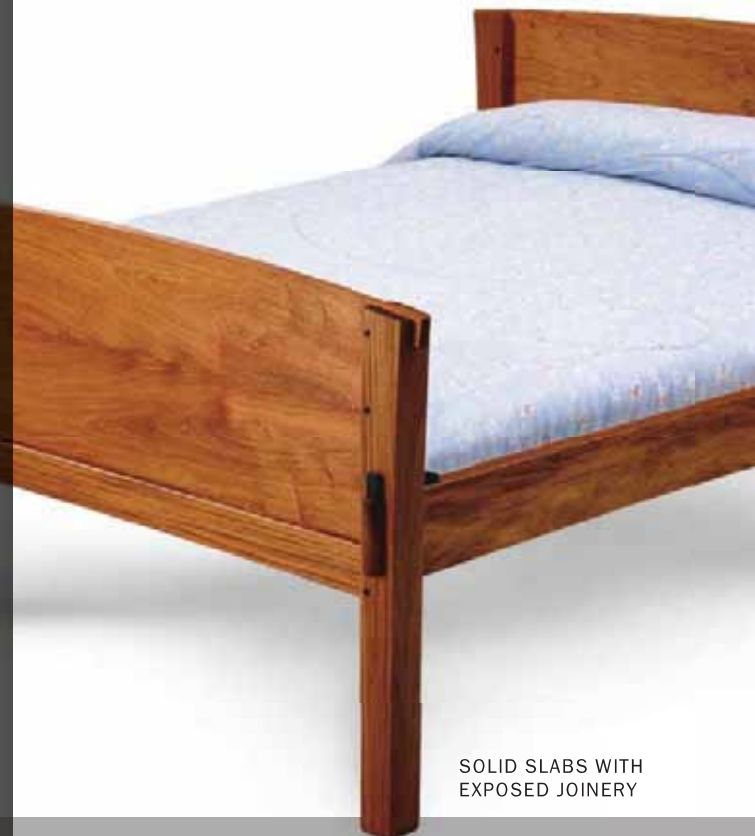
almost any bed you can dream up



FRAME-AND-PANEL

on tradition for design and construction, while others make their own rules. Whether your tastes lean toward the 18th century or the 21st, the six construction methods shown here should cover almost any bed you can imagine.

Matthew Teague is a former Fine Woodworking managing editor. He now designs and builds furniture in his backyard studio in Nashville, Tenn.



SOLID SLABS WITH
EXPOSED JOINERY

Traditional pencil-post

This pattern was probably taken from an 18th-century bed that came into the shop for my father to repair,” says Lou Irion, former owner of Irion Company Furniture Makers in Christiana, Pa. Jonathan Sanbuichi, who now runs the company, builds this bed the same way it was done for generations.

When assembled, the headboard and footboard on this bed are too tall to fit through standard doorways, so tall-post designs are engineered to break down completely. To this end, posts attach to the headboard, footboard, and side rails using shallow tenons and traditional bed bolts hidden by bolt covers of varying designs.

The upper portions of the posts are tapered and hexagonal at the top, with hand-carved lamb’s tongues where the taper begins. The upward sweep of the posts draws the eyes upward toward the tester, or canopy. Joining the tester to the posts is straightforward: The maker drives nails into the tops of the posts, removes their heads, and the four corners of the tester are then drilled so that they simply slide in place over the headless nails.

To replicate the look of period rope beds, this design is often built using thick, heavy rails that could have resisted the lateral pull of the rope. To accommodate modern box springs, bed irons

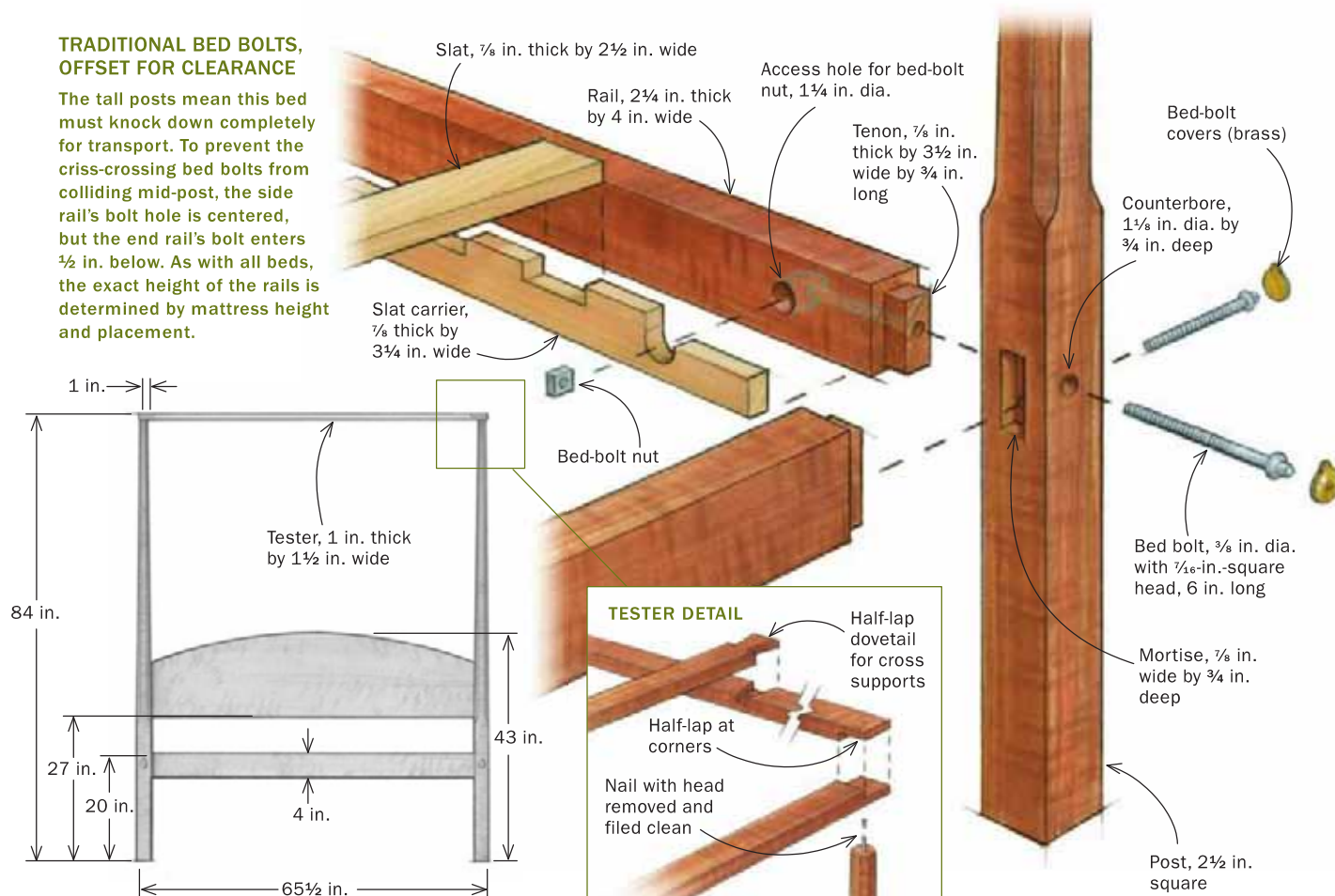


Shaker simplicity, canopy optional. Irion’s clean design is a tribute to 1800s-style pencil-post beds, and features brass covers over the hardware.

must be mortised low on the side rails, a look that almost requires the bed to be dressed with a dust ruffle. A cleaner look, which is also historically accurate, skips the box spring altogether and uses slats to support the mattress.

TRADITIONAL BED BOLTS, OFFSET FOR CLEARANCE

The tall posts mean this bed must knock down completely for transport. To prevent the criss-crossing bed bolts from colliding mid-post, the side rail’s bolt hole is centered, but the end rail’s bolt enters ½ in. below. As with all beds, the exact height of the rails is determined by mattress height and placement.



Contemporary pencil-post

Designer and maker Bill Huston of Kennebunkport, Maine, is drawn to simple forms like this variation on a traditional pencil-post bed. While eight-sided posts are more common, tapered four-sided posts offer a similar visual presence yet appear more streamlined and contemporary, a look Huston prefers. He also chose a simple pattern for the headboard, then centered three wenge inlays near the top, a modern touch that has become a signature on his work.

Like the traditional pencil-post design, the posts, rails, and headboard of this bed break down completely to fit through doorways. Where tradition calls for through-bed bolts, however, Huston uses shopmade bed bolts that are invisible from the outside of the bed. Instead of buying specialty bolts, Huston opts for inexpensive 6-in. hanger bolts that have machine threads on one end and wood threads on the other. The wood threads are permanently screwed into the posts. The other end of the hanger bolt is let into a hole drilled into the end of the bed rail. To secure that end of the

Tall posts with hidden hardware. Huston's modern take on the pencil post does away with the tester and visible bed bolts for a sleeker look.



bolt, a nut and washer are set into a mortise drilled on the inside of the rail. Shallow $\frac{1}{4}$ -in. tenons on the ends of the rails make quick work of assembly and alignment. "As with any spare design," says Huston, "the more straightforward the design, the more important the choice of woods and graining."

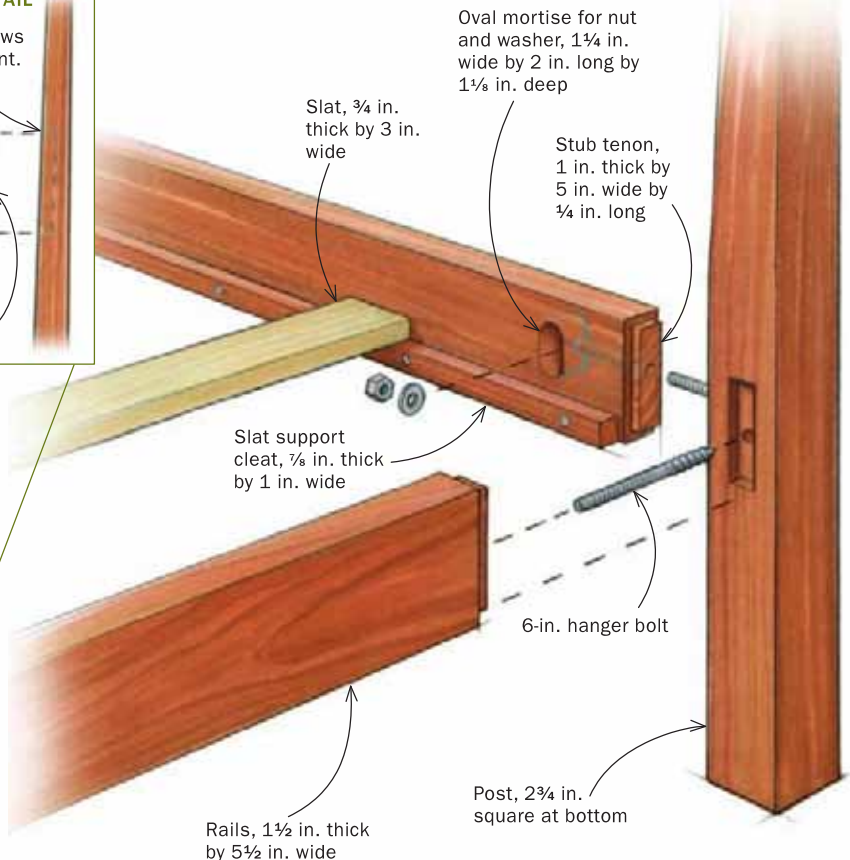
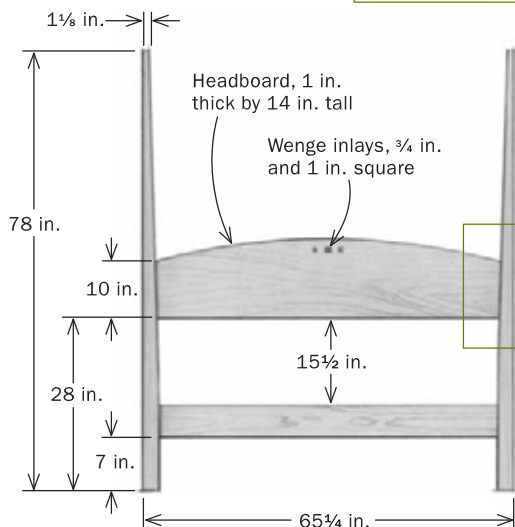
HIDDEN VARIATION ON TRADITIONAL BED BOLTS

Hanger bolts are the key, with one side simply screwed into the wood. An easy way to drive them is to lock two nuts halfway down the machine-threaded end, and then turn the outer nut with a wrench. Ultimately the machine-threaded end goes into the end of the rail and emerges in an oval slot where a nut and washer can draw the rail and post tight.

HEADBOARD DETAIL

Taller mortise allows for wood movement.

Slight angle to match tapered post



Frame-and-slats

Kevin Rodel's clients requested a four-post, slat-type, Stickley-style Arts and Crafts bed in quartersawn white oak, but left the other details to his own tastes. In the end, Rodel guided them toward the Glasgow style, in keeping with his other work. He began by working out the shape of the posts as well as the slat size and orientation. Once the basic shape was determined, he turned to the joinery. Because the bed is a low-post design, the headboard and footboard can be solid assemblies glued up using traditional mortise-and-tenon joinery. For knockdown joints where the side rails meet the head and footboard, he opted for through-bed bolts (horton-brasses.com; part No. H-73) located using shallow tenons on the rails, much like those used on Irion's pencil-post bed. Instead of using traditional bolt covers, however, Rodel squared up the mortises used to recess the bolt heads and then plugged



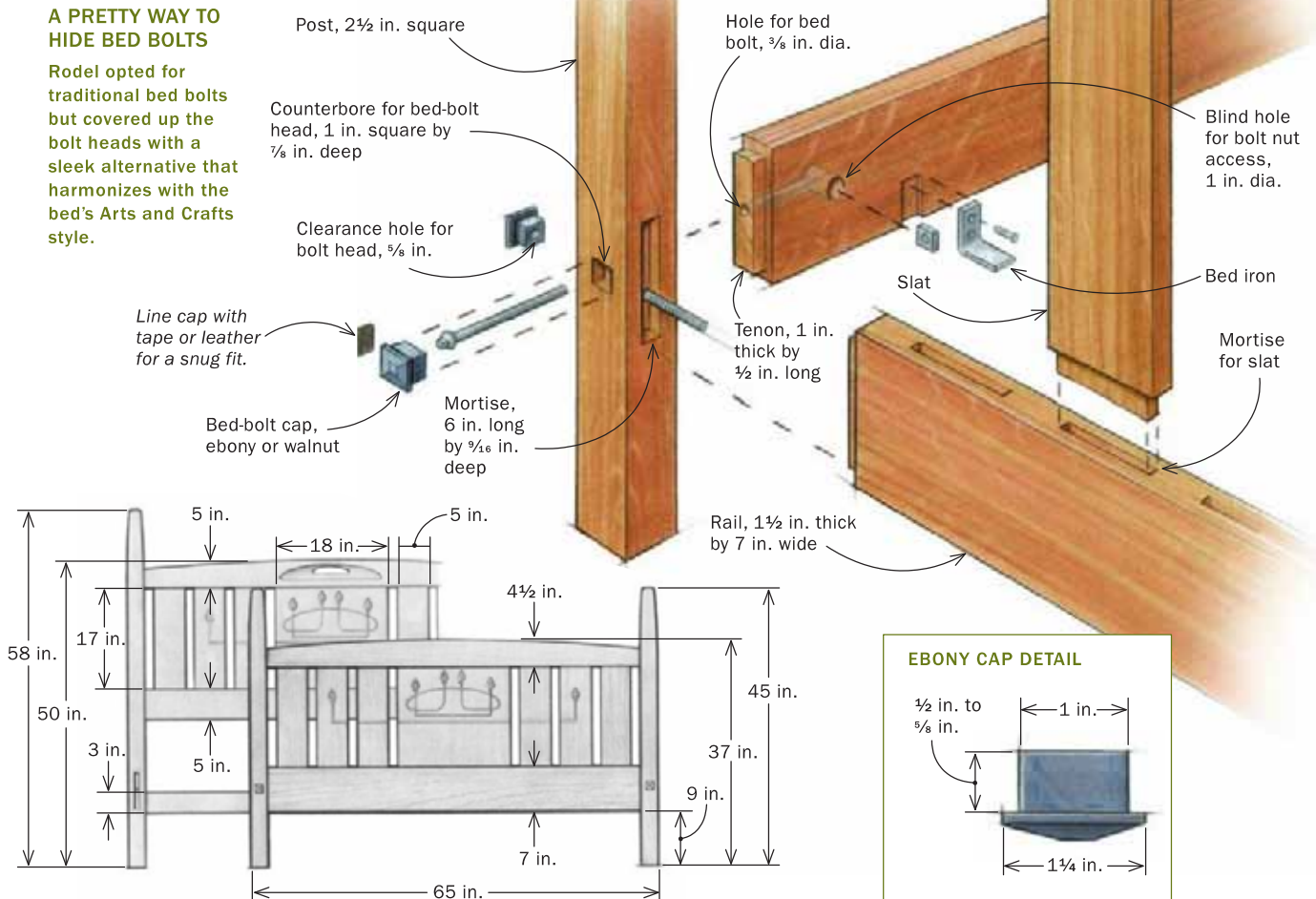
Hide the hardware, show off the artistry. The slats on Rodel's Arts and Crafts bed showcase the maker's detailed inlay and relief carving, while a clever cap conceals the hardware.

them with ebony caps. The edges of the caps are lined with tape or leather, which compresses just enough to create a friction fit, making them removable.

Because his clients already owned a mattress and box springs, he attached simple bed irons (also available from Horton Brasses) as low as possible on the side rails.

A PRETTY WAY TO HIDE BED BOLTS

Rodel opted for traditional bed bolts but covered up the bolt heads with a sleek alternative that harmonizes with the bed's Arts and Crafts style.



Frame-and-panel

Design ideas often come from unexpected places. The inspiration for Seattle woodworker Ross Day's bed came while he was watching a commercial promoting travel to Japan and featuring someone playing a *koto*, a Japanese instrument with strings stretched over a long, convex wooden soundboard. "The shape of the instrument attracted me," he said, "I just really liked the curves."

Day began with the curves in the top rail of the headboard, and later mimicked that curve throughout the bed in both the shapes of the panels and in the compound angles of the legs.

A few years earlier, Day had purchased a few planks at the lumberyard, convinced that their curved graining would one day come in handy. He bandsawed the planks into veneer, jointed the seams with a plane, and attached them to plywood cores. The veneered panels are grooved on edge and glued into the tenoned frames



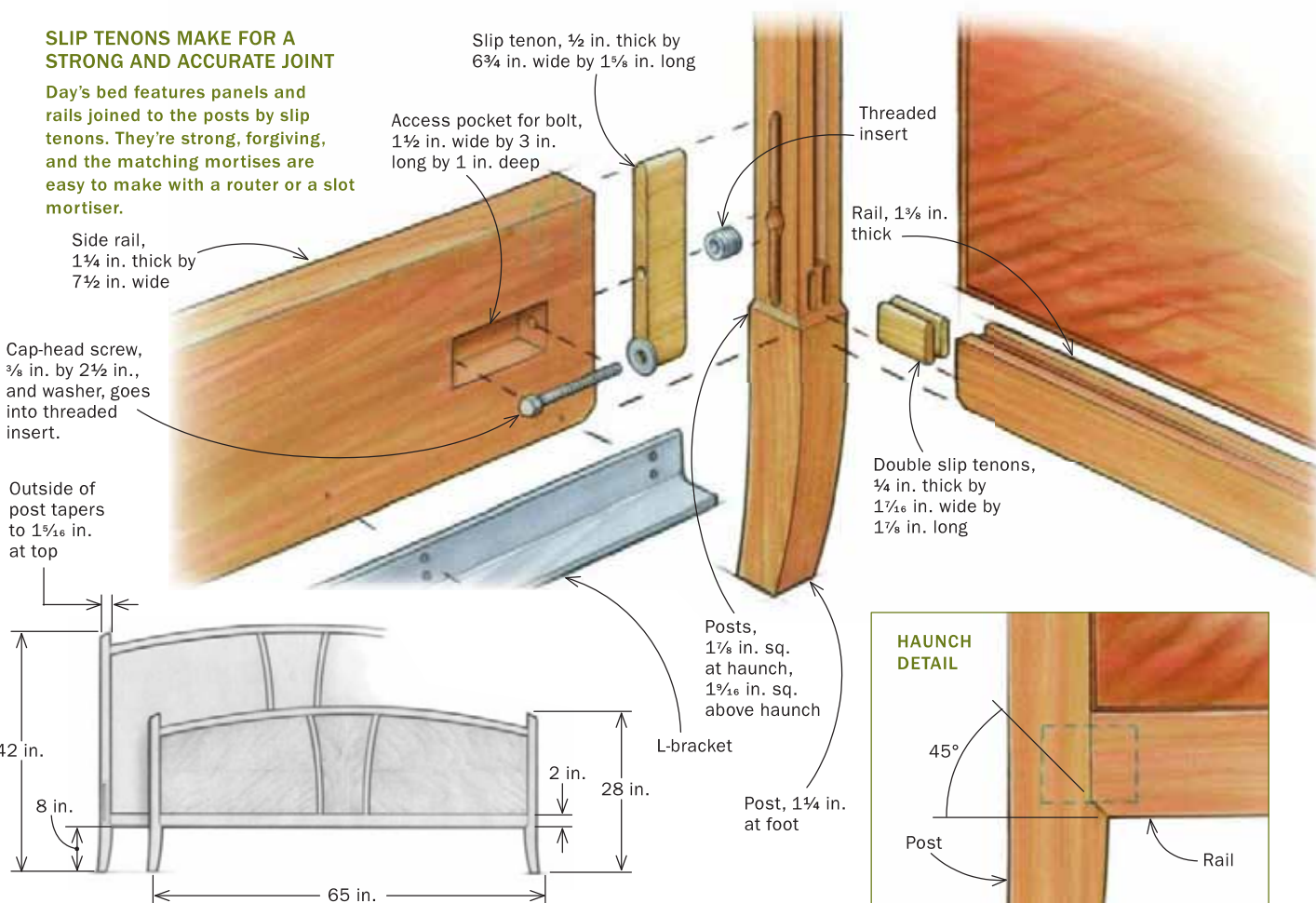
Harmonious lines, veneer construction. Matching curves inspired by musical instruments are paired with the beautiful grain of custom-sawn veneer.

using solid cherry splines. Small gaps around the panels create interesting shadowlines.

Day's ingenious version of a hidden knockdown joint uses cap-head screws, accessed at one end by a hidden mortise in the rails and secured at the other end in threaded inserts that are set into the back side of a slip tenon in the headboard and footboard.

SLIP TENONS MAKE FOR A STRONG AND ACCURATE JOINT

Day's bed features panels and rails joined to the posts by slip tenons. They're strong, forgiving, and the matching mortises are easy to make with a router or a slot mortiser.



Solid slabs with exposed joinery

While many makers try to envision the lines of a design first and figure out the joinery later, Oakland, Calif., woodworker David Fay tries to “refine the lines and minimize ornamentation so that the actual construction method is the thrust of the design ... to emphasize the simplicity and elegance of the joinery.”

For his Rockwell bed, Fay's starting point was finding an attractive joint for a detachable rail. The *sagekama*, a joint common in Japanese architecture, came to mind. Fay learned to cut this wedged, half-dovetailed, through-tenon early in his training when he used one to build a sawhorse in a woodworking class, and he knew that the wedges are easily tapped back into place when they loosen over time.

This particular bed is designed to work with a futon mattress. Cleats are attached to the inside of the bed rails and supporting slats are set on top. The cleats are positioned so that the top of the futon sits about 6 in. above the rails.

The head and footboard also take advantage of their joinery as



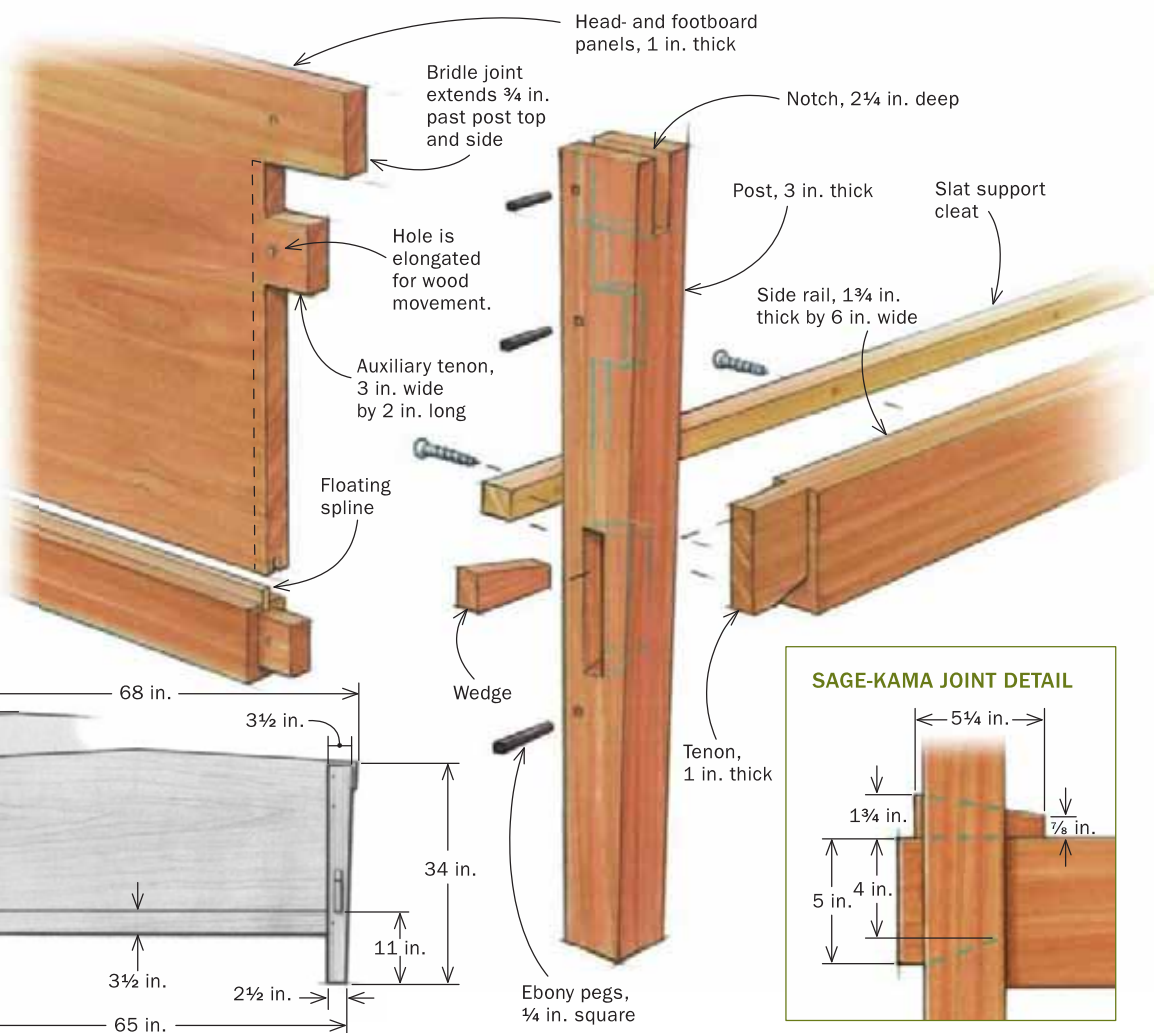
Perfect together. Strong joinery, elegant lines, and beautiful boards: Fay's Rockwell bed shows off all three.

ornamentation. At the tops of both the headboard and footboard are wide bridle joints

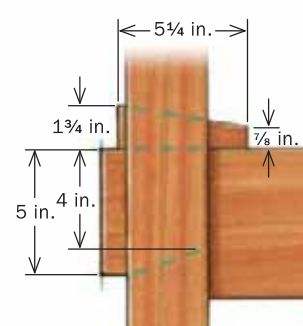
where the bookmatched Narra panels are let into mortises in the posts. The rest of the panel, including an auxiliary tenon, is also mortised into the post. Only the top of its joinery is pegged, forcing wood movement toward the bottom, where an unglued spline can accommodate it.

**EXPOSED JOINERY
ATTACHES RAILS
AND STABILIZES
SOLID PANELS**

When Fay decided to showcase the joinery in his Rockwell bed, he realized that the joint had to be simple, attractive—and bombproof. The wedged half-dovetail sage-kama uses the same forces that bear on the bed to keep the joint tight. On the head- and footboards, pinned tenons and bridle joints create solid assemblies, while a long floating spline keeps the wide planks in line with the rails.



SAGE-KAMA JOINT DETAIL



Platform with thick timbers

Robert Spangler's inclination toward Asian design ties in well with a renewed interest in platform beds. This low-slung platform bed is an evolution of earlier designs. "I've always really liked the wide rails around the side," says Spangler, "because it accentuates the horizontal lines in the furniture."

Spangler's design is easily the least traditional of the lot. Not only is it a platform design, it also features a headboard that doesn't run all the way to the floor but instead appears to float. The headboard is tenoned into an angled riser block on the bed frame, which tilts it backward about 11° to make it comfortable when sitting up in bed.

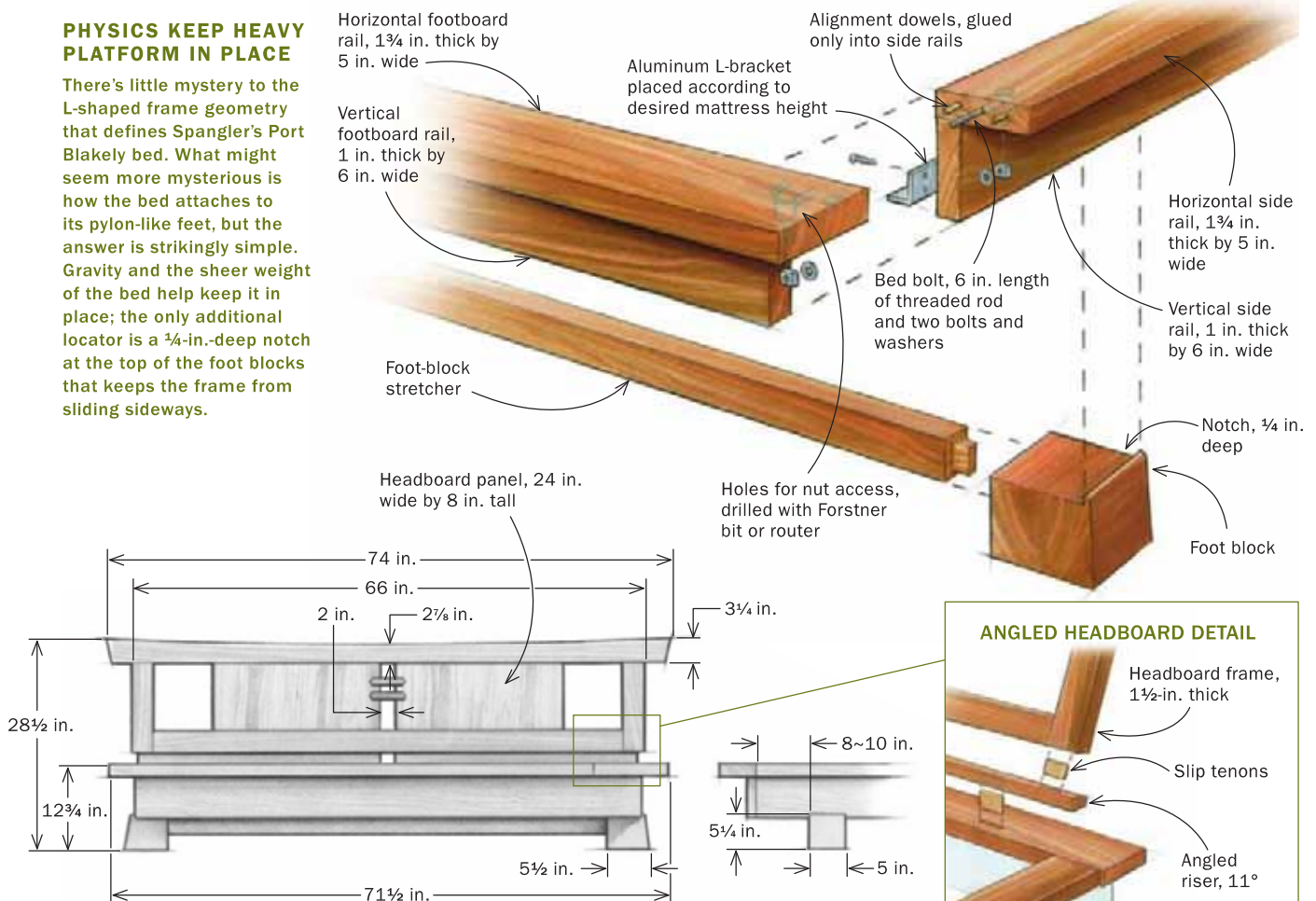
While many platform beds are built so that the mattress slides around on top, Spangler set his inside the frame, with 1x4 slats resting on angle brackets. This not only allows the mattress to sit lower, but it also locks it into place.

Graceful curves crown strong, solid-wood construction. Asian elements in the headboard work well with thick timbers that cradle a low-slung, futon-like mattress.

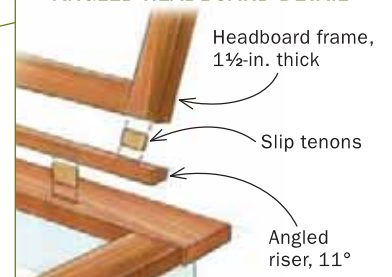
Another interesting joinery detail is in the feet, which are simply blocks of wood that are joined in pairs by a simple rail, and notched to hug the frame above. The frame is joined with shop-made bed bolts let into the horizontal members, and a pair of alignment dowels. The bed bolts are nothing more than a 5-in. length of threaded rod outfitted with a nut and washer on each end.

PHYSICS KEEP HEAVY PLATFORM IN PLACE

There's little mystery to the L-shaped frame geometry that defines Spangler's Port Blakely bed. What might seem more mysterious is how the bed attaches to its pylon-like feet, but the answer is strikingly simple. Gravity and the sheer weight of the bed help keep it in place; the only additional locator is a ¼-in.-deep notch at the top of the foot blocks that keeps the frame from sliding sideways.



ANGLED HEADBOARD DETAIL



Trim Routers

New breed
of compact routers
is a big win for
furniture makers

BY GREGORY PAOLINI

The last time *Fine Woodworking* reviewed trim routers (“Laminate Trimmers,” *FWW* #171), they were tools designed for a single carpentry task: trimming countertop laminate. But they were the only small routers out there, so we worked around their deficits.

Recently, however, manufacturers have responded to user feedback with features that make these tools more versatile and easier to use. The best routers in this new crop are perfectly suited to a variety of furniture-making tasks: rounding over and chamfering edges, routing hinge mortises, flush-trimming veneer and edge-banding, routing cavities for inlay, and more. Their small size and light weight makes them agile, so they are easy to move around corners and along curves, and to balance on edges and narrow parts like legs. And they can be used one-handed, which means you can fly around a workpiece, holding the router and easing the edges with one hand while holding and repositioning the workpiece with the other.

There are a lot of new models on the market, and choosing one is difficult if you can’t get them all in the shop and try them out. But I’ve done just that, so you

don’t have to. I gathered 12 compact routers in my shop and used them daily as I made furniture. Over the course of several months, clear winners emerged.

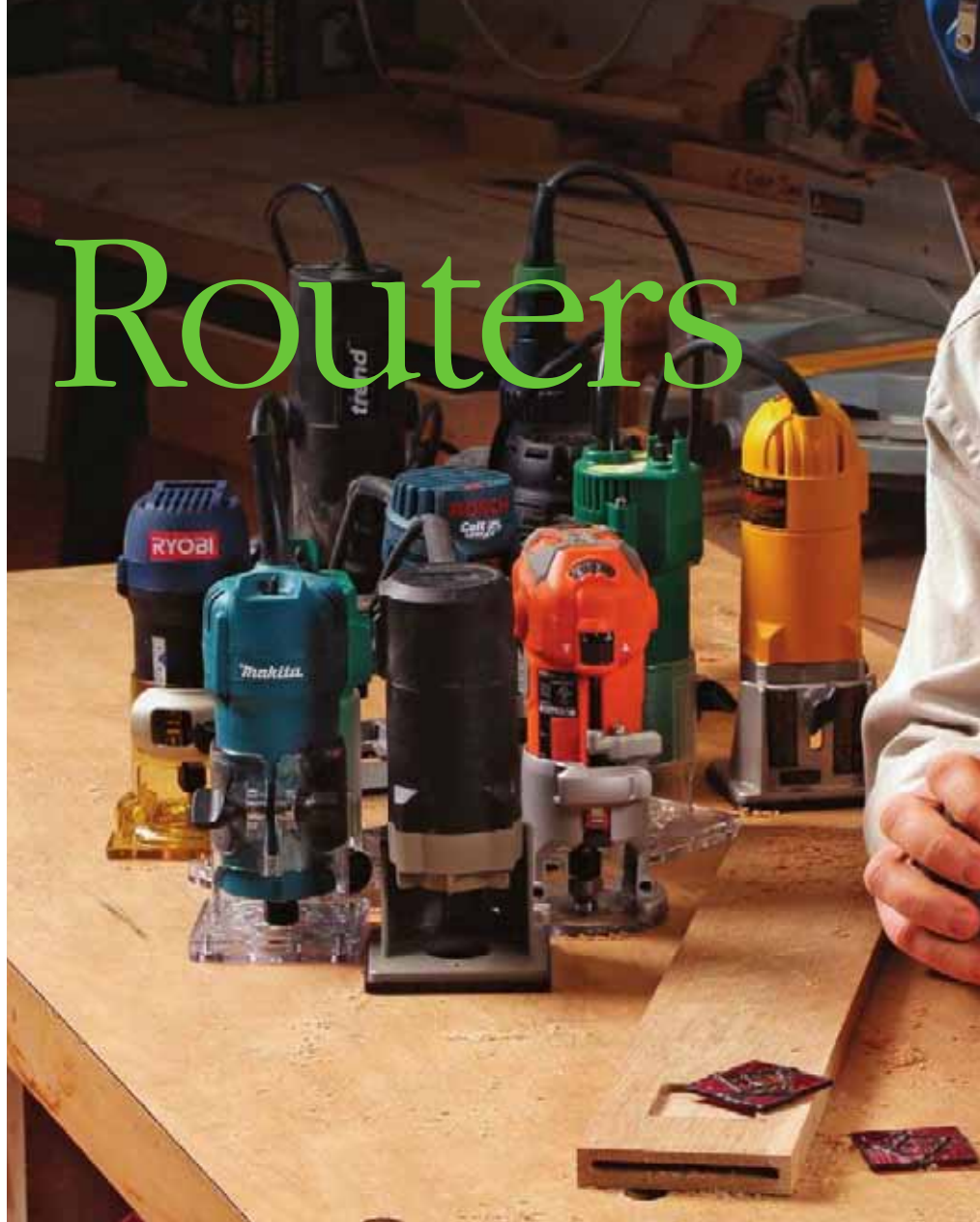
Put to the furniture-maker’s test

There are a lot of empirical measurements—such as spindle runout—that can be taken when testing a router. But what ultimately matters is power, cut quality, how easy the router is to use, and how comfortable it is to hold while you’re using it.

So I skipped the measurements, took the routers out to the shop, and used them the way a furniture maker would. To gauge cut quality, I rounded over and chamfered

MUCH MORE THAN A LAMINATE TRIMMER

No longer just a countertop installer’s tool, today’s trim routers excel at a variety of woodworking tasks. From routing mortises for hinges and inlay to rounding over edges and trimming edge-banding flush, the best new routers offer the perfect combination of power, precision, and control.

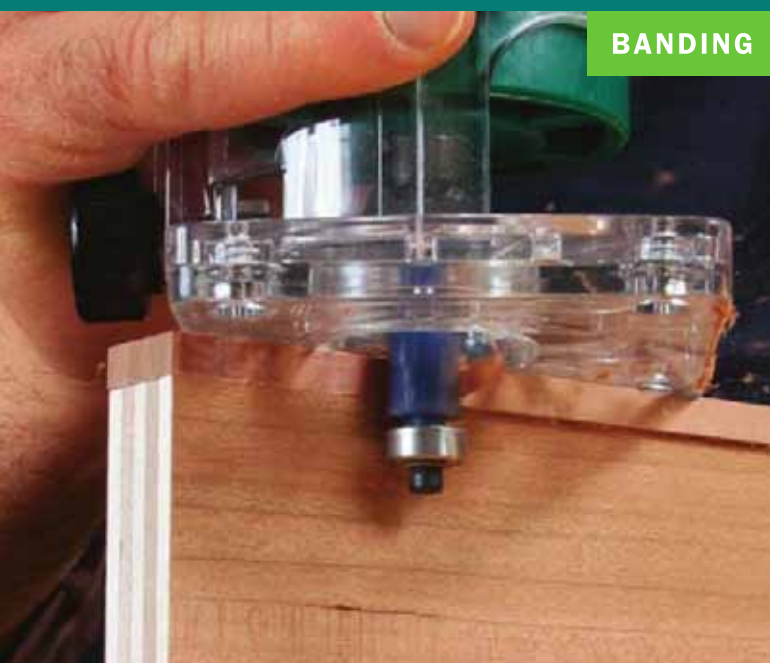




INLAY



HINGES



BANDING



EDGES

BIT HEIGHT SHOULD BE EASY TO ADJUST

Trim routers are used for small work, where a bit that is a few thousandths of an inch too deep can spell disaster. Bit-height changes should be uncomplicated and accurate.

Best system. A thumb-wheel on the Ridgid makes minute changes to bit height a snap. Depress a thumb lever (just above the locking lever on the base), and the lead screw disengages, so big, quick moves are easy, too.

Simpler design gets the job done. The lead screw on the Makita (right) and Grizzly H7791 controls all bit-height adjustments.

The twist is good, too. When using the fixed base on the Porter-Cable 450PK (below) and its close relative, the DeWalt 611PK, all height adjustments are made by releasing a locking lever and then turning the motor in the base, another system that works very well.



furniture edges. Then I routed hinge mortises and cavities for inlay. After the formal tests, I used all of them as I went about my daily work. As I used them, I took note of whether they ever bogged down due to a lack of power.

To keep a level playing field, I equipped each router with new Whiteside router bits, chosen because they have performed well in previous *FWW* tests. However, for flush-trimming edge-banding, the Festool needed a proprietary bit, which the manufacturer provided. But this had no effect on my overall impression of the router.

Here's what I discovered. Power is not a problem and neither is cut quality. All of these routers did everything I asked of them without a problem and left a clean, chatter-free surface. But there was a difference when it came to usability and comfort. The DeWalt DWP-611PK was the easiest to use and the most versatile, so it is my pick for best overall. For best value, I picked two routers. The



Two that are less precise. Bit adjustments on the Ryobi (above) and Grizzly H7790 are similar. Release the lock and then push and pull the motor until you get the height you want. That's OK for coarse adjustments, but it's a struggle for fine changes.



A CLEAR VIEW MAKES FOR EASIER ROUTING

When routing mortises for inlay or hinges, you need to stay within the layout lines, so visibility is key. A base with a large cutout and clear sub-base creates the perfect window, letting you see exactly what you're routing.



A perfect view. The DeWalt's fixed base has a huge opening cut into it and a clear base. And the motor housing has built-in LED lights, so you'll never have trouble watching your work.

Tunnel vision. The base on the Porter-Cable 7301 offers a great view of the bit up high, but the sub-base is opaque and has a small opening, so it is very difficult to see what the bit is routing.

Ridgid R2401 has fast, precise height adjustments, an LED light for improved visibility, and is great for one-handed use. Because of its low cost, the Grizzly H7791 is the perfect choice for a router that you leave set up for one task. □

Gregory Paolini is a furniture maker near Asheville, N.C. In the past, he has reviewed tools for Festool, but he has not received compensation of any sort from the company.

Unique features to consider



A new angle on flush-trimming. Festool's horizontal base turns the motor 90° and provides a stable platform for trimming edge-banding—a huge improvement over balancing a router on the thin edge.



Online Extra

To learn more about the features that make a great trim router, watch the video at FineWoodworking.com/extras.

Plunge bases are perfect for inlay. Tipping a fixed base into a mortise can be tricky, so if you do a lot of inlay work, consider the Trend T4 (a dedicated plunge router), the DeWalt 611PK, and the Porter-Cable 450PK.

Trim routers head to head

DeWalt 611PK



dewalt.com

Street price: \$200

Amps: 7; Weight: 4 lb.
(fixed); 6.6 lb. (plunge)

This revolutionary new tool is a smaller version of the popular two-base router kits. It's compact like a trim router, but more powerful. Both bases are well-designed. The fixed base has excellent height adjustments, is comfortable for one-handed use, and has a rough exterior that provides a solid but comfortable grip. An elongated, square sub-base

improves the router's balance on narrow parts and rides easily against a straight edge. The plunge base is just as good. Its small size is ideal for inlay work. Both bases offer great visibility, too. And there is an LED light built into the motor housing that makes more precise work much easier.



Bosch Colt

boschtools.com

Street price: \$117

Amps: 5.6
Weight: 3.8 lb.

The Bosch is comfortable to hold. It also is bottom-heavy, so it was well-balanced and stable in use. The square base works well with a straightedge, and bit-height adjustments are quick and easy. But it does lack LED lighting, and the black sub-base limits visibility.



Grizzly H7791

grizzly.com

Street price: \$46

Amps: 1.7
Weight: 3.6 lb.

The Grizzly lacks LED lighting and variable speed, and height adjustments are more difficult than on the DeWalt 611PK and Ridgid R2401. Also, it is not as comfortable as those two routers, but at \$46 it is a great choice for a router dedicated to one job, like rounding over edges. Then you can lock it in place and leave it alone. Always at the ready, this router will save you time and effort. It is also light and easy to hold, perfect for one-handed use as you race around the edge of a tabletop. I am tempted to buy two or three, setting up each one for a different task.



Ridgid R2401

ridgid.com

Street price: \$100

Amps: 5.5
Weight: 3.8 lb.



I loved using this elegantly simple trim router, because bit-height adjustments are quick and accurate. There is a lead screw for micro-adjustments, but a push of your thumb disengages the mechanism so that rough adjustments can

be made. It also is comfortable to hold, making it a favorite when it came time to round edges. There's a large opening in the base, a clear sub-base, and an LED light, all of which add up to great visibility. Bit changes are a snap. There also is a second, square sub-base, which is just what you need to guide the router with a straightedge, and an edge guide. It can't match the DeWalt's versatility, but it is easier to handle for light routing, and much less expensive.





DeWalt 26670

dewalt.com

Street price: \$95

Amps: 5.6

Weight: 3.6 lb.

I've done a lot of laminate work, and this router would be a workhorse for trimming laminate flush to countertops and profiling edges. However, the sub-base is opaque and limits visibility, so tasks like mortising for hinges and removing material for inlays—two important and frequent tasks in furniture making—are difficult at best.



Festool MFK 700

festoolusa.com

Street price: \$535

Amps: 6

Weight: 5.2 lb.

I tested this router with two bases. One held it vertically, but in that configuration, the bit is completely hidden by the base and it was not easy to hold in one hand. Those are serious problems for a furniture maker. The second base holds it horizontally, which turned it into the best tool I have ever used for trimming edge-banding flush.



Grizzly H7790

grizzly.com

Street price: \$42

Amps: 2.1

Weight: 3.8 lb.

This router has a clear plastic base and sub-base, so visibility was great. However, the motor is both heavy and top-heavy, so the balance wasn't good. And adjusting the bit height is somewhat tricky. After the locking lever is released, the motor rotates and slides in and out freely. Setting the height involves a fair amount of trial and error.



Makita 3709

makita.com

Street price: \$110

Amps: 4

Weight: 3.6 lb.

A rack-and-pinion system makes fine and coarse adjustments easy. The power cord comes out of the top, improving the balance. But this wasn't a comfortable router: the housing didn't fit my hand well, and the edge-guide locking knob was often in the way.



Porter-Cable 450PK

portercable.com

Street price: \$185

Amps: 7; **Weight:** 4 lb. (fixed)

6.6 lb. (plunge)

The Porter-Cable 450 is almost identical to the DeWalt 611PK. But the differences are where it falls short. There are no LED lights, so visibility isn't as good. Also, the body of the fixed base has painted ridges running parallel to your fingers, resulting in a slick surface. And the sub-base is round, so it's not as good for use with a straightedge.



Porter-Cable 7310

portercable.com

Street price: \$100

Amps: 5.6

Weight: 3.8 lb.

This Porter-Cable is practically a twin of the DeWalt 26670. Other than a few cosmetic differences, they differ only in that the Porter-Cable's adjustment knob is not as nice as the DeWalt's and the Porter-Cable is flat on top, rather than domed. In terms of performance, they are practically identical.



Ryobi TR45K

ryobitools.com

Street price: \$80

Amps: 4.5

Weight: 6 lb.

The Ryobi fit well in my hand and was comfortable to use for extended periods of edge-chamfering. However, it was difficult to set the bit height, because the motor slides freely in the base. Height is adjusted by pushing the motor in or pulling it out, an approach that works for coarse changes but makes fine adjustments difficult.



Trend T4

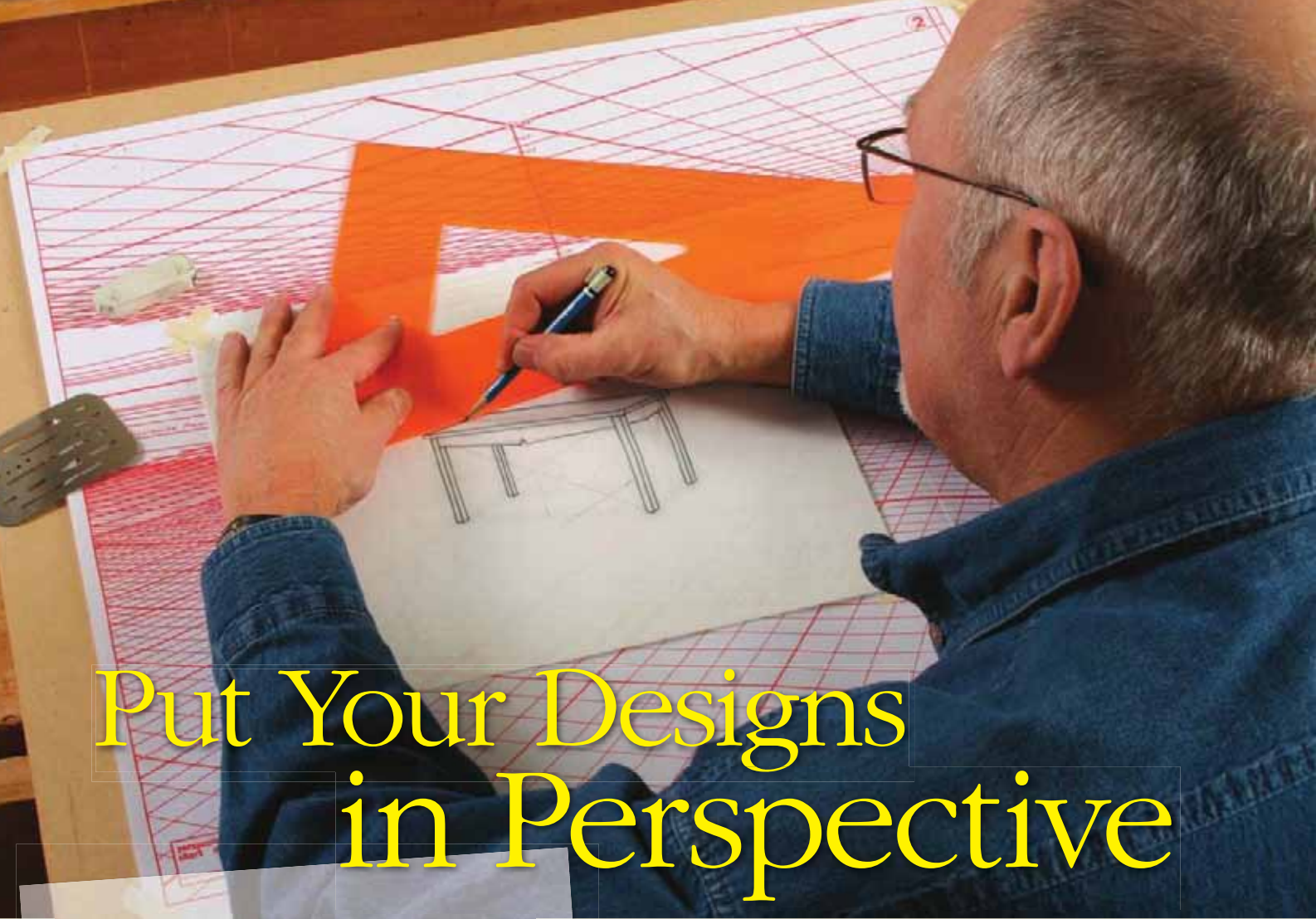
trend-uk.com

Street price: \$120

Amps: 6.6

Weight: 6 lb.

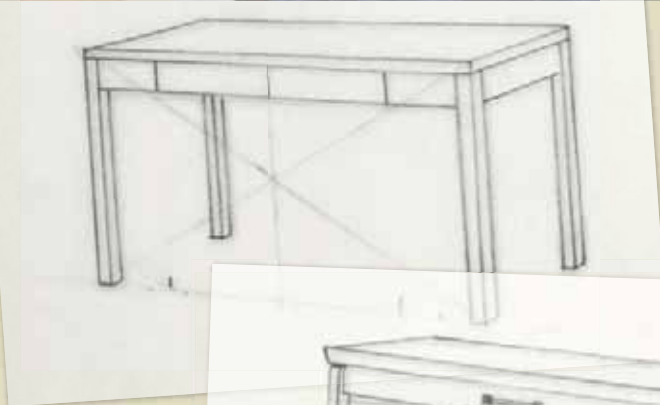
This is a dedicated plunge router. It worked great for inlay work and routing hinge mortises. However, it is just as large as my mid-size plunge routers. That means it isn't well-suited for one-handed work like rounding over or chamfering edges. Also, the fit and finish were a bit rough, with a few burrs here and there.



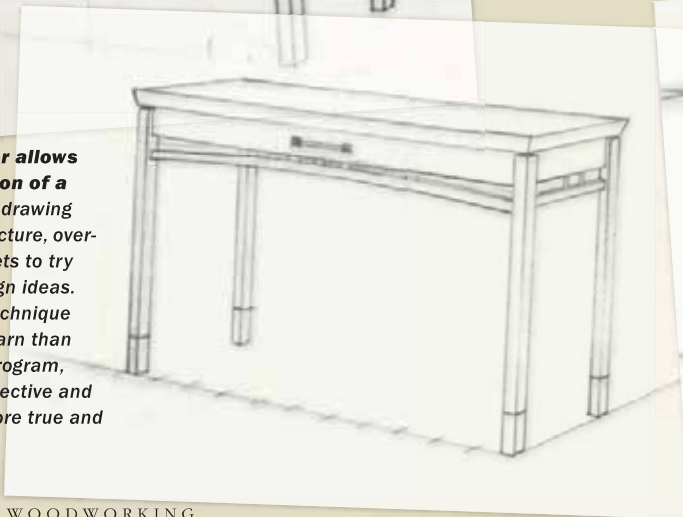
Put Your Designs in Perspective

Why pencil and paper
still beat the computer

BY MICHAEL C. FORTUNE

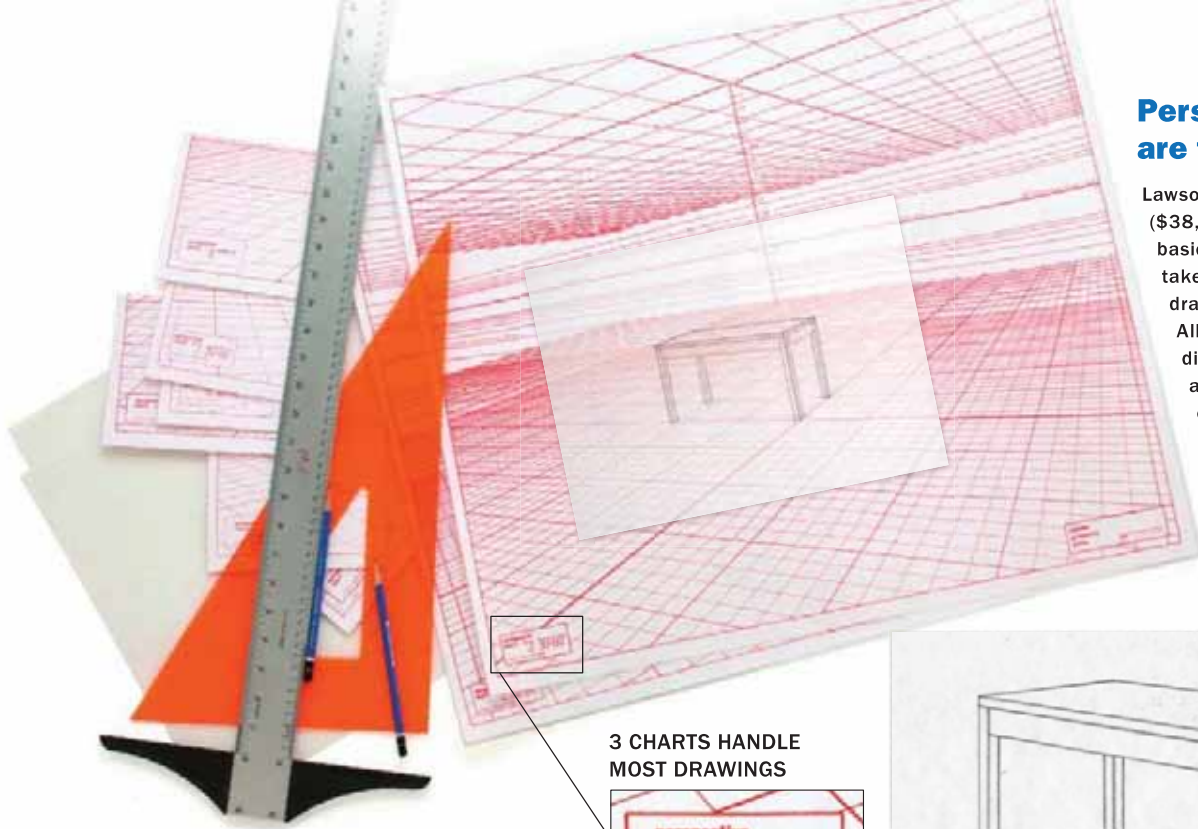


Tracing paper allows rapid evolution of a design. After drawing the basic structure, overlay clean sheets to try different design ideas. This simple technique is easier to learn than a computer program, and the perspective and curves are more true and realistic.



Perspective charts are the secret

Lawson perspective charts (\$38, amazon.com) are basically smart grids that take all the work out of drawing in perspective. All you do is mark off distances and use the grid as a guide for lines. The charts come in a set of six types, but you'll use only three of them.



3 CHARTS HANDLE MOST DRAWINGS



If you want to show the front and side equally, use chart No. 1.

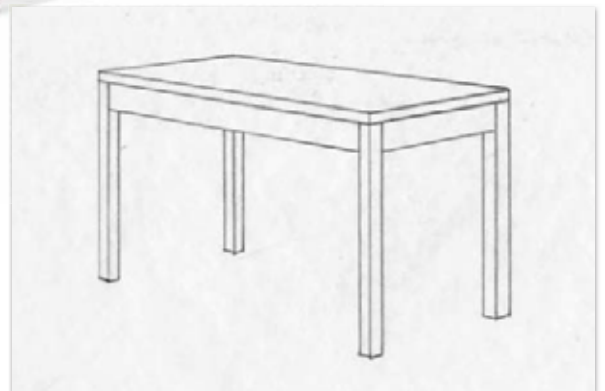


Chart No. 2 allows you to draw furniture as if you were seeing it while standing in front and a bit to the right.

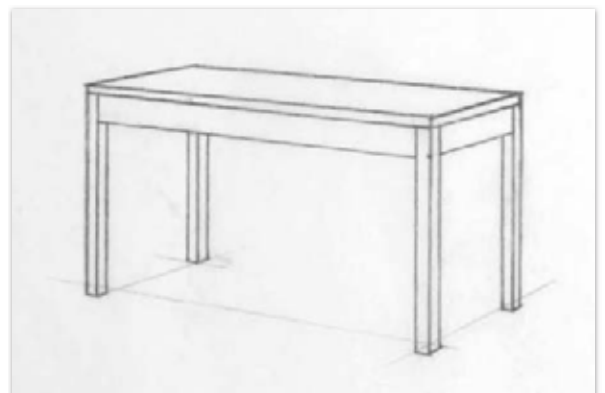
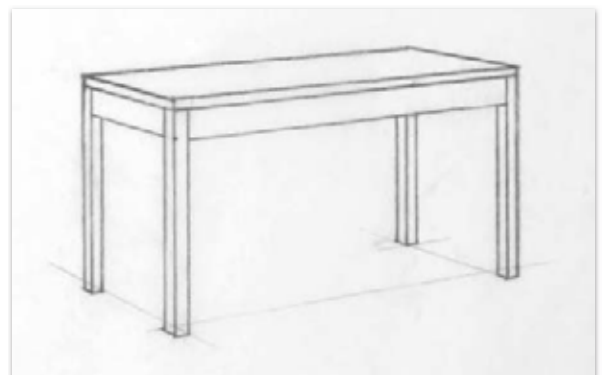


Chart No. 3 provides the perspective from in front and to the left.



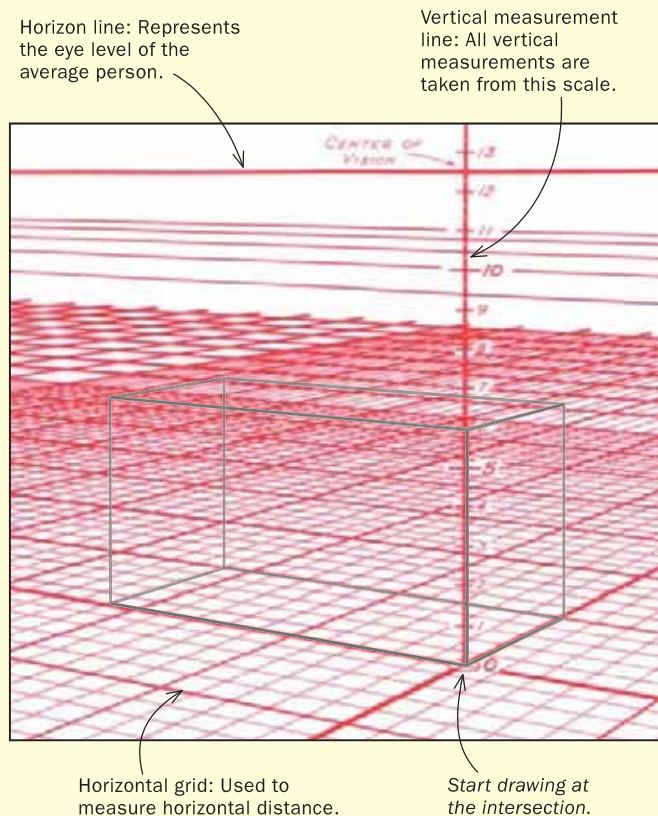
Elevation drawings—where the top, side, and front of a piece of furniture are shown separately—are a common design tool, but they have two serious flaws: They isolate the three views from one another, and they don't show perspective. That makes it difficult to visualize what the completed piece will look like. A perspective drawing of the same piece shows exactly how it will look, allowing you to catch design problems before you begin to make it.

Perspective drawings are also a great tool when you're building for someone else. A client, spouse, or friend is more likely to understand a perspective drawing than a set of elevations, and won't be surprised when the piece is delivered. I've also found that my perspective drawings have become a great "inspiration bank" when I'm casting about for something to make.

Ordinarily, learning to draw in perspective can take a long time. I spent four years in art school drawing still-lives and naked people, and converting those skills to furniture drawings proved difficult until I happened across a set of Lawson perspective charts. It was a real "eureka" moment for me: After using the charts for just a short time, I was drawing pictures of my furniture ideas that really looked like what I had in mind. All the parts were to the same scale and even my table legs all appeared to rest on the floor, a detail that had previously escaped me. A

Start with a box

When drawn in perspective, every piece of furniture fits in a box. Draw the box first, matching its height, width, and length to the overall dimensions of the piece.



USING A PERSPECTIVE CHART

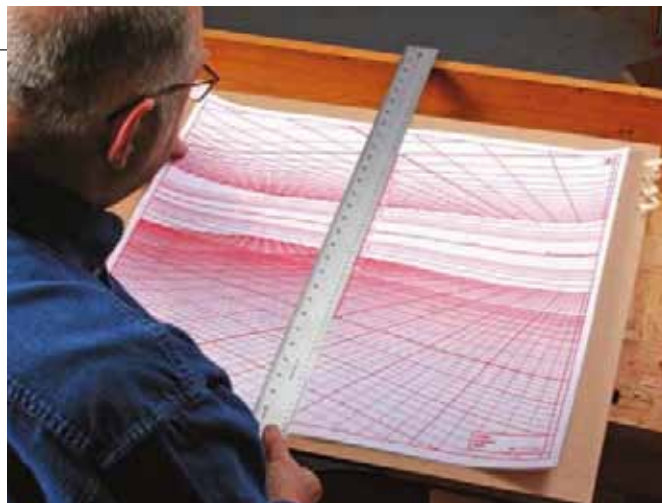
Start drawing where the three bold red lines intersect. The grid lines on the floor are laid out according to the scale on the vertical measurement line. The scale is arbitrary, but Fortune has found that assigning 5 in. to each unit works well, placing the horizon line at eye level. Of course, do not draw directly on the chart.

bit more practice allowed me to leave the charts behind, because I'd developed a sense of what perspective drawings should look like and how they're made. After I show you what I've learned, you, too, will be on the path to beautiful and useful drawings.

You need just a few tools

The first tool to buy is a set of Lawson perspective charts (amazon.com, \$38). They come as a set of eight, but you really only need charts No. 2 and No. 3 for the majority of your drawings, because they come closest to duplicating how we typically see furniture in a room, showing you more of the front than the side. I occasionally use chart No. 1, too, when I want to show the front and side equally.

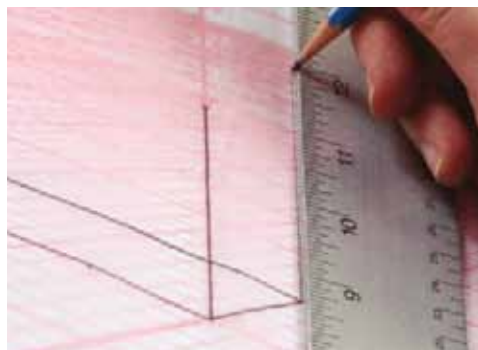
You also need a drafting table or other drawing surface. A piece of MDF 24 in. wide by 28 in. long works fine, but it is important that the top and bottom are parallel to one another, so you can use both to draw vertical lines. You use the grid to draw horizontal



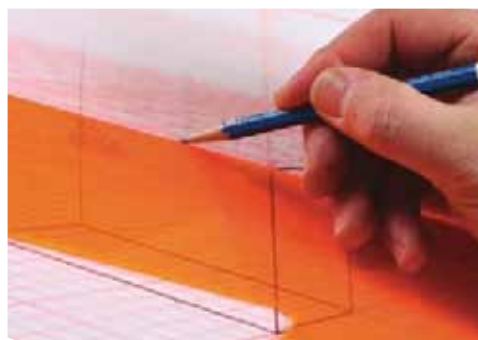
Align the chart. Because the T-square will be used to draw vertical lines, use it first to align the vertical measuring line on the chart. Then tape down the chart, and add a piece of tracing paper on top.



Start with the bottom of the box. A push pin in the right side vanishing point helps align the drafting triangle for lines on the side of the piece. Use the grid for lines that vanish toward the left.



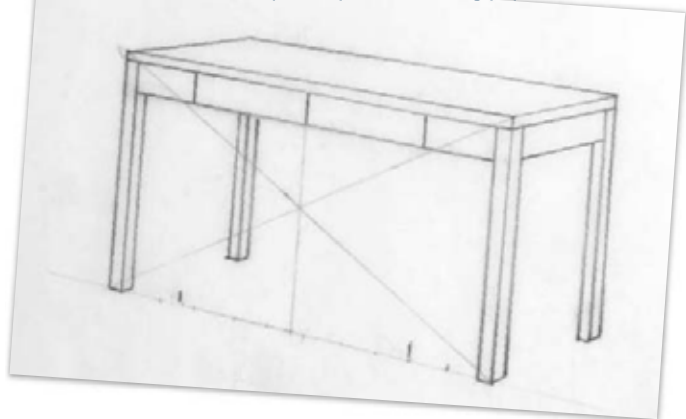
Draw the corners next. After marking the height of the box on the vertical measurement line, draw the front corner. Draw the other three as light construction lines that extend beyond the box's top.



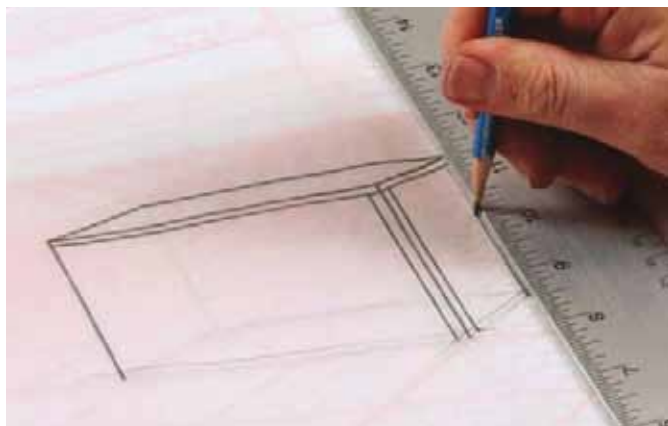
Then add the top. Align the drafting triangle with the top of the front corner and the vanishing points to draw the first two sides. Darken the remaining three corners after all four sides of the top are drawn.

Define the structure

Lay a second sheet of tracing paper over the box, and use the box as a guide for drawing in the basic parts of the piece. Leave them square, so this drawing can be used as a template for drawing multiple variations—each on a separate piece of tracing paper.



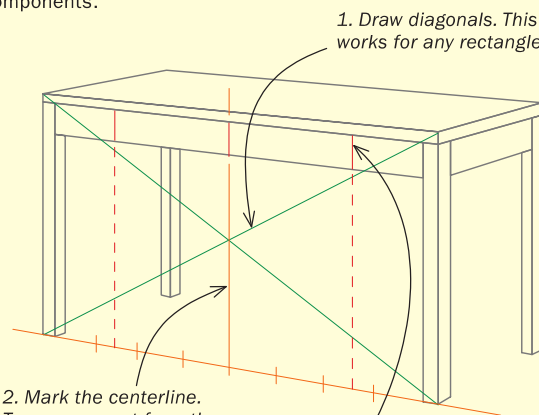
Draw the top first. Trace the top of the box and then measure down the front corner to get the thickness.



The legs and aprons are next. Use the grids on the chart underneath to figure out widths and thicknesses. Save the leg in the far back corner until after you've drawn the aprons. Draw only the aprons you'd see (left): the front and right side. For the leg in the far back corner, transfer its thickness from the other back leg and its width from the leg in front of it.

DIAGONALS FIND THE CENTER

It can be hard to judge distance along a vanishing line. To find the center of a table front or carcass side, draw diagonals from corner to corner. They intersect at the center. Repeat this process to divide a distance into quarters, eighths, etc., to add drawers and other components.



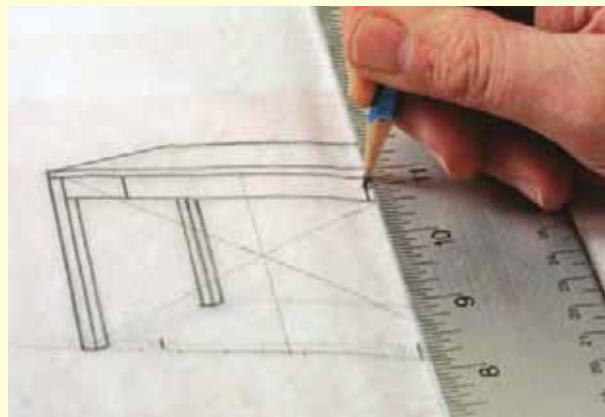
1. Draw diagonals. This works for any rectangle.

2. Mark the centerline. To measure out from the centerline, use the grid lines on the perspective chart.

3. Now draw the drawers. Use the T-square and mark the three vertical lines.



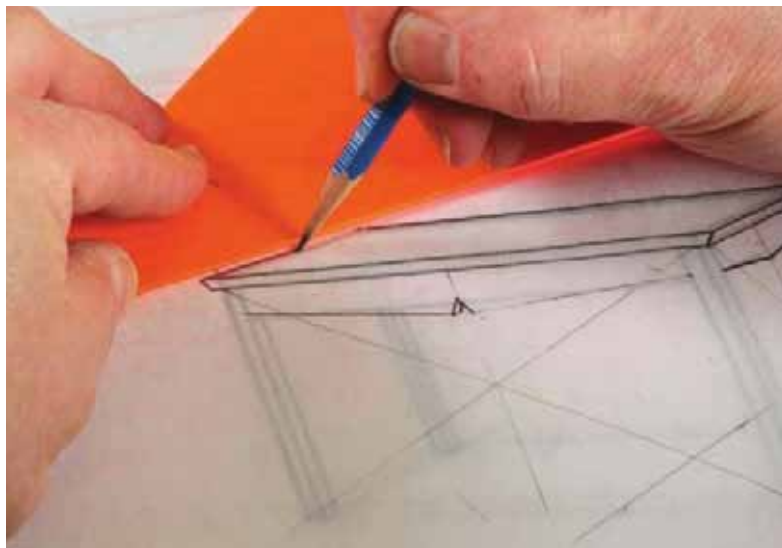
Divide with diagonals. The intersecting points of the diagonals will identify the center of the piece.



Measure from the center out. Use the chart's grid lines so that the correct perspective is preserved.

Explore details and variations

Now that you have a template of the table's basic structure, you can lay another sheet of tracing paper over it and quickly draw a version with design details, such as angled aprons. Knocking out several design variations is no problem.



Fast work. There is almost no new measuring needed, because the template tells you where parts start and stop. Just draw the shaped parts directly over it.



lines. The T-square should have a 30-in.-long blade. Get a drafting triangle, too. Use tracing paper: 11-in. by 14-in. sheets are the right size for most furniture. Get an H or 2H pencil for drawing fine lines, and a 2B or 4B pencil for bolder lines. Finally, pick up some blue painter's tape or low-tack drafting tape to hold everything in place on the drafting table and, because we all make mistakes, get an eraser.

Draw a box, rough out the piece, then add detail

Align the vertical measuring line with the edge of the T-square and tape the chart to the drafting table. Then tape a sheet of tracing paper over the perspective chart—if you draw directly on the chart, it's good for one use only.

Now draw a fine-line three-dimensional box that matches the overall dimensions of the piece of furniture you are drawing. To do this, you first need to assign a scale to the horizontal grid and the vertical measuring line. I've found that assigning 5 in. to each increment works best. Draw the bottom of the box, and then draw a vertical line for each of the four corners. Mark the height of the box on the vertical measurement line and then draw the top of the box.

After the box is drawn, use the same methods to

sketch in the basic structure of the piece.

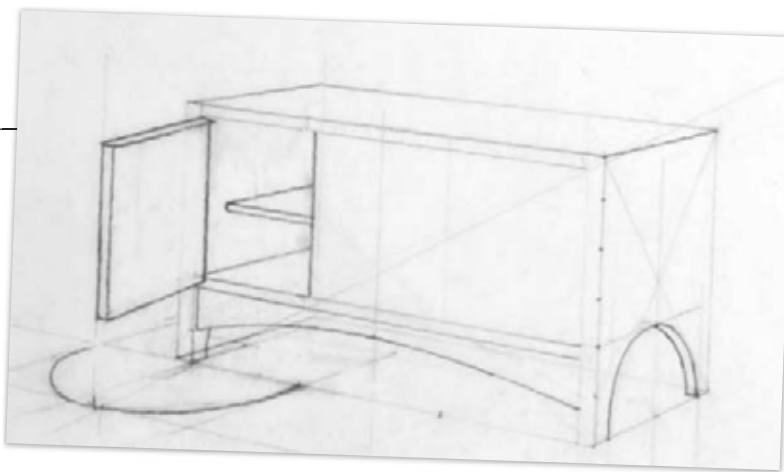
For a table, that is the top, aprons, and legs.

At this point, keep all of the parts square and don't add details, because this roughed-out piece works as a template for trying out different ideas. Simply tape another sheet of tracing paper over it and make a detailed drawing over the roughed-out drawing. You can repeat that process again and again, trying out subtle and dramatic variations. And because the underlying template is there to trace over, it's actually a fairly quick process. □

Contributing editor Michael Fortune designs and makes furniture outside Warsaw, Ont., Canada.

How to handle curves

To draw curves in perspective, first lay out a grid for the height, width, and centerline. Then draw the two sides of the curve, keeping in mind that because of perspective one side is steeper than the other.



Start with a box. Draw vertical lines for the two sides and the center. Then draw a line (as shown) at the top of the curve.



Draw small curves freehand. Go from the middle down to the bottom and then repeat for the other side.



Use a French curve on the big ones. Try different parts of the curve until you find the section that looks right.

USE A CIRCLE TO OPEN A DOOR

Start with a virtual door that extends down to the floor line.

1. Locate the hinges' axis.
2. Draw a circle to define the door's swing.
3. Locate a vanishing point for the top and bottom edges of the virtual door.
4. Draw the front edge of the door.

5. Draw vanishing lines through the leading edges of the door and hinge axis.
6. Draw the actual door.



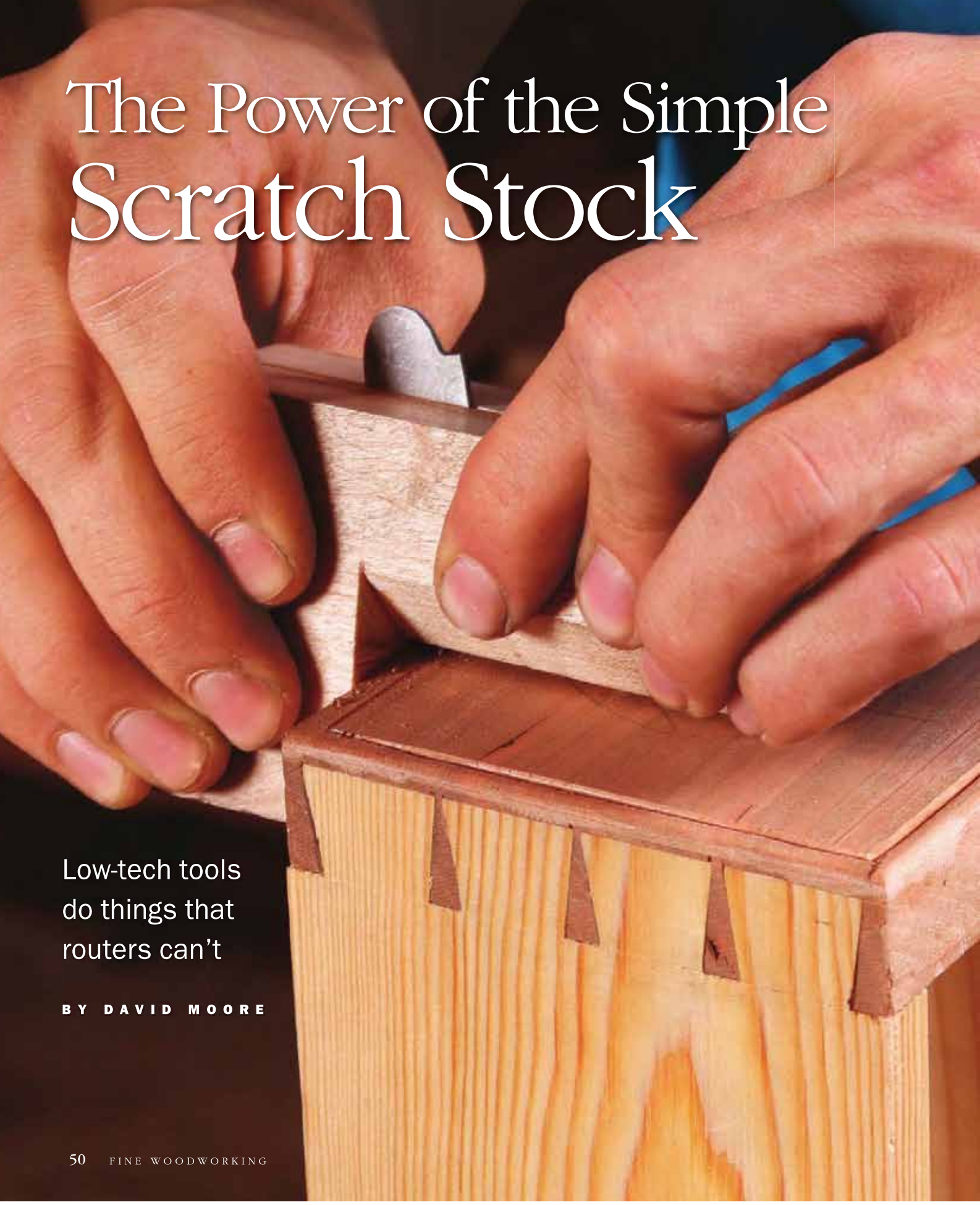
Start with a circle on the floor. Centered on the hinge axis, its radius is the door's width, and its circumference is the door's swing.



Find the vanishing point. A line through the centerpoint of the circle and the leading corner of the door finds the vanishing point on the horizon.



Draw the true top and bottom along new vanishing lines. Then draw the vertical edges. Mark the door's thickness and draw the rest.



The Power of the Simple Scratch Stock

Low-tech tools
do things that
routers can't

BY DAVID MOORE

The router is a wonderful tool for creating moldings and decorative details. There are bits that produce roundovers, ogees, ovolos, scotias, and astragals, to name a few. But despite the growing field of router jigs, bits, and accessories, there are still times when a router just won't do. Some details are too delicate for a router to achieve, and there are times when no bit's profile looks quite right. These are times to reach for a scratch stock, a shopmade tool that furniture makers have wielded for hundreds of years.

Basically a wooden holder and a flat metal blade, a scratch stock works surprisingly quickly, creating custom molding profiles and other decorative details as well as voids for stringing and other inlay. Unlike a router, the scratch stock can be customized and—if



you have a little scrap material on hand—can be had without leaving the shop.

I'll take you step by step through making this simple tool and show you some great ways to use it.

Low-budget and easy to make

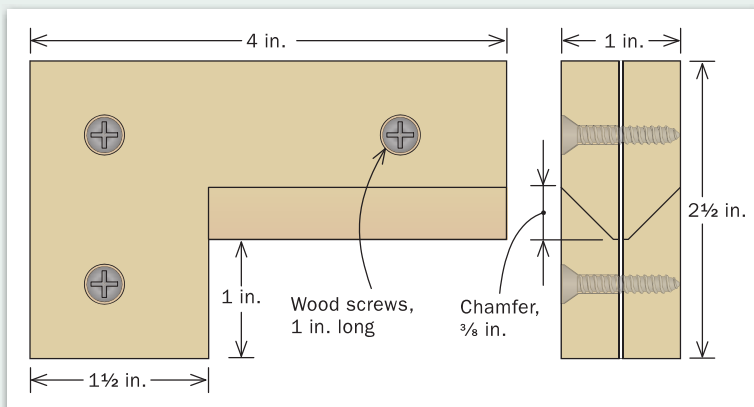
I make scratch-stock holders out of maple because it's long-lasting and produces minimal friction. I make them from two pieces, screwed together to hold the cutter between them. Two 1/2-in.-thick strips, 12 1/2 in. long and 2 1/2 in. wide, provide enough stock to make three holders. I lay out all three on the top blank, leaving 1/8 in. between them to allow for the tablesaw kerf.

For best alignment, pre-drill for the screw holes with the blanks clamped together. Be sure to drill the hole in the top blank slightly wider than the diameter of the screw's threads. This way, the threads won't bite in the top half of the holder, making it easier to loosen and tighten the cutter. Last, countersink the holes so the screw heads are flush with the face of the top blank.

With the blanks screwed together, use the tablesaw and then the bandsaw to cut them out. Once the holders are separated, lay out the chamfer angles on the end of the holder and carry the lines down the length

Make a few holders

It's easier to make the holders in a batch of three or more, and it's nice to have more than one scratch stock on hand and ready to go. Two pieces of maple, screwed together first and then sawn to shape, form each holder. The chamfered body lets the user tilt the tool to control the cutting depth.



Better in batches.

A 1-in. vertical cut creates each holder's fence (top). After cross-cutting to separate the holders, free the waste from each with a stopped ripcut on the bandsaw (left). To chamfer, use a hand-saw to make angled cuts in the body where it meets the holder's fence, then pare away the waste with a chisel (bottom left).

How to make a cutter

Lay out the profile.

Moore uses a drawing of the profile as a reference and a scratch awl to make fine but distinct layout lines. Circle templates help create curved shapes.



of the body. Use a handsaw to make angled stop cuts where the chamfers die into the holder's fence. Then use a chisel to pare away the waste.

Making the cutter—The blank for a scratch stock's cutter can be had from a variety of sources, but the most common is a piece of an old scraper or blade from a handsaw or bandsaw, about 1/32 in. thick. Use tin snips or a hacksaw to cut a blank large enough to hold easily at the grinder. I typically leave my cutter blanks a couple of inches long, which makes them easier to adjust in the holder. Grind away the saw-teeth, quenching the metal often in water to keep the steel from overheating, which will cause it to dull more quickly.

When you're done grinding, two adjacent edges of the blank should be straight and square to one an-

FILES MAKE QUICK WORK OF SHAPING



Follow the layout lines. Moore uses several files of different shapes and diameters to remove material from the blank and create the cutting profile. Be sure to work with the files at a 90° angle to the blank, to keep the cutter's edges square to its faces.



Hone both faces.

Lapping on the 1,000-grit stone removes burrs from the cutting edge, and ensures that the scratch stock will cut cleanly in both directions.



other. The next step is to lap both faces smooth on a 1,000-grit stone.

Once this is done, lay out the cutter's shape on the blank. First, scribe a line parallel to the cutting edge to mark the full depth of the profile. Then scribe the cutting profile onto the metal's surface.

To cut the profile, I secure the blank in a vise and use a set of inexpensive round files designed for sharpening chainsaw blades (mcmaster.com; part No. 4246A). Any file that can produce the shape will work, but having round files in a variety of diameters helps make quicker work of complex shapes.

The cutter's edge should be square to its face and—unlike a card scraper—free of any burr. The burr on a card scraper helps it cut aggressively but requires a specific angle of attack. The scratch stock must cut cleanly when used in either direction and at all degrees of tilt. To help get a square edge, try to posi-

Online Extra

To watch Moore make and use a scratch stock to create a mirror frame, go to FineWoodworking.com/extras.

Tips for custom moldings

SIMPLE BEADS

Tailor-made tool. This bead is sized to match the delicate proportions of a small drawer front. Unlike a router bit, a scratch stock can have a fine quirk, and also stop cleanly where the grooves meet in the corners.

Quirk



Finish rounding the outside edges. Moore uses a rasp to make the rounded outer profiles meet.

tion the blank at a working height that makes it easy to keep the file parallel to the floor (and square to the work) for the full length of each stroke.

When your filing gets close to the layout lines, take the blank back to the 1,000-grit stone to lap the burrs away. Now file with less-aggressive strokes, repeating the whole process until the lines have been reached.

Now it's time to fit the cutter. For best support, install the cutter as close as is practical to the fence and top of the holder. Tighten the screws and then take a few test passes on scrap stock to determine whether you need to adjust the cutter's position or tweak the shape of the cutter itself. Now it's time to put your cutter to use.

Four ways to use a scratch stock

Here are four practical applications where a shopmade scratch stock can prove invaluable.

Decorative beads—With a router and a beading bit, it's easy to cut a clean bead on parts like drawer fronts or table aprons. Trouble is, the available bits don't always yield a bead whose proportions fit the overall size of the piece. A scratch stock can be sized much more precisely, and with much more delicate details.

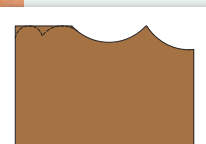
The cutter profile is easy to create with small-diameter round files using the process described earlier. The chamfers in the holder let you control the depth of cut by tilting the tool forward or back (as you push or pull the scratch stock) for a shallower pass. Start with shallow passes and increase the angle of the tool to make deeper passes. When the tool reaches full depth, it will stop cutting and the profile will be done.

Custom molding profiles—The scratch stock can also be used to cut a completely unique molding profile or, in the example shown at right, to help blend together the router-cut elements of a larger profile. As



LARGER PROFILES

Router bits are the starting point. Let the power tool do the heavy work. In this case, a core-box bit makes the first two cuts.



Router profile

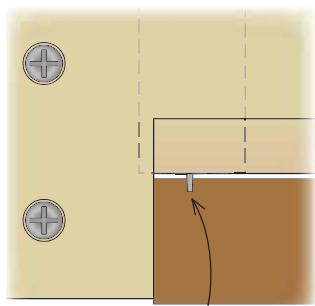


Finished scratch-stock profile

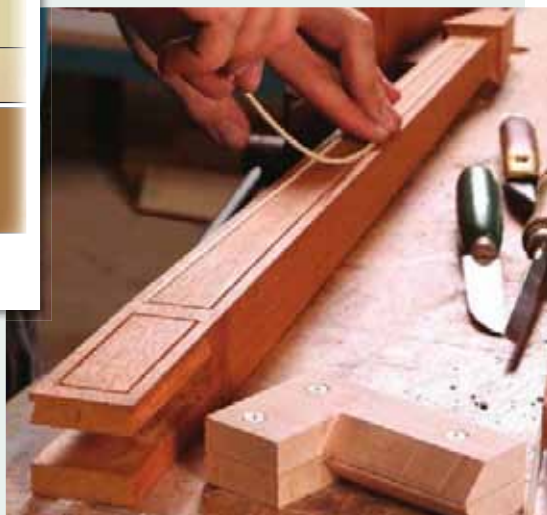
Scratch stock completes the job. With much of the waste hogged away by the router, Moore uses the scratch stock to add a bead and to smoothly blend the hand-cut and machine-cut portions of the molding.

Best tool for inlay grooves

Well balanced. The scratch stock works well on narrow stock, even at the end of a workpiece where guiding a small router would be more challenging. The cutter is shaped precisely to fit the stringing stock.



The cutter is sized to match the stringing.



much as possible, use machines or other hand tools to remove the bulk of the waste before switching to the scratch stock. To complete the profile shown, I used a router to cut the coves. I then used a scratch stock to create the bead and ease the transition from the bead to the cove.

When designing profiles, consider the diameters and shapes your tools make. In this case, I chose a 1/2-in. radius core-box bit and two different-diameter files (3/8 in. and 5/64 in.) to create the final shape.

Grooves for stringing—When working parallel to an edge, the scratch stock is a quickly adjustable and convenient way to cut stringing grooves. File the cutter to ensure the material fits snugly in the voids it creates. In my case, I shape the cutter into a slightly tapered “V” so the groove more closely matches the shape that my stringing cutter produces. (For more on stringing, see Master Class: “Line-and-berry inlay,” *FWW* #196.)

Begin making test passes with the cutter while it is still oversize, filing away more material as needed and using stringing to check the fit.

Reference lines for carved details—There are times when you’ll want to chamfer the scratch stock’s vertical fence as well as its horizontal one. Doing so lets the tool closely follow a tightly curved edge like the one on the dresser base shown below.

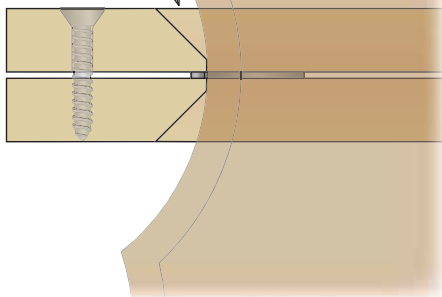
In this case, I use the cutter as a layout tool, creating a deep stop line against which I can reference a carved detail on the workpiece. A standard marking gauge, with its broad, flat fence, would not be able to navigate the curve.

The cutter is basically a single, sharp point that is spaced a given distance from the fence. I used a round file to cut it, even though I had no plans to use it for shaping. It’s a good way to get a very fine cutting point. □

David Moore is a furniture maker in St. Louis, Mo.

Ready the fence for curves

Chamfer the fence to follow inside curves.



A nimble marking gauge. On this dresser base, the scratch stock’s knife-like point makes a line parallel to the sharply curved edge. Chamfers on the fence let the tool make sharp turns (left). Moore uses this stop line as a reference for carved details on the face of the workpiece (above).

Climb-cutting sounds like an X Games sporting event, but there's nothing extreme about it. The technique, in which you move the router in the same direction that the bit wants to pull it, gets a bad rap as being unsafe. But it's a legitimate

Climb-Cutting: Don't Believe the Naysayers

BY CHRIS GOCHNOUR

practice that every woodworker should use—in the right places.

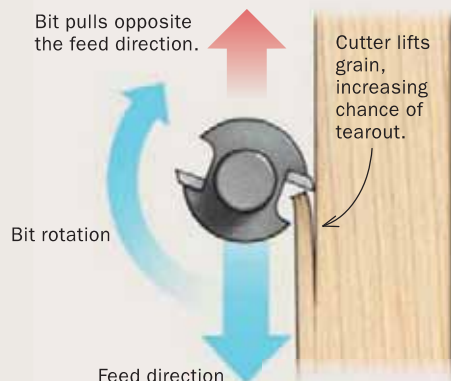
The biggest benefit of climb-cutting is that it prevents chipout and tearout when routing along an edge. For some cuts, it also lets you set the bit to cut full depth and just whittle away until you get close, a real time-saver.

Climb-cutting is no more dangerous than any other machine technique. But to do it safely, you first need to understand when

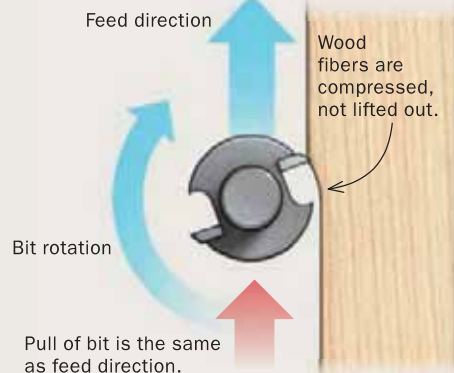
Push-cutting vs. climb-cutting

In a push cut, the router is moved against the rotation of the bit. The counteracting forces make it easier to control the tool, but the technique is more prone to tearout. A climb cut eliminates tearout, but because the router moves in the same direction as the bit's rotation, the tool will want to take off on you.

A PUSH CUT IS EASIER TO CONTROL BUT PRONE TO TEAROUT



A CLIMB CUT IS TEAROUT-FREE BUT REQUIRES A FIRM GRIP



to do it and how the router will behave during the cut.

What makes the climb cut tricky

Many woodworking instructors tell their students they should always rout against the rotation of the bit, often called a push cut. Push-cutting does provide maximum control over the tool, so it's considered safer and is the reason why beginners are taught to rout this way. But push-cutting can cause the unsupported wood fibers ahead of the bit to tear out

(see drawing, p. 55). That's where climb-cutting can help.

Climb-cutting cuts the wood on the entry stroke, which compresses the wood fibers rather than lifting them. Each pass will be tearout-free, but be careful. Climb-cutting has more of a tendency to make the router "run" forward, so controlling the tool is job number one.

When climb-cutting, use a broad, stable stance, like a boxer, holding the router firmly with both hands. Don't force the tool against the workpiece while climb-

cutting, because this will make the router take off on you. Instead, start the router and engage the workpiece with a light touch. Once it contacts the workpiece, pull the router toward you, using your arms to control the tool. When profiling, take multiple, light, controlled passes until you reach full depth.

Read on to find out more about how to climb cut and when it's appropriate.

Chris Gochmour recently opened a new shop near Salt Lake City, Utah.

ROUT PERFECT EDGE PROFILES

Large profiling bits are notorious for tearout. The solution is a climb-cut. Set the bit to its full cutting depth and whittle away material. Finish with a push cut to eliminate any waves left by the climb cut.



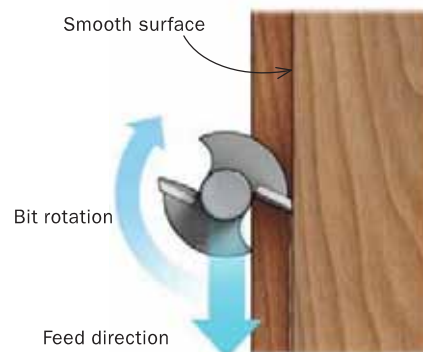
CLIMB FIRST

Make waves. Climb-cutting eliminates tearout, but it leaves a somewhat wavy surface in its wake.



PUSH LAST

Calm the water. To clean up the wavy edge, make the last pass a light push cut.



When climb-cutting is a no-no



NEVER WHEN TIED DOWN

Do not climb cut if the bit is trapped or tethered in some way and can't climb out of the cut, such as when using a circle-cutting jig.



NOT ON A ROUTER TABLE...

Use a push cut when feeding stock by hand. If you climb cut, the stock can be ripped from your hand, drawing your hand into the cutter.



...UNLESS YOU USE A JIG

If your workpiece is large, or locked into a heavy jig or sled of some kind, a climb cut on the router table can be made safely.



CLIMB-CUTTING ON PANELS: MOVE CLOCKWISE

With a handheld router, you generally move right to left to climb-cut. On a panel, this means moving the router clockwise.



INSIDE FRAMES: GO COUNTERCLOCKWISE

Inside a frame, however, you need to move in the opposite direction.



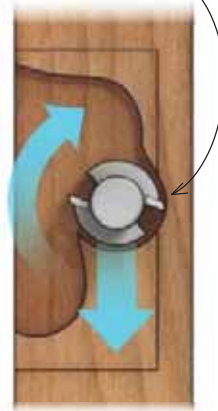
ROUGH OUT MORTISES

When doing inlay or installing hinges, it's often easier to rough out the mortise with a router. In these cases, a push cut can be ruinous. With no bearing to anchor the bit, the router can stray beyond the layout line if you're not careful. For more precision, use a climb cut, which will push the bit away from the layout lines. When you get close, finish the mortise with chisels.



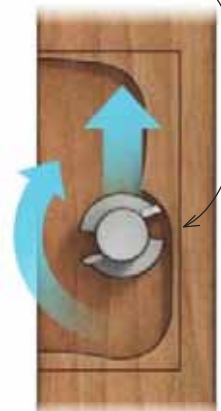
THE PROBLEM WITH A PUSH

Push cut can dive past layout lines.



THE FIX IS TO CLIMB

Climb cut keeps you within the lines.

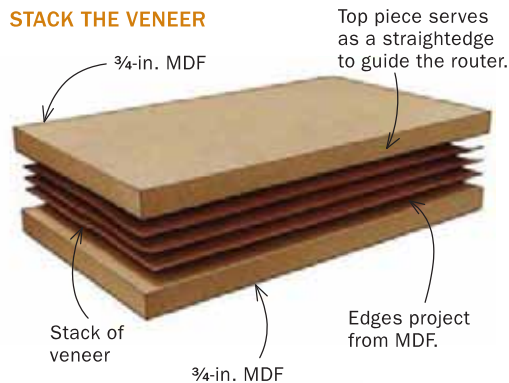


JOINT VENEER

To join pieces of veneer, you need crisp, straight edges that are hard to get on such fragile material. For the cleanest results, stack and squeeze the veneers between two pieces of $\frac{3}{4}$ -in. MDF and joint the edges with a climb cut and bearing-guided bit. Make a final, light pass with a push cut.



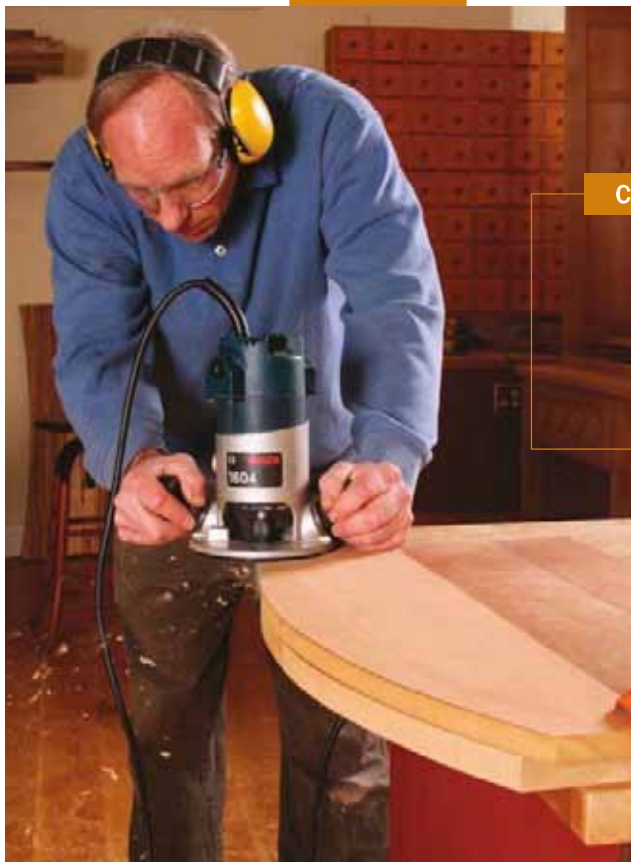
STACK THE VENEER



JOINT THE EDGES



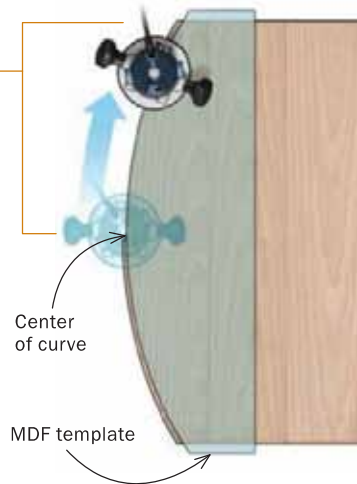
ROUT SMOOTH CURVES



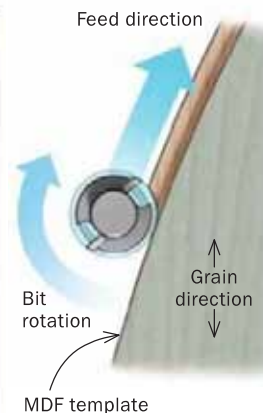
CLIMB CUT HERE

When routing the edge of a curved panel, say for a demilune tabletop or curved apron, use a climb cut on one half of the curve (left), starting near the top, or center, of the curve, where the grain is straight.

FIRST HALF



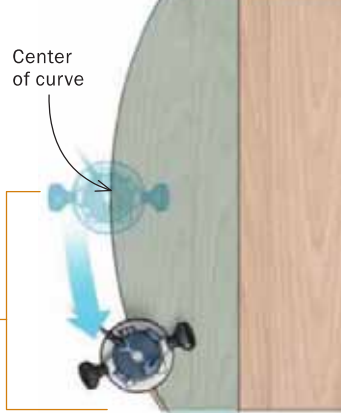
DETAIL



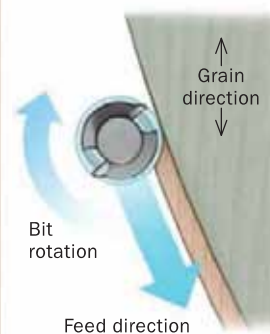
PUSH CUT HERE

After climb-cutting on one side, use a push cut on the other. As before, start the push cut at the center of the curve.

SECOND HALF



DETAIL



Finest Way

BUTTERFLY LEAF RISES AND SPREADS ITS WINGS

The secret to this expanding table is a hinged leaf that swings on pivot pins. It stays hidden under the table when not in use, but quickly spreads open when you need extra space.

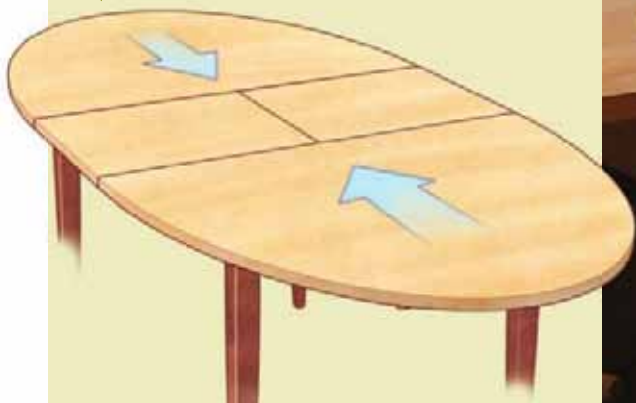
1 OPEN THE TOP



2 PULL LEAF UP FROM BELOW



3 CLOSE TOP FOR EXPANDED TABLE



to Expand a Table

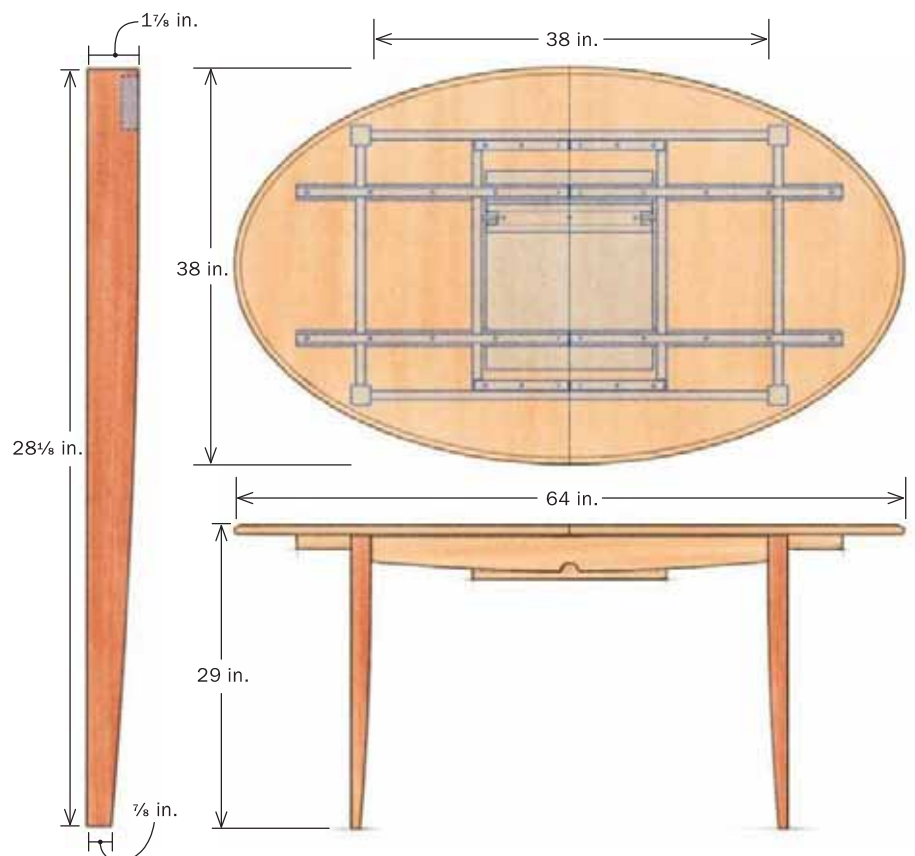
Pivoting leaf is ready when guests arrive

BY MICHAEL C. FORTUNE

When it comes to expanding tables, nothing beats a butterfly table for grace, beauty, and just overall coolness. Its leaf lies under the tabletop and then, like a mechanical wonder, swings up and open, coming to rest fully expanded on the aprons. As the name suggests, it's like a butterfly emerging from its cocoon—sure to draw a gasp of admiration from your dinner guests and fellow woodworkers, too.

The mechanism is both simple and ingenious. The leaf is two pieces joined by barrel hinges. It is connected to the table by a pair of pivot pins, and stores neatly under the tabletop. Then, as your guests arrive, you slide the top apart, take hold of the top half of the leaf, and pull up. As you do, it rotates on the pins and opens, rising up from beneath the top and unfolding until it rests on the aprons. At that point, you simply push the sides of the top against it and, voila, you have a bigger table. To stow the leaf, you just reverse the process. No struggle, and no loose leaves to store in a closet.

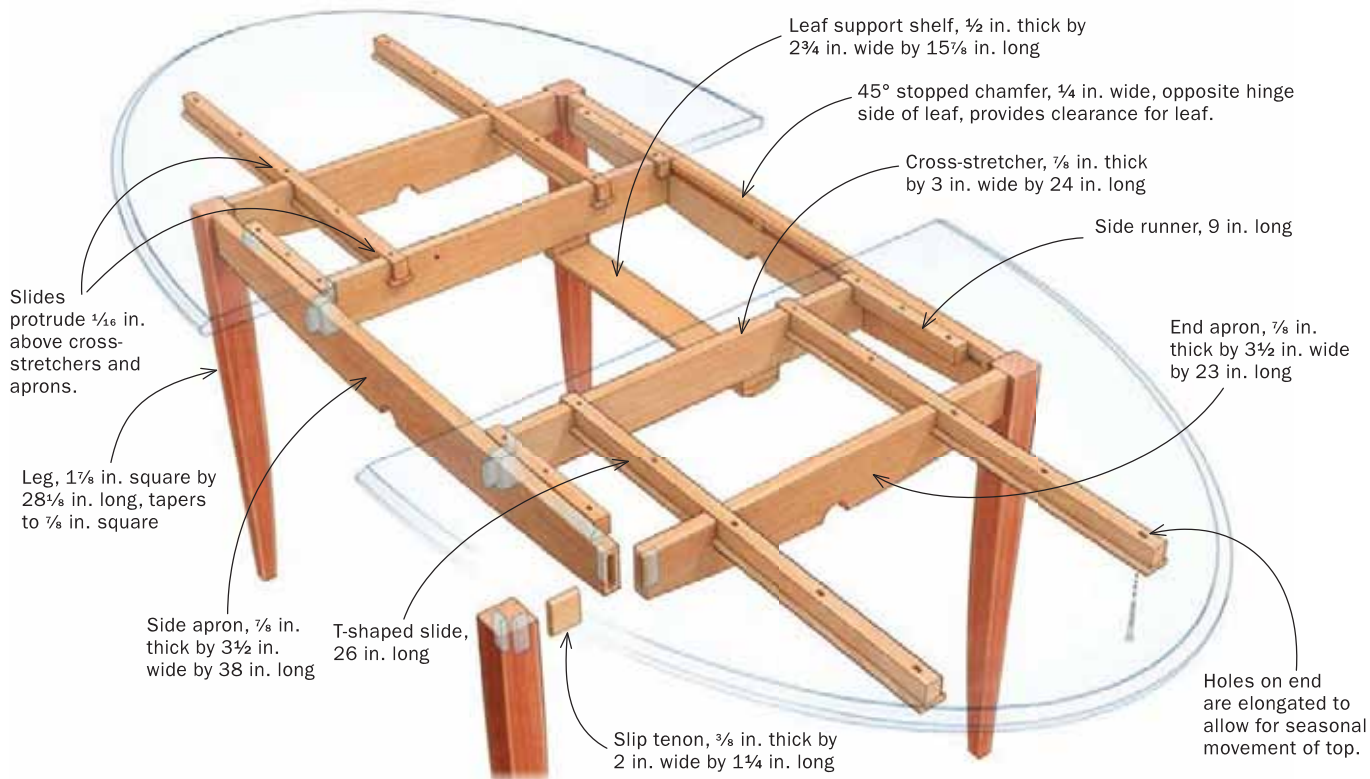
The genius of the mechanism, paired with your craftsmanship, is the perfect way to show how far you've come as a furniture maker. It's not as hard as you might



Online Extra
To see three more butterfly tables by Michael Fortune, go to FineWoodworking.com/extras.

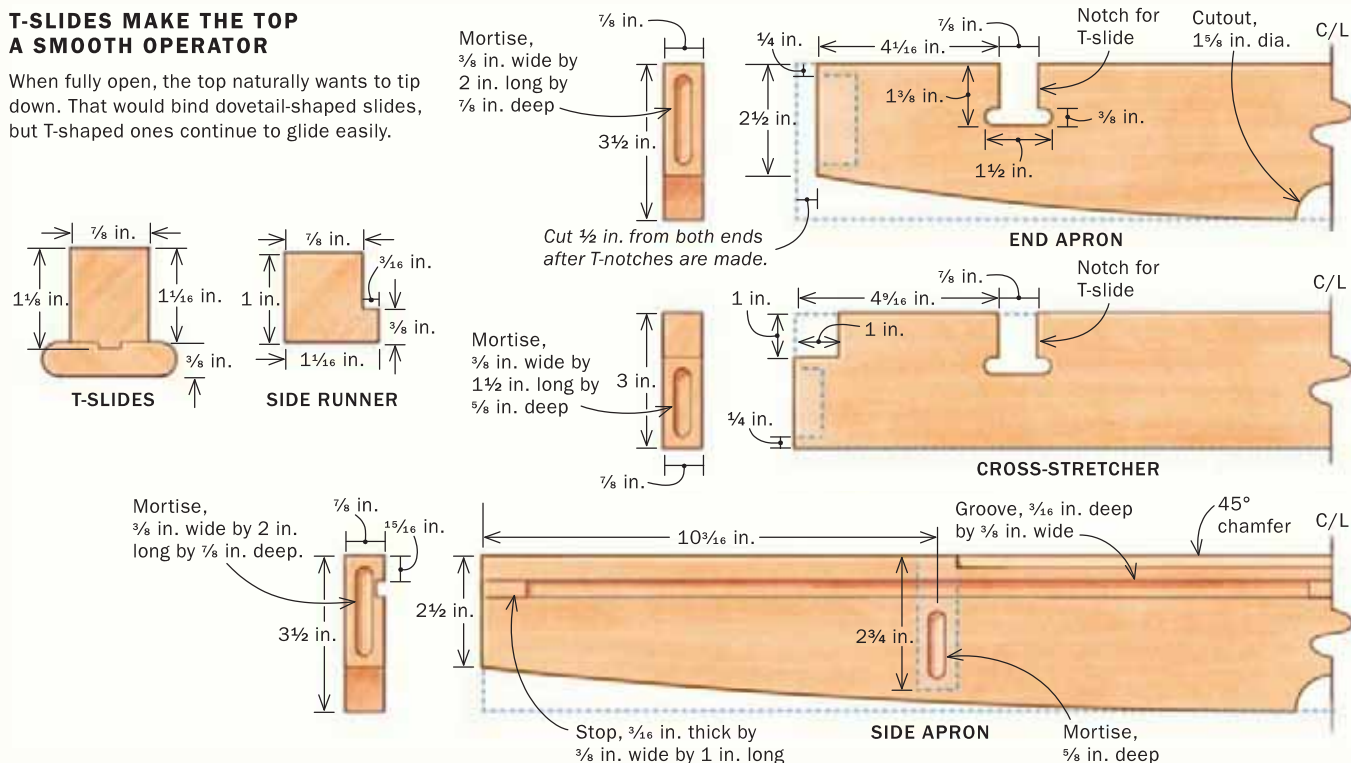
MAKE THE NOTCHES AND SLIDES FIRST

For the slides to work without binding, they must be parallel to one another, and that means the notches in the two aprons and two cross-stretchers must be located precisely. To make that easier, start with all four parts the same length and cut the aprons to final length after the notches are done.



T-SLIDES MAKE THE TOP A SMOOTH OPERATOR

When fully open, the top naturally wants to tip down. That would bind dovetail-shaped slides, but T-shaped ones continue to glide easily.





CUT THE NOTCHES

Tablesaw, then router. A pair of stops on a sled's fence controls the width of the notch. Cut the sides and then nibble away the waste in between. Flip the part end for end to cut the second notch (above). Repeat for the other six notches. Fortune uses a $\frac{3}{8}$ -in.-dia. spiral upcut bit to make the horizontal part of the notch (right), taking several light passes. Use a pair of edge guides for a straight cut and a pair of stops to control the length.



MAKE THE T-SLIDES

Two-part T-slide. First cut a groove down the center of the horizontal part. Fortune uses a dado set for that. Then round its edges to match the notch (above). Rout a tongue on the upright to fit the groove. Two passes along a straight bit (right) is all it takes.



think. Locating the pivot pins properly is the trick, but I'll show you a trouble-free way to do it. And the mechanism is simple enough to work with just about any type of table. The one I've made for this article is fairly conventional—four legs joined to aprons—but you can make one with a pedestal or trestle base. The top can be rectangular, round, oval, or just about any shape. I even have made tops with a serpentine leaf. It works on big tables, too, as long as you beef up the slides (ball-bearing slides are best for big tables) and use more hinges on the leaf.

Straight-grained slides won't bind

The basic structure of this table is simple. I joined the legs and aprons with slip tenons. The aprons are curved and the legs tapered, but I keep them square until after I've made the butterfly mechanism and routed the mortises. However, the butterfly mechanism does need some explanation.

The two halves of the top are attached to slides that ride in notches cut into both the end aprons and a pair of cross-stretchers that run between the side aprons. The slides and notches are T-shaped and work much better than dovetail-shaped slides, which tend to bind when the top is extended.

Make the notches and then fit the slides to them. Cut the vertical part of the notch at the tablesaw, using a standard blade and crosscut sled. After the vertical part is cut, rout the horizontal part of the notch. I use a handheld router and a spiral upcut bit. A pair of edge guides ensures a straight slot and a pair of stops controls the length. After the notches are done, cut the end aprons to length, cutting both ends of the apron to locate the notches properly.

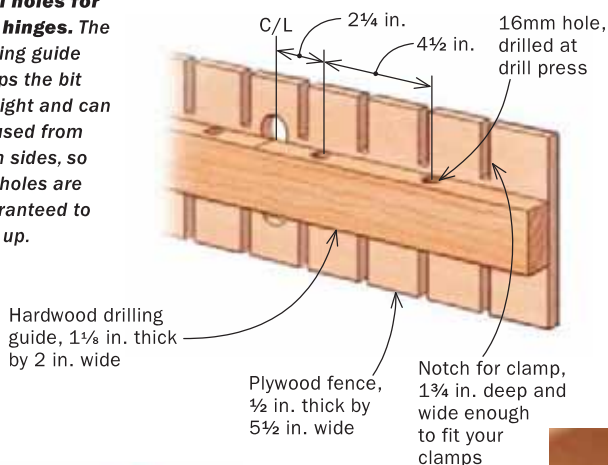
Now make the matching slides. They are assembled from two pieces of hardwood, which should be straight-grained because it is less likely to warp, twist, cup, and bind in the notches. Rip the pieces to width and then cut them to length. Use a dado set to cut a shallow groove down the middle of the piece that becomes the horizontal part of the slide. A tongue routed in the vertical part of the slide registers in that groove during glue-up. Then round over all four edges so that the slide moves smoothly through the notch. Glue the two pieces together to make the T-shaped slide.

The slide mechanism also has a pair of L-shaped runners attached to both sides of the top. They ride in grooves cut in the side aprons. Stops glued into the grooves limit the in-and-out travel of the top. Cut the grooves (I use a dado set at the tablesaw), then make the runners. They're just a length of hardwood with a rabbet that I cut at the tablesaw with a standard blade—one pass for each wall of the rabbet.

For the top to close completely after the runners are installed, the cross-stretchers need to be notched to allow the runners to pass through. To make the notch,



Drill holes for the hinges. The drilling guide keeps the bit straight and can be used from both sides, so the holes are guaranteed to line up.



JIGS ALIGN TOP AND LEAF PERFECTLY

The location of the hinges and alignment pins is critical, ensuring that the halves of the top and the leaf are perfectly level when the table is expanded, but simple drilling guides lock in their location.

BARREL HINGES CONNECT THE LEAF

The round hinges are installed in holes drilled in the adjoining edges of the leaf parts.



Install the hinges. Pound the hinges into one leaf with a mallet. If the fit is too tight, sand the barrels lightly with P320-grit paper. Add the second leaf, tapping back and forth across the end. The clamp keeps one side on while you tap the other.

first stand the cross-stretchers on edge and guide them past the tablesaw blade with a crosscut sled. Then make a ripcut at the bandsaw to free the waste. I notch the runners in the same way.

Finally, make the stops, but don't install them until after the base is assembled and the runners have been attached to the top.

Now, before moving on to the top and leaf, assemble the base. Rout mortises in the aprons, cross-stretchers, and legs. Make slip tenons to fit. I start with a long board, round the edges, and then crosscut tenons from it. Gluing the base together is difficult if you do it all at once, so I don't. Instead, I glue up one pair of legs and an end apron, then the second pair to their apron. The side aprons and cross-stretchers are then glued together as a unit. To help keep it square, I cut a piece of particleboard to fit in

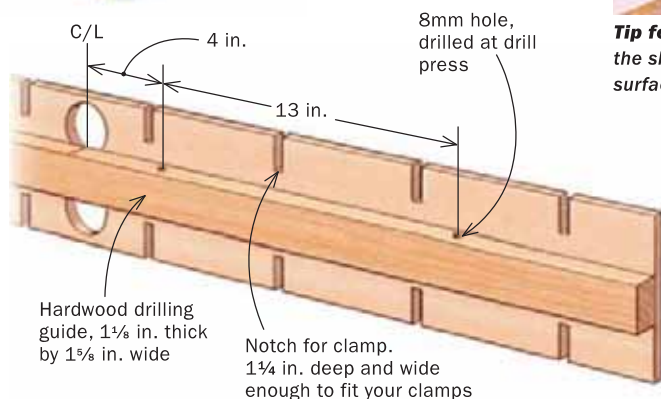
the space between the cross-stretchers, assemble the side aprons and cross-stretchers around it, and then put on clamps. I leave it there while the glue dries. After the glue has dried on all three components, I glue them together to form the base.

How to hinge the leaf

To make the leaf, glue up an oversize panel and, after the glue has dried, rip it to width. Leave it long for now; it will be cut to length after a dry-assembly of the top and leaf, so you can mark it directly from the two halves of the top.

PINS ALIGN THE TOP AND LEAF

A similar drilling guide is used to drill the holes for the alignment pins and sleeves.



Tip for the sleeves. To sink the sleeve without marring the surface, put in a pin and tap it.



Install the slides. Center the halves of the top first, and leave a bit of space between the ends of the slides.

After ripping the leaf, cut it in half and install the hinges. The perfect hinge for this application is a concealed barrel hinge. On a top like this, which is $\frac{7}{8}$ in. thick, a 16mm hinge is the right size (leevalley.com; No. 00H36.16). The two hinges on the outside are 2 in. from the edge. Space the rest equally between them.

To drill the holes for the hinges, I make a jig at the drill press. One half of the leaf is drilled from first side of the jig and the other half from the opposite side. This ensures that the holes in both halves are mirrors of one another and align perfectly. After the holes are drilled, install the hinges.

Pins align tabletop sections

Now it's time to install alignment pins in the leaf and tabletop halves. To do that, I use a jig similar to the one I used for the hinges. The holes in the two halves of the top must mirror one another, and the holes in both sides of the leaf must mirror those in the top that they align with.

There are two parts to the alignment pins (leevalley.com; part No. 00S10.06): the pin and sleeve. One half of the top gets only pins, and the other half gets only sleeves. After you've installed them, put them in the leaf, too. Now close the top (without the leaf) and shape it. I used a router and full-size pattern, taking several passes to rout through the full thickness. Put the leaf in place, mark both ends from the top, and cut it to final length.

Install the pivot pins last

Now that the base is glued together and the top and leaf are made, install the pivot pins. The pins for this table are nothing fancy. I use window bolts bought at a local hardware store. I like them because you can slide the bolt in and out of the pivot hole, which makes it easy to test-fit the leaf, take it out for finishing (and any time you need to move the table), and then put it back in.

The pins are attached to a batten screwed to the underside of the leaf. The batten serves two purposes. First, it lowers the pivot point

ATTACH THE TOP TO ITS SLIDES

The top doesn't attach to the base with buttons or screws as on a conventional table that doesn't expand. Instead, it's attached to T-shaped slides that allow the two halves to move freely in and out, and prevent the open halves from tipping.



Put the stops in next. A bit of glue is strong enough to hold them in place. There are three stops per groove: one in the center and one at each end.



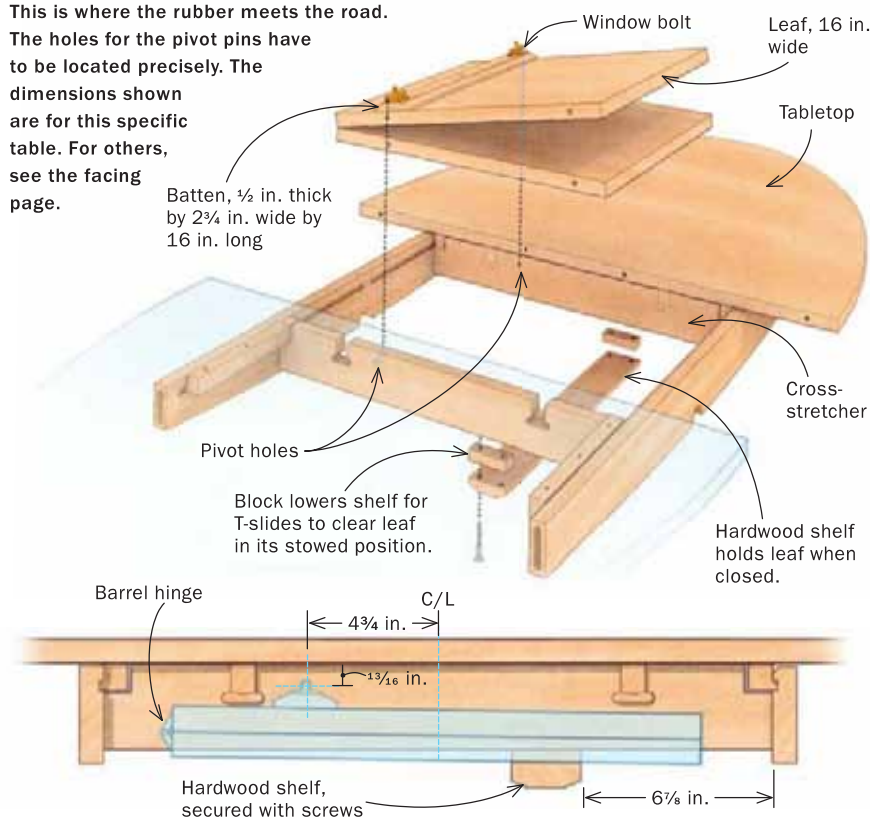
Add the side runners last. Fortune drills a clearance hole in the runner, transfers its location to the top with a punch, and then drills a pilot hole in the top.



Small shelf supports the folded leaf. Turn the table over and open the top so that you can clamp the shelf in place. Add blocks as shown on p. 66 to lower the shelf. Drill clearance and pilot holes and screw the shelf in place.

INSTALL THE LEAF

This is where the rubber meets the road. The holes for the pivot pins have to be located precisely. The dimensions shown are for this specific table. For others, see the facing page.



far enough down the cross-stretchers to allow the leaf to clear the underside of the slides when it is stored in the table. Second, it helps to keep the leaf flat. Because it is screwed across the width of the leaf, use elongated screw holes in the batten to accommodate the seasonal movement of the leaf.

With the pins installed, drill the pivot holes in the cross-stretchers. I use a drilling guide made at the drill press to ensure the hole is straight and square to the face of the cross-stretcher. It is long enough to register against the side apron, ensuring that both holes are the same distance from the apron. If the holes aren't aligned properly, the leaf sits askew under the table and won't open properly.

Now install the leaf. Make sure that it opens and closes without problem. (If you've drilled the holes in the wrong place, plug and re-drill them.) Close the leaf and screw a narrow hardwood shelf to the underside of the cross-stretchers. When closed, the leaf rests on it, taking the weight off of the pivot pins and holes. Remove the leaf. Place the top upside down on the bench and then put the base on the top. Put the slides in their notches and then screw them to the top. Now glue the stops into the grooves in the side aprons, and screw the runners to the top. □

Contributing editor Michael C. Fortune is a furniture designer and maker who lives near Warsaw, Ont., Canada.



Drill the pivot hole. Use a drilling guide that references off the side apron. That keeps the two holes aligned and the leaf swinging freely.



Attach the pivot pins. Fortune uses a window bolt because they make it easy to take the leaf in and out for fitting, finishing, and moving the table.

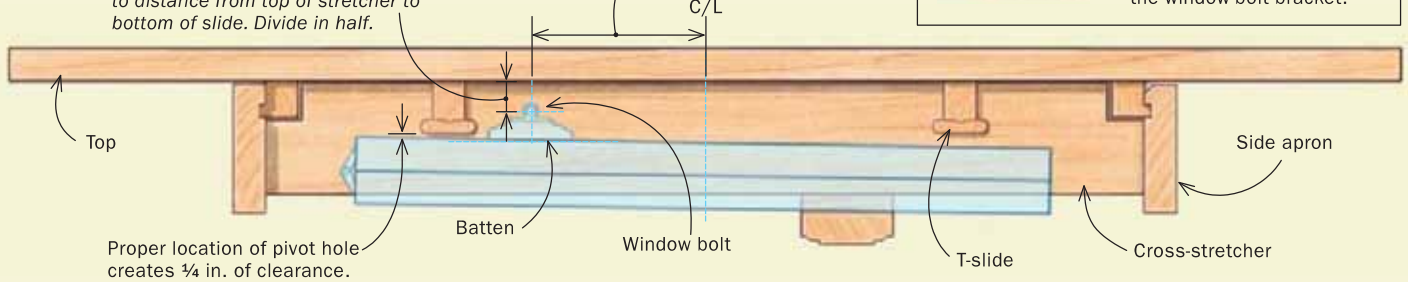
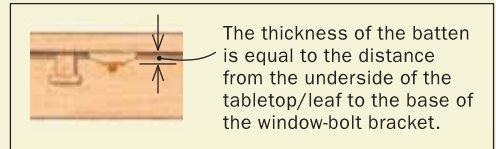


Put the leaf in place. Fold the leaf and let one end rest on the shelf while you lock the bolts into their holes.

Different table dimensions? Here's how to locate the pivot

To calculate this dimension, add $\frac{1}{4}$ in. to distance from top of stretcher to bottom of slide. Divide in half.

Horizontal pin location is $\frac{1}{8}$ of leaf's total length from center line



Measure from the table base's centerline one-eighth of the leaf's final length. Draw a vertical line down the cross-stretcher there. Next, add $\frac{1}{4}$ in. to the distance from the top of the cross-stretcher to the bottom of the T-slide and divide in two. Use the result to find the center point of the pivot hole on the vertical line.

In theory, that should be perfect, but I found out on my first butterfly table that there is more to it than theory. The leaf must be able to clear the slides and the apron. So, I now use a narrow mock-up of the leaf to test the pivot hole location. It is 2 in. wide and as long as the leaf, cut in half and hinged with tape. Add a spacer as thick as the batten and screw on a window-bolt bracket that has had its bolt removed. Use a drill bit or transfer punch the same diameter as the bolt in its place.

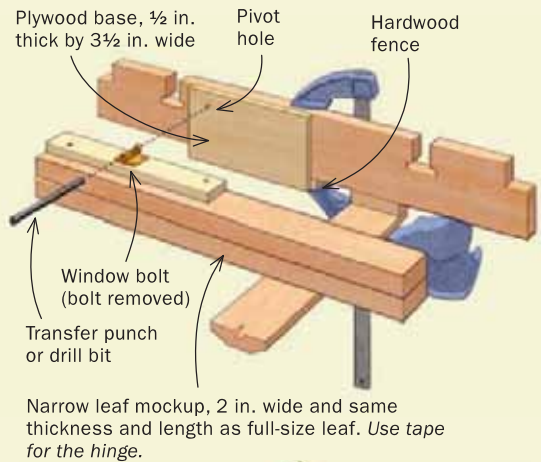
I then drill a hole in a piece of plywood and attach a fence to it. Clamp it in place so that its hole lines up with the location you marked on the cross-stretcher. Put the narrow leaf in place and insert the drill bit. Swing the leaf open and closed. If it swings without hitting the T-slide and side apron, use that location for the hole. But before you drill, locate the support shelf so that as you open the leaf, it rides on the support and just clears the side apron. That's best done by trial and error. I clamp the support to the cross-stretchers about 1 in. from the side apron and test the leaf's swing. If it hits the apron on its way up, move the support closer to the table's centerline and try again. Repeat this process until the leaf opens with no problems. Then screw it in place and drill the pivot holes.



Put a temporary leaf in place. Fortune clamps a piece of plywood with a pivot hole to the cross-stretcher. He then puts a transfer punch (or drill bit) in place of the window bolt.

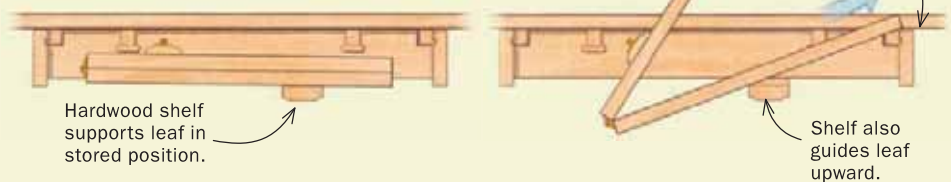
VERIFY YOUR MATH WITH TWO JIGS

One jig lets you place the pivot hole where you think it belongs. And a simple leaf mockup lets you dial in the location of the window bolt.



LOCATE THE HARDWOOD SHELF

Place the shelf so that the leaf just clears the apron when opened (right). If the leaf shelf is positioned too close to the apron, the leaf will hit the apron and not ride over it.



Swing it open to check for problems. The side on the bottom is the one to watch. As it rides up the leaf support, it should just slide over the apron's chamfered edge.

Antique Finish that Holds

BY PETER GEDRYS

Building any reproduction involves a great deal of time, effort, and expense, so when the last drawer is fitted you might be tempted to apply the finish as quickly as possible. After all, you've put a lot of hours into the piece and you just want it done. You might also be afraid that anything more than the simplest of finishes could ruin all your hard work.

However, just as your cabinetmaking skills have progressed from butt joints and basic boxes to dovetails and desks, so you should expand your finishing horizons beyond wiping on oil. Finishing is no harder than woodworking, just a different skill set.

I'll show you how to imitate a century or three of use and age to form that unique surface known as a patina. It involves choosing and using dyes, filling open-pored woods, adding depth to the color with a glaze, applying a clear topcoat, and using surface tricks to age a piece. Unquestionably, it takes longer than applying a wipe-on varnish, but when you are already months into an heirloom project, what's a couple of weeks more? Give your reproduction the finish it deserves, one that creates a wow factor each time someone sets eyes on it.

Practice and experiment—but not on the piece

Start by looking at finishes that you'd like to replicate. This is similar to getting ideas when you design a piece. Look at books, magazines, auction catalogs, and websites and see what colors and finishes please you.

Once you've settled on the look you want, see where you're starting from. Take the sample boards from each



USE THE FIVE CLASSIC STEPS

You'll need five fundamental finishing techniques to create a period patina, but none is very hard, and each is worth learning. You can use them in different combinations to create an infinite variety of effects on many styles of furniture.

1 Dye the wood



Antiques often have deep, dark colors. Tiger maple goes a rich golden brown, and to imitate this look, begin by dyeing the bare wood.

2 Fill the grain



When using any film finish on open-grained wood, you should fill the grain. While antiques may have some visible pore structure in the finish, there are no deep voids.

Nothing Back

How to turn your reproduction into a masterpiece



part of the piece and wet them with a solvent to see the base color of the wood. You can use alcohol for a quick preview or slower-drying mineral spirits for a longer study.

On this Federal desk, built by *FWW* Managing Editor Mark Schofield, I wanted to darken the main veneer, which had a strong, pinkish-red base to it. On the first sample board, I applied Chippendale Red Brown dye (all the dye powders I used are water-soluble) and when it dried, applied several coats of shellac. This left the wood darker but still with too much red, so then I used Georgian Brown Mahogany instead. This cool, greenish-brown dye neutralized the base red to a more pleasing brown.

I also experimented on samples of the tiger maple on the legs and the bird's-eye maple drawer fronts before settling on a combination of colors.

Sand the whole piece but seal it selectively

It's better to spend a little extra time fine-tuning the surface than to discover flaws after you start applying the dyes. After a final hand-sanding with P180-grit paper, I remove the dust and wipe the surface with alcohol. This reveals any areas with glue residue that require a little extra sanding.

Once I'm satisfied that all is well with the surface, I clean it well, blowing out the pores with compressed air, vacuuming it, and giving it a good wipe-down

3 Glaze selectively



To simulate wear and tear in the carved areas, apply a translucent color over a sealed surface, leaving more in the recesses.

4 Lay down a topcoat



Shellac is the traditional clear finish for period pieces. Padding it on greatly reduces the need to rub out the final coat.

5 Leave wax in the corners



Dark wax applied in crevices and corners imitates centuries of dust and dirt. Don't go overboard; a little wax is all it takes to fool the eye.

Dyes add decades of darkening

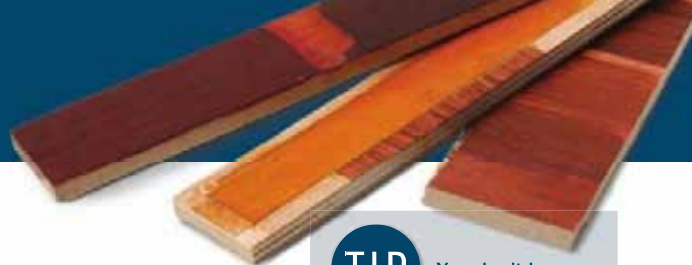
SEAL SELECTIVE AREAS BEFORE YOU DYE



Stain controller. Before applying any dye, washcoat end grain with a thin coat of shellac to prevent it from absorbing too much dye.



Protect light-colored woods. To prevent the holly stringing from being discolored, use a narrow brush to seal it with a thin coat of varnish.



TIP

You don't have to dye every species of wood in a particular piece, but for each one you do dye, use a sample board of the same species to select the dye colors.

with clean, dry, lint-free cloths.

If you have the steady hand of a marksman, you can try to apply the dye up to but not onto the holly stringing and banding. For the rest of us, it's safer to isolate the areas you don't want to dye. I've found that masking tape, even when burnished, isn't effective because the thin dye seeps under the edge.

Instead, I dilute varnish to a water-like viscosity, and use it to seal the stringing and banding. Apply it with a small sable artist's brush. You should be able to go 8 in. to 10 in. before having to reload your brush. When you begin again, land the brush gently like a plane, overlapping the previous stroke about an inch or so. This ensures you don't miss a spot on the stringing.

APPLY THE DYE

The whole surface of this desk was dyed, with the exception of the inlays, which were presealed to resist the dyes and retain their color. Dye numbers refer to W.D. Lockwood's catalog.



Apply the dye. A flat artist's brush works well in confined areas (above), while a folded paper towel covers large areas quickly (right). Try to even out the color while the dye is wet. (For more, see "Success with Dyes," FWW #201.)

Georgian Brown Mahogany (#22)
Carcase veneer

Solid mahogany

Metal Acid Yellow (#194)
and **Medium Yellow Maple (#142)**
in a 3:1 ratio.

Tiger-maple leg panels

Rosewood banding

Bird's-eye maple drawer fronts



It is a good idea to practice with denatured alcohol before trying it with varnish. One trick I have for areas close to an edge is to use my baby finger as a kind of guide fence. Don't be in a rush: With all the stringing on the base, drawers, and top of this desk, this step took me the better part of a day. It is exacting work but no more so than laying in the stringing or the fans in the first place.

Let the coloring begin

Once the inlays and stringing are isolated, apply the dye. For confined spaces I use a #20 bright artist's brush, but for larger areas I use a non-embossed industrial paper towel folded over a couple of times. I like these because they hold a lot of dye, flatten out nicely to a sharp edge, and give me a great deal of control. Even though the inlays are coated, try to avoid running the dye over them. You know the old saying: An ounce of prevention is worth a pound of cure.

I used the same yellow dye on the rosewood that I used on the maple because it creates color harmony to the eye. Later, I'll tweak the rosewood's appearance

TOUCH UP TROUBLE SPOTS



Sand away mistakes. If dye strays onto the wrong wood, wrap medium-grit sandpaper around a credit card and sand that section. A straight edge helps guide the sandpaper.



Pigment trumps dye. If you can't sand away errant dye, use opaque artist's watercolors to cover the affected area.



Seal in the dye. Before filling the grain, seal the dyed wood with a coat of dewaxed shellac. Otherwise, the filler will discolor the surface.



Stains replace dyes. If you discover a section that wasn't dyed after you've sealed the surface, use a pigment stain to apply color over the sealer. Two choices are gel stains or universal tints. If using the latter, mix it with a binder such as shellac.



Use filler on open-pored woods



Tint the grain filler. Gedrys likes to use uncolored, oil-based grain filler that he tints using artist's oils.



Filter the filler. After adding the colors, squeeze the filler through layers of cheesecloth to mix in the color and remove lumps.



Pack the pores. Use an old paintbrush to force the filler into the pores. Let the filler cure for a few minutes and then pull a plastic squeegee across the surface perpendicular to the grain to remove the excess.



Clean the surface. A white abrasive pad does a great job scrubbing any remaining filler from the surface while leaving the pores filled. Don't wait or the filler will harden on the surface.



Fill grain on carvings, too. A clever way to fill the pores on carvings is to take a pad used to remove surplus filler from flat surfaces, and rub it over the carving, working it into the recesses, too.

by glazing it (see facing page). After I've dyed the whole piece, I let it dry overnight and then look for areas either missed or dyed by mistake. You can try sanding any dyed sections of holly, but if this doesn't work, apply a matching gouache (an opaque artist's watercolor) with a #2 artist's brush.

I next rub the surface very sparingly with boiled linseed oil. I used less than 3 oz. for the whole desk but this is enough to set the dye in the wood. After the oil has cured overnight, I apply a 1½-lb. cut of blond, dewaxed shellac. This can be done by brush, pad, or spray and serves to isolate the base colors you just applied from the color in the grain filler applied next.

Finish alone can't fill open-pored wood

A formal finish needs to have a flat surface. If you apply a film finish to open-pored wood, it will leave the surface with a hungry look. Instead you need to

apply a grain or paste filler. You can get paste filler already colored, but I prefer to tint my own to get a better match with the wood. I use an oil-based filler from Sherwin Williams, which in this case I tinted with raw umber and a dash of black artist's oils.

Paste filler requires thorough mixing to be effective. Once I have it colored, I'll pour it into a cup lined with cheesecloth folded over a couple of times. Then I gather the cheesecloth at the top and pull down on it, forcing the paste filler through it. This ensures my filler is lump free and the color is well incorporated.

You can apply the filler with a brush or a plastic blade. The pores on this wood are large and pronounced, so I used a short-bristle brush to force the filler in. Be sure to apply filler in manageable sections; otherwise, it will become very difficult to remove as it dries. Start with an area of a couple of square feet.

Although burlap is often recommended for removal, I've never liked it. I scrape off most of the excess with a plastic spreader going at 45° or perpendicular to

Glazing simulates wear and tear



the grain to avoid pulling filler out of the pores.

Then I use a white abrasive pad to erase any filler that remains on the surface. These work great, and I can use a clogged pad to apply filler to carved areas such as the reeded legs. I simply rub the pad around the leg a few times, and then come back with a sharpened dowel to remove any filler from the groove between each reed. After letting the filler cure for five or six hours, I wipe all the surfaces with a clean cloth dampened with mineral spirits and let the piece sit overnight.

Don't be surprised if very open-pored wood requires a second round of filling. Don't skimp on this step or you'll find yourself trying to compensate later with the clear coat.

Once the pores are filled, let the piece dry for a few days and then seal the surface with a 2-lb. cut of dewaxed shellac in preparation for glazing.

Glazing adds depth to the color

If you study antiques closely, one of their major differences with modern pieces is the subtle darkening found on some surfaces, particularly on carvings. The best way to imitate this combination of buildup in the recesses



Seal again, then glaze. Tint an oil-based glazing stain to the desired color or use diluted asphaltum. Apply it to the sealed surface.



Wipe the high points. Use a paper towel to remove the glaze from the prominent surfaces, which are lighter on antiques.



Blend the transition. Use a dry brush to soften the line between the glazed and unglazed areas.

SOURCES OF SUPPLY

Dyes

wdlockwood.com

Shellac flakes,
SealCoat shellac,
white pads,
grain filler and
plastic spreaders,
natural or tinted glazes,
Behlen's Rockhard
Tabletop Varnish,
paste wax,
rottenstone,
patinating wax
woodworker.com

Artist's brushes,
artist's oil colors,
asphaltum
dickblick.com

Topcoats seal in the beauty

It is fine to use one type of finish such as shellac on the base and add a more durable one such as varnish or lacquer to the top.



Color with shellac. If you choose shellac as your finish coat, tweak the final appearance by selecting a color ranging from super blond to garnet.



Make your pad. Gedrys uses a cheesecloth core inside a linen wrapping. Add the shellac to the core for a consistent release onto the workpiece.



Build the finish. The advantage to padding on shellac over brushing is that you end up with a smooth finish (devoid of brush marks) that doesn't need rubbing out.

and greater wear on the high points is by a technique known as glazing.

Glaze is a translucent color applied over a sealed surface. It is a versatile tool in the finisher's arsenal because it is very forgiving. If you don't like what you see, simply wipe it off before it dries.

In this case I used asphaltum as my glaze. A black, naturally occurring, tar-like substance, it mixes well with mineral spirits to produce a rich golden brown. It's easy to adjust the color strength by adding more asphaltum to the thinner. During application, less is more. Light applications read better to the eye than thick ones. Remember, you can always add more glaze if required.

I apply the glaze with a pad, paper towel, or brush on flat areas such as the rosewood banding, but for carved areas I use an artist's fan brush to reach into the recesses. This brush has short, stiff bristles that allow me to quickly apply a thin coat of glaze to, in this case, the reeded legs. Next, use a paper towel to remove the glaze from the high points. To feather out or blend the resulting unnaturally sharp line between the glazed and unglazed areas, gently go over the surface with a dry artist's brush to give the glaze a harmonious appearance.

You have a choice of clear finishes

Set the piece aside for a few days to dry well before you apply the clear topcoat. You have a number of choices based on the application method you feel most comfortable with and the amount of use the finished piece will receive. It is perfectly fine to use two different types of finish on a single piece. On this desk, I padded shellac onto the base and used wiping varnish on the top for extra protection, but you could also brush on either of those finishes or spray the top with lacquer.



A durable top. To give the desktop extra protection, Gedrys wiped on some thinned varnish over the shellac sealer.

Wax and dirt add the final touches



Wax the recesses. To imitate dust buildup, begin by using an old artist's brush to push clear paste wax into the recesses of carvings.



Add your dust. Brush rottenstone onto the freshly waxed areas. Rottenstone's pale blue/gray cast mimics dust well.



Complete the effect. After 20 minutes, use a piece of folded newspaper to remove most of the rottenstone but leave traces deep in the recesses.

On the base, after I sand the sealer coat well on the non-glazed areas with P320-grit paper, I pad on shellac. I use an identical pad to one used for French polishing (see "French Polishing Demystified," *FWW* #217), and basically the same technique. This includes the same circular and figure-8 patterns, but I lay down slightly thicker coats and finish by going with the grain. The advantage of the pad is that it doesn't leave any brush marks and the surface is refined during application, eliminating the need to rub it out afterward. Take the time to practice this technique. You'll be happy you did.

On the top, I sealed the surface with a 2-lb. cut of dewaxed shellac and then wiped on four coats of Behlen's Rockhard Tabletop Varnish, thinning the varnish by about 40% with mineral spirits. This is enough protection for a desktop, but dining tables would be safer with three brushed-on coats, thinning the finish by 10% to 15% and sanding between each coat.

The finishing touches

When all the finish coats were done I set the desk aside for a week prior to any rubbing out. This also gave me the chance to look at the piece and to consider whether it needed any more aging.

There are some subtle surface techniques done with a little wax and rottenstone that imitate the buildup of dust, grime, and polish. Whether you wax the whole piece is entirely optional. In this case it doesn't affect the look of the piece but it does give a uniquely attractive quality to the touch.

The beauty of this finish is its visual depth. Once you've tried it, experiment with some of the steps and colorants to create your own patinas. □

Peter Gedrys is a professional finisher. You can view his work at petergedrys.com.



Dark wax in the corners. Wipe on some dark wax, letting it build up in the corners to imitate antiques.



Patinating pulls. To add contrast to the antique-finish pulls, first use brass polish to give shine to the wear points, then rub some dark wax into the recesses. Finally, buff the whole surface with a clean cotton cloth.



Period-Perfect Bracket Feet

Best approach is a combination
of machines and hand tools

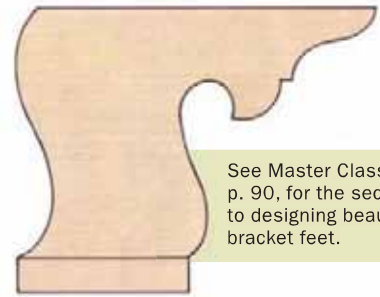
BY DAN FAIA

Ogee bracket feet, often linked to the Chippendale style, have been around since the late 17th century, and they remain one of the most recognized forms in furniture.

The distinctive S-curve on the faces (the ogee) and the ornate profiles on the ends of the feet traditionally were made with hand tools—a time-consuming, labor-intensive process. My method blends the best of the new and old. I've replaced the molding planes with the tablesaw to rough out the ogee profile, and the bandsaw has replaced the coping saw for cutting the end profile. However, machines can't replace the scrapers and other hand tools

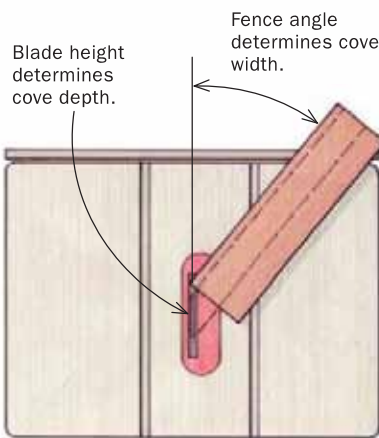
1

CARVE OUT THE COVE ON THE TABLESAW



See Master Class, p. 90, for the secret to designing beautiful bracket feet.

Reference lines. Use a full-size pattern to lay out the face profile on each end of the blank. You'll reference those lines as you rough out and refine the profile.



Eyeball it. Raise the blade to the apex of the cove. Then pivot the fence to set the cove's width, using the head of a combination square to keep the pattern 90° to the fence and table (above). Once you're there, clamp down the fence (right).



that are necessary to refine those machine-cut shapes.

Tablesaw takes the big bites

The front pairs of feet typically are mitered. To get the best possible grain match and flow, and for efficiency, start with a long blank, milled to the right size. You'll need a board long enough to make six pieces. You'll also need enough stock to make the unshaped portions of the rear pairs of feet, which are dovetailed together. Often these unshaped pieces were made of a secondary wood, because they were not seen.

The key to success is making a couple of full-size patterns out of 1/8-in.-thick



Nibble away. Start with the blade about 1/16 in. above the table. Then make multiple passes over the blade, raising it in 1/16-in. increments, until you've removed as much waste as possible.

2 FINISH THE CURVES

Stay at the tablesaw. A few bevel cuts rough out the rest of the profile. Using the layout lines on the end of the blank as a reference, take multiple passes to remove the waste, adjusting the angle as you work. You'll end up with a faceted surface.



Hand tools take over. Use hand planes (above) to fair the faceted surfaces made by the tablesaw. A goose-neck scraper works quickly in the cove area (right). Finish with sandpaper.



plywood, which will guide both machine and handwork (to learn more about designing ogee bracket feet, see Master Class, p. 90). I use one pattern to draw the ogee profile on each end of the blank. After the ogee shaping is complete, I use another pattern to lay out the miters and to draw the profile on the inside of the foot.

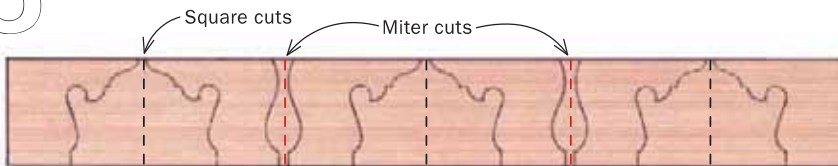
For speed and consistency, I shape the face of the long blank on the tablesaw, using a cove-cutting technique. This is done by passing the piece diagonally across the blade, guided by an auxiliary fence, and raising the blade a bit more for each pass. You can use any straight material for the fence, as long as it's thick enough to support the workpiece. The fence I made is simply two $\frac{3}{4}$ -in.-thick strips of MDF. After screwing the pieces together, I ripped both long edges straight. I don't use a special blade for the cove cut; it's just a combination blade.

Because this cove cut is symmetrical, the blade will be perpendicular to the table (an asymmetrical cove would require the blade to be tilted). Start by raising the blade to the apex of the cove, using the pattern as the guide.

Now dial in the width of the cove by pivoting the auxiliary fence. Place the end of the pattern against the fence. To ensure accuracy, use the head of a combination square to keep the pattern 90° to the table and fence. With your eyes level with the table, pivot the fence until the blade aligns

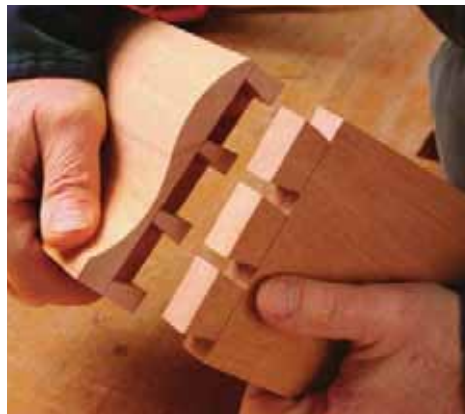


3 CUT THE JOINTS AND PROFILE THE ENDS



How to get a great grain match. You want the grain at the miters to flow seamlessly around the corner, so lay out the blank as shown. Note that the parts on the ends are the back feet, which are left square.

Perfect miters. Leave the mitered sections extra long, so you can creep up on a perfect fit. Then cut the feet to length.



Dovetails in back. Because the rear of the case was not seen, period makers didn't bother to shape the back pieces. Those flat parts join to the shaped side pieces with dovetails.

with the cutout on the pattern. Clamp the fence in place and make a test cut.

To do that, lower the blade so it projects about $\frac{1}{16}$ in. above the table. Make the first pass or two and then compare the cut to the pattern you traced on the end of the blank. Because you're taking such light cuts, any errors in the setup are easily corrected by adjusting the fence as you go. Continue making passes over the blade, raising it about $\frac{1}{16}$ in. at a time, until you're cutting the full depth of the cove.

Once the cove has been cut, it's time to create the convex (top) portion of the foot on the blank. This job is started at the tablesaw, with the blank on edge. Tilt the blade to remove the bulk of the waste in one pass. Then readjust the blade angle to creep up on the layout line with smaller passes. You'll end up with a faceted surface.

Hand tools heal the tablesaw scars

Following the layout lines on the end of the blank, I clean up the machine marks on the blank and refine the curves.

To shape the convex portion, I use No. 5 (jack) and No. 4 (smoother) planes, gradually removing the tablesawn facets to create a smooth curve. To smooth the concave area, I use a gooseneck scraper and

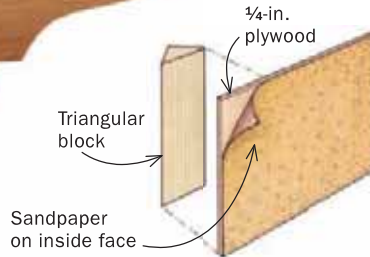


Cut the inside profile. First trim the feet to length. Then trace the pattern onto the back of each foot (above), aligning the inside edge of the pattern with the square-cut end. Cut the profile at the bandsaw (left). Work carefully—clean cuts here mean less work later.



4

GLUE AND FINE-TUNE THE FEET



Pinpoint clamping. Faia uses a pair of simple clamping cauls to apply pressure directly on the miter. Start by clamping the cauls to the mitered parts (right). Then clamp across the triangular blocks to bring the joint together firmly and evenly (below).

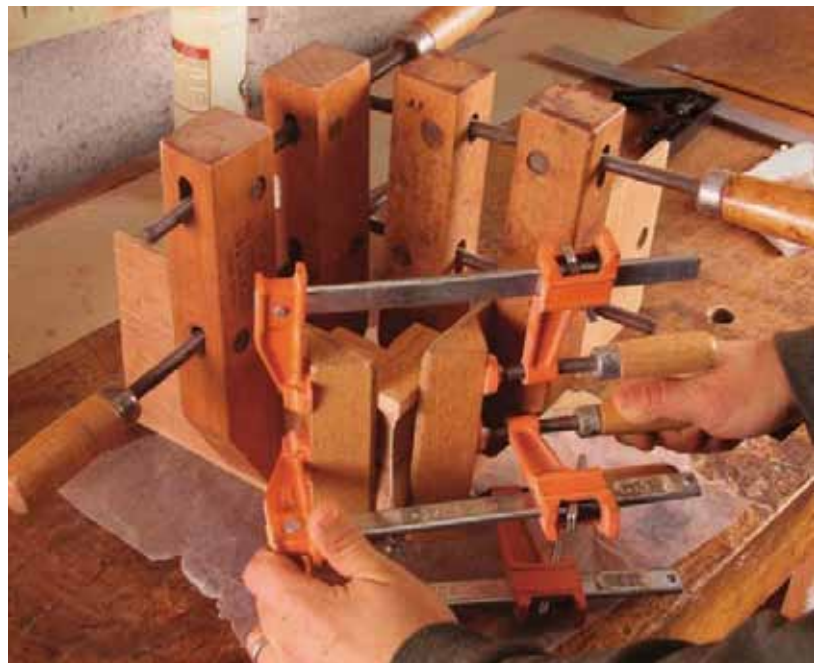


TIP

QUENCH THIRSTY MITERS



End grain soaks up glue quickly, drawing it from the surfaces and weakening the joint. The solution is to seal the end grain with an initial coat of glue, a process called “sizing.” Let the glue absorb for a minute or two, then wipe it off with a rag moistened with water. Let the pieces dry completely before applying more glue and clamping them.



sandpaper. Finally, I sand all the curves smooth. Once the face is complete, you can start cutting the individual feet from the blank and mitering them.

Accurate miters are a must

True to the period forms, I typically miter the front pairs of feet, but I use half-blind dovetails in the rear pairs. The dovetail is a strong way to join the thin, flat back piece to the shaped piece (see photo, p. 79).

To ensure a continuous grain match around the feet on the front, it's important to lay out the parts in pairs. When laying

out the parts, leave extra material on the straight-cut ends. This will give you room to make test cuts until you have perfect-fitting miters.

Once the miters are cut, trim all the feet to their final length using the inside profile pattern as a guide. Now cut the dovetails in the rear pairs of feet: tails in the flat feet and sockets in the molded feet. Don't glue any of the feet together yet.

Profile the feet before assembly

Once the joinery is done, lay out and cut the inside profiles on the feet. Use the

full-size pattern to draw the design, and bandsaw close to the lines. Now glue the feet together—both the miters and the dovetails. For the miters, I use clamping cauls that direct the clamping pressure to the corners. I also seal, or size, the porous end grain with glue before assembly. Don't rush here. The glue must dry completely to adequately seal the end grain; otherwise, the joint will be compromised.

It may seem counterintuitive to glue the feet before fairing the end profiles, but doing so makes it easier to clamp the feet in a vise for the final shaping.



Cleanup work. First remove sawmarks using rasps and files (left). Use gouges to back-cut the edges slightly (center), then go back and refine only the outside profile using rasps and files. Finally, chamfer the inside edges with a chisel (right). It's OK to leave unseen, inside surfaces rough.

After the glue dries, fair the inside profile. First, I remove most of the bandsaw marks with rasps and files. Then I use gouges and chisels to back-cut the shapes at a slight angle. The back-cut makes it easier to finesse only the visible portion of the profile in front with rasps and files. I also break the inside edges by chamfering them with a chisel.

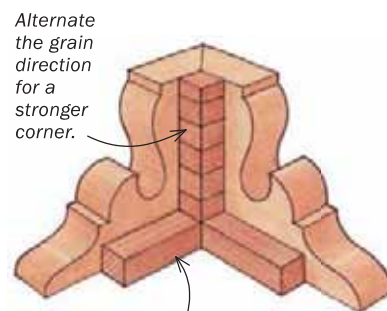
The final step is to add reinforcing corner blocks to the inside of the feet. The blocks strengthen the miter and add to the overall glue surface for attaching the feet to a base frame. Here's a trick to avoid a potential problem with cross-grain glue surfaces on the vertical section. I cut a series of small glue blocks and stack them, alternating the grain direction of the blocks. This creates a super-strong block assembly that will remain stable over time. No need to clamp any of the glue blocks in place; a simple rub joint will do the trick.

After the glue dries on the blocks, I trim the vertical pieces flush, then chisel a slight chamfer on the outside corner to make sure the pieces can't be seen by any probing eyes. Now the feet are ready to mount to the case. □

Dan Faia runs the Cabinet and Furniture Making program at North Bennet Street School in Boston.



Reinforce the corners. To strengthen the miters, add glue blocks to the back of the feet. No need for clamps here; a rub joint works fine. Rub each block until the glue grabs and holds it.



Include long blocks for gluing or screwing the feet to the case.



Chamfer when dry. A wide chamfer helps hide the glue blocks.

readers gallery

DAVID BEACH

Leesburg, Va.

When designing this curly maple tall clock (12 in. deep by 21 in. wide by 94 in. tall), Beach and his client took elements from clocks found in *The Willard House and Clock Museum and the Willard Family Clockmakers*, by Roger Robinson and Herschel Burt (NAWCC, 1996). The Willards were the premier clock-making family in New England from 1766 to 1870. The clock held many technical challenges, but Beach said he found the arched hood molding to be the most difficult part. The finish is tung oil and shellac. The movement is by David Lindow, the hardware is from Londonderry Brasses, and the dial painting is by Kathi Edwards.



MATT HUTTON

Portland, Maine

Part of a series by Hutton exploring layers, multiples, and curves, this table is 25 in. deep by 19 in. wide by 19 in. tall. The core of the construction is the brick-laid layers of the tabletop frame. Hutton varied the thickness of the layers and used a router to cut a rabbet for the top to rest in. The walnut table has an oil finish. PHOTO: JAYYORK.BIZ





NICK BOYNTON

Missoula, Mont.

Boynton says the biggest challenge in making this cherry and curly maple rocker (30 in. deep by 25 in. wide by 40 in. tall) was cutting the three compound-angle slots in the legs. Rather unconventionally, he cuts the laminations with his shopmade bandsaw (*FWW* #202), and glues them back together without surfacing them. Ten years and 50 chairs later, he stands behind this method as time-tested and efficient. The finish is oil and lacquer.



ERIC McRORY

Bellingham, Wash.

McRory built this backgammon board to play the game with his "little brother" in the Big Brothers Big Sisters program. It was inspired by a design he saw in *Fine Decorative Wood Boxes* by Andrew Crawford (Sterling, 2003). The book also taught him the veneering and inlay techniques he used to make the maple and zebrawood case with ebony and bloodwood inlay. The finish is varnish and wax, and the case is 12 in. deep by 26 in. wide by 2½ in. tall. PHOTO: CARL FLANSBAUM



MICHAEL LOBBY

Saint Helens, Ore.

Lobby built this coffee table as an assignment in the Distance Mastery Program at Gary Rogowski's Northwest Woodworking Studio. Lobby wanted to design a strong table with an airy feel, so he used narrow cross-stretchers to float the light maple top over the darker mahogany base and also added swirly ebony keys. The table has an oil finish and is 28 in. wide by 46 in. long by 18 in. tall.

RAMON VALDEZ

Bloomfield, N.M.

Valdez designed this Shoji screen (1¾ in. deep by 65 in. wide by 73 in. tall) around a curly maple board he'd been hanging onto for years. To add interest to the maple slats, he sliced and numbered them, then alternated and flipped them to enhance the chatoyance (shimmer). The frame is purpleheart and the panels are anigre. Prior to assembly, Valdez finished each part with an oil/polyurethane mixture.



MICHAEL FOSTER

Springfield, Vt.

The inspirations for this walnut vessel were math and nature, or math in nature to be more accurate. Foster based the pattern on the giant Lobelia plant. The array of leaves consists of 21 spirals moving in one direction and 13 spirals moving in the opposite direction. This is an example of Fibonacci numbers found in nature, 13 and 21 being adjacent numbers in that series. The turned and carved vessel (4½ in. dia. by 6¾ in. tall) is finished with Waterlox Original.



VIC HUBBARD

Pasco, Wash.

Inspired by Tim Clark's trestle cradle (*Home Furniture #11*), Hubbard built this cradle (22 in. deep by 42 in. wide by 43 in. tall) for a childhood friend and his wife, to celebrate the birth of their first child. He used crotch birch, flame birch, and walnut. Hubbard developed the triangular locking rocker mechanism because he wasn't satisfied with what he'd seen on other custom cradles. The finish is tung oil.



Submissions

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

RICHARD KAUTTO

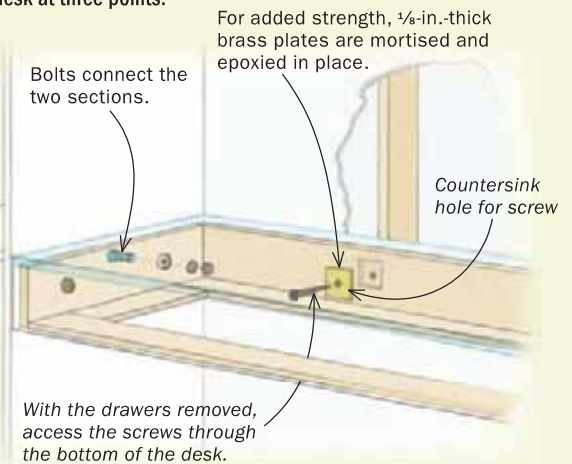
Lessebo, Sweden

DEFYING GRAVITY

This American cherry and Swedish maple desk (17 in. deep by 48 in. wide by 44 in. tall) was Kautto's pre-masterpiece project at Capellagården, a fine craft school in Sweden. He wanted to make a laptop workspace with a modern design and simple lines. So he mounted the desk and cabinet to the wall to give it a clean, floating appearance. The finish is Osmo Polyx-Oil.

**HOLDING THE WEIGHT**

Of course Kautto had to consider the weight of a fully loaded unit when he decided to anchor it to the wall. He secured the cabinet to the desk with bolts with brass head covers. Then he screwed the cabinet section to the wall in four places and the desk at three points.

**WILLIAM KLUGE**

Wichita, Kan.

This mahogany tea table (19½ in. deep by 33 in. wide by 26¾ in. tall) is a replica of a John Goddard original made in 1760. In 2005, the original was sold at a Sotheby's auction for over \$8 million. For Kluge, the most challenging and time-consuming part of the construction was hand-carving the lip around the top. Compared to that, the ball-and-claw feet were easy, he says. The finish is aniline dyes, oil, shellac, and wax.

PHOTO: TONY SCHOCK



Need a smoothing plane? Start small, then go big

Q: Which smoothing plane should I get first, a No. 4 or a No. 4½?

—WILLIAM CHO, Sacramento, Calif.

A: MY RECOMMENDATION IS TO START WITH A NO. 4 because its size and agility make it an ideal all-around smoother. I use mine to clean up dovetails after assembly, fine-tune the fit of drawers and doors, remove mill marks from board edges, and smooth small panels.

However, on large panels and tabletops, a wider blade and more mass are nice to have. The blade is wider on the No. 4½, and the plane weighs about 1 lb. more. It takes more energy to get the No. 4½ going, but once moving, its extra momentum carries it easily through the cut.

Ask a question

Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

—Chris Gochmour is a furniture maker and hand-tool expert near Salt Lake City.



Sibling rivalry. A No. 4½ smoothing plane (right) is the big brother of a No. 4 smoother.

The smaller No. 4 is a great all-around smoother, while the No. 4½ is perfect for big surfaces like tabletops—jobs that the No. 4 can struggle with.



No. 4 is No. 1. A No. 4 is perfect for most furniture parts, including small tabletops and panels.

3 ways to avoid bowl-turning tearout

Q: How can I avoid end-grain tearout while turning a bowl on the lathe?

—JAMES GOULD, Manchester, England

A: MOST BOWLS ARE TURNED FROM A LONG-GRAIN SECTION of the tree, so you work mostly end-grain wood. It is more difficult to cut than side grain and you need a very sharp tool to leave behind a smooth surface.

You can start with a fingernail-grind gouge, because it removes wood faster. However, it tends to act as a wedge and tear the wood fibers, so use a short-ground gouge for your final cuts, because it leaves a smoother surface.

On denser, figured, and spalted woods, I use a gouge with a shorter grind right from the start.

Also, make cuts with the grain. This means cutting from the smallest diameter to the largest on the exterior and the largest to the smallest on the interior. If tearout is still a problem, apply your intended finish to the difficult areas and, while it is still wet, make finishing cuts with a freshly sharpened tool.

—Michael Mahoney is a professional bowl maker and turner.



That's poplar? The silky-smooth surface on this quilted poplar bowl by Mike Mahoney came from the edge of a sharp gouge with a short grind.



Matching and surfacing large boards is a snap

Q: I want to make a wide book-matched tabletop using large flatsawn boards from a local sawyer. How can I match the grain attractively on these large boards?

—CHARLES BARTUNEK, Eugene, Ore.

A: THERE ARE SOME SIMPLE TRICKS that allow you to book-match large boards, whether they were flatsawn or quartersawn.

First, make sure you purchase consecutively sawn boards. Once they are thoroughly dry and acclimated to your shop, trim a bit from the end of each board so that the growth rings are visible. Stack the boards in sequence and put a reference mark on one side of the end grain across both boards, marking in far enough to clear any waney edges along the board's length.

Next, open the boards like a book and look for your future joint line by taking string and stretching it end-to-end on both planks. Remember, you do not have to stay parallel to the waney edge of the board, and you can adjust the joint line to suit how you envision the book-match.

After you've found the best match, snap a chalk line on both boards and then trim the planks $\frac{1}{4}$ in. wide of the line to allow future fitting.

Finally, flatten and smooth the faces, removing the absolute minimum. As the surfaces become clean, the book-match becomes more apparent. If you don't like the match where the boards join, remember that you can improve it by slightly adjusting the joint line.

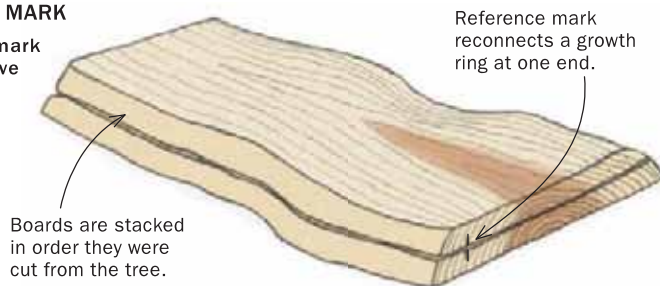
—Rob Hare is a furniture maker who works with wood and forged steel in Ulster Park, N.Y.



Big boards, beautiful book-match. It takes a bit more work than veneer does, but this table by Rob Hare shows that you can get a great looking book-match from sequential boards cut from the same log.

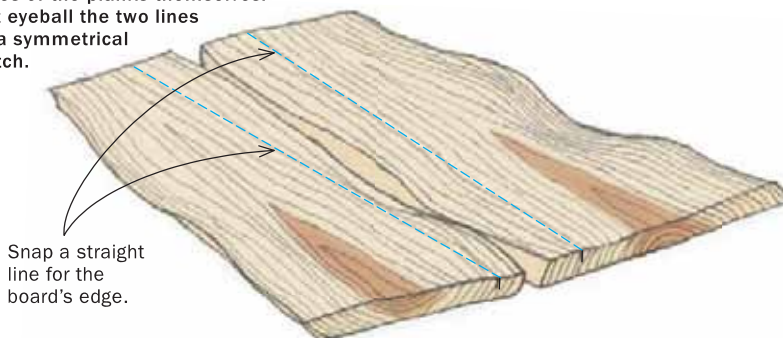
STACK BOARDS IN SEQUENCE AND MAKE A REFERENCE MARK

The reference mark ensures you have a known point at which the growth rings match.



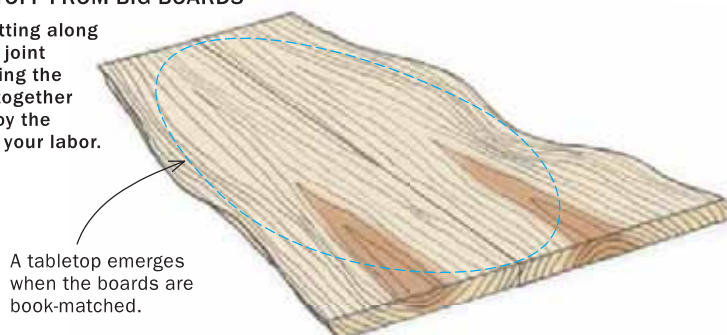
START FROM THE MARKS AND SNAP A JOINT LINE

Remember that the joint doesn't have to follow the edges of the planks themselves. Just eyeball the two lines for a symmetrical match.



BIG PAYOFF FROM BIG BOARDS

After cutting along the new joint lines, bring the boards together and enjoy the fruits of your labor.



U.S. tablesaw safety now on par with Europe

Q: I've heard a lot of discussion lately regarding tablesaw safety. Are European tablesaws and combination machines safer?

—B.J. CONNELLY,
Nashua, N.H.

A: AT ONE TIME, EUROPEAN TABLESAWS were safer than North American saws—but we have finally caught up.

With more stringent safety regulations for the trades, Europe has long required a riving knife on saws. It is very effective at preventing kickback, and importantly, it is convenient—which means that users will keep it on the saw. For a long time, U.S.-style splitters were bulky and inconvenient, but that changed in 2008 when Underwriters Laboratories began to require that all new tablesaw designs have a riving knife, and that all old designs have them by 2014.

Many North American makers also have equipped saws with better dust collection shrouds and ports, so you can collect almost all the waste from this major producer of sawdust, a known carcinogen.

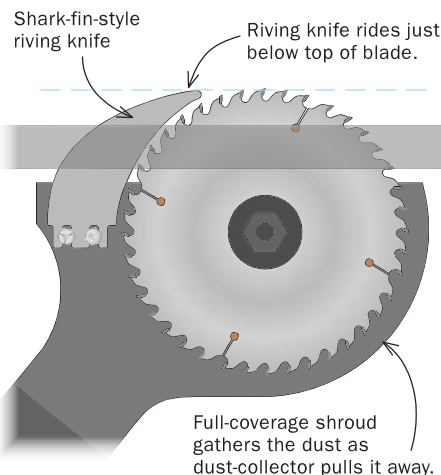
—Asa Christiana is FWW's editor.



Say good-bye to kickback. Available standard or as an accessory, low-profile riving knives are the most convenient type, since they can stay on the saw for almost any type of cut, including non-through cuts.

U.S. SAWS FINALLY GREW UP

The riving knife required for new U.S. tablesaws rides just below the top of the blade and stays out of the way. Below the table, a form-fitting plastic shroud directs dust to the collection chute.



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Draw ogee bracket feet with perfect proportions

NAIL THE DESIGN WITHOUT MATH

BY DAN FAIA

Ogee bracket feet are one of the most recognized forms in period furniture. They are to the Chippendale period what cabriole legs are to the Queen Anne period. The design can trace its roots back to classical Greece, but first appeared on English pieces during the Walnut Period in the late 17th and early 18th centuries.

Their popularity increased with the publication in 1754 of Thomas Chippendale's book, *The Gentleman & Cabinet-Maker's Director*. The new designs were taken up by American

woodworkers, who regularly used the ogee bracket foot as an alternative to the ball-and-claw foot when the furniture forms had shaped drawers and cases.

Making ogee bracket feet is a pretty straightforward process. My method combines hand and machine tools (see pp. 76-81). But you need to nail the design first; otherwise, the whole piece metaphorically falls down. The most glaring error is to design the S-curve either too flat or too severe. I'll show you how to avoid those pitfalls using some simple geometry and drafting techniques. With this method, you'll get the ogee shape

Gentle curves are easier on the eyes

The most common design error with ogee bracket feet is making the S-curve too flat or too severe. The view you want to pay the most attention to is the 45° projection of the feet at the corners. From that perspective, the profile becomes more pronounced.

TOO MUCH

This shape looks OK from straight on. But when viewed from 45°, it's too severe.



↑
Viewed from straight on



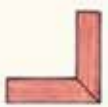
↑
Viewed from 45° angle



Profile viewed from straight on

JUST RIGHT

This shape may look like it doesn't have enough curve when viewed straight on. But from an angle, it's perfect.



↑
Viewed from straight on



↑
Viewed from 45° angle



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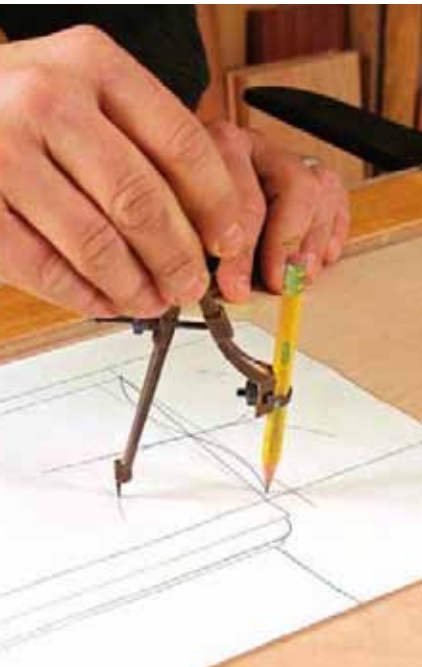
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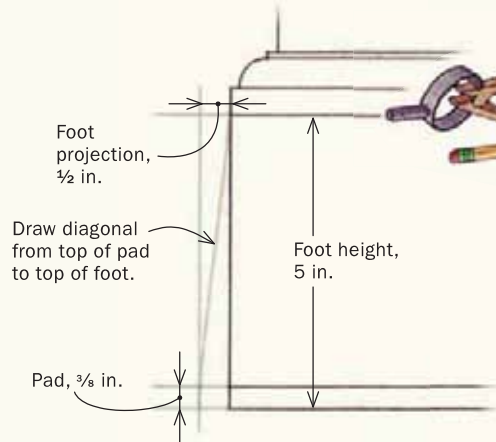
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The secret is a series of compass tricks

1 LOCK IN THE FOOT HEIGHT AND PROJECTION

The dimensions that guide the design are the overall height of the foot, its projection from the bottom of the case, and the height of the pad. The featured pattern is designed for a chest of drawers. For a smaller foot, scale back the projection and pad height proportionally to the foot height.

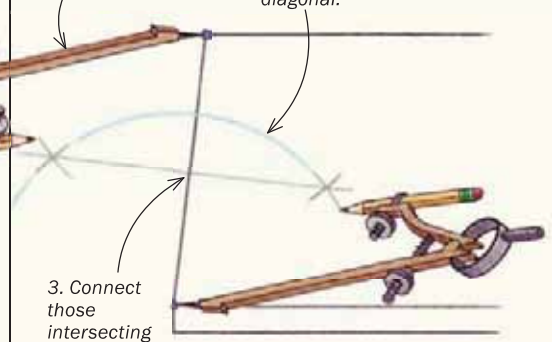


2 BISECT THE DIAGONAL—NO MATH NEEDED

1. Set the compass by eye beyond the center point of the diagonal.

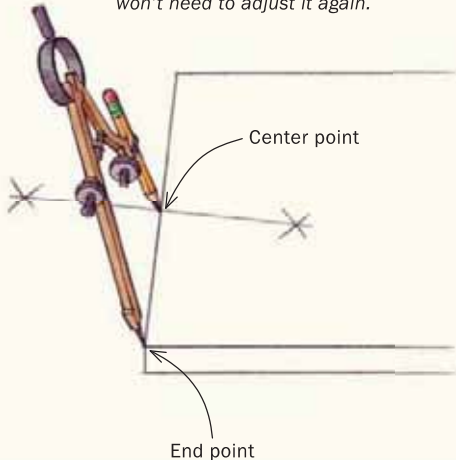
2. With the same compass setting, swing intersecting arcs on each side of the diagonal.

3. Connect those intersecting points to bisect the diagonal.



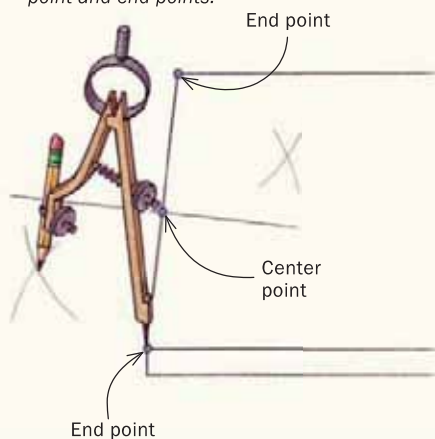
3 SET IT AND FORGET IT

Set the compass from the end point to the center point. You won't need to adjust it again.



4 ESTABLISH ARC CENTERS

Swing intersecting arcs from the center point and end points.

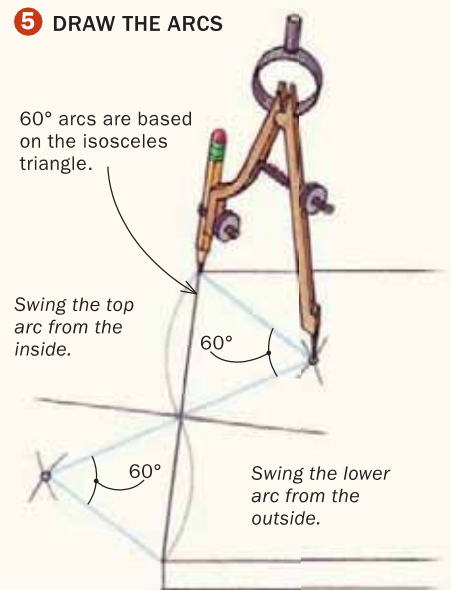


5 DRAW THE ARCS

60° arcs are based on the isosceles triangle.

Swing the top arc from the inside.

Swing the lower arc from the outside.



and proportions right every time, no matter what size foot you're making.

Divide and conquer

The key to getting the shape and proportions correct is using a compass to make a pattern with 60° equal arcs. Lay out the height and projection of the foot from the bottom of the case. Draw a line parallel to the baseline, indicating the height of the flat area, or pad, of the foot.

Draw a diagonal line from the top of the foot to the top of the pad. Use a compass to divide that diagonal in half (see

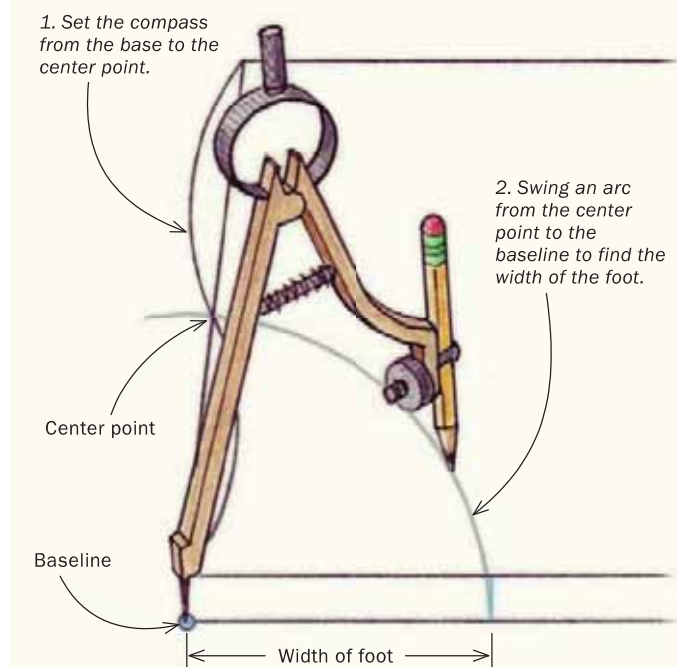
drawing) and then set the compass to that distance. This setting will result in arcs of equal length and shape. Swing intersecting arcs from each end point and from the center point. Now, without resetting the compass, use those intersecting points to swing arcs for the ogee curve on the face of the foot. That's it. The result is a pleasing curve of good proportion that flows across the pattern.

Same technique for the inside curve

With the face of the foot drawn out, use those proportions to set the width of the foot and the inside curve.

Inside profile repeats the process

1 DETERMINE THE BASE WIDTH



Start with the width. Set the compass equal to the distance from the outside corner of the base of the foot to the center point of the diagonal you drew earlier. Swing an arc from the corner down to the baseline. This defines the width of the foot. From this point, draw a square line up to the top of the foot.

To make the inside curve, use the same compass tricks used to draw the ogee shape on the face of the foot. Start with a layout line angled $\frac{1}{2}$ in. from the vertical line you just drew. That line is equal to the projection of the foot from the base of the case.

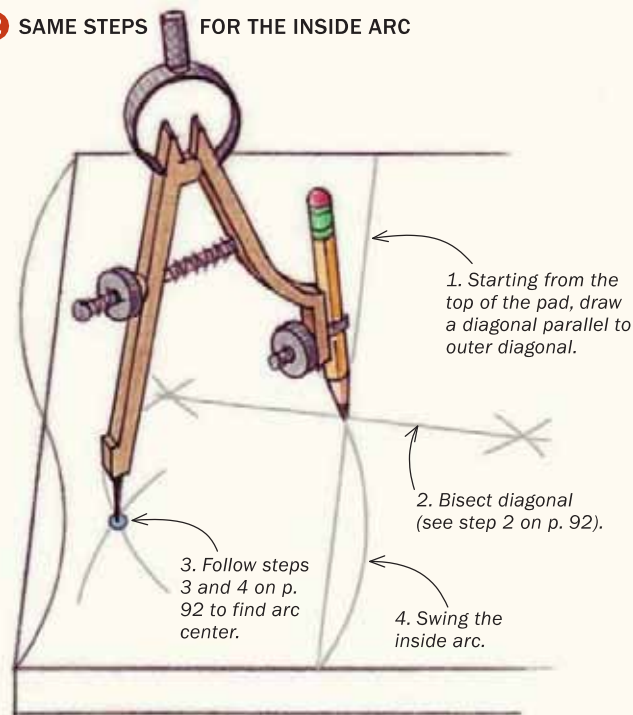
Bisect that line and set the compass to that distance. Swing intersecting arcs from the bottom of the diagonal and from the center point. Now use that intersection point to swing an arc to draw the inside curve, which will be perfectly parallel to the outside curve.

Now you can blend the top of this arc into the pattern that defines the top portion of the inside of the foot. The pattern shown here is classic, but you can alter it as you wish.

Once you have a full-size sketch of the foot, create two patterns on $\frac{1}{8}$ -in.-thick plywood: one for the face cuts and one for the end cuts. Make sure the lines on the patterns are smooth because these are going to guide you as you start the shaping process (see p. 76). □

Dan Faia runs the Cabinet and Furniture Making Program at North Bennet Street School.

2 SAME STEPS FOR THE INSIDE ARC



3 FINISH THE PROFILE

Once you nail down the ogee shape and the overall proportions of the foot, the inside scrolled pattern and how it transitions into the foot are ultimately the designer's choice.



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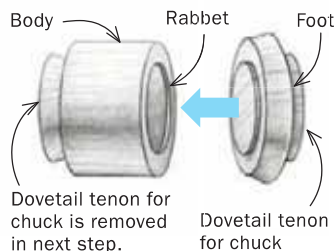
Perfect circles

BY ANISSA KAPSALES

Steven Kennard's work (see the back cover) combines everyday turning techniques with his own innovations—seen in the rings, layers, and carving—to deliver an exquisite end product. His work is the sum of decades of experience, an artist's eye for beauty, and a smart sequence of operations. In this box, an African blackwood body is bound by a cocobolo collar and foot, and lined with thuja burl. A blackwood and cocobolo lid fits perfectly. In the end, creating this small box took as much precision and planning as a piece of furniture.



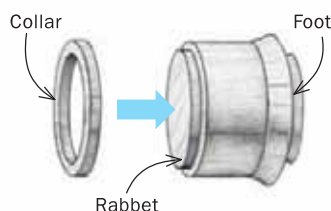
Attach the foot. After turning the body to size and cutting a slight rabbet into the bottom, Kennard uses cyanoacrylate glue to attach the foot.



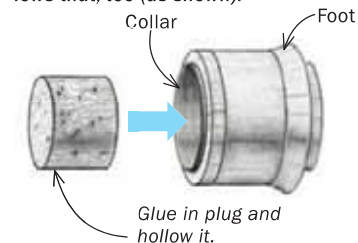
A place for the collar. Re-grabbing the foot, he turns away the tenon on the body and replaces it with a rabbet.



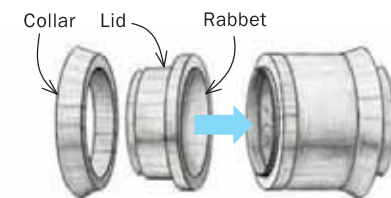
Collar is a turned ring. Turning the ring as shown is an expert technique. A safer way is to leave the ring attached to a larger blank while fitting it, and then part it away at the end.



The lining is next. After hollowing the body, he turns a solid cylinder, glues it into the body, and then hollows that, too (as shown).



Turning the two-part lid. Kennard grabs a tenon on the lid blank to both hollow it and turn a rabbet for another contrasting collar. After fitting the lid to the body, he tapes them together and turns the top of the lid (as shown).



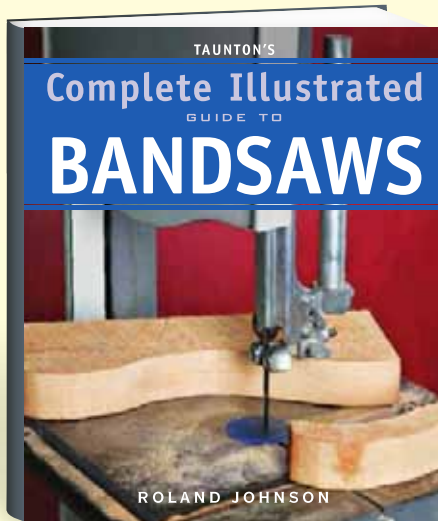
Engraving takes the box to another level. Kennard worked freehand over a couple of days to create this tree motif, using different-size jeweler's burrs on a rotary tool.



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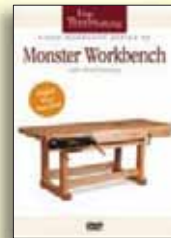


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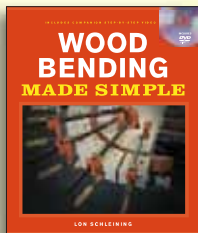


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Boxes that Turn Heads

Steven Kennard's winding path through woodworking has included stints making theatrical props, building furniture and kitchen cabinets, restoring antiques, and refinishing grand pianos. But through it all, he says, "My passion has always been the turned wooden box." An Englishman who now lives in Nova Scotia, Kennard is entirely self-taught. He bought his first lathe in the late 1970s so he could turn replacement parts for antiques. Within a few weeks, he had turned his first box. Thirty years later, he's still intrigued by the mysterious voyage each box provides, and



is able to sell them for as much as \$2,500. For most of his boxes, Kennard favors African blackwood for its color, density, stability, and forgiving grain structure. He often uses cocobolo and thuya burl as accent woods. Kennard engraves the blackwood with a rotary tool fitted with jeweler's burrs. He does the work freehand and without laying out the design. "I'm not a great measurer," he says, "I like to work by feel."

—Jonathan Binzen



Photos: Steven Kennard

How They Did It Turn to p. 98 to see the precision and planning that goes into one of Kennard's turned boxes.

Pro Portfolio For an audio slide show featuring more of Kennard's work, go to FineWoodworking.com/extras.