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New Designer's Notebook
Pros reveal their secrets, p. 26

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wiping *and* brushing

Clever expanding top
works for any table

TOOL TEST

12-volt drill-drivers

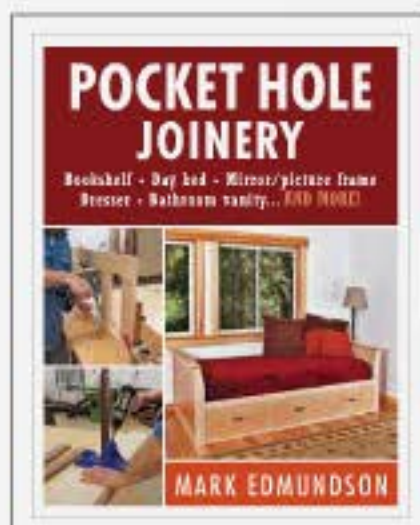
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Feb. 2015 No. 245

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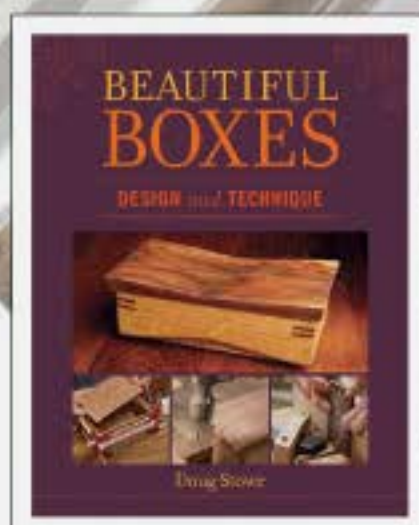


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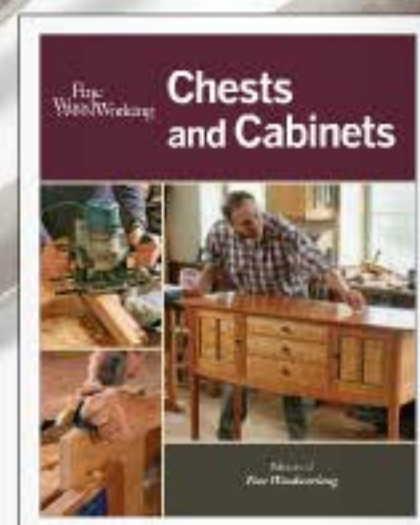


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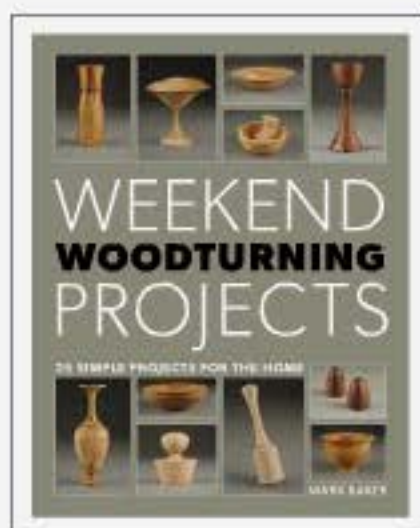


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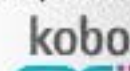
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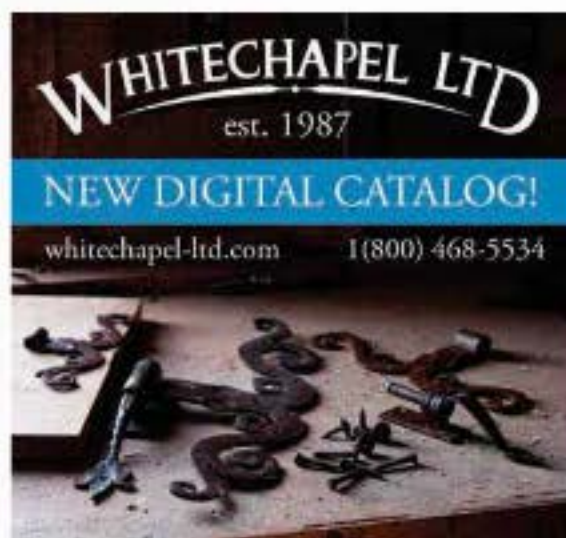
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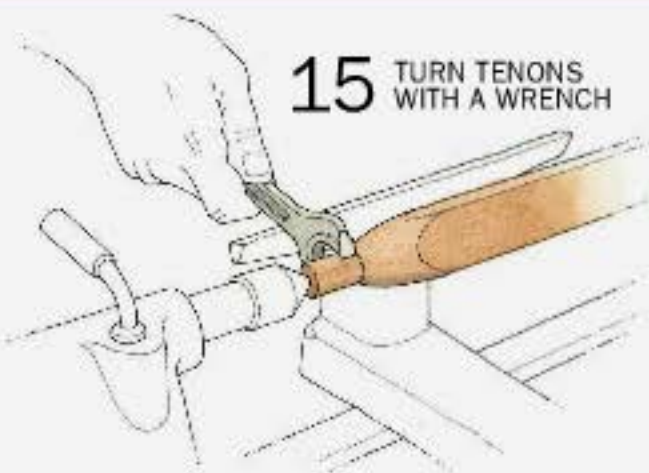
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15 TURN TENONS
WITH A WRENCH

up front

6 On the Web

8 Contributors

10 Letters

14 Methods of Work

- Fix a broken plane tote
- Turn accurate tenons with a modified wrench

18 Tools & Materials

- Router table has a great lift and dust collection
- A truly quiet air compressor

22 Handwork

Sharpen your spokeshave

NEW DEPARTMENT

26 Designer's Notebook

Mining Danish Modern



20
MEDIUM-SIZE
ROUTER PLANE

features

28 Sturdy Stool for Home or Shop

Comfortable, handsome, and quick to build, it fits the workbench or the kitchen island

BY CHRISTIAN BECKSVOORT

36 Wiping Varnishes

TOOL
TEST

Which products work best for wiping and brushing

BY MARK SCHOFIELD

42 Lock Mortises Made Easy

COVER
STORY

A router and three jigs add up to a flawless fit

BY MICHAEL PEKOVICH

48 Get a Drill and Impact Driver for Less

TOOL
TEST

These compact 12-volt tools boast big power

BY KIT CAMP

54 Small Chest of Drawers

Understated dresser has clean lines and simple, smart joinery

BY TIM ROUSSEAU

62 Smooth Curves with a Spokeshave

For curvy furniture and shaped edge profiles, make the spokeshave your secret weapon

BY CHRIS GOCHNOUR

68 Expanding Top for Any Table

Clever mechanism is easy to build and works smoothly

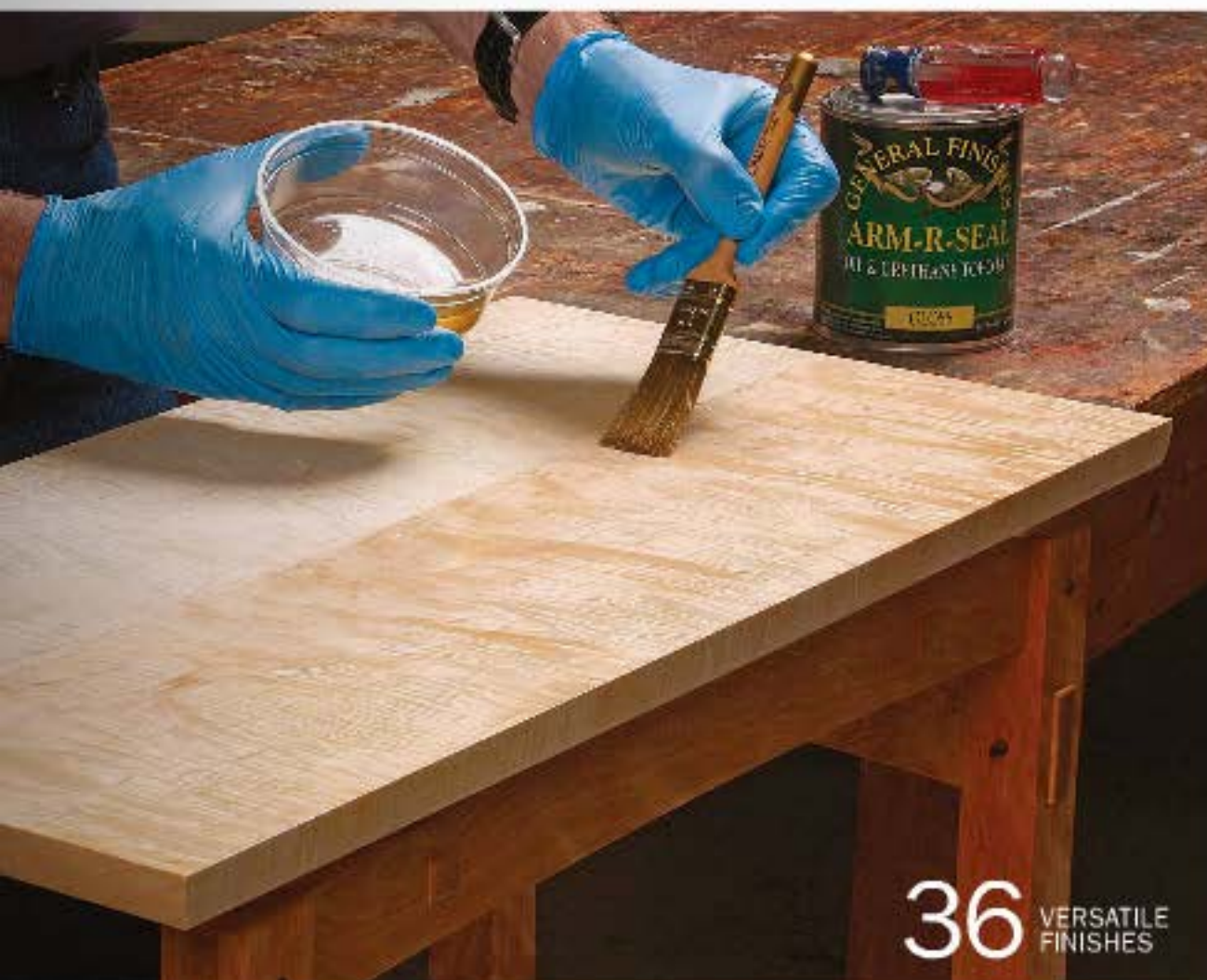
BY TOMMY MACDONALD



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68
EXPANDING
TABLETOP



36 VERSATILE
FINISHES



28
STOOL FOR HOME
OR SHOP

in the back

74 Readers Gallery

78 Fundamentals

Pocket-hole joinery is fast and strong

84 Master Class

Two pulls that pack a punch

90 How They Did It

The back cover explained

Back Cover

Putting the Primal into Production

62
USING A
SPOKESHAVE



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VIDEO

Lock Mortises Made Simple

Learn how to use three simple router jigs to cut perfect mortises for a lockset (p. 42).

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VIDEO

Practice Your Pocket Holes

Speed through cabinet and face-frame construction with our tips and tricks for pocket-hole joinery (p. 78).



VIDEO

Spokeshave Science

Build a shopmade honing jig (p. 22) for a super-sharp spokeshave.

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contributors

Kit Camp ("Tool Test: Get a Drill and Impact Driver for Less") spent his childhood wrecking his father's tool collection, and the desire to build things with tools and wood followed him through college. A gift subscription to *FWW* in the early 1990s led him to James Krenov's writings and to the Northwest School of Wooden Boatbuilding, where he learned to work wood with hand tools. This led to two years building boats, and then to a year studying with Krenov at College of the Redwoods. After four years teaching hand-tool woodworking to children, Camp has worked as a finish carpenter and cabinetmaker in San Diego since 2005. He still teaches woodworking to kids. "It's loud, chaotic, and real," he says. "The kids appreciate the trust I put in them when I hand them tools. For nearly all of them it's a totally new experience, so they have a blast and so do I."



Timothy Rousseau ("Small Chest of Drawers" and Designer's Notebook) lives in midcoast Maine with his wife and three sons. He divides his time between making furniture at his home shop and teaching furniture making at the Center for Furniture Craftmanship in Rockport. His work has been shown in galleries throughout the Northeast, and is included in private collections nationwide. Rousseau's style is a blend of traditional and modern forms, with a high emphasis on craftsmanship. He intends his furniture to be used in everyday living.



When **Mark Schofield** ("Tool Test: Wiping Varnishes") left *FWW* in 2012 to accompany his wife to Puerto Rico (her job had moved temporarily), all their friends jealously expected them to have two years in paradise. But Schofield is not a fan of the beach or of slow-moving island life, and the nearby lagoon was too choppy for his racing scull. While the couple was happy to avoid two long and bitter New England winters, they missed their garden and local rowing club. Back in Connecticut now, Schofield is happily competing in master's rowing competitions again.

Dean Pulver (*Back Cover and How They Did It*) studied sculpture at the University of the Arts in Philadelphia and then spent much of the 1980s working wood in Massachusetts. He now lives in Taos, N.M., where he and his wife, ceramist Abby Salsbury, have their studios in an adobe-style structure they built beside their house. What attracted him to furniture making? "I always wanted to touch things, and in the art world that's not cool. But you're always welcome to touch furniture."



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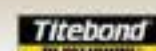
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From the Editor

A NEW DEPARTMENT DEVOTED TO DESIGN

Fine Woodworking showcases some of the best furniture makers in the country. These folks have the perfect combination of design and technical skills that make their pieces ideal for our audience.

When we feature their projects, however, we don't typically have a lot of space to highlight the evolution of the design. We focus instead on the technical, how-to aspect of the furniture. To my eye, a design wink isn't enough. I've long thought we needed more design talk in our magazine, and the time has come. Starting in this issue, we are rolling out a new department, *Designer's Notebook*. This new section typically will focus on one successful piece at a time, with the spotlight perhaps beamed on the creative use of wood, innovative joinery, or the soup-to-nuts design journey.

Senior editor Jonathan Binzen is leading the charge for *Designer's Notebook*, and he has no shortage of material. When we first met with him a few months ago about the scope of the endeavor, he laid out more than a year's worth of worthy candidates. That wasn't really a surprise, as Jon deftly handles our Back Cover and often pens some of our best design-oriented articles (see "Uncommon Arts and Crafts" in *FWW* #239).

My goal is to get design discussions in each issue, and *Designer's Notebook* is sure to fit the bill. The first one features a desk by Timothy Rousseau (see p. 26). I hope you enjoy it, and I look forward to your feedback.

—Tom McKenna, editor



Wants more info about shed shop

I was interested in learning more about the experience Ken St. Onge had with using a prefabricated shed for his shop ("Put a Shop in a Shed," *FWW* #244). I was hoping to find out more about the costs to heat and cool the shop as well as what was done, if anything, regarding the floor and roof in terms of insulation. I am in New England as well.

—DAVE CLOUTIER, Derry, N.H.

Ken St. Onge replies: I can't give you a great estimate because I didn't keep

it heated for most of last winter. I plan to keep things hovering around 45° or so this winter when I'm not in the shop—just enough to counteract the cycles of condensation and keep my tools from rusting out. It's electric heat, and I estimate it will add a few hundred dollars a season at most.

I have a 4,000-watt, ceiling-mounted electric heater installed in the shop, and it throws a ton of heat. The units cost roughly \$300 to \$450 depending on the model. For the cooler, far side of the shed, I plan to add a plug-in

space heater attached to a temperature-controlled outlet adapter—so it will kick on below 35° and turn off at 45°.

For cooling, I have a 12,000 BTU air conditioner installed in the wall. The walls and ceiling are insulated with R-15 fiberglass batts and air-sealed at every seam. The floors aren't insulated, but they are air-sealed with silicone caulk. Once I have all the machines placed where I'm sure I want them, I plan to use 2x2 DRIcore sheets, which will add a tiny bit of R-value but nothing amazing.

Quick fix for a skewed sled fence

I enjoyed Marc Adams's article in your Tools & Shops issue (*FWW* #244) on making a crosscut sled, especially the addition of the safety box. But an important part was left out of the instructions. The caption on p. 24 says, "Figure out which way the fence is skewed," but the article does not tell how to do that, a potential problem for beginners. You might have referenced Alan Turner's similar article in *FWW* #227, where Turner gives very precise directions for adjusting the back fence. He also provides a useful tip for keeping the back fence square: Glue it in place with a glue that has a fairly long open time. Once you have it dead-square and screwed down, set it aside to dry. The glue will ensure better than any screw can that the fence never drifts out of square.

—BILL CHRISTIE, Brevard, N.C.

Thrilled to be in Readers Gallery

A big thank you for including my bombé chest in Readers Gallery (*FWW* #243). I started buying *FWW* shortly after becoming interested in woodworking about 11 years ago. Upon receiving each issue I would always turn to the gallery first to see who and what had made the cut. I would then think to myself, "maybe someday."

I want to add that many of the skills I have acquired in the past 11 years can be directly attributed to *FWW*. For example, I added drawer cock beading and fluted corner columns to a recent desk project. Although the desk was completed as the result of a class taught by an established master cabinet maker, I relied on two *FWW* articles written by Steve Latta and

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Jeff Headley, respectively, to learn how to add those two elements.

—BRUCE LEONARD, Alexandria, Va.

More help with tool rust

John Scheessele's tool rusting problem (*FWW* #243, p. 12) needs some additional discussion. He has mounted his tool cabinet against a cement block wall, which I assume is in Pittsburgh. Pennsylvania is cool in the fall, cold in the winter, and cool in the spring, thus making the backside of the cabinet cold almost year round. The tools inside the cabinet also get cold and act as moisture condensers (like a cold beer can), which leads to rust bloom.

The solution is simple: Put spacers of 1 in. to 2 in. behind the cabinet so the cabinet is not in direct contact with the cold cement-block wall. I would extend the top of the cabinet back past the depth of the spacers so that debris does not get behind the cabinet. Doing this along with your suggested "rust fighters" should solve most of his rust problems. Finally, the oils and acids left on polished handplanes from our hands can cause rusting, so wiping the tool down with a cotton rag before putting it away could help.

—RICHARD O. BYRNE, Staunton, Va.

Router clarification

In your review, "Midsize Fixed-Base Routers" (*FWW* #243), you list the Porter-Cable 892 as one of the routers that "offer through-the-base depth adjustment" for use in router tables. That's true only if you purchase an optional attachment for \$27. I learned this only after buying one for the specific purpose of saying good-bye to under-the-table adjustments.

—DAVID ANDERSON, Austin, Texas

Editor replies: You're right. We should have used better language to make it clear that although through-the-base height adjustment is available on some models, the accessory for it is not necessarily included with the router. Sorry for the confusion.

When to joint a board convex side down

I enjoyed Michael Pekovich's article about making a table from a single board (*FWW* #243). I found it informative and insightful and thought his variation on cabriole legs was, to apply one of *FWW*'s most-used adjectives, elegant. But the text says that if the board is cupped or bowed, flatten the concave face on the jointer. Yet the photos seem to show him flattening the convex side of the board. Have I missed something?

—WAYNE KITSTEINER, Richmond, Va.



Don't rock it. To keep the board from rocking, apply pressure directly over the center of the board and slowly joint the face.

MICHAEL PEKOVICH REPLIES:

Good catch. Conventional wisdom says to joint a cupped board concave-side down. This provides a more stable platform for flattening one face. However, if your board is a little wide for your jointer, as in this case, you can cheat a little more capacity out of it by flattening with the convex side down. This way only the center area of the board is jointed and you can handle a board wider than your jointer knives. It's a cool trick, but something that slipped under the radar this time.

With the convex face straddling the jointer bed, flatten the high spot.



Only the high spot. Joint just enough to create a stable surface for flattening the opposite face or for resawing.

About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't perform operations you learn about here

(or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, find another way. We want you to enjoy the craft, so please keep safety foremost in your mind.

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Best Tip **Fix a broken plane tote**



Tad Grenga started woodworking at age 14 when his mother gave him his first set of tools. Now a plastic surgeon, he prefers using hand tools for woodworking, and has no tablesaw. His latest project is a Chippendale-style mahogany highboy made using tools he collected and restored.

I collect old hand tools, and it's really common to find a nice vintage handplane with a broken tote. If the tote is cracked into two pieces it usually can be fixed, and if it's made of a beautiful wood like rosewood or cocobolo, it's entirely worth salvaging.

Tropical hardwoods naturally contain oil, so prepare the two halves for a strong glue joint by wiping the mating surfaces with solvent to remove any natural oils. Place a 3-in.-long dowel into the tote's bolt hole to help keep the pieces lined up. Wax the dowel to keep it from getting glued in the hole. To clamp the tote, I use hand-screw clamps, which let me make small adjustments to the clamping angle to get a tight joint. To make the top of the tote fit in the clamp, cut a custom-shaped caul on the bandsaw and test the fit in the clamp. The jaws should be parallel when clamping.

Put on the glue and clamp it overnight. Knock out the dowel and smooth the joint by scraping and sanding, then put on a few coats of finish. Reassemble the plane, and you're ready to start smoothing.

—TAD GRENGA, Suffolk, Va.

Insert dowel in bolt hole to line up pieces.

Wax the dowel for easy removal after glue-up.

Caul is shaped to keep the clamp jaws parallel.

Use a hand-screw clamp to apply the pressure.

Plane tote

A Reward for the Best Tip

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



Extend the reach of your clamps

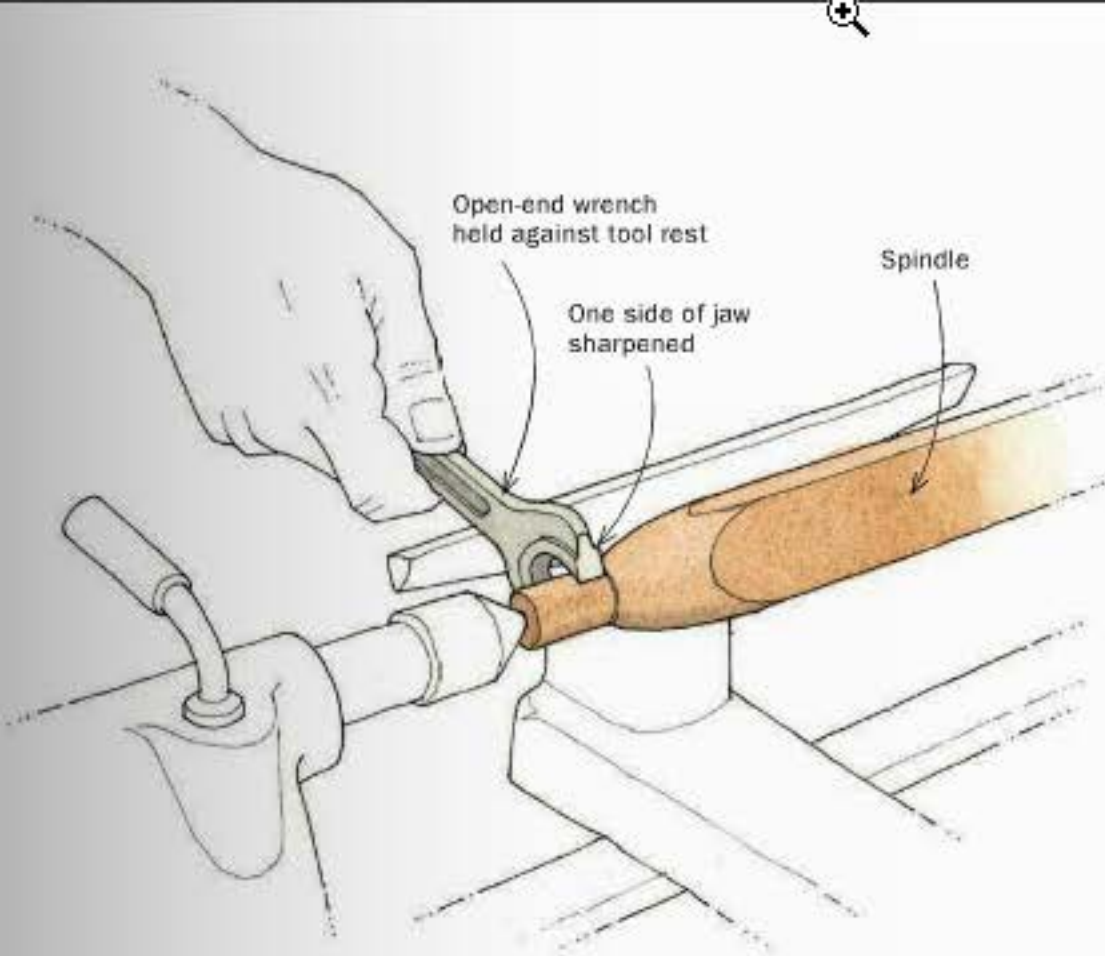
This simple wooden clamp extension allows you to make clamps of any length from the clamps you already have, and can really save you in a pinch. To make it, cut a piece of wood $\frac{3}{4}$ in. thick by 2 in. wide to the length you need. Cut a cleat with a 5° bevel on one end to help center the clamping pressure. Glue the cleat to one end and drill a hole in the other end to fit the clamp head. The extensions work great up to any length—even 16 ft.

—ANDY OLERUD, Driggs, Idaho

Inboard end of cleat beveled at 5°

Clamp

Extension



Turn accurate tenons with a modified wrench

A lot of people use open-end wrenches to check the size of turned tenons. I've taken the idea a step further. I sharpen one jaw so that it can remove stock and size tenons in one step. Starting with yard-sale open-end wrenches (here in the UK we call them spanners) in the tenon sizes you need, slowly grind a 30° cutting edge on one side of the jaw, dipping it in water often so you don't overheat the hardened steel and draw the temper.

To use it, turn the tenon slightly oversize with a regular turning tool. Then switch to the wrench and adjust the tool rest to support the wrench's neck. Lay the wrench against the tool rest and touch the lower jaw to the work first. Slowly press forward to start cutting. When the tenon reaches its final size, the tool will slip onto the tenon and stop cutting. Leave the wrench on the tenon for a moment to burnish and slightly compress the wood fibers. When you apply glue to the tenon and put it in, the fibers will expand again, locking the joint tight.

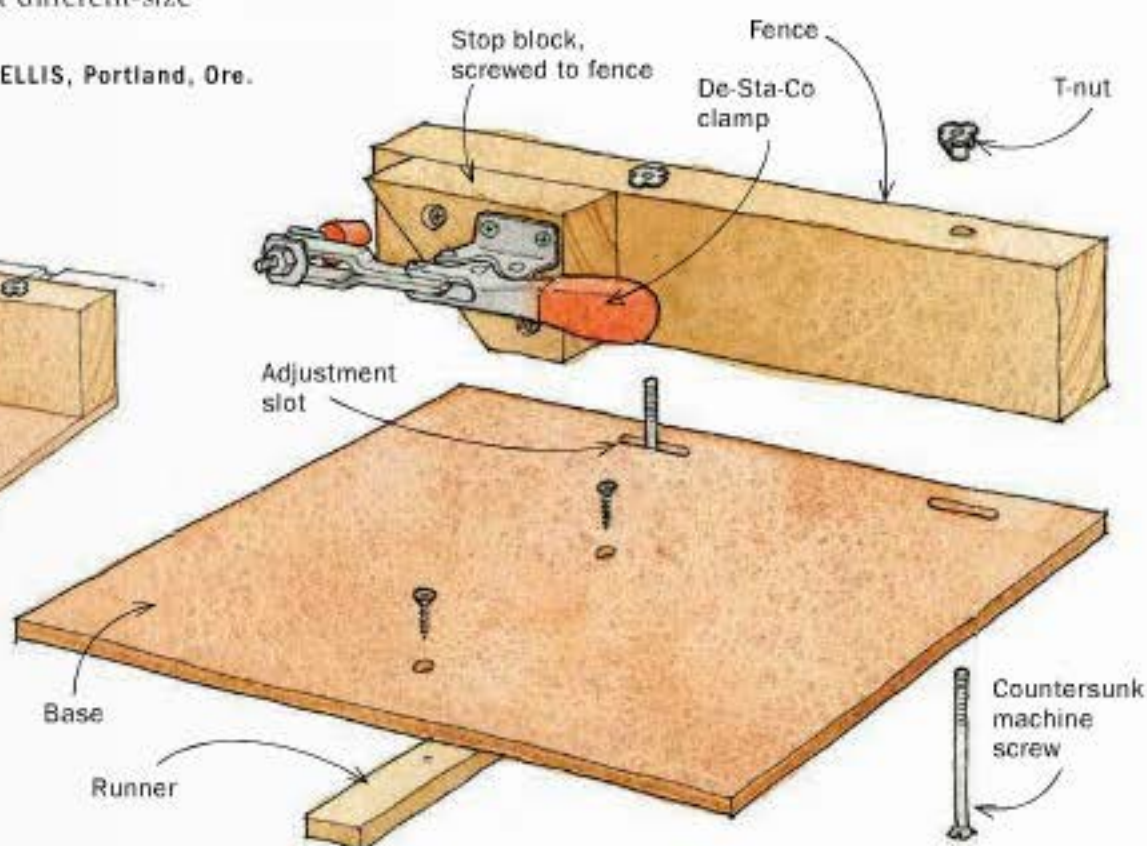
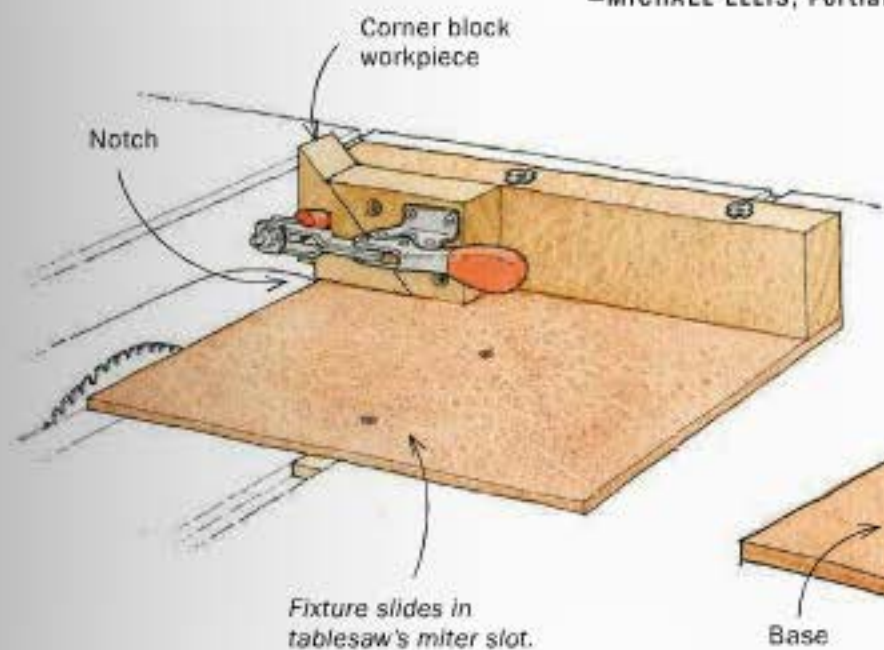
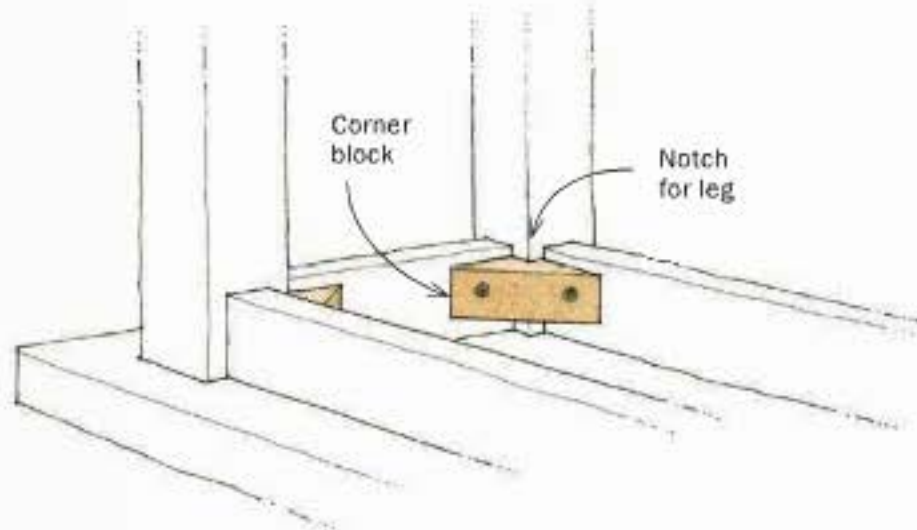
—IAN WELFORD, Sinderby, North Yorkshire, England

Quick-to-make corner brace

While building a suite of benches for the lobby of a local university, I faced one particularly challenging problem. The bench design called for triangular blocks to stiffen the joints, and each block needed a notch cut into the corner to fit around the leg. I had a bunch of blocks to notch, so I needed a safe and efficient method. This jig slides in the tablesaw miter slot and holds the workpiece firmly so that I can cut notches without concern.

I used ½-in. plywood for the base, maple for the fence and stop block, and a De-Sta-Co clamp to hold the workpiece. The fence is attached to the base with countersunk machine screws that tighten into T-nuts in the top of the fence. Slots in the base allow the fence and stop block to move so you can cut different-size notches.

—MICHAEL ELLIS, Portland, Ore.



methods of work continued

Tapers on the miter saw

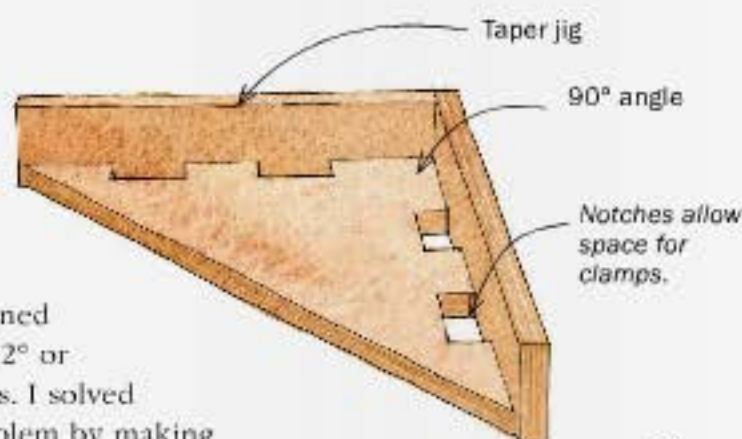
The short tapers on the bottom of legs are awkward to cut with a tapering jig on the tablesaw,

which is designed for longer, 2° or 3° tapers. I solved the problem by making a jig to cut them on my miter saw. The miter

adjustment on the saw made it easy to get the correct angle for the tapers. Made from ¾-in.-thick plywood, the taper jig is essentially a right-angle brace with holes cut on both sides for clamps. To use it, clamp the taper jig to the miter-saw fence and the workpiece to the other side. Set the saw to the correct angle, then cut the taper.

In use, be careful to place the clamps clear of the sawblade. By the way, this little jig can help keep cases square as you assemble them, too.

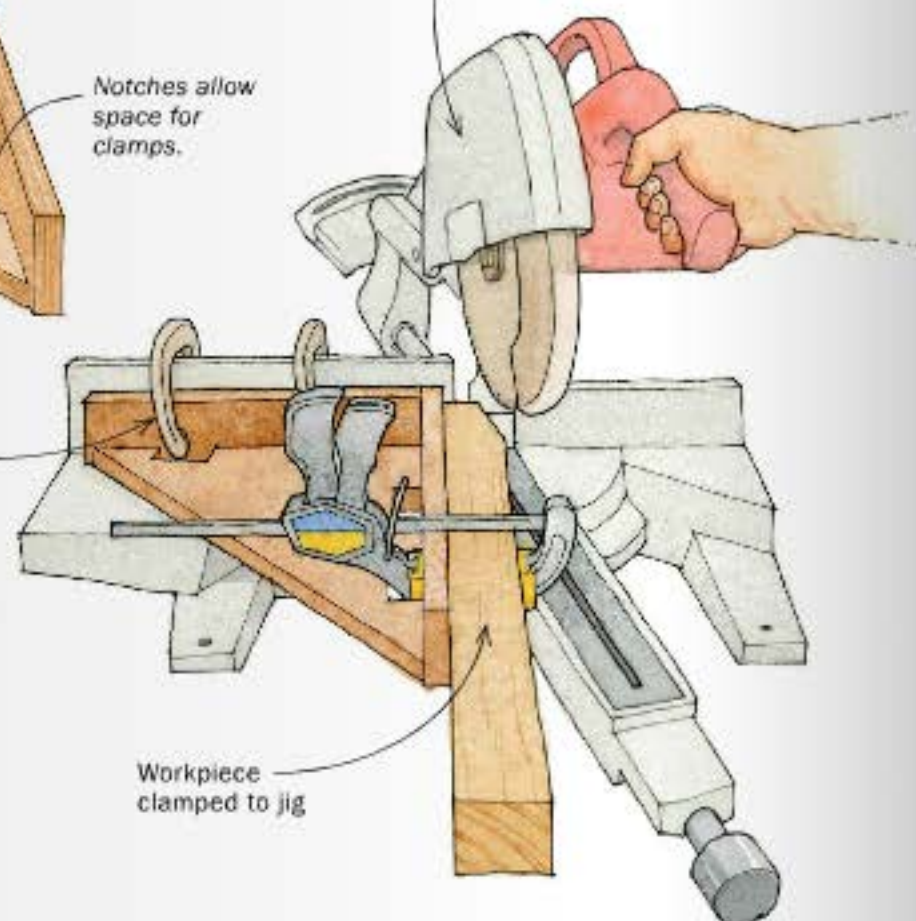
—ROB CAIRNS, Nevada City, Calif.



Taper jig clamped to fence

Workpiece clamped to jig

Miter saw is set to the desired angle.



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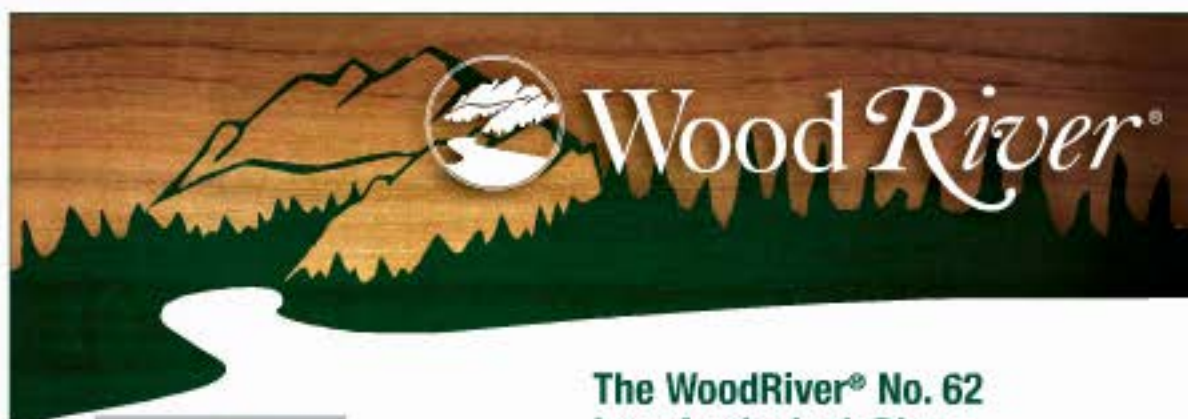
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The WoodRiver® No. 62 Low Angle Jack Plane

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— James Krenov

■ ACCESSORIES

Router table has a great lift and dust collection

WOODTEK'S NEW ROUTER TABLE IS nearly identical to the General International table that earned Best Overall when I tested router tables and lifts (FWW #237, p. 51). Both feature an excellent lift in the package. Had it been available at the time of the test, it would have tied for Best Overall.

The Woodtek's lift is easily and accurately adjusted by means of a crank handle inserted through the top of the nearly 1/4-in.-thick aluminum lift plate. The chain-driven four-post height-adjustment system needs no locks or clamps to hold the router in position, no matter how heavy the workload. That's impressive.

The lift sits in a 32-in. by 24-in. cast-iron top that was dead flat and had a nicely machined surface. A paddle-style power switch can be mounted in several different locations on the stand, and a handy hook keeps the lift crank and miter gauge close by. The cast-iron top and sturdy stand are heavy but they sit atop a smooth-rolling set of casters, making it easy to move the table out of the way when not in use.

Dust collection is exemplary, with the router motor completely contained in a box beneath the table. The box has a 4-in. port that does a great job of catching dust that falls below



the table. A 2 1/2-in. hose runs from the 4-in. port to the fence on the table, and catches most of the chips above the table.

The fence was square to the top and easily accepts shopmade sacrificial fences. T-tracks make it easy to put featherboards and jigs wherever you need them. The Woodtek also includes two handy router-bit storage trays that attach to the stand.

—Roland Johnson is a contributing editor.



Convenient bit storage. Two trays attached to the base keep bits within arm's reach at all times.



Great dust collection. Dust and chips from above and below the table are collected through a single port on the back of the router box.



Versatile fence. Featherboards, jigs, and stops can be attached to the front of the fence, and on top of it.

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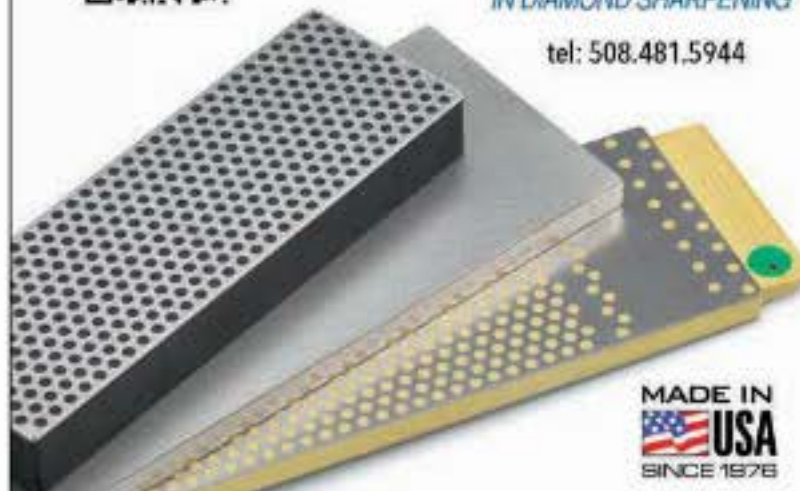
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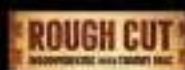
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■ MACHINES

A truly quiet air compressor

I HAVE TWO PNEUMATIC NAILERS (18 gauge and 23 gauge) for making jigs in my shop and hanging molding in my home, but until recently I almost never used them. That's because my compressor was very large, very heavy, and very loud. In my shop, the noise was just too much. When I needed it for renovations in the house, I had to run a long hose from my shop because the compressor was far too difficult to move into the house (and there's no way I'd subject my family to its horrible racket).

All of this changed when I bought Rolair's JC10 (1 hp, 2½-gal. tank) hand-carry compressor. It is unbelievably quiet. Standing next to the compressor and taking readings at ear level, I measured its noise at 67 db. At 10 ft. away, the noise level dropped to 62 db. That's quieter than your alarm clock and normal street noise. You can easily carry on a conversation without raising your voice while it's running. At just 39 lb., it's also light, so I have no trouble carrying it into the house.

I've used the JC10 quite a bit for making jigs in my shop and for hanging crown molding in the kitchen. It has no problem keeping up with the nailer regardless of how fast I go, and it is so quiet that neither my wife nor my kids have noticed it. The JC10 is the perfect compressor for my nailers, which are getting much more use now.

—Matt Kenney is a senior editor.



Air compressor from Rolair

JC10
\$240



Medium router plane from Veritas

\$109 with ¼-in. blade
\$99 without blade

■ HAND TOOLS

Router plane is just right

I THINK A ROUTER PLANE IS A MUST-HAVE for a furniture maker, and the Veritas medium router plane is a smart choice. It comes with a ¼-in. cutter, but can use the same cutters as the Veritas large router plane. That means there are 12 other blades (imperial and metric) available for it, adding to its versatility. The plane also comes with an adjustable depth stop.

Out of the box the sole was 0.003 in. out of flat. You could easily use the plane like that without trouble, but I chose to flatten the sole. After a few minutes on a flattening plate covered with 80-grit sandpaper, the sole was true. I then honed the blade and put the plane to use. It performed very well.

Traditionally, router planes have come in two sizes. Large ones are used for heavier carcass work and small ones for hardware installation and inlay. Although the Veritas medium router plane is not a replacement for these two sizes, it certainly does some of the "in-between" jobs quite well. With the supplied ¼-in. blade, it easily handles mortising for half-mortise locks and larger butt hinges, and is nice for cleaning up smaller dados and other joinery.

—Dan Faia is a professional furniture maker and the head of the Cabinet and Furniture Making program at North Bennet Street School in Boston.

■ ACCESSORIES

Remove broken screws without damaging the hole

THERE'S NOTHING MORE FRUSTRATING (at least in the shop) than breaking off the head of a screw, especially when I'm installing hinges. Fortunately, I've found a fast and easy way to remove broken screws without having to plug and re-drill the hole. The Unscrew-Ums Screw Extractor is a hollow bit with sawteeth on the end that chucks into your drill. To remove a broken screw, set the drill on reverse and slowly drill into the hole containing the broken screw. The extractor's teeth will shear off the threads on the upper portion of the screw's shank, and then the hollow bit expands around it. Once it gets a grip, it backs the broken screw out of the hole, leaving plenty of wood intact to secure another screw.

Unscrew-Ums come in a variety of sizes to match the most common screw sizes.

—Michael Pekovich is a furniture maker, instructor, and FWW's executive art director.

Screw extractor from T & L Tools

Unscrew-Ums
\$8 to \$12



Cure for broken screws. Unscrew-Ums is a split pin that spreads over the broken shank. It's used with the drill in reverse, and when it grabs the shank, it slowly unscrews it from the hole.

■ FINISHING

Grain filler that's easy to hide

AQUA COAT CLEAR GRAIN FILLER is a completely transparent paste filler, making it ideal for those times when you want to fill the pores without adding color to the wood. The slick paste goes on easily and scrapes off cleanly. A problem with all fillers is that it can be difficult to tell if the pores are filled enough. That's not a worry with Aqua Coat, because you can fill the grain again after a coat of finish has been applied. That can't be done with other fillers on the market. Aqua Coat does not affect the adhesion of later coats of finish. I enjoyed working with it.

—Teri Masaschi is a professional finisher in New Mexico.

Clear grain filler from Aqua Coat

\$19 for 16 oz.





Sharpen your spokeshave

A SIMPLE BLADE HOLDER
IS THE KEY TO SUCCESS

BY CHRIS GOCHNOUR

Sharpening most spokeshaves is like sharpening a handplane, but the blades are a lot smaller and tricky to hold. The solution is a wooden blade holder. With the blade mounted in it, you can grind and hone to perfection using standard sharpening techniques. It's also double-ended, so it can handle both short bevel-up blades and longer bevel-down blades. A concave spokeshave requires a different approach, but I'll tell you the secrets to that, too.

Make the blade holder

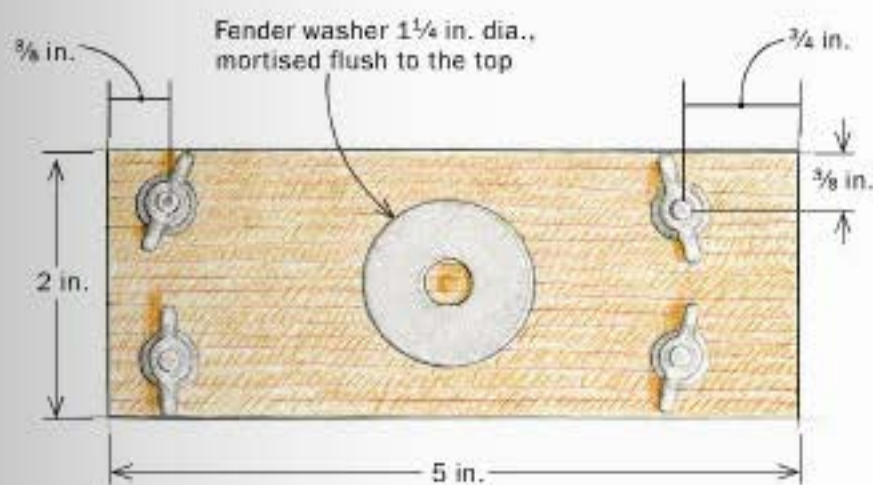
I first discovered this style of blade holder when reading about spokeshaves in a reprint of a book written in 1903—*The*

MAKE THE BLADE HOLDER

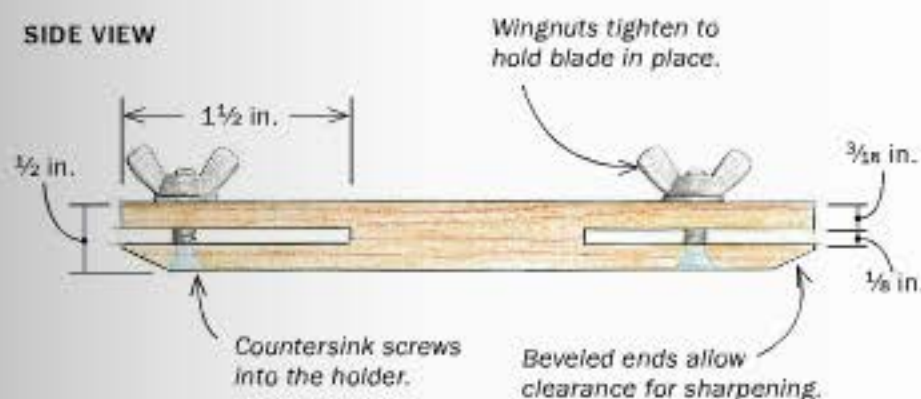
A slotted block with wingnuts lets you get a grip on hard-to-hold spokeshave blades for easy grinding and honing. An inset washer lets you mount a digital angle gauge for quick, accurate setup (opposite).



TOP VIEW

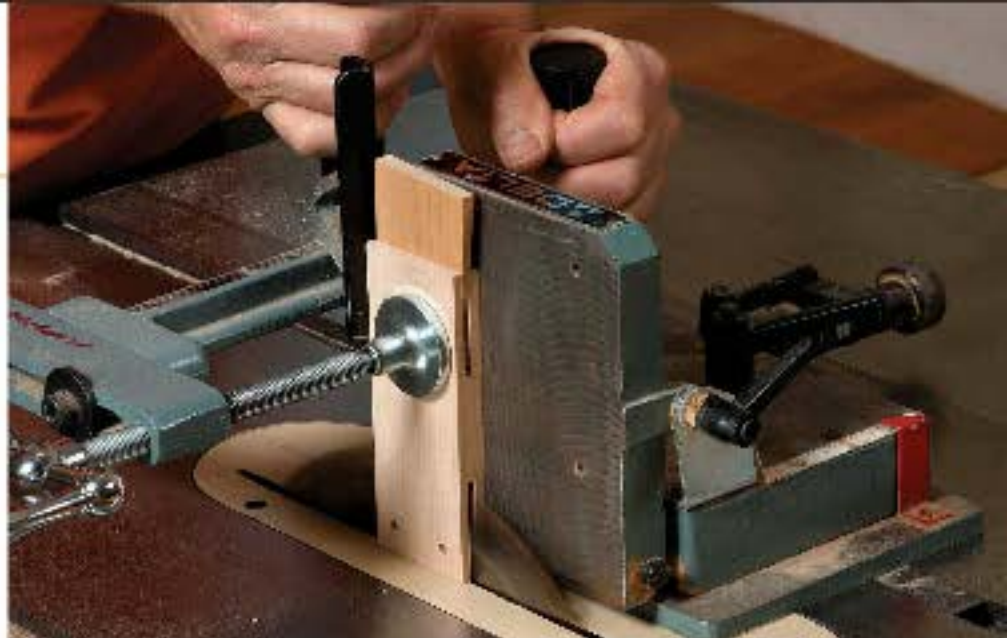


SIDE VIEW



Handyman's Book by Paul Hasluck (2001, Ten Speed Press). Traditionally the blade is wedged into the holder's wooden body, but I added screws and wingnuts to hold the blade and glued a steel washer to the top so that I could stick on a magnetic angle gauge. I also cut different-size slots into each end so that I could sharpen 1 1/2-in. long bevel-down blades, and shorter bevel-up blades too.

Making the blade holder is simple. Mill a piece of hardwood to size and cut a slot in each end, 1 1/2 in. deep and as wide as the blade it will hold. In my case, a 3/8-in. slot worked well, but if your spokeshave blade is thinner, you may want to cut the slot with a thin-kerf blade. I cut the slots using a tenoning jig on



Make way for the blades. Gochmour uses a tenoning jig to cut the slots on the tablesaw, and sticks a wedge in the first slot to keep the blade holder securely in the jig when cutting the second slot. A 3/8-in.-wide slot is perfect for most blades.



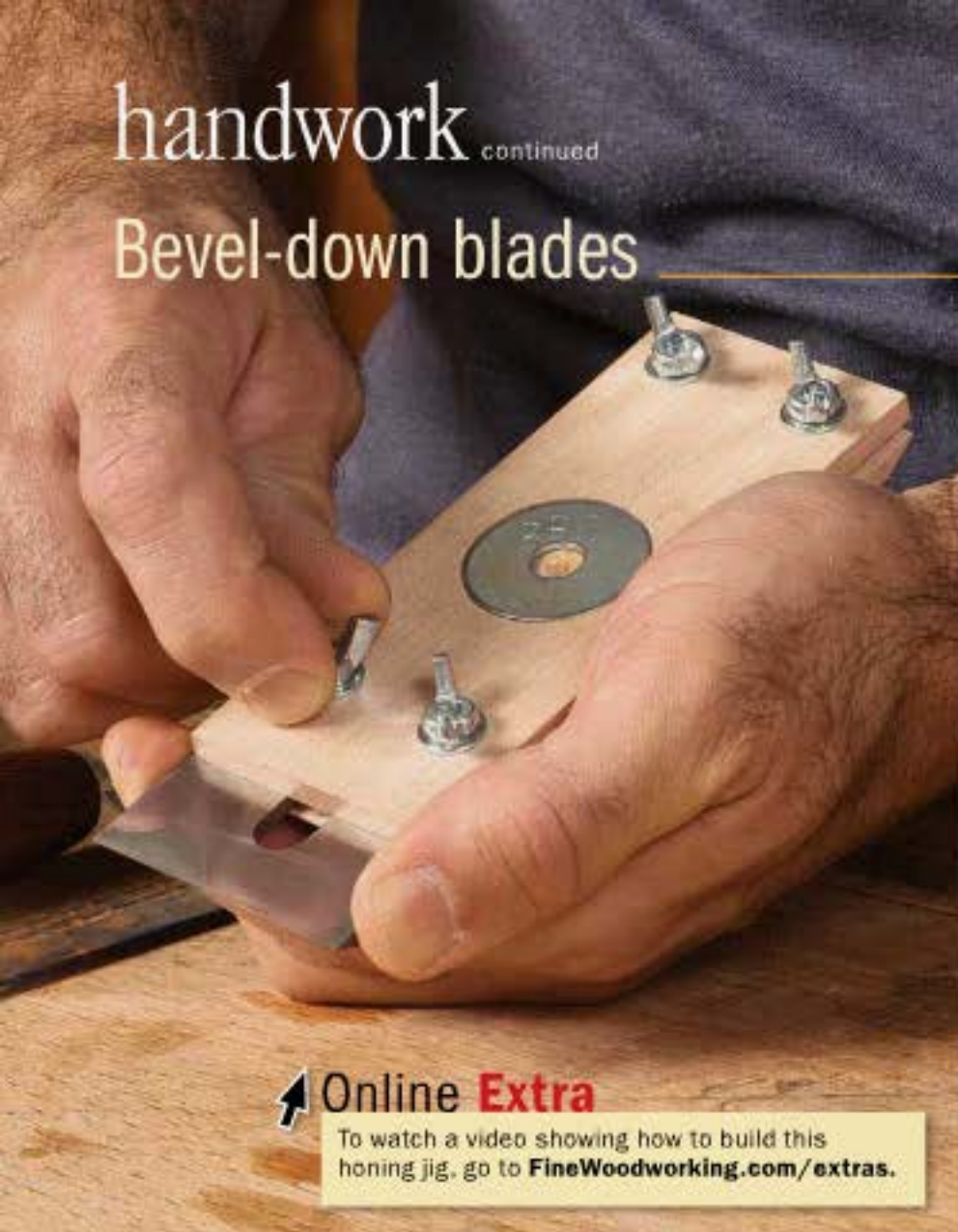
Drill the holes and the mortise. After drilling the holes for the screws, use a Forstner bit and set the depth stop to create a shallow mortise, then secure the fender washer with cyanoacrylate glue.



Add some glue to the screw heads. The screws thread into their holes on one side. To keep them from spinning during use, Gochmour uses a little cyanoacrylate glue under each screw head to lock them in place.

the tablesaw. Next, to create clearance for grinding and honing the bevel, tilt the blade to 25° and cut a bevel on the underside that rises about 5/2 in. on each end. Drill and countersink holes for the two clamping screws in each end. The screws will also serve as a depth stop to keep the blade square with the holder, so make sure they are parallel with the ends. To allow the top half of the slots to tighten freely under the wingnuts, change to a drill bit slightly larger than the screw threads and redrill the holes on the top side of the holder. A fender washer mortised into the top creates an attachment point for a magnetic angle gauge. Drill the shallow washer mortise in the center of the top, then glue it in with cyanoacrylate glue. The screws for the

Bevel-down blades



Online Extra

To watch a video showing how to build this honing jig, go to FineWoodworking.com/extras.

Insert the blade. Slide it all the way in, then tighten the wingnuts to secure it for grinding and honing.

wingnuts are also glued in place (just a bit under the screw heads) to keep them from rotating in their sockets. Put on the washers and wingnuts, and you're ready to sharpen.

Sharpening the blade

Bevel-up and bevel-down spokeshave blades are sharpened the same way, but their secondary bevels are a slightly different angle. Bevel-down blades typically have a 25° primary bevel and a 30° secondary bevel. Bevel-up blades have a 20° primary bevel and a 25° secondary bevel.

To begin sharpening, check the blade's back. If it isn't flat, lap the back on a series of sandpaper grits (220 through 2,000) until it's flat and polished. For more details on flattening the back, check out Handwork, "Plane blades and chisels need a flat and polished back," in *FWW* #232.

Next, grind the bevel. It's best to use a slow-speed grinder to avoid overheating the blade. You won't need to regrind it every time—only when it's worn, chipped, or needs an angle change. Put the blade in the holder with the bevel facedown. To protect myself from the sharp edge, I secure the tip of the blade about ½ in. deep in a vise, then stick the holder onto it until the blade butts against the screws, and tighten the wingnuts. Set the tool rest to the primary bevel angle and grind the bevel, making the edge straight and square to the blade's side.

To hone the secondary bevel, mount the blade and holder in a side-clamp honing guide. Set the angle to 30° and begin

1 GRIND



Grind the primary bevel. The blade holder keeps a firm grip on the small blade, and its size makes it easy to hold steady against a tool rest.

2 HONE



Sandpaper, then sharpening stones. Gochmour starts honing on 150-grit sandpaper, then switches to the stones, working his way up through the grits for a sharp, polished secondary bevel.

3 POLISH



Remove the burr. After honing the bevel, remove the burr by polishing the blade's back flat against your finest stone.



Bevel-up blades

Straddle the stone. For bevel-up shaves, grind and hone the same way, using the slot for narrow blades. Just let the tangs hang off the sides.

honing with 150-grit sandpaper to produce a wire edge. After you notice a burr forming on the back, switch to sharpening stones and polish the cutting edge, working through a series of grits: 1,000 to 6,000 to 13,000. Last, remove the burr by rubbing the flat back against a fine stone. If your blade has tangs, you can sharpen it using the blade holder—just let the tangs straddle the stone. If the tangs aren't wide enough to straddle the stone, hone the blade by hand on the stone's narrow side.

Concave shave is a different beast

The cutting edge of a concave spokeshave blade is ground to match the shave's sole, so you'll need a different method to



Concave blades

Hone it by hand. With the blade mounted in a machinist's vise, set the bevel parallel with the benchtop, and hone the bevel with a side-to-side motion, sweeping it across the blade's curved edge.



Simple fix for short blades. If the tangs don't clear the face of the stone, hone the blade freehand with diagonal strokes on the stone's edge.

sharpen it. I bring the abrasive to the blade by using a large dowel wrapped with sandpaper to establish the bevel and hone a secondary bevel. Just like a regular spokeshave blade, the primary bevel shouldn't need attention every time you sharpen, but it will once in a while. Mount the blade in a vise with the bevel faceup, tipping it to the angle of the primary bevel, about 35°. Use a wooden dowel slightly smaller than the blade's arc, wrapped with 150-grit sandpaper. Hold the dowel horizontal and hone the primary bevel, using a diagonal sweeping motion. Then loosen the vise and adjust the blade's angle to 37° to hone the secondary bevel. To easily see which part of the blade you're honing, mark the bevel with a permanent marker. Change the abrasive paper on the dowel to a finer grit, and hone a microbevel on the blade, working your way through 320-, 600-, and 1,000-grit, checking the marks on the bevel to make sure you're getting an even edge. Now just remove the burr—take it out of the vise and polish the back on a fine stone. □

Chris Gochnour is a professional furniture maker and hand-tool expert in Salt Lake City.



Remove the burr. Finish the job by removing the burr using a 13,000-grit stone.

designer's notebook

Mining Danish Modern

INSPIRATION BEHIND A SUCCESSFUL DESK DESIGN

BY TIMOTHY ROUSSEAU



I designed and built this desk in a hurry—a show I'd been invited to join was two weeks away. As it turned out, that wasn't a bad thing, because it forced me to focus and to make design decisions quickly.

Much of the inspiration for the desk came out of Danish Modern furniture. In particular, I was looking at desks with a broad writing surface and A-frame leg assemblies. I veered away from the standard Danish Modern style by building my piece from a much lighter-colored wood, ash, and by making the shapes harder-edged.

As I designed the desk, I focused solely on the end view. I never even did a drawing of the whole desk. The piece was fairly simple, and I felt confident that if I got the ends right, the whole desk would hang together.

In a series of very rough end-view sketches, I explored various shapes for the desk's end cap, settling on one that reminded me of the swooping hull of a racing sailboat. I also worked out the splay of the legs, giving the back leg a more pronounced angle than the front, and setting it farther in from the end of the end cap. When I had shapes I felt good about, I made a more careful—but still rudimentary—small sketch.

Then I made a full-scale end-view drawing on brown kraft paper (not quite artist's vellum, but hard to beat at \$11 per 140-ft. roll at Home Depot). This full-scale drawing is where I worked out the sizes of the parts and the details of the joinery. At the tops of the legs, where strength was vital, I used shouldered tenons to join them to the end cap. But down below, to make the joinery less fiddly, I fully housed the stretchers into the legs; that way, with no shoulders to worry about, even if the angle of the legs was slightly off, the fit of the stretcher would be fine.

I followed up the full-scale drawing by making a full-scale poplar mockup of one end assembly. This allowed me to refine the shaping of the parts and do a trial run on the joinery.

To give the spare desk some real rigidity, I made the writing surface of plywood—veneered with ash I sliced from solid wood—and glued it to the end caps along its full width with tongue-and-groove joints. I also glued the surface to the rails beneath it.

With wood cut from the same plank as the veneer, I made a 3-in.-wide solid nosing for the front edge of the writing surface. This enabled me to undercut the front edge and bring it to a fairly narrow point, giving the impression of a thinner surface.

On some of the Danish Modern desks I'd admired, there was a small drawer or two perched on the back of the writing surface. I liked that, and had planned all along to add one to my desk. But as the days flew by and the deadline loomed, I had to drop the idea. In retrospect, I'm glad; it seems to me it was another example of how the tight time constraints helped simplify and clarify my vision of the desk. □

Timothy Rousseau makes furniture in Appleton, Maine.

Danish descent. Rousseau's desk was inspired by Danish Modern pieces like this one, designed in 1961 by Arne Wahl Iversen. Danish Modern work absorbed the simplicity and minimalism of International Style furniture, exemplified by designers like Mies van der Rohe, but warmed it up with softened edges and rich woods like teak.



Slight curves soften the surfaces. A shallow curved profile routed onto some parts softens their look and feel without losing the hard arrises that provide visual definition. In a detail borrowed from Danish Modern chairs, Rousseau used a small chamfer where the leg meets the end cap; it defines the joint and makes fitting it less exacting.



From sketching to scaling. Rousseau developed his desk design from the end view. He started with rough sketches on scrap paper and refined the details in a full-scale drawing made on kraft paper at his drafting table.



Sturdy Stool for

Comfortable
and quick to build,
it fits the workbench
or the kitchen island

I built this cherry stool with a leather seat to use in the kitchen, but to my wife's dismay I kept carrying it out to the shop—it turns out to be perfect as a bench stool when I'm chopping dovetails. I've also taken it with me when I do shows, where I need a seat that's comfortable all day long. It fits the bill for all three uses, and it doesn't take long to build.

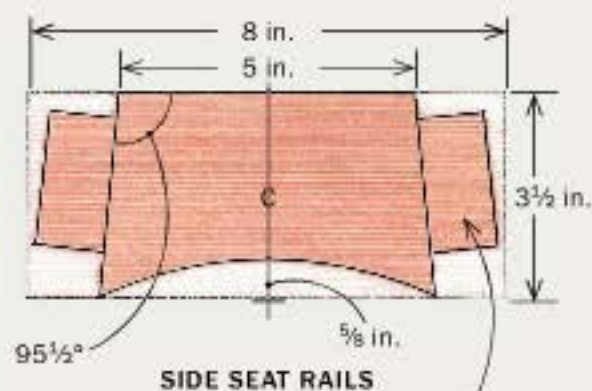
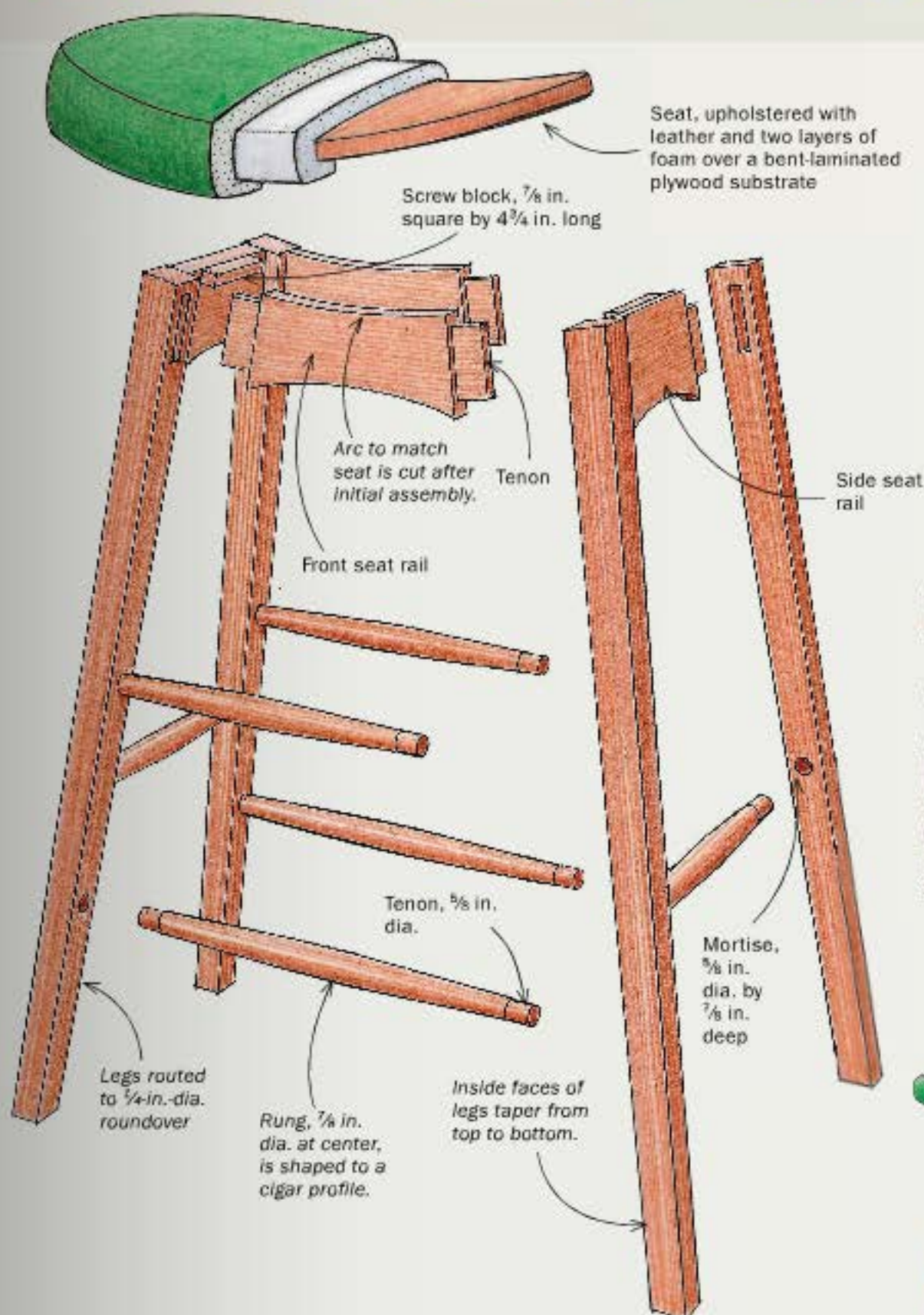
I started by making a full-scale drawing, something I rarely do. I can visualize most rectilinear furniture in my head, but for chairs, which have few flat surfaces or right angles, a full-scale drawing is a necessity. Forty minutes with a piece of cardboard, and I had all the primary elements down: square tapered legs, round rungs, arched rails and, for comfort, a curved, upholstered seat. I gave the stool an overall height of 29½ in., which works well with our high kitchen counter and my tall workbench. As a rule of thumb, a seat should be 11 in. to 12 in. lower than its mating table or counter. So a stool for a 36-in. counter should be about 24 in. tall. To make the stool as comfortable as possible, I decided on an upholstered seat, but I sent it out to be upholstered. If you like, give it a try—it's not a complicated job.

Make the legs first

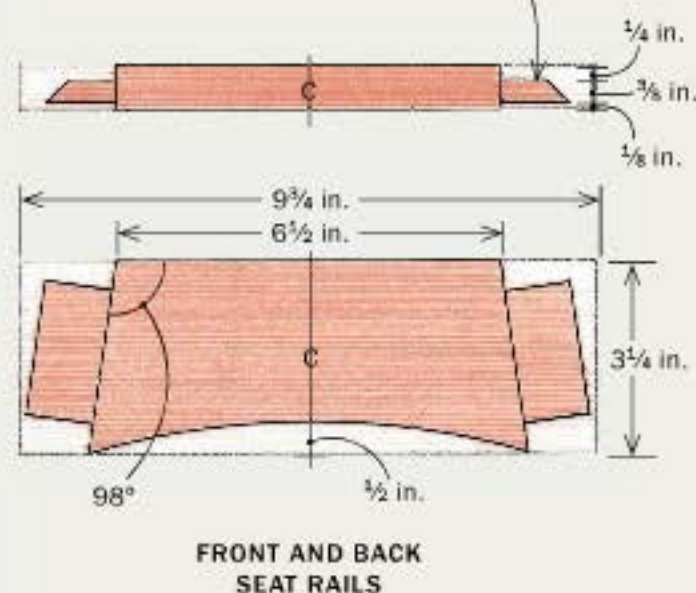
I made the legs with straight-grained stock and tapered their inside faces. I used a shopmade tapering jig on the tablesaw, but cutting to a line on the bandsaw would also work. Once the legs are tapered, mark them on top so it's easy to keep track of which is which and how they are oriented. To give the stool a softer, less angular look, ease all four corners of the legs at this stage with a ¼-in. roundover bit on the router table. Then it's on to mortising for the seat-rail

Home or Shop

BY
CHRISTIAN
BECKSVOORT

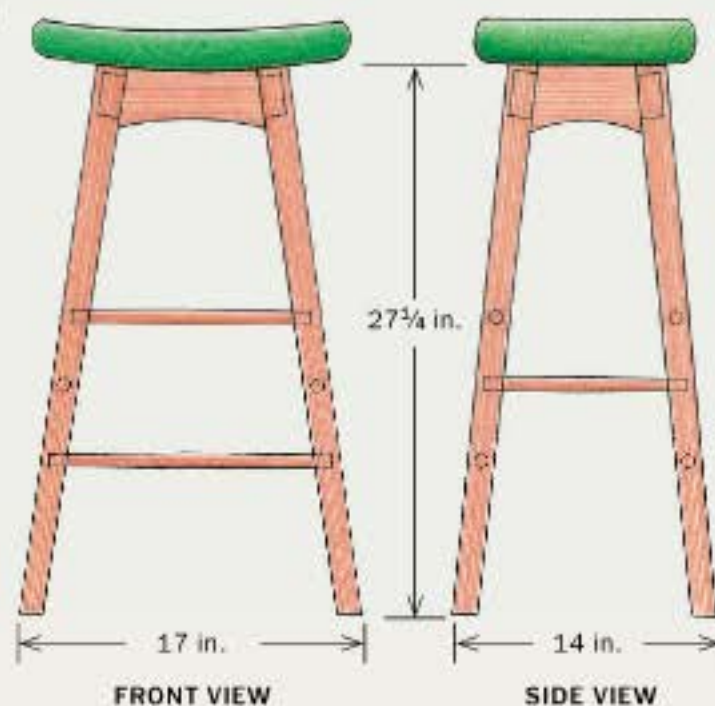
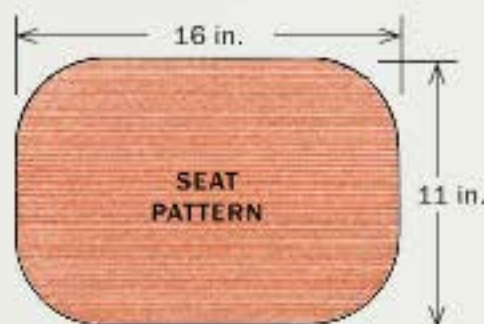


Tenons, $\frac{3}{8}$ in. thick by $2\frac{1}{4}$ in. wide by $1\frac{1}{8}$ in. long

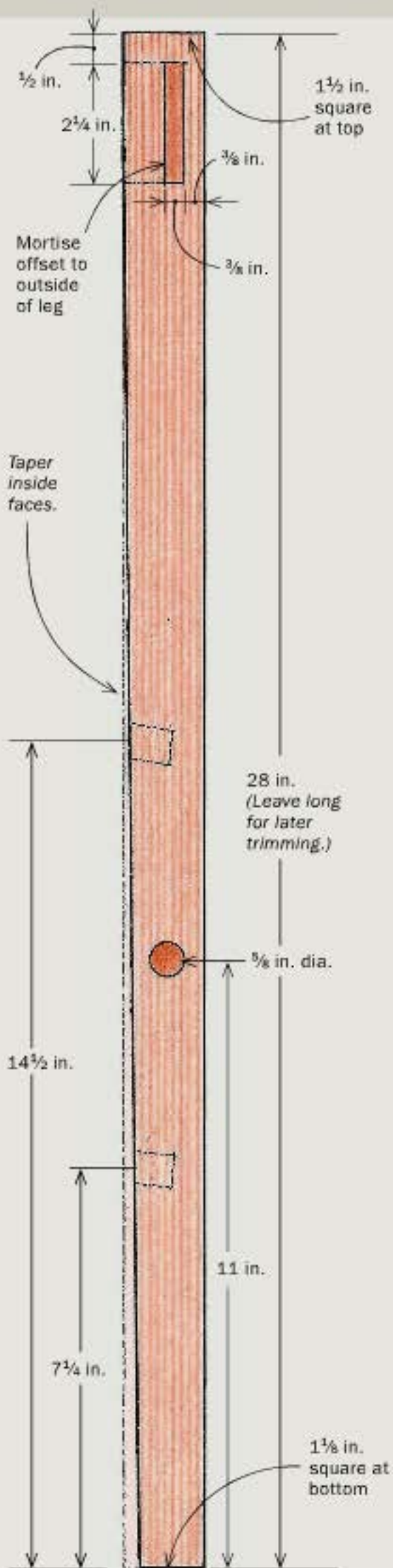


BAR STOOL WITH UPHOLSTERED SEAT

With its square tapered legs, turned rungs, and arched rails, this stool is simple to build. Even the curved, upholstered seat is not that difficult to make.



Make and mortise the legs

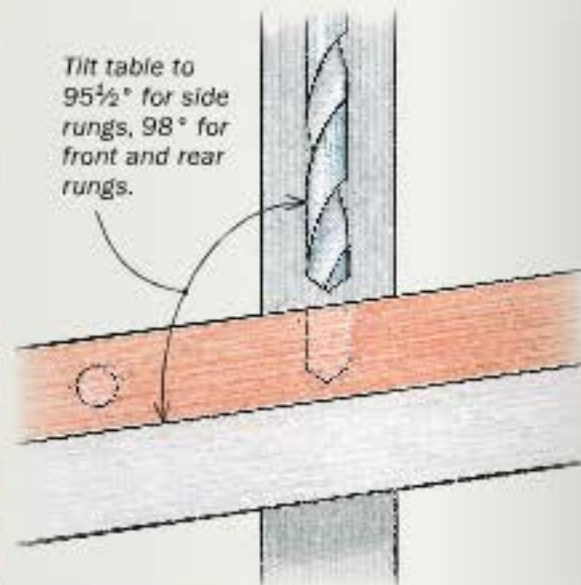


Taper two sides. Using a shopmade tapering jig, Becksvoort tapers the two inside faces of each leg. Then he cuts the mortises and rounds over the long edges of the leg on the router table.



DRILLING ANGLED MORTISES

Tilt table to 95½° for side rungs, 98° for front and rear rungs.



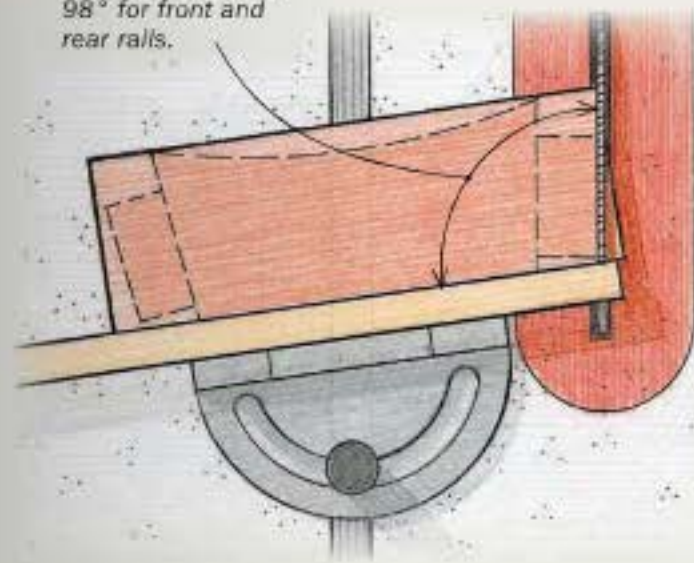
From drawing to drilling. After tapering the legs, cut the mortises for the seat rails and rout the roundovers. Then, to cut the angled mortises for the rungs, set a bevel gauge to the angle on your drawing, and tilt the drill-press table to that same angle.



Prep the seat rails

CROSSCUT AT AN ANGLE

Angle miter gauge
95½° for side rails,
98° for front and
rear rails.



End angles first. Crosscut the seat rails with a miter gauge on the table saw. Then, with the blade lowered and the miter gauge at the same setting, cut the shoulders of the tenons.



Buzz the ends at the bandsaw. Make the end shoulder cuts at the bandsaw and clean them up with a chisel if necessary. The tenons are offset toward the outside face of the rail.



A meeting of the miters. With a block plane, miter the rail tenons so they don't contact inside the leg.

tenons. I did this with my horizontal mortiser, but any other mortising method would be fine. Whichever technique you use, be sure to register off the outside—untapered—face of the leg, so that the face of the seat rail will be parallel to it.

I cut the round mortises for the rungs at the drill press, using a 5/8-in. brad-point bit. I tilted the table to match the leg-to-rung angle and drilled about 7/8 in. deep.

Shape the seat rails

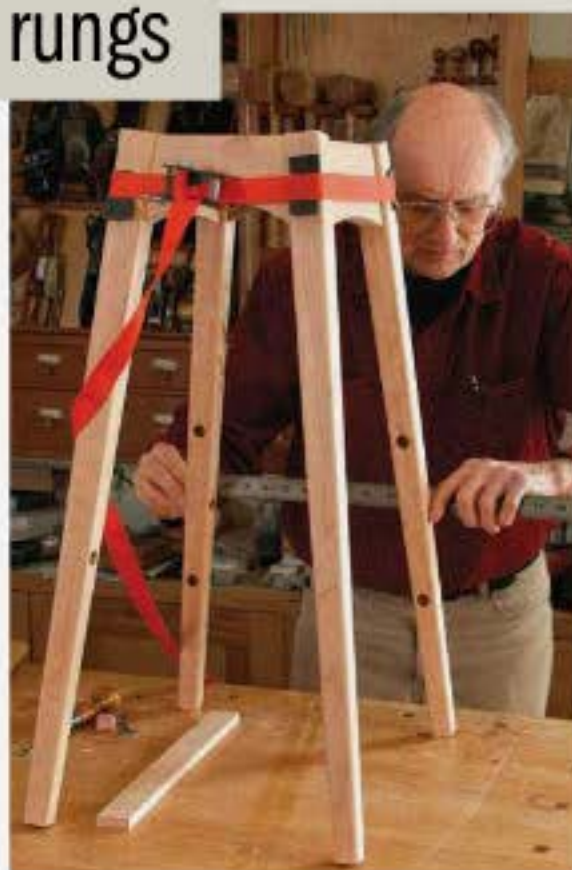
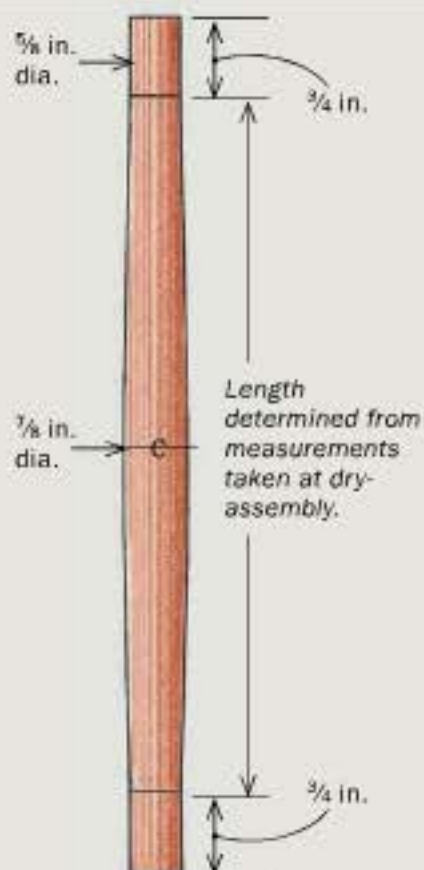
After milling the seat-rail blanks, make the angled crosscuts on each end. These angles produce the splay of the legs. Note that the side rails are cut at a different angle from the front and back rails for a less-pronounced splay. Once the angles are cut, you can cut the tenons, on the table saw, as I did, or by hand. The tenons intersect inside the leg, but I offset them toward the outside to make them as long as possible, and I mitered their ends with a block plane.

Next bandsaw the arc on the bottom edge of each rail, and fair the curve with files or a sander. The side seat rails have a tighter-



Trace a curve. You can use a flexible ruler in a bar clamp to reproduce the curve on the full-scale drawing and trace it onto the seat rails. The curves are then bandsawn and smoothed.

Turn and fit the rungs



Reality check. Dry-assemble the legs and aprons and measure the length for each rung separately. Add $\frac{3}{4}$ in. to each end for the tenons.



Tenoning rig. With the rung blanks milled square and cut to length, Becksvoort uses a tenon cutter in the drill press to cut the tenons on each end. Alternately, you can turn the tenons.



Clever doughnut. A scrap with a $\frac{5}{8}$ -in.-dia. recess drilled into it helps mount the rung on the lathe. The small, through centerhole seats on the lathe's dead center.



Make that rung a cigar. After turning the square blank to a cylinder with a roughing gouge, use a smaller gouge to taper the rung to a gentle cigar shape.

radius arc than the front and back seat rails. To speed things up, stack and tape together the pairs of rails for sawing and sanding.

Tenon and taper the rungs

Dry-assemble the stool with a band clamp at this point, and take measurements for the rungs directly from the stool. The lengths should be close to what the drawing shows, but may be off slightly depending on how accurately the rail angles were cut. After milling the rung blanks to a bit more than $\frac{7}{8}$ in. square, cut the three pairs of rungs to length, being sure to include $\frac{3}{4}$ in. extra at each end for the tenons.

Next up is shaping those tenons. You'll be turning the rungs to their cigar shape, and you could also turn the tenons. But I often

mill them with a tenon cutter chucked into the drill press. Then I put the rung on the lathe and turn it to shape. I fit one of the tenons into a three-jaw chuck. The other is held in a little adapter I made by drilling a $\frac{5}{8}$ -in.-dia. hole partway through a scrap of wood. A small hole centered on the $\frac{5}{8}$ -in. hole seats against the dead center, automatically centering the workpiece. I turn the rung to about $\frac{7}{8}$ in. dia. at the middle, and taper it down from there to $\frac{5}{8}$ in. at each end. If you don't want to turn the rungs, you can shape them by hand with a drawknife, spokeshave, and block plane.

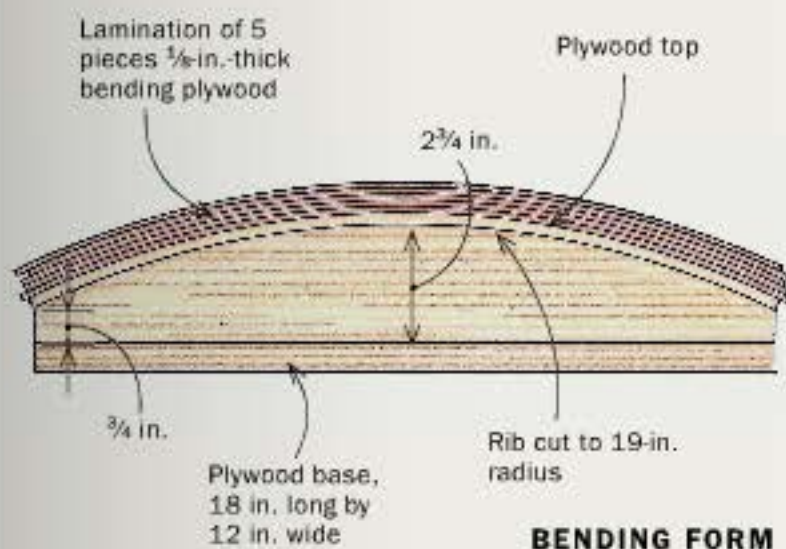
Prepare for the upholsterer

Although I didn't do the upholstery myself, I did make the substrate of the seat, a dished lamination of five pieces of $\frac{1}{8}$ -in.

Create the curved seat



Five-ply sandwich. Five sheets of $\frac{1}{8}$ -in. plywood are clamped over a bending form to make the upholstered seat's substrate. Band clamps pull the plywood tight to the bending form. As an alternative, a vacuum bag could be used with the same bending form.



Shaping the seat's perimeter. Becksvoort bandsaws the bent-laminated seat to shape (left), following lines traced from a pasteboard pattern. Then he smooths the sawcuts with a disk sander. To ensure comfort and a smooth wrap of the leather, he uses a $\frac{3}{8}$ -in.-dia. roundover bit (above) to ease the edges around the top of the seat. Use a $\frac{1}{4}$ -in.-dia. roundover bit to radius the bottom edge.

Assemble in two stages



First the front and back. Glue up the front and back as separate units and set them aside to cure.

bending plywood. I bent them to shape over a shopmade form, which has five ribs of $\frac{3}{4}$ -in. plywood covered with three pieces of $\frac{1}{4}$ -in. plywood. A vacuum bag would be excellent for this task.

To shape the seat, make a pattern with rounded corners from pasteboard. When the seat lamination is cured, place the pattern on it and trace around it. Then bandsaw to the line, round over the edges with a router, and sand the edges. Now it's ready for upholstery. My upholsterer used a bottom layer of 1-in.-thick dense foam, and a top layer of $\frac{3}{4}$ -in.-thick softer Dacron foam. He covered them with leather, stretched and stapled in place.

This stool could also accept a wooden seat. Glue up a blank, bandsaw it out, and shape it with spokeshaves, rasps, files, scrapers, and sandpaper.

Assembly in two steps

I sand all the parts to at least 220-grit at this point and assemble the front and back units. When they've dried, trace the curvature of the seat profile across the top of the rails and legs. Then, with the bandsaw table tilted to $5\frac{1}{2}^\circ$, cut along the pencil lines.



The top edge must mirror the seat. Trace the curve of the seat onto the legs and seat rail of the front and back units (left). With the subassembly riding inside face down, and the bandsaw table tilted $5\frac{1}{2}^\circ$, cut along the curved line for the scooped seat (above).



Dry-fit and draw a line. With the side rails and rungs dry-assembled, mark the side rails where they protrude above the leg. Then disassemble and trim to the line at the bandsaw or tablesaw.



The second gluing. After attaching screw blocks inside the seat rails, do the final assembly of the stool.



Wobble check. To eliminate rocking, trim all four legs in the same plane. Holding the stool steady on a flat surface, trace around each foot with a pencil held on its side and elevated on a scrap. Cut to the lines on the bandsaw, and follow up with rasps and files.

Dry-assemble the side rails and rungs to the front and back units. You'll see that the side rails now protrude above the front and back legs. Mark the amount by tracing the curve at the top end of the legs onto the side rails, and then trim off the excess at the tablesaw or bandsaw. Glue screw blocks to the inside faces of the side rails, and you're ready for the final glue-up.

The seat meets the base

When the seat lamination is cured, attach it to the base with screws driven through the screw blocks. Then stand the stool on a flat surface and mark around each leg with a pencil laid flat. Bandsaw to those lines, and rasp and sand out any irregularities.

Remove the seat to upholster it and to oil the base. Then add felt or rubber pads to the feet, if you like. When the upholstering is done, re-assemble, sit, and enjoy. □

Christian Becksvoort has been making Shaker-inspired furniture in Maine for 40 years.

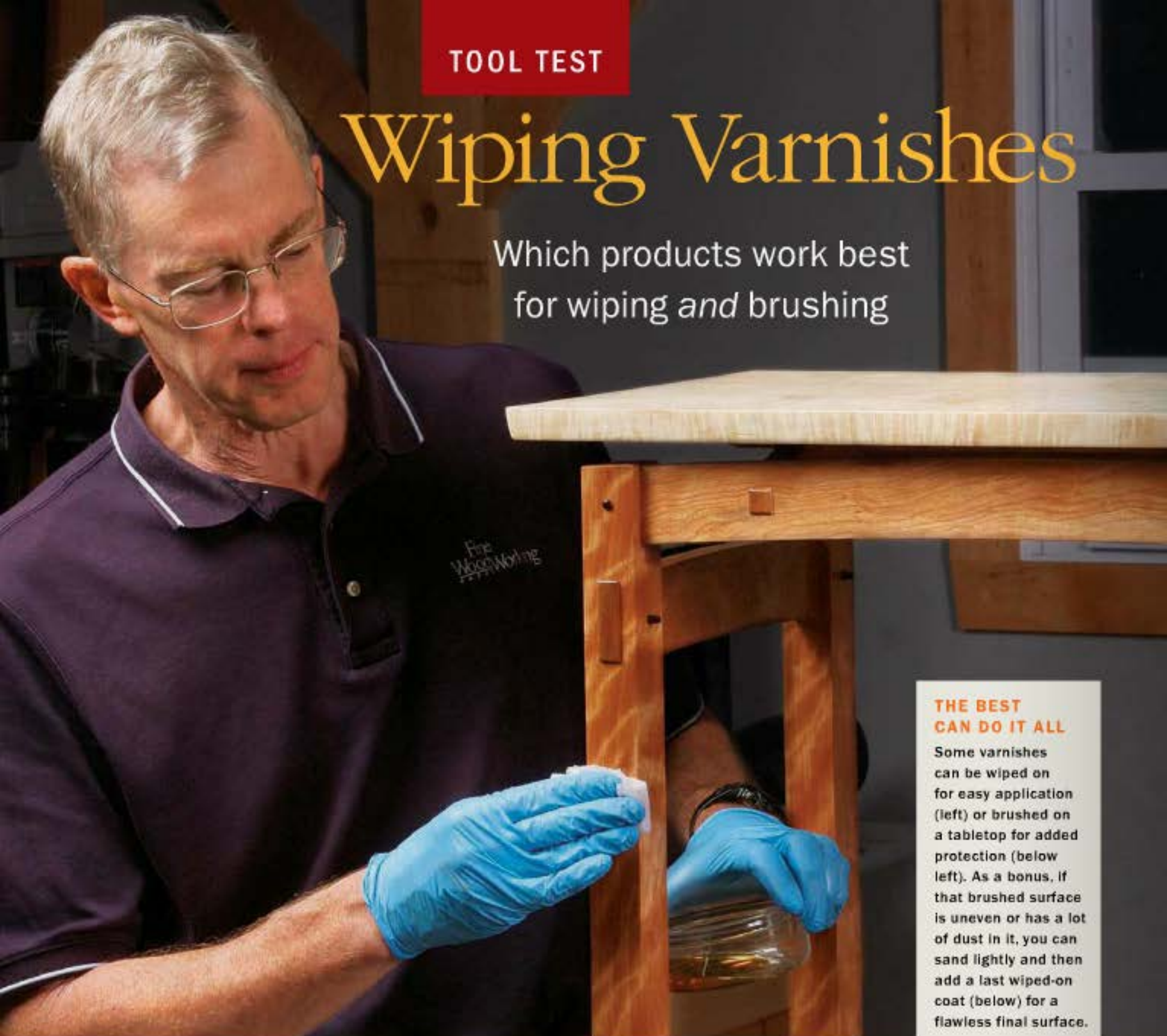


Done. When the seat is upholstered, drive screws through the screw blocks to attach it to the stool's base.

TOOL TEST

Wiping Varnishes

Which products work best for wiping *and* brushing



THE BEST CAN DO IT ALL

Some varnishes can be wiped on for easy application (left) or brushed on a tabletop for added protection (below left). As a bonus, if that brushed surface is uneven or has a lot of dust in it, you can sand lightly and then add a last wiped-on coat (below) for a flawless final surface.





BY MARK SCHOFIELD

It's no surprise that so many woodworkers love wiped-on finishes: They are hard to mess up, and the oil soaks in and highlights the carefully chosen hardwood below, adding an elegantly low sheen. But a thin, wiped-on finish doesn't offer enough protection for a high-wear area such as a tabletop or chair seat. In those cases you reach for a brush to build a thicker finish.

That's why the ideal finish could be brushed and wiped on equally well. You could use that one finish in a variety of combinations, such as wiping it on a table base where there's less wear, and brushing it on the top for durability. And with only a single can on the shelf, you would save money and waste less.

There are finishes that promise to work for brushing and wiping. Officially classed as "wiping varnishes," they basically are oil-based varnishes that are thinned with solvent, and then, unfortunately, sold under a bewildering variety of names.

Fine Woodworking asked me to test these finishes to find out which ones work best for both brushing and wiping. Preparing for this test, I knew it wasn't going to be easy to identify all of the possible candidates. I contacted each relevant finish manufacturer and simply asked which of their products could be both wiped and brushed. Like the names and instructions on the cans, the manufacturers' answers were not very clear. A few were confident their finishes could be applied both ways; a few stated categorically that their wiping finish couldn't be brushed; and some fence-sitters said they didn't recommend brushing "but it would probably work." Based on their answers, I identified 16 finishes to test. Where there were different luster levels available, such as gloss, satin, etc., I went with the gloss version. The only exception was Zar Ultra Max poly, which was available only as semi-gloss, but looked like gloss anyway in practice.

Once I had the finishes in hand, I first made sure that every one was a true wiping varnish, which is simply a thinned varnish, and not an oil-varnish blend or simply oil. After this initial test, one finish—Sam Maloof Poly/Oil Finish—fell out of the running.

How the testing was done

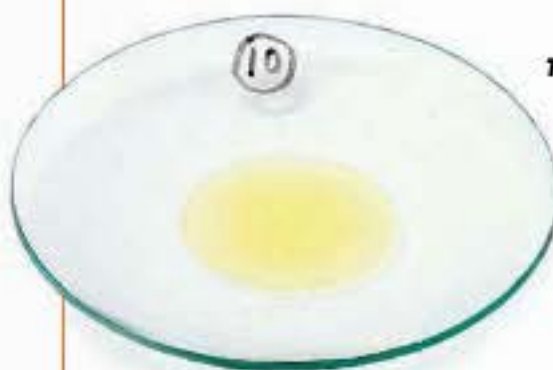
Although I wanted the same thing from each finish—easy application and great results on a variety of woods—I knew that each product has differences, such as the amount of solids in the finish and therefore how long it takes to build a film. So I treated each one as an individual, working to get the best from it. For the wiped-on samples I was looking simply for an even sheen.



The wrinkle test. The common test for a finish's ability to cure as a film is to drop some into a shallow dish and wait.

IS IT A WIPING VARNISH?

Most finishes, if thin enough, can be wiped on. But for a finish to be brushed successfully, it must cure level and hard when applied as a thicker film. A simple test tells the tale.



True wiping varnish. All but one of the finishes cured hard and level, proving they would work when brushed.

Oil finish. An oil finish or oil-varnish blend, when dry, will have a wrinkled or rubbery surface, which makes it unsuitable for brushing.



For the brushed-on samples I wanted to build enough of a film to protect the top of a dining table, and create a dead-smooth surface. While inconsistencies in the wood, like pores and minor irregularities from planing or sanding, will show in the surface of a wiped-on finish, I wanted those all to be filled and smoothed out by the brushed-on film. The number of coats it took to achieve each of these results varied (see chart, pp. 40-41), which means that some of these finishes will take longer to apply than others, a factor I weighed as heavily as looks and durability.

I tried each product on two common furniture woods. I used curly maple to see how each finish popped the figure and how its color impacted a pale wood. I also tested each finish on cherry because of its neutral color and popularity. I sanded each board

Tough tests

Schofield wiped and brushed each product on two types of woods: plain cherry and figured maple. Then he evaluated the appearance and toughness of each finish.

AS A WIPE-ON FINISH



First coat. Schofield divided each cherry sample board down the middle, wiping finish onto one half (the other half was for brushing), letting it soak in, and then wiping it off.



Sanding between coats. He sanded the first coat of each wiped-on finish with P400-grit paper. All of the finishes sanded easily enough.

As many coats as necessary. He applied as many coats as it took to get an even sheen.



AS A BRUSHED VARNISH



Better build. Schofield let each brushed-on coat cure for 24 hours before sanding with P320-grit paper and applying another one. He stopped when the surface was a smooth film with no irregularities.

to P220-grit using a random-orbit sander, continuing up to P400-grit for the wipe-on boards. Thinner finishes require a smoother surface for best results.

Wipe-on application varied—Some wiping varnishes get sticky quicker than others. So I wiped on the first coat liberally, allowed it to soak in for the length of time recommended by the manufacturer, and then wiped off the surplus. If no time was specified on the can, I checked each finish after 10 and 15 minutes, wiping it off if it was starting to get sticky, and leaving it for 20 minutes if not.

A coat of oil-based finish needs at least 12 hours to dry before sanding. To be safe, I waited 24 hours before sanding the first coat with P400-grit paper and a cork-faced block. Then I vacuumed off the dust and wiped on more coats, waiting 24 hours each time.

Additional tests for brushed finishes—I chose a natural China-bristle brush for the brushing test, except for the two oil/water hybrids, where I used a foam brush. I allowed the first coat to dry 24 hours before sanding. A brushed surface is a little bumpier than a wiped one, so I sanded with P320-grit. I repeated these steps, sanding each coat, until I was happy with the look.

After letting the finishes cure for a week, I evaluated them for clarity, depth, and how well they enhanced the wood's figure and natural shimmer. I then rubbed them out with steel wool and wax to better represent a typical final surface, and tested them for durability and protection. All of the finishes rubbed out fairly easily.

To determine wear-resistance, I used a set of 12 pencils with leads graduated from a soft 6b to a hard 4h to try to scratch the surface. All the finishes were at least moderately scratch-resistant, but a few offered a higher level of hardness. To see if the brushed-on finishes offered enough protection for a tabletop, I left some red wine under a glass for 24 hours on each maple board. The good news is that all 15 finishes were undamaged.

There was also some variation in the amount of color that the finishes imparted on the maple, whether brushed or wiped. The



APPEARANCE

All angles. Schofield looked at the finishes at a low angle to detect problems with surface quality, and also looked at them head on to evaluate color, depth, clarity, and how well they enhanced figure.

Thick and thin. The best finishes were beautiful both brushed on thick and wiped on thin.



Color varies. Schofield used the maple samples to evaluate color. The darkest finish was Waterlox (left), while Formby's Tung Oil Finish (right) added the least color.



Trouble with oil/water hybrids. The Zar Ultra Max finish (shown) was plagued by fish-eyes when brushed. The Wood Turners Finish left cherry looking gray.



PROTECTION

The wine-glass test. To test the impermeability of the brushed finishes, Schofield dipped the base of a glass in red wine and left it on a sample board for 24 hours. In every case, the dried wine simply wiped off (below), leaving no trace.



DURABILITY



The scratch test. Using a set of pencils with 12 levels of hardness, Schofield attempted to scratch each finish.



Toughness varied. Most of the finishes were scratched by the hardest pencils, but a few were unblemished.

Wiping varnishes, head to head

To come out on top, a finish had to wipe and brush well, beautify the wood, and produce the desired level of sheen and protection in the fewest possible coats.



PRODUCT	STREET PRICE/QT.	COATS NEEDED		SURFACE QUALITY		SHIMMER/DEPTH*	FIGURE**	SCRATCH TEST
		WIPING	BRUSHING	WIPING	BRUSHING			
Formby's Tung Oil Finish	\$14	3 to 4	4	Excellent	Very good	Excellent	Excellent	Good
BEST OVERALL CHOICE General Finishes Arm-R-Seal	\$17	3	3	Excellent	Excellent	Excellent	Excellent	Very good
General Finishes Seal-A-Cell	\$20	3 to 4	4	Very good	Very good	Excellent	Very good	Good
General Finishes Wood Turners Finish	\$28	3	4	Fair	Very good	Fair	Very good	Good
Minwax Antique Oil Finish	\$20	3 to 4	5	Good	Good	Very good	Excellent	Good
BEST VALUE CHOICE Minwax Fast-Drying Polyurethane	\$10	3 to 4	3	Excellent	Excellent	Excellent	Excellent	Very good
Minwax Tung Oil Finish	\$26	3 to 4	4	Excellent	Very good	Excellent	Excellent	Good
Minwax Wipe-On Poly	\$21	3 to 4	5	Very good	Very good	Excellent	Excellent	Good
Phoenix Finish-All	\$22	4	5	Fair	Very good	Fair	Very good	Good
Sutherland Welles Murdoch's Hard Sealer	\$41	5	4	Fair	Good	Fair	Good	Good
Sutherland Welles Wiping Varnish	\$46	2	3	Good	Excellent	Excellent	Excellent	Excellent
Watco Wipe-On Poly	\$20	3	4	Very good	Very good	Excellent	Excellent	Good
Waterlox Original Sealer/Finish	\$30	4	5	Good	Very good	Excellent	Excellent	Good
Zar Tung Oil Wipe-On Finish	\$17	3	3	Excellent	Very good	Excellent	Excellent	Excellent
Zar Ultra Max Wipe-On Poly	\$36***	4	5	Poor	Poor	Fair	Very good	Excellent

* Tested on cherry

** Tested on curly maple



COMMENTS

Takes one more coat than the winners, but results are beautiful. Adds the least color to light woods.

Gives beautiful results with only three coats, wiped or brushed. More scratch-resistant than most.

Very thin finish builds slowly but has good depth and shimmer. Not able to build as thick a film as others.

Oil/water hybrid. Finish dries fast and sands easily, but doesn't penetrate or add shimmer. Also, gray-looking on maple.

Thin finish builds very slowly, especially when brushed. Pops figure well.

Designed for brushing, but also wipes easily. Builds quickly with beautiful results and above-average toughness.

Top-notch results but builds slower than some and offers moderate scratch-resistance.

Thin finish requires more coats to build when brushing, but yields good results. Second-least color change on maple.

More of a sealer than a finish. Required many coats and results were dull.

More of a sealer than a finish. Never really built whether wiped or brushed on.

Thick, fast-building, beautiful, and tough. Best brushed finish in test, but hard to wipe on evenly.

Good build and great looks but more dust nibs than others, perhaps due to longer drying time.

Darkest finish was slow to build. Even five brushed coats left a somewhat irregular finish.

Good build but very thick. Brushed-on coats were a little uneven. Tied for highest scratch-resistance.

Hybrid oil-water mix. Too sticky for wiping evenly, and brushed-on coats became a mass of fish-eyes (dimples).

***Not available in quart size; \$18/pint



GENERAL FINISHES
ARM-R-SEAL



MINWAX
FAST-DRYING
POLYURETHANE



darkest finish was the Waterlox, followed closely by the Sutherland Welles Wiping Varnish and the Zar Tung Oil Wipe-On Finish. The finish that turned the maple least yellow was Formby's Tung Oil Finish, followed closely by Minwax Wipe-On Poly.

The bottom line

While this test revealed a few specialists—thin finishes that wipe beautifully but don't build much, and thick finishes that brush on clear and tough—I was looking for finishes that do it all. A number of these products fill the bill, but two edged out the rest when all factors were considered. General Finishes Arm-R-Seal is my pick for the Best Overall finish. It applies quickly and easily by brush or rag, builds quickly with fewer coats than most, looks great thick or thin, and rubs out easily with steel wool.

On sale for as low as \$10 a quart, Minwax Fast-Drying Polyurethane is a steal. Meant for brushing, its low viscosity also makes it excellent for wiping. You might have to wipe on an extra coat compared to the Arm-R-Seal, but the results are almost identical, the price is lower, and the finish is more widely available. □

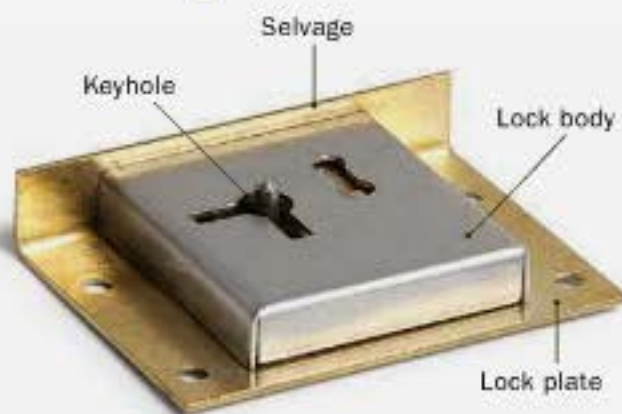
Mark Schofield was FWW's resident finishing expert for 13 years.

Lock Mortises Made Easy

A router and three jigs add up to a flawless fit

BY MICHAEL PEKOVICH

3 steps to success



THE KEY PARTS OF A LOCK

1 DRILL THE KEYHOLE



2 ROUT FOR THE LOCK BODY



Installing a half-mortise lock by hand is time-consuming and tricky to get just right. The process involves mortising for the lock plate, selvage, and body as well as drilling for the keyhole. Everything needs to be sized and aligned precisely to end up with a perfect fit. So when I decided to teach a class on building my tool chest ("Tool Chest with Drawers," *FWW* #234), which requires three locks, I was a little stressed out. The thought of shepherding 10 students through two drawer locks and one lid lock in a hectic five-day class seemed impossible. To have any hope of success, I had to figure out a better way to do it.

My solution is based on a hinge-mortising jig made by boxmaker Doug Stowe ("Perfect Hinges Every Time," *FWW* #211). His jig is built around the hinge itself for a perfect fit without measuring. In that vein, I designed a routing jig for the shallow mortises, a second routing jig for the deep mortise, and a keyhole drilling guide. The routing jigs are used with a pattern bit. To make registration on the drawer front easy, all of the jigs are marked for the keyhole's center. It takes less time to make these jigs and rout the mortises than it does to do the job by hand, and the results are as good as, if not better than, my hand-cut lock mortises.

Buy the lock, then put the jigs to use

Because the jigs are built around the lock, you need to buy the lock first. To get the most from these jigs, find a good quality lock and stick with it on future projects. I chose the LK-2 half-mortise drawer lock (\$17.50, horton-brasses.com).

The jigs can be made from a quarter-sheet of 1/2-in.-thick Baltic-birch plywood. Start by cutting the sheet into strips of uniform length, then rip them to width. You'll need two pieces for each jig, but make a few extra to have as backups.

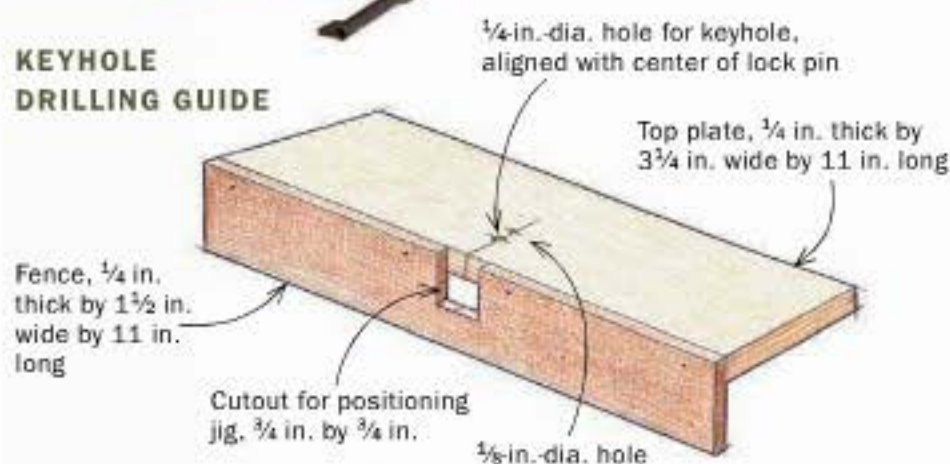
Start with the lock-plate jig—The lock-plate jig determines the final fit of the lock and is critical to get right. There are two pieces to the jig: a top plate and a fence. Place one plywood strip flat on the tablesaw table with its long edge against the rip fence. This will be the top plate. Next, place a second strip on top of the first, resting it vertically against the rip fence. This will become the fence. Now center the lock on the assembly with

Simple jigs ensure perfection

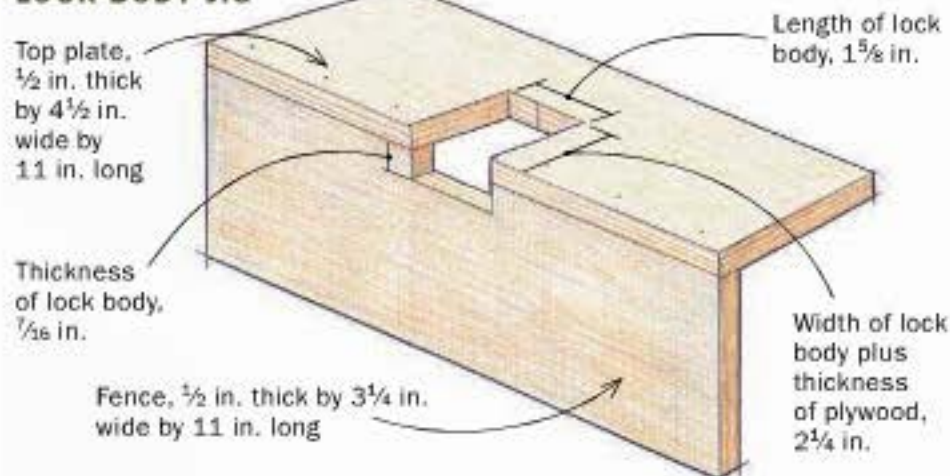
Splitting the work among the three jigs gives each the ability to shine at its specific task and results in a fit that is second to none.



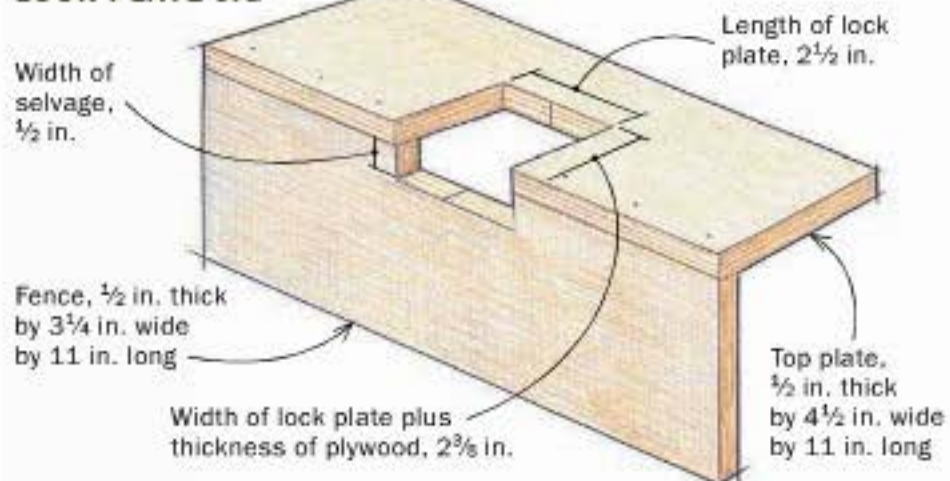
KEYHOLE DRILLING GUIDE



LOCK-BODY JIG



LOCK-PLATE JIG



3 ROUT FOR THE LOCK PLATE AND SELVAGE



Jigs are easy to make

LOCK-PLATE JIG

The lock plate's shallow mortise must fit the plate exactly. Pekovich marks every cut from the lock itself and tests the fit.



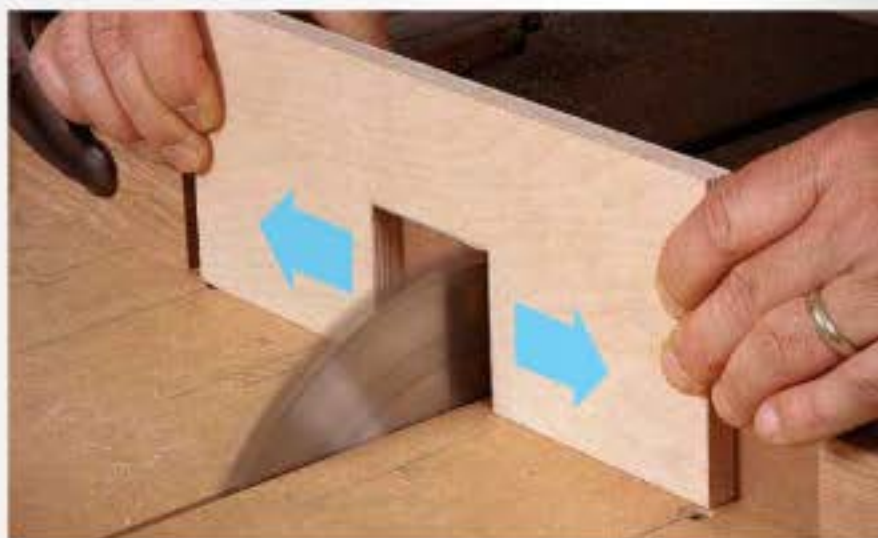
Straight from the lock. With the jig's fence resting on the top plate, and the assembly against the tablesaw fence, mark the perimeter of the lock plate on both parts.



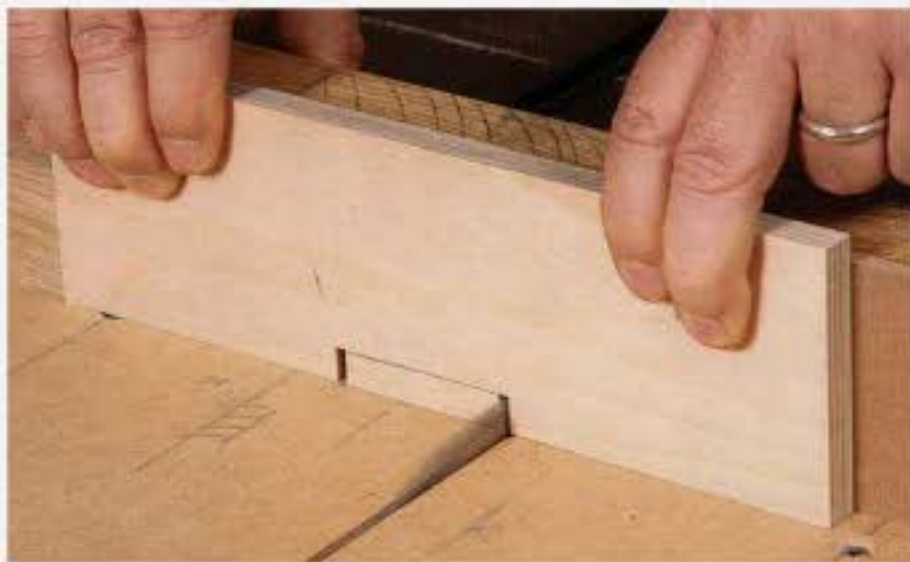
Stop blocks ensure precise cuts. Pekovich cuts the notch using his tablesaw crosscut sled, clamping a stop block on each side of the blade to size the notch accurately.



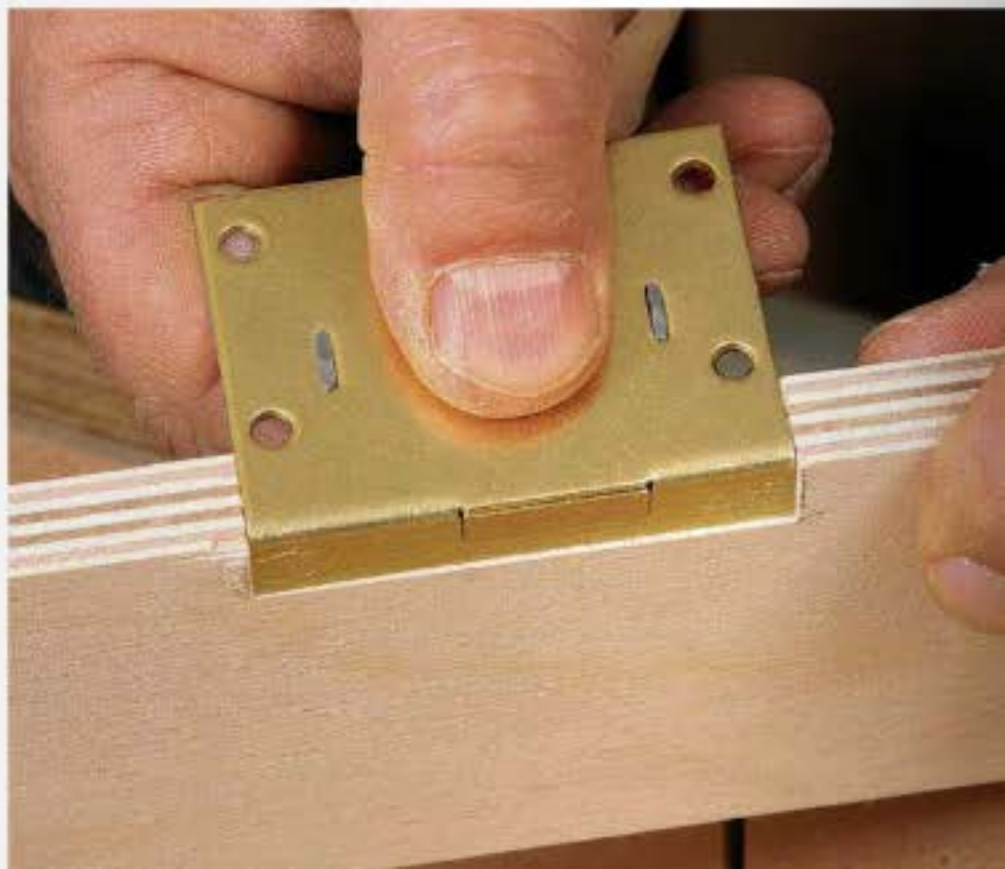
Go deep. Cut the sides of the notch all the way to the top mark and then clear most of the waste between the kerfs with a bandsaw.



Sweep away the waste. To get a clean, flat bottom on the notch, slide the piece back and forth over the blade while slowly moving the sled forward until the part reaches the apex of the blade.

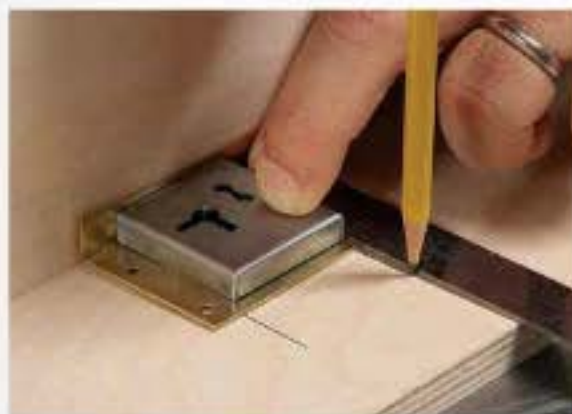


The selvage side of things. Lower the blade and repeat the technique on the fence side with the stop blocks still in place. Check that the lock plate fits the jig opening tightly (right) to ensure success later.



LOCK-BODY JIG

The lock body requires a deep mortise to clear the lock's mechanism housing. But because the lock body is hidden by the lock plate, its mortise does not need to be as precise. It's best to keep it slightly oversize to avoid issues when fitting.



Mark for the lock body. Place the jig's fence and top plate against the tablesaw fence, and use a straightedge and pencil to mark the lock body's location on both pieces. Remove the lock and connect the marks for a complete outline.



Aim for a loose fit. The notches in the fence and top plate are cut the same way as those in the lock-plate jig (facing page). The lock body should slide in and out of the notch without interference.

KEYHOLE DRILLING GUIDE

This jig helps you drill both holes for the keyhole accurately into the face of the drawer.

Measure the keyhole depth. Using a small combination square, measure from the center of the keyhole to the center of the locking pin.



Transfer to the jig. After drawing the centerline across the face of the fence, mark for the keyhole depth.



Guide holes come next. Drill the guide holes in the jig at the drill press. The $\frac{3}{4}$ -in. hole will accommodate the key's shaft, the $\frac{1}{4}$ -in. hole the key's tooth.

ASSEMBLE AND MARK THE JIGS



Nail the trio. With an 18-gauge brad nailer, Pekovich assembles the halves of each jig. He takes extra care to make sure that the notches on both pieces line up and that the two halves are perpendicular.



Mark the jigs for center. While the keyhole jig is already marked for center, the other two aren't. Put the lock in the lock-plate and lock-body jigs and use a straightedge to mark for the keyhole center. This reference line will ensure each jig is in place, relative to the keyhole.

Get a perfect mortise in minutes

1 CREATE THE KEYHOLE



Find your center. The notch cut into the keyhole guide's fence serves as a window so that you can line up the guide with the centerline on the drawer.

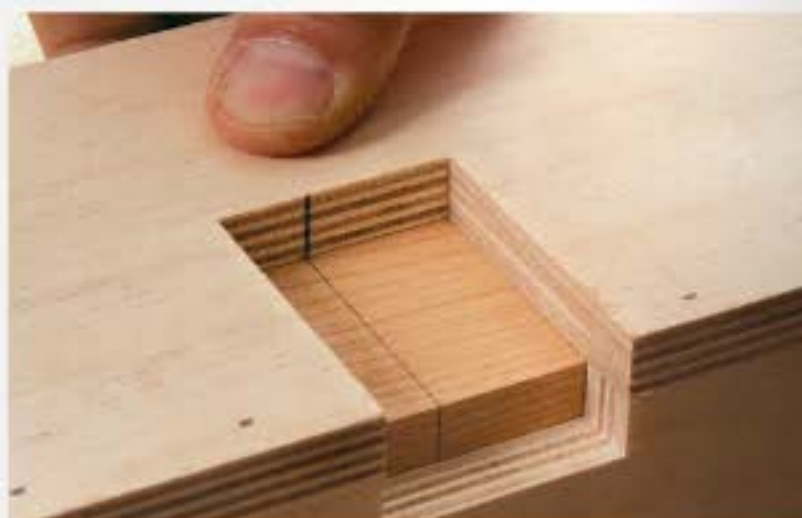


Drill out the keyhole. These holes only have to go about halfway through the drawer, so mark the bit for depth using a blue tape flag, which also helps sweep away swarf.

Two holes become one. Remove the jig, score between the holes, and use a chisel to connect the two openings, forming a $\frac{1}{8}$ -in. channel that intersects the $\frac{1}{4}$ -in. hole and creating the iconic keyhole.



2 CUT THE LOCK-BODY MORTISE



Line up the jig. Before clamping the lock-body jig to the back of the drawer front, align the centerline on the drawer with the mark on the jig.



Rout the deep mortise. With a bearing-guided pattern bit, rout the deep mortise in two passes.



Square up the corners. Before removing the jig, use it as a guide to chisel the corners of the mortise square and clean.

the selvage against the fence and trace its outline. Grab a crosscut sled and with the top plate held vertically, align one mark on the top plate with the kerf in the sled. Clamp a stop block to the fence at one end of the template. Repeat the steps for the other mark and clamp a stop block on the other end. Make two full-height cuts to define the notch opening, then use the bandsaw to remove the waste between the kerfs. The lock should fit snugly with no wiggle room. If it's too tight, adjust one of the blocks and take another cut. If it's too loose, grab another strip of plywood and try again. Once the fit is right, clear the waste fully at the tablesaw.

Lock body is next—The lock-body jig is made the same way, but it doesn't require a piston fit. Place the top plate and fence on the tablesaw as before and mark the location of the lock body on both pieces. Cut the notches on the crosscut sled and bandsaw. When you check the fit, make sure there's some wiggle room for the lock body to prevent any potential binding during fitting later.

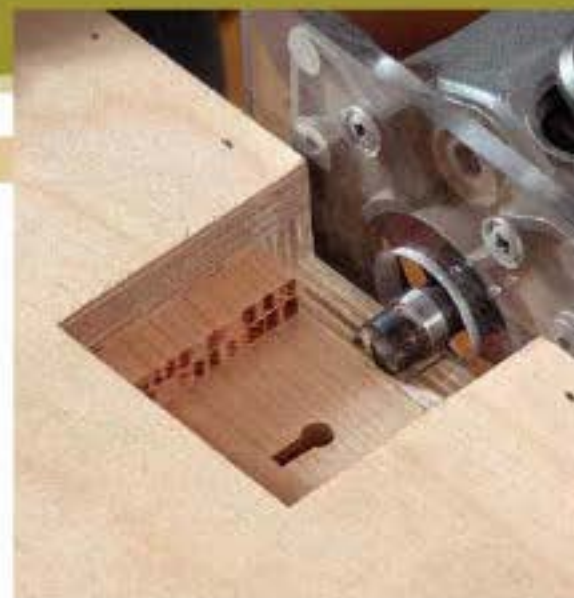
3 FINISH WITH THE LOCK-PLATE MORTISE



Set the bit depth. Pekovich raises the router bit through the jig and then sets the bit to the thickness of the plate.



Rout the mortise. After aligning the jig with the centerline on the drawer, rout the back of the drawer to accept the lock plate.



Don't forget the selvage mortise. While still clamped up, rout along the fence, mortising for the selvage, before squaring the corners with a chisel.

Drilling guide rounds out the trio—To make the drilling guide, strike a centerline on a jig piece. Set a combination square against the selvage and measure to the center of the lock pin. Transfer that to the centerline on the jig and repeat for the bottom of the keyhole. At the drill press, drill the two holes that will form the keyhole. The fence of the drilling guide is made of 1/4-in. MDF and has a notch cut in it for alignment. Use a brad nailer or glue to assemble the jigs and mark each jig for the keyhole center. The center marks are used to align each jig on the work.

Installing a lock

Now that the hard part's over, all it takes to install a lock is a prepped drawer front and 15 minutes. Mark the center of the drawer front, aligning the drilling guide's center mark with the drawer front's centerline. Clamp the guide in place and then drill the holes. After removing the guide, align a square with each edge of the smaller hole and knife a line connecting it to the larger hole. Chisel out the waste. You only need go about halfway through the drawer front as the rest of the material will be removed when routing the mortises. Next,



The final cut. The last adjustment is to chisel a chamfer along the edge of the shallow mortise where the selvage folds over (left). This will make room for the rounded inside corner. The lock should slide snugly into place. As a final test, grab the key and check that the lock functions without binding (below).



Online Extra

To see the lock-mortise jigs in action, go to FineWoodworking.com/extras.

jig's fence and rout out the mortise. With the jig still in place, chisel the corners square.

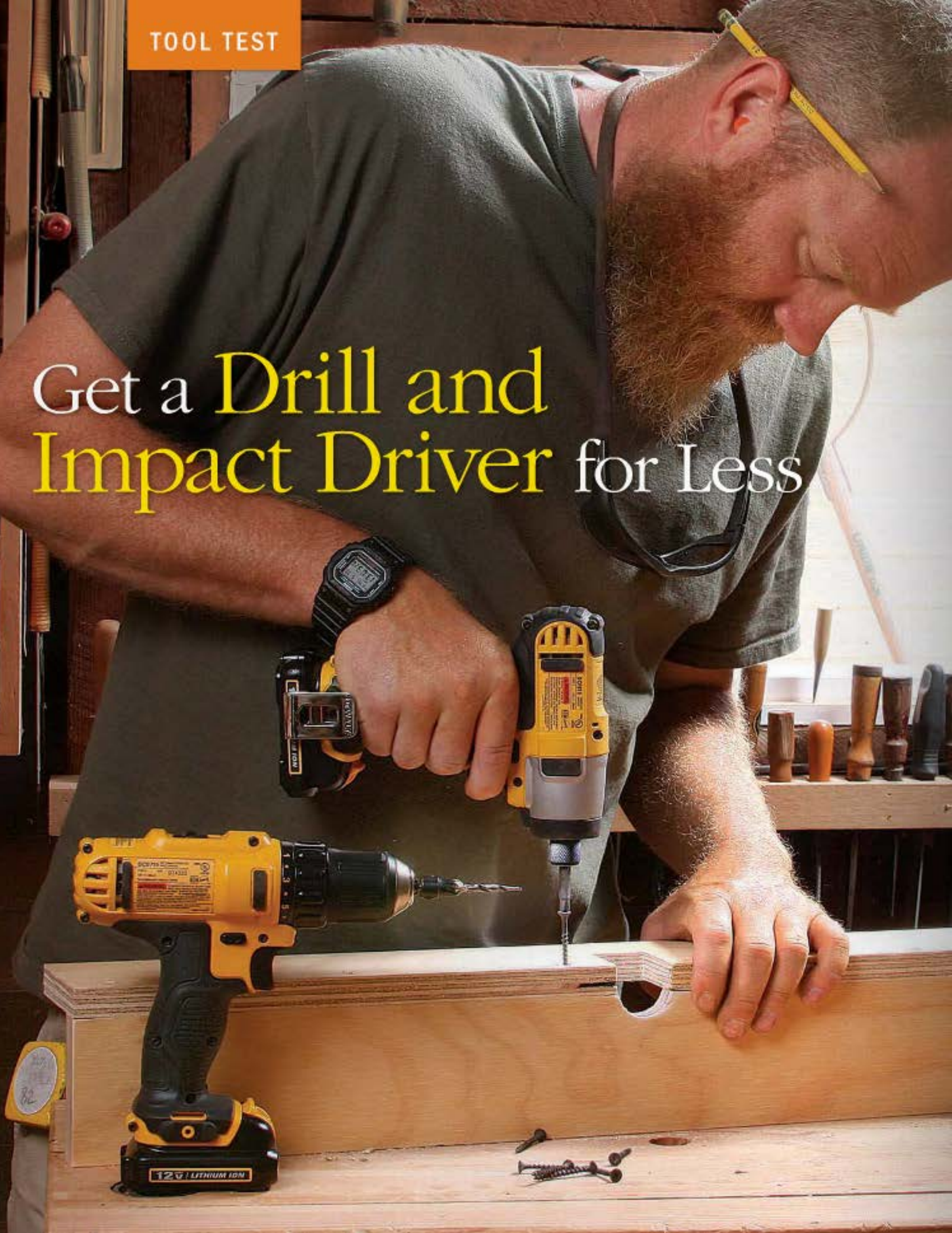
Finally, set the bit depth to the thickness of the lock plate and clamp on the lock-plate jig. Rout out the mortise on the inside face of the drawer, then along the selvage to complete the mortise. Square up the corners and remove the jig.

There's one more task to take care of before the lock will fully seat. The lock plate has a rounded 90° bend in it to make the selvage, so chisel a chamfer at the corner of the mortise bottom. Then the lock should settle snugly in place. □

Michael Pekovich is a furniture maker, instructor, and FWW's executive art director.

TOOL TEST

Get a Drill and Impact Driver for Less



In case you missed it, cordless technology has changed significantly in the past few years. With the combination of lithium-ion batteries and impact action, smaller 12-volt cordless tools are capable of performing tasks that required 14.4- or even 18-volt models 10 years ago.

There are many tools that fit this 12-volt category—right-angle drills, jigsaws, multi-tools, flashlights, radios, and so on—more than we could test in a year. For this test we focused on the two that are most valuable in a woodshop, an impact driver and a standard drill, available as a kit with two batteries and a charger. Having both tools close at hand, one set up to drill holes and the other to drive fasteners, is a real advantage.

The batteries in this test are marketed as 12-volt, which is what they produce with

These compact 12-volt tools boast big power

BY KIT CAMP

a fresh charge and the drill spinning freely, but all produce 10.8 volts in actual use. Don't worry. As you'll see, these compact workhorses are more than capable of handling everything a woodworker will throw at them. And at prices ranging between \$110 and \$190 (with one big exception), these two-tool kits are the best buy in cordless.

You'll notice one apple among the oranges. With high-tech brushless motors, bigger batteries, and a price tag significantly higher than the others, Milwaukee's "Fuel" system doesn't quite fit the mix. But because those batteries are still rated at 10.8 volts, we kept the Fuel tools in our test group.

Impact driver is the star

The impact driver is an amazing invention. When the going gets tough, it applies a series of rotational blows to the drive shaft, creating a vibrating action that makes screws almost melt into the wood. The change in efficiency and control is almost as



User-friendly features

As with any tools, performance is about more than power. Conveniences make a big difference.

Easy bit changes. The chucks on Camp's favorite impact drivers allow bits to simply slip in (left) without a sleeve being pulled out. The chucks on his favorite drills lock when the trigger is released, letting you tighten them with one hand (below).



Light in the darkness. The Bosch and DeWalt drivers have three LED work lights on the extreme end of the tool. The others have single LEDs, which can be blocked by the user's hand.

Technology that packs a punch

Lithium-ion batteries spell serious power for both drills and drivers, and the impact drivers' performance was amazing. Batteries were freshly charged for each test.

DRILL TESTS



How many holes? Using a $\frac{3}{8}$ -in. brad-point bit in hard maple, Camp drilled as many holes as he could on a single charge. Milwaukee's Fuel drill did almost four times as many as its competitors.



Even bigger bit. Using a $\frac{3}{4}$ -in. Irwin Speedbor bit, Camp bored as many holes as he could through a $5\frac{1}{2}$ -in.-thick, old-growth fir beam. The DeWalt did well here.

dramatic as the change from a hand screw-driver to a cordless drill. Whether driving tiny brass hinge screws or $3\frac{1}{2}$ -in. cabinet-hanging screws, these impact drivers almost never cam out (the bit rotates out of the screw head), which is reason enough to buy one. In fact, they require almost no pressure to stay engaged, and consequently are very easy on the hands and wrists. The only disadvantage of an impact driver is the noise; Ear protection is a must.

While the drills all have a standard chuck and will use any type of bit you own, the impact drivers accept only $\frac{1}{4}$ -in. hex-shanked bits. You probably already have some drill and driver bits like this, but if not, they are affordable enough.

The impact-driver chucks vary a little. One type requires you to slide a sleeve forward to remove or insert a bit. The second type, which I prefer, allows you to slip in the bit with one hand without needing the other to pull on the sleeve.

By the way, all of the drivers feature at least one LED light, which illuminates the bit when working.

A few notes on the drills—The standard drills in these kits have a $\frac{3}{8}$ -in. chuck, except the Fuel, which will take shanks up to $\frac{1}{2}$ in. dia.

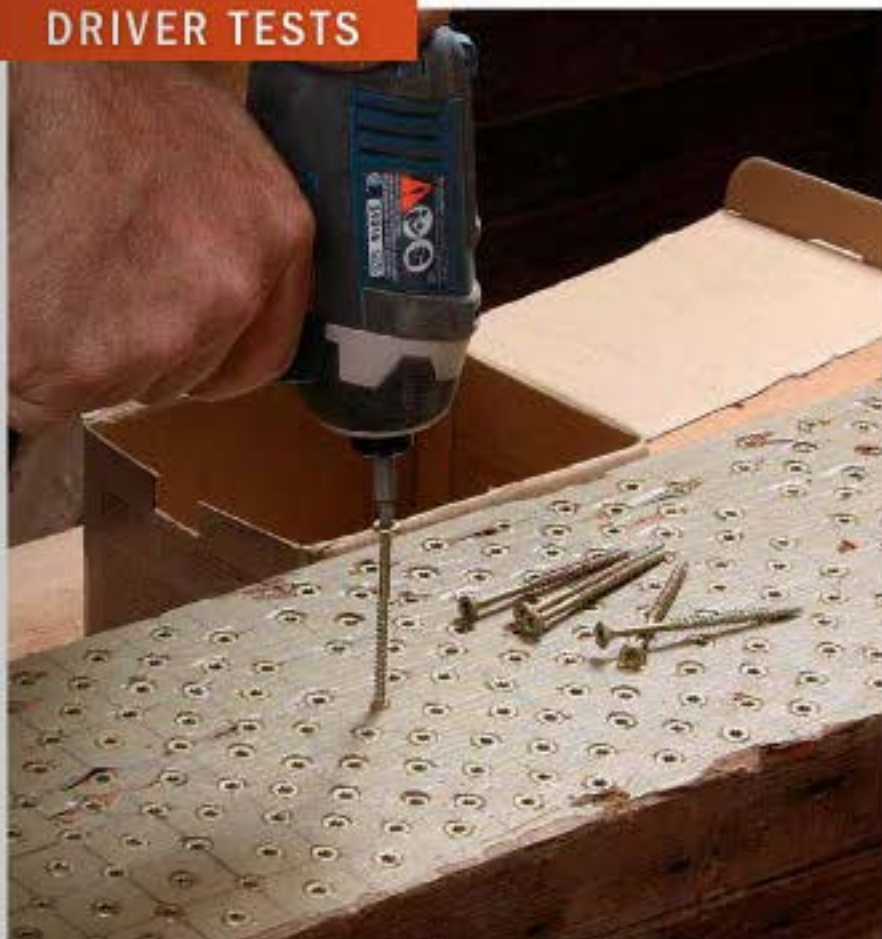
My favorite drills have a chuck that locks when you release the trigger, letting you ratchet the chuck closed with one hand. All of the drills have a clutch, handy when

you do happen to use them as a driver, and all have a variable speed trigger controlled with a switch on top that determines the maximum rpm. For example, the DeWalt drill will run from 0 to 400 rpm on low, and 0 to 1,500 on high.

Tough tests

To test these kits, the *FWW* editors and I developed a range of tasks that would push the tools as far as a typical user would, and beyond. All the tests were performed with freshly charged batteries. To get an overall feel for each tool, I also took them to job sites and used them to bore hundreds of pilot holes, drive boxes of screws, and perform any other tasks

DRIVER TESTS



How many screws? Working with another section of that hard fir beam, Camp drove as many 3-in.-long screws as he could, with no pilot hole.



One for fun. To find the top-end torque of the drivers, Camp attempted to drive 4-in.-long screws into a very dense tropical hardwood, with an undersize pilot hole.

DRILL TESTS

DRIVER TESTS

BRAND	3/8-IN. HOLES	3/4-IN. HOLES	3-IN. SCREWS	4-IN. SCREWS (INCHES DRIVEN)
BEST VALUE Bosch CLPK22-120	34	13	67	2½ in.
Craftsman	18	5	47	1⅝ in.
BEST VALUE DeWalt DCK211S2	36	12	62	3 in.
Hitachi KC10DFL	19	9	48	2 in.
Makita LCT209W	17	7	53	2⅞ in.
Milwaukee M12	38	13	60	2⅝ in.
BEST OVERALL Milwaukee Fuel	144	50*	235	3⅞ in.
Porter-Cable PCL212IDC-2	22	5	43	1⅝ in.

*Tested with larger battery; drilled 20 holes with smaller battery.

How the kits stacked up



**AUTHOR'S
BEST OVERALL
CHOICE**

MILWAUKEE FUEL 2594-22

Street price: \$260

Batteries: (1) 2 amp-hours,
(1) 4 amp-hours

It's hard to compare this pair with the others. These have brushless motors, which adds to the cost. The larger of the two batteries adds power and run-time. The drill has a larger-capacity, metal chuck (which locks for tightening) and a selector ring to switch between drilling and driving modes. The impact driver is the only one with two modes, one with slower rpm and less power, nice for smaller or more brittle fasteners. It also has a handy, push-in chuck. Both tools have belt hooks and battery indicators.



**AUTHOR'S
BEST VALUE
CHOICE**

BOSCH CLPK22-120

Street price: \$175

Batteries: 2 amp-hours

As a cabinetmaker and carpenter, I preferred the Bosch tools. They performed with the best of the more affordable kits yet are the smallest of the lot. The impact driver is especially tiny, allowing it to fit easily in a tool belt or shop apron. The driver also has three LEDs and a battery indicator. The drill sports a locking chuck. The only drawbacks to the Bosch tools are the fatter handles that come with stick-style batteries, and a chuck on the driver that requires you to slide a sleeve forward to change bits.



**AUTHOR'S
BEST VALUE
CHOICE**

DeWALT DCK211S2

Street price: \$190

Batteries: 1.1 amp-hours

The DeWalt tools also tested at or near the top (behind the Fuel), and I enjoyed using them around the shop and on the job. The pod-style batteries allow thinner handles, which I find more comfortable. This comes at the cost of being bulkier overall than the Bosch, though not by much. The drill has a locking chuck, and the impact driver is quite compact, features three LED lights, and has a slip-in chuck. The DeWalt tools also have the most user-friendly belt hooks.

that came along in my work as a finish carpenter and cabinet maker.

We developed different tests for the drills and impact drivers. First, I compared the power and endurance of the drills. I chucked a 3/8-in.-dia. brad-point bit into each drill and bored as many holes as I could through a piece of 8/4 hard maple. Milwaukee's Fuel drill blew everyone away here, with the DeWalt coming in second.

Next, I drilled as many holes as I could all the way through a hard, massive, old-growth fir beam, using a 3/4-in. Irwin Speedbor auger bit. I like this test because the lead screw on the bit pulls it into the work, helping to ensure that all the drills are pushed in the same way. Again the Milwaukee Fuel was the winner by far, with the DeWalt, the Bosch, and the

other Milwaukee drill leading the rest of the pack.

Finally, I drove some #4 brass wood screws into a piece of hardwood (with pilot holes) to test the range and sensitivity of each drill's clutch settings. All of the drills performed well here: It was easy to find a "just-right" number to countersink my screws correctly without stripping them.

Then I moved on to the impact drivers, using the same old-growth fir beams. I drove as many 3-in.-long, Torx-head screws as I could on a single charge, with no pilot hole. This should be a brutal test for a 10.8-volt tool, but all of the impact drivers were great here. I repeated this test a second time and averaged the results. The Milwaukee Fuel impact driver was an arm-wrecking beast again, driving almost

four times as many screws as the Bosch, which came in second.

Last, I attempted to drive 4-in.-long screws into undersize pilot holes in very dense, tropical hardwood. This was too much to ask of these drivers (except the Milwaukee Fuel, which drove at least one screw all the way), but all managed to drive the screws at least partially. To account for small differences in the screws or the wood grain, I ran the test three times, eliminated the most inconsistent result for each driver, and averaged the other two.

Plenty of winners

Milwaukee's Fuel kit ran away with the Best Overall award. Even using the smaller, 2-amp-hour battery, both the drill and impact driver were the top performers by far.



CRAFTSMAN

Street price: \$110

Battery: 1.3 amp-hours

Strangely, the Craftsman kit comes with two tools but only one stick-style battery. The driver did well on raw power, but both drill and driver performed more poorly in the other tests. When you add the price of a second battery, you'll find better tools for the money.



HITACHI KC10DFL

Street price: \$125

Batteries: 1.5 amp-hours

The Hitachi tools were middle-of-the-road performers. I found the chuck on the drill to be rough on my hands, and it was the only one that required two hands to tighten. The tools have the same slim, comfortable handle as the DeWalts, but the batteries are bulkier.



MAKITA LCT209W

Street price: \$130

Batteries: 1.3 amp-hours

The Makita tools' appeal lies in their compact design, second only to the Bosch. They slip easily into a tool belt, and the drill has a locking chuck. The tools also have a battery-level indicator.

However, this huge advantage in power and stamina comes with a big increase in bulk and price compared to the other tools.

At a much lower price than the Fuel, our Best Value picks are the best choice for most woodworkers. For me it's a tie between the DeWalt and Bosch kits. All four of these tools performed near the top in my tests and are similar in price. But each has features that make it stand out from the pack, such as multiple LEDs on the impact drivers. Each pair also has its own ergonomic advantages. The DeWalt's pod-style batteries allow a slim, comfortable grip. But if you wear a shop apron (or a tool belt, as I do), you might prefer the tiny overall size of the Bosch impact driver, accepting the slightly fatter grip that comes with its stick-style batteries.

Just behind the Bosch and DeWalt was the other Milwaukee, just as powerful in all of the tests, but edged out for being larger and heavier. □

Kit Camp, a graduate of the College of the Redwoods' Fine Furniture program, makes his living as a cabinetmaker and finish carpenter in San Diego.



MILWAUKEE M12 2494-22

Street price: \$170

Batteries: 1.5 amp-hours

Identical to the Bosch and DeWalt in performance and features, the Milwaukee M12 tools missed out on a Best Value pick because of their added size and weight, and the single LED on the driver. Like its big brother (Fuel), the M12 drill has a metal chuck, an industrial feature that promises more durability.



PORTER-CABLE PCL212IDC-2

Street price: \$130

Batteries: 1.3 amp-hours

The Porter-Cable tools are compact and fully featured: The drill has a locking chuck, and both tools have a belt hook and a small magnet to hold a spare driver bit. Unfortunately, they tested near the bottom and the driver vibrated excessively, making it hard to keep the bit engaged.

Small Chest of Drawers

Understated dresser has clean lines and simple, smart joinery



BY TIMOTHY ROUSSEAU

Every June there is a faculty show at the Center for Furniture Craftsmanship in Maine, where I teach. I've learned that the furniture I make for the show should be something we could use in our home, in the event that no one purchases it. That's how this ash dresser came to be.

I made the drawers deep enough to fit my jeans and sweaters, and sized the case to fit perfectly in a spot

in our bedroom. That dresser sold right away. But I really liked it, so I built another one for myself, plus one for each of my sons. The dresser's uncomplicated, crisp lines and lack of ornamentation really define its style, allowing it to fit quietly and beautifully into just about any bedroom.

Because time was tight before the show, I wanted the chest construction to be straightforward and fast. The

Clean, elegant lines never look dated, so this dresser won't lose its appeal. And it won't fall out of service either, because it's held together by bombproof mortise-and-tenon joinery.

Divider, $3\frac{3}{16}$ in. thick
by 1 in. wide by
9 $\frac{1}{2}$ in. long, including
 $\frac{5}{8}$ -in.-long tenons

Tenon, $\frac{13}{16}$ in. thick
by $\frac{5}{16}$ in. wide by
 $\frac{5}{8}$ in. long —

Tenon, $\frac{5}{8}$ in.
thick by 1 in. wide
by $\frac{5}{8}$ in. long —

Runner/kicker,
 $1\frac{13}{16}$ in. thick by
2 in. wide by
 $14\frac{13}{16}$ in. long,
including tenons

Tenon, $\frac{5}{16}$ in. thick
by $1\frac{3}{8}$ in. wide by
1 in. long

Slide bottom apron into slots after case is glued together.

Bottom, $3\frac{1}{8}$ in. thick by
17 $\frac{1}{8}$ in. wide by 31 $\frac{3}{8}$ in.
long, including tenons

Web frame rail, $\frac{13}{16}$ in. thick by 2 in. wide by 31 $\frac{3}{8}$ in. long, including tenons

Bottom apron, $1\frac{3}{16}$ in. thick
by $1\frac{5}{8}$ in. wide by $31\frac{3}{8}$ in.
long, including tenons —

Tenon, $\frac{3}{8}$ in. thick
by 1 in. wide by
 $\frac{5}{8}$ in. long

Haunch,
3/4 in. long

Tenon, $\frac{3}{8}$ in.
thick by 1 in.
wide by $\frac{5}{8}$ in.
long

Side, $1\frac{3}{4}$ in. thick
by 18 in. wide by
31 $\frac{3}{4}$ in. long

Rabbit,
1/8 in. deep
by 3/8 in. wide

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

Top, $1\frac{3}{16}$ in. thick by
17 $\frac{1}{8}$ in. wide by 31 $\frac{3}{8}$ in.
long, including tenons

Back rail, $3\frac{3}{16}$ in. thick by 2 in. wide by 28 $\frac{1}{2}$ in. long, including tenons

Center mullion, $1\frac{3}{16}$ in. thick
by 2 in. wide by $28\frac{3}{8}$ in.
long, including tenons

Back panel, $\frac{3}{8}$ in. thick by
13 $\frac{1}{8}$ in. wide by 27 $\frac{9}{16}$ in. long

Tenon, $\frac{5}{16}$ in. thick by
 $1\frac{3}{8}$ in. wide by $\frac{3}{4}$ in. long

Back stiles, $1\frac{3}{16}$ in.
thick by 2 in. wide
by $31\frac{3}{4}$ in. long

Groove, $\frac{3}{4}$ in.
wide by $\frac{5}{16}$ in.
deep

Drawer guide,
1³/₁₆ in. thick
by 1¹/₂ in. wide
by 16¹/₁₆ in.
long, including
tenons —

Technical drawing of a three-drawer dresser. The overall dimensions are 31 3/4 in. wide and 31 3/4 in. high. The top panel is 13 1/8 in. thick. The first drawer is 7 7/8 in. high. The second drawer is 8 11/16 in. high. The third drawer is 9 1/2 in. high. The bottom panel is 1 5/8 in. thick. The drawers are shown with handles and are arranged in a 1x2x1 grid.

Diagram of a rectangular plate with the following specifications:

- Overall width: 18 in.
- Overall height: 18 in.
- Four vertical slots on the left side, each 1 in. wide and 1 in. deep.
- Bottom-left corner: 1 5/8 in. radius.
- Bottom-right corner: 1 5/8 in. radius.

Case construction

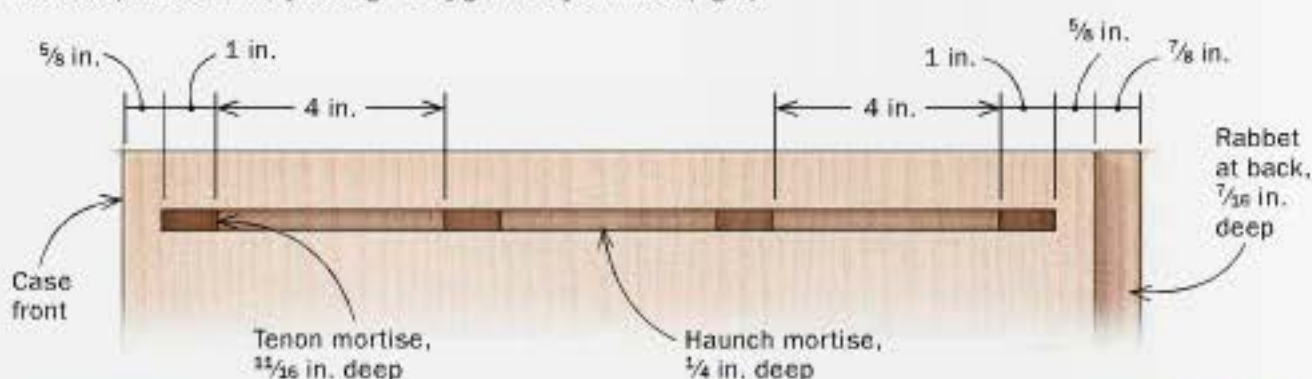
MORTISE THE CASE SIDES



The housed mortise-and-tenon has several evenly spaced tenons connected by a stub tenon, or haunch. Rousseau uses the same jig to cut both the deep and shallow mortises.



Two fences are better than one. Rousseau's mortising jig features parallel guide rails that prevent the router from wandering. A notch routed in a sacrificial fence face (use the same bit you'll use for the mortises) makes it easy to align the jig with layout lines (right).



case is 18 in. deep, and dovetail joinery at the corners would have taken forever to cut, so I chose what I call a housed tenon joint instead. This joint features a series of tenons connected by a haunch, all of which are housed in a wide mortise routed in the case side. It's a strong joint that's quick to make.

The web frames between the drawers are attached to the sides with double mortise-and-tenons. This looks like an intimidating joint to make, but I'll show you a simple, fast method using a router and bandsaw.

Case joinery comes first

The housed tenons that join the top and bottom to the sides are not difficult to make. To make the mortises for them, I use a router and a straightedge jig with two par-



Deep mortises first. Plunge to full depth at each end of the mortise, and then use two passes to rout out the waste in between (left). Then rout the haunch mortise (above), getting to final depth in two passes.



Square them up with chisels. The tenon and haunch mortises all get the chisel treatment, which is faster and easier than rounding over the tenons.

TENON THE TOP AND BOTTOM

Use a rabbeting bit to cut the cheeks quickly, then form the tenons by cutting out the waste between them.

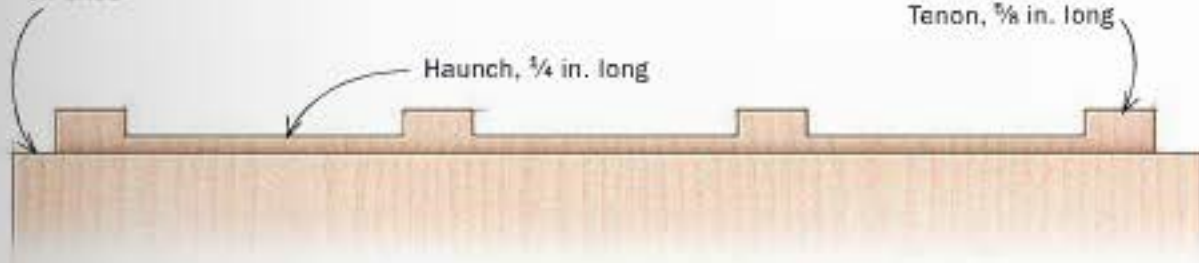


Two rabbets make a tenon. Rousseau cuts to the final depth and width on each side in a single pass.

Tenon shouldered on ends

Haunch, $\frac{1}{4}$ in. long

Tenon, $\frac{5}{8}$ in. long



Transfer the mortises. Pressed against the mortise's wall, the blade of a combination or try square shows where to mark for the tenon width.



Saw down to the haunch. Use a backsaw to define the tenons, then cut the haunch at the bandsaw.

Remove the waste between the tenons. After making an angled cut to remove the waste between tenons, use the bandsaw fence to guide the cut that defines the haunch's top edge.



allel guide rails. The router rides between the rails, which keeps it cutting in a straight line so you won't have any wavy mortises.

There are three things you should do to optimize the straightedge jig. First, attach an auxiliary face to the jig's fence. Then, before you use the jig on the case sides, rout through the face with the same bit you'll use for the mortises (a $\frac{3}{8}$ -in.-dia. spiral upcut bit). The "kerf" cut in the auxiliary face shows you exactly where the router will cut, and that allows you to set up the jig with much greater precision.

Second, after you have clamped down the jig with one clamp, make sure that the guide rails are parallel

to your layout lines. I use calipers for this. Finally, clamp down the jig and workpiece securely to your bench so they don't move when you are routing.

I rout the deep mortises first, and then the shallow one that connects them. I don't worry about getting the mortises' length perfect, because the tenons will be marked directly from them and then cut to fit. After I've routed the mortises, I move to the router table to rout a rabbet on the back edge of each side for the frame-and-panel back.

Finally, I cut the tenons on the top and bottom, also on the router

Web frames

TWIN MORTISES

Two tenons offer more insurance against racking than one. To ensure precision when routing the mortises, Rousseau uses a set of stop blocks.



STOP BLOCKS WORK WONDERS

Use stop blocks to control the mortises' length. Hold them in place with double-sided tape.

Tape down stop block flush against router base.



Bit's cutter is aligned with end of mortise.

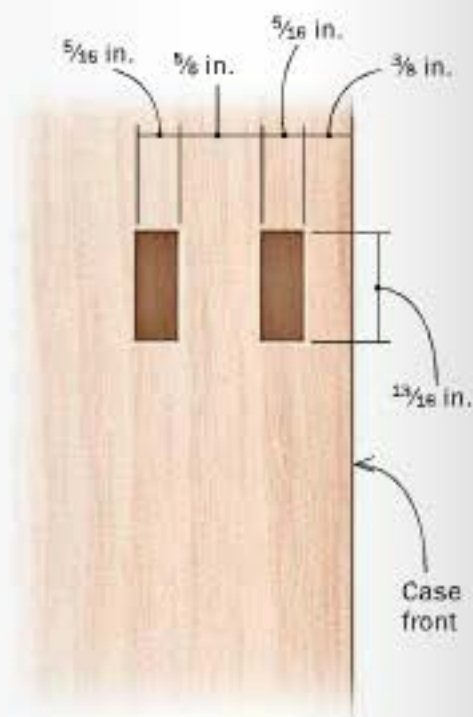


table. I remove the waste between the tenons using a bandsaw, and do the final fitting with hand tools. Here's a tip: Rip the top and bottom to final width after you've routed the tenons. This way, any tearout caused by the router bit will be cut off.

Double tenons aren't twice as hard

The web frames that create the drawer pockets have a front and back rail that connect to the case sides with double mortise-and-tenons. The trickiest part of this joint is getting the space between the tenons to match the space between the mortises perfectly. Fortunately, I have a technique that eliminates all of the hassle.

At the heart of my method is a spacer. I rout the first mortise using the tool's edge guide to control the cut. I then attach a spacer to the edge guide with double-sided tape and rout the second mortise. The same spacer is used at the bandsaw to set the distance between the two



Inside mortise first. Set the edge guide (no spacer yet) so that the bit is located to rout the mortise farther from the edge.



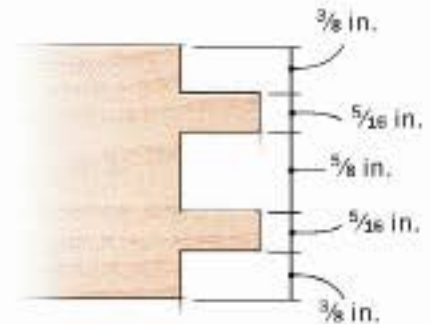
Add a spacer for the second mortise. The spacer's thickness equals the distance between the two mortises plus the bit's diameter. Attach it with double-sided tape.



DOUBLE TENONS

After cutting the shoulders on the tablesaw, cut the cheeks on the bandsaw. Set the bandsaw's fence to cut the cheek farthest from the fence and then leave it there. A pair of spacers moves the workpiece away from the fence for the remaining cheek cuts.

The first cut.
Clamp a stop to the bandsaw table so that every cheek cut stops right at the shoulder.



tenons. A second spacer is used to control the tenon thickness. As a result, the tenons fit perfectly into the mortises right from the saw. The tenons do not have top and bottom shoulders, so I tape stops to the case side when routing the mortises to prevent mortises that are too long.

After all of the case joinery has been cut, I make the feet by band-sawing away the waste and then routing them flush to a template.

The web frames and back are much easier to make, as all of the joints are single mortise-and-tenon. However, keep in mind that the case sides can expand and contract quite a bit throughout the year. To accommodate this movement, glue in the front tenon only, and let the tenon at the back of the runner float in the mortise.

Assembly is straightforward

The simplest and least stressful way to glue up this dresser is to glue up the web frames first. Next, glue together the parts that form the top row of drawers: the top web frame, the case top, the vertical dividers, and the runner and drawer guide.

After the glue has dried, you can glue together the entire case. I do this last step on some low saw-horses. I place one side outside face down and glue in one part at a time. I then spread glue on all of



Add a spacer for the second cut. This "tenon" spacer is as thick as the tenon, plus the blade's kerf.



The router spacer cuts the third cheek. It determines the space between the tenons, just like it did the space between the mortises. Make sure the double-stick tape is still in place.



Use both spacers. When paired, they align the workpiece for the final cheek cut.

Assembly

START FROM THE INSIDE

When it comes time to glue up the case, use a glue with a long open time, such as Titebond Extend, to reduce the stress.



Begin with the web frames. Only the joints at the front get glue. The back joints float to accommodate wood movement.



Add dividers. Putting the drawer dividers in place at final assembly would be nearly impossible.



One side at a time. Leave the joints for the second side dry until you have all of the joints on the first side together.

the joinery for the second side and set it in place. Clamping up a wide cabinet like this can be tough. To simplify the job and spread pressure evenly over the joints, I use cauls to reduce the number of clamps I need for each joint.

After gluing together the case and screwing the back in place, make and fit the drawers. The fronts are ash, and I used walnut for the sides, back, and bottom. I like the contrast between the pale cream of the ash and the rich brown of the walnut. I made the pulls (see opposite page) from some rosewood I've had stashed for many years. Cocobolo would be a good substitute. □

Timothy Rousseau, who lives in Appleton, Maine, is a professional furniture maker and teaches at the Center for Furniture Craftsmanship in Rockport.

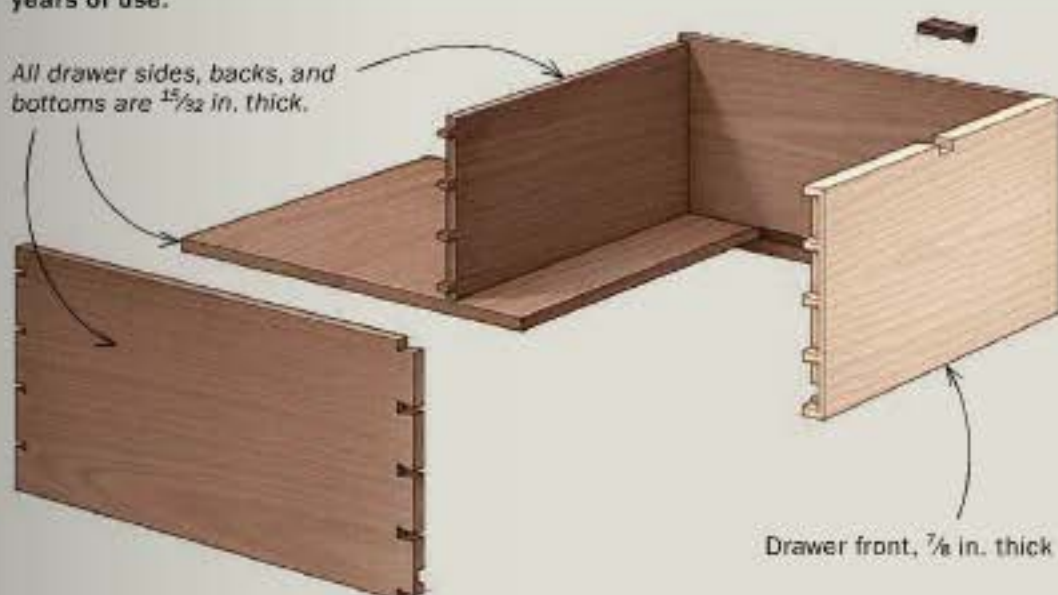
Clamp up with thick cauls. Rousseau's cauls don't have a curved clamping surface, but they are thick, so they spread pressure across the entire joint.



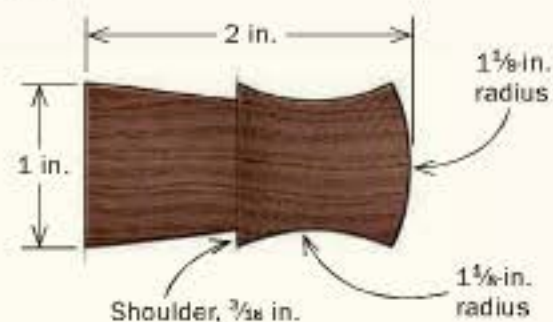


Dovetailed pulls are a perfect detail

Small and shaped with comfortable curves, these pulls are easy to grip, and the dovetail anchoring them to the drawer fronts will stand up to years and years of use.



TOP VIEW



SIDE VIEW



Cut the tail. After laying out the pull on a blank, Rousseau uses a jig sloped the same angle as the tail to cut the sloped sides. Begin the rabbet under the dovetail at the bandsaw, too.



Clean up. After removing the tail and rabbet waste, pare down to the shoulder line.



Clean up with a sander. After removing most of the waste at the bandsaw, Rousseau finishes shaping and smoothing at his shopmade spindle sander, which spins on his lathe.



Lay out for the socket. In addition to transferring the tail's sides (left), also mark the socket's depth to match the tail's thickness. Remove the waste (above). Kerfing the waste between the cuts that define the socket's walls makes it much easier to chop out the waste. To avoid blowing out the corners on the narrow side, work toward the wider side of the socket.



Clamp down. To prevent damage to the pull or drawer front, use a caul above the pull, and clamp to the bottom of the bench.

Smooth Curves with a Spokeshave

For curvy furniture and shaped edges, make the spokeshave your secret weapon

BY CHRIS GOCHNOUR

When it comes to refining curves and shaping contoured work, there's nothing better than a spokeshave. Mechanically, a spokeshave works the same way as a handplane, but its small sole makes it ideally suited for following curves. After you've cut out your work on the bandsaw or router, a spokeshave steps in to remove sawmarks and irregularities with precise fingertip control.

Spokeshaves come in a wide array of styles and designs (see "Specialty shaves," p. 67). The most versatile and perhaps the easiest to start out with is a standard-angle shave, with a flat sole and the blade mounted bevel down. This type of shave can handle most of the curves—concave and convex—a furniture maker will

encounter. Here I'll show you how to get the most out of this special tool, from setup to shaping.

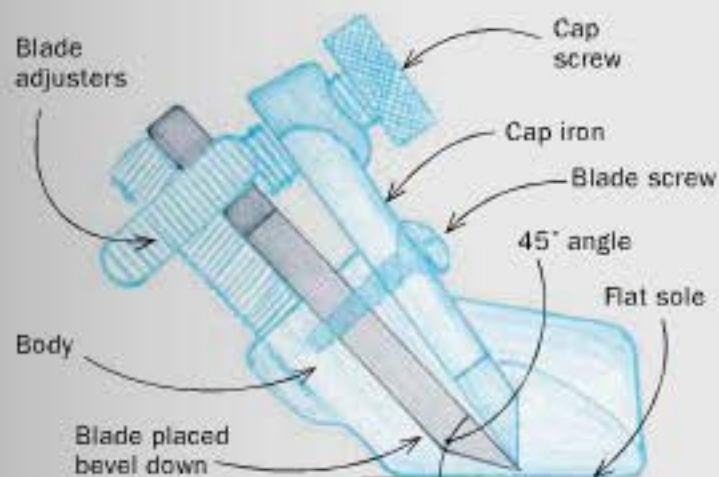
Install and adjust the blade

As with a bench plane, the first step with a spokeshave is to sharpen the blade. Because of its small size, sharpening can be tough, but I have a jig that takes the pain out of the job (see Handwork: "Sharpen your spokeshave" on p. 22). Once sharp, it's pretty easy to install and adjust the blade for perfect results.

Most newer spokeshaves have twin adjustment screws that move the blade laterally as well as in and out, making it easy to get the blade in the proper alignment. With the blade drawn into the

Set up for success

The first shave to buy is a flat-sole, bevel-down version. It can negotiate all but the tightest curves, and in most situations it leaves a smooth finish without tearout.

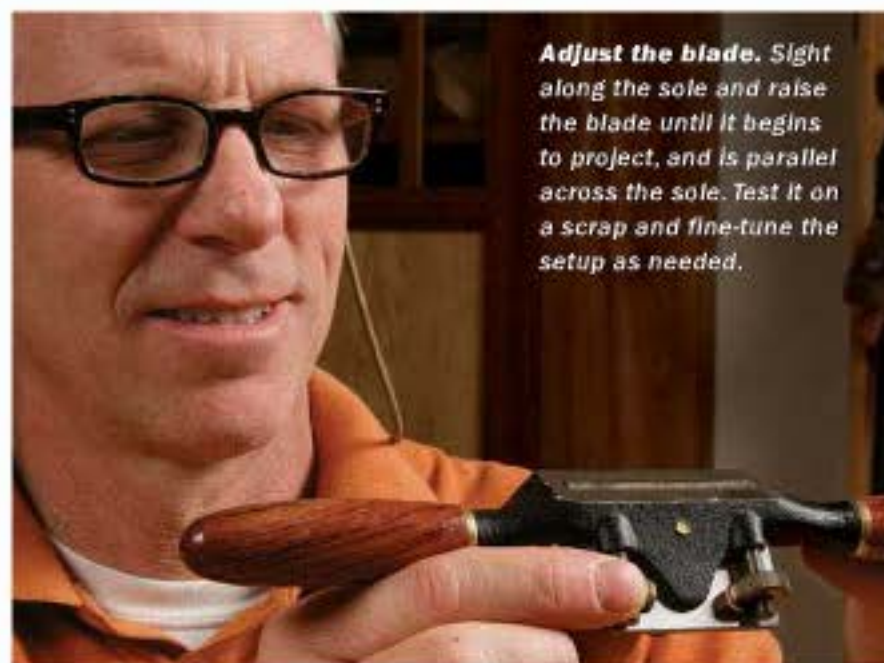


Insert the blade and put on the cap. Make sure the bevel is oriented correctly (down, in this case) and that it rests flat against the bed. Slip the cap iron into place and tighten the cap screw—enough to hold the blade securely, but still allow you to adjust it.



body, begin by tightening the cap screw (or screws) to hold the blade. Slowly rotate the adjusting screws to advance the blade and stop when the blade begins to project proud of the sole. You can sight along the shave's sole for the initial setup, then try out the shave on a wood scrap and adjust the blade until you get the right setting. It's best to start with a light cut, and advance the blade as needed. For an even-depth cut, the blade should project evenly and be parallel to the sole. Check it by taking a shaving with each edge of the blade—it should cut the same on each side.

If your shave doesn't have adjustment screws, don't worry. Loosen the cap screws and set the shave on a flat piece of wood. Insert the blade until it touches the wood, then tighten the screws. Test it out first—it should make a very light shaving. If you need a deeper cut, advance the blade with a few light taps on the back with a small hammer. Tapping in the center moves the blade forward, and tapping the sides moves it laterally. To back out the



Adjust the blade. Sight along the sole and raise the blade until it begins to project, and is parallel across the sole. Test it on a scrap and fine-tune the setup as needed.

NO ADJUSTERS? NO PROBLEM

Some shaves don't have adjustment screws, but the setup is just as fast.



Use a piece of wood to set it up. Place the shave on a block of wood, insert the blade until it touches the wood, then tighten the screws.



Then tap it out. A few taps with a small hammer on the back of the blade gets it into position. For lateral adjustments, tap on the side of the blade.

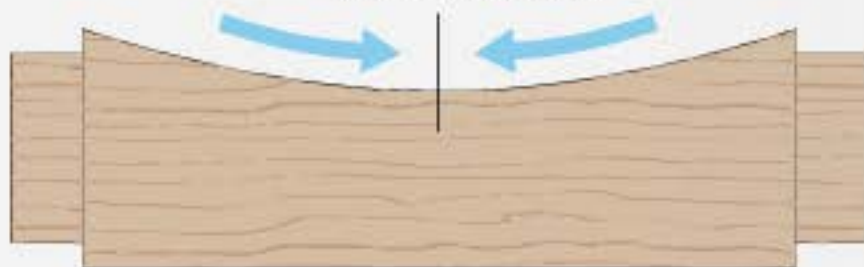


Back out the blade for fine cuts. The easiest way to do this is to flip over the spokeshave and tap it against the bench.

Smoothing with a shave

CONCAVE CURVES

Start at the ends and shave downhill toward the center, working with the grain.



Grip it and rip it. Use your thumbs to push the shave (top), gripping both handles between your thumb and index fingers, and wrapping your other fingers around the handles. For a pull cut (bottom), turn the shave around and hold it the same way, but pull with your index fingers.

blade for a shallower cut, hold the shave upside down and gently tap the handle on the bench. Be careful of tapping too hard—if it takes more than a few light taps, it's better to loosen the cap screws and pull the blade in, then advance the blade out again with a hammer.

For best results, cut with the grain

Spokeshaves excel at smoothing out bumps and refining curves fresh off the bandsaw. To give you the basics, I'll show you how to refine the concave and convex curves of an arched table apron.

The main idea is to cut with the grain, or downhill. On the concave edge, start at one end and cut downhill until you reach the low point of the curve. Do the same for the other side, always shaving downhill toward the center. If the wood tears out or the tool digs in, stop and check the grain direction—you may need to reverse your approach.

Because of its short sole, getting the shave started isn't always easy. But there's a trick for that: Skew the shave by holding it diagonal to the workpiece. This lengthens the sole, giving you more support for a smoother start. After the rough sawmarks and

AVOIDING TEAROUT TROUBLE



Watch out for reversing grain. If you notice tearout or feel the blade digging in, try cutting from the other direction. This tearout (above) is from cutting uphill in white oak. The best way to check for bumps and tearout is to run your fingers down the edge (right). They'll feel bumps you can't see.



CONVEX CURVES

Start the shave at the top of the curve and work downhill with the grain.



major bumps are beginning to smooth out, go back to a normal grip and clean up the rest of the arc with a few more passes.

To remove stock evenly and maintain a flat, square workpiece, watch the sawmarks—you want them to disappear evenly on each side. Keep working until the sawmarks are gone, then check your progress against the layout lines. Your hands often can feel differences that your eyes can't see, so to find those last bumps and dips, try running a hand along the curve.

Once the concave side is finished, flip the workpiece over and begin smoothing the convex edge. The principle is the same. Start the shave at the highest point of the arc, and work downhill with the grain.

Broader curves, such as on drawer fronts, can be handled the same way. Just like before, rotate or skew the shave to get it started in rough spots, and straighten it as the surface begins to smooth out.

Rounding an edge—You can round curved edges, too, like the bullnose edge profile of a curved tabletop. Cut out the curved edge and smooth it with a shave. Lay out some pencil lines for the bullnose profile starting with a 45° bevel, then set the shave for a deep cut. Shape the 45° bevel first, then knock off the corners



Start high and work low. Gochnour starts in the center and pushes toward the low end of the curve (left). To smooth the other side of the curve, he reverses his grip and pulls the shave, always cutting with the grain (below).



EXTRA STEPS FOR WIDE STOCK



Work wide curves evenly. Gochnour works systematically to create an even surface on this drawer front—watching the bandsaw lines to keep him on track. This works well on narrow edges, too.



Skew the shave for an easier start. When it's tough to get the shave started, try holding it diagonally to the work. It makes the sole longer, so it's easier to smooth out those first few high spots.

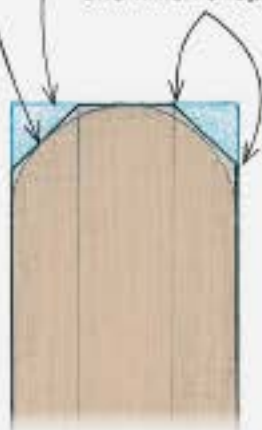
Shaping with a shave

PROFILE AN EDGE

1. Draw the profile.

2. Mark and cut 45° bevels.

3. Remove the peaks and finish shaping.



Bullnose starts with a bevel. Use a combination square to mark guide lines for the profile (above left). Shave to the lines to create 45° bevels, then do it again to create 22.5° corners. Set the shave for a lighter cut, and smooth away the remaining facets (right).



SCULPT A LEG



with 22.5° cuts. Finally, reset the blade for a light cut to make it even smoother. You can leave the last small facets if you like, or sand the profile smooth.

Shaping a cabriole leg—The flowing curves of a cabriole leg really show off the strengths of this tool. When all of the bandsaw marks are removed and the curves of the leg are smooth, begin to round the corners of the leg. The corners of cabriole legs transition gradually from square to round, so mark sets of lines down the corners to give you a guide. Set the shave for a deep cut and rough the leg to shape. Work with the grain, switching directions if necessary. For the final smoothing, set the shave for a fine cut and rotate the shave slightly with each cut. Smooth out any remaining tiny facets with sandpaper. □

Chris Gochmour is a professional furniture maker and hand-tool expert in Salt Lake City.

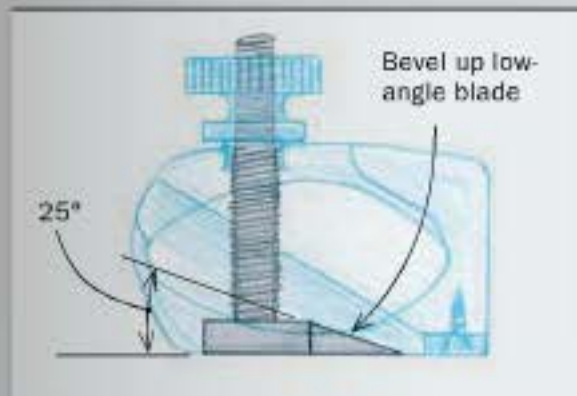


Shape a curvy cabriole leg. First Gochmour removes the sawmarks and smooths the curves (above left). With the overall shape established, he moves on to rounding and shaping the corners (above).

Specialty shaves

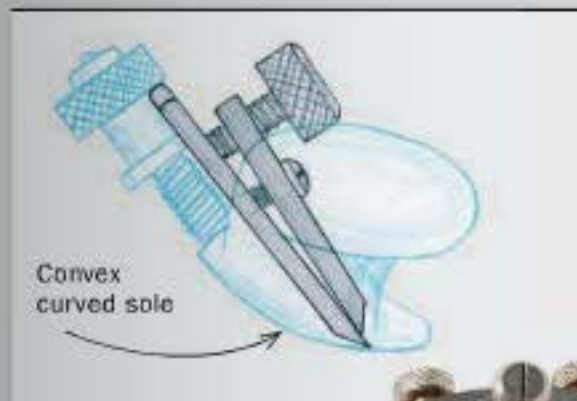
For extreme curves and tough end grain, a specialty shave can save you time and give superior results.

LOW-ANGLE BLADE FOR END GRAIN



Bevel-up shaves are the traditional choice for shaping green Windsor chair spindles, because the low cutting angle follows the grain nicely. They handle end grain better than a standard-angle shave, too, leaving it super smooth.

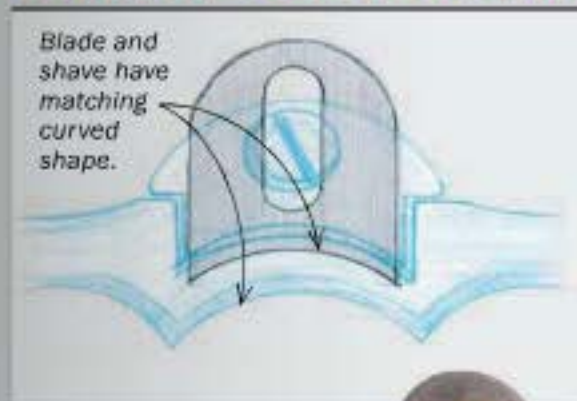
ROUND SOLE FOR TIGHT CURVES



Reach for a round-sole spokeshave to refine tight, concave curves like the ones on this cabriole leg.



CONCAVE SOLE FOR SHAPED PROFILES



This shave's concave bottom won't leave flat facets on rounded profiles like the one on this tabletop, and it's great for round chair spindles, too.



Expanding Top for Any Table

Clever mechanism is easy
to build and works smoothly

BY TOMMY MACDONALD



Every so often, you need to fit a few more friends or family around the dining table. That's when it pays to have a table with an expanding top that accommodates the extra diners without compromising on elbow and leg room and shrinks back to normal size in a jiffy.

There are several ways to make an expanding table. Butterfly tables store the leaves under the top. Pull the top apart, swing the leaves up, and unfold them—beautiful, no doubt, but a challenge to make so that it works flawlessly. More common is a top that pulls apart so that you

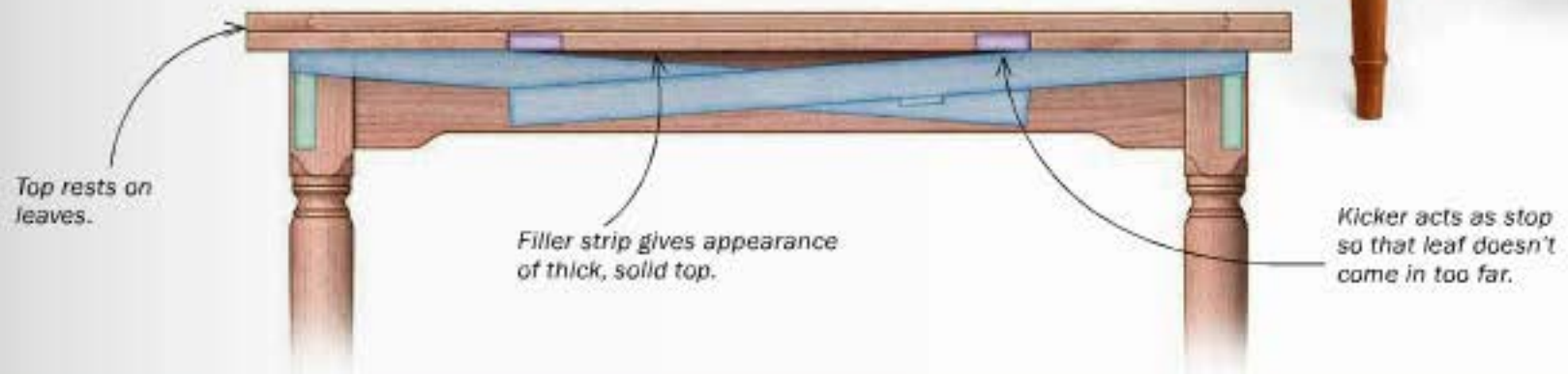
 **Online Extra**

To watch this tabletop in motion,
go to FineWoodworking.com/extras.

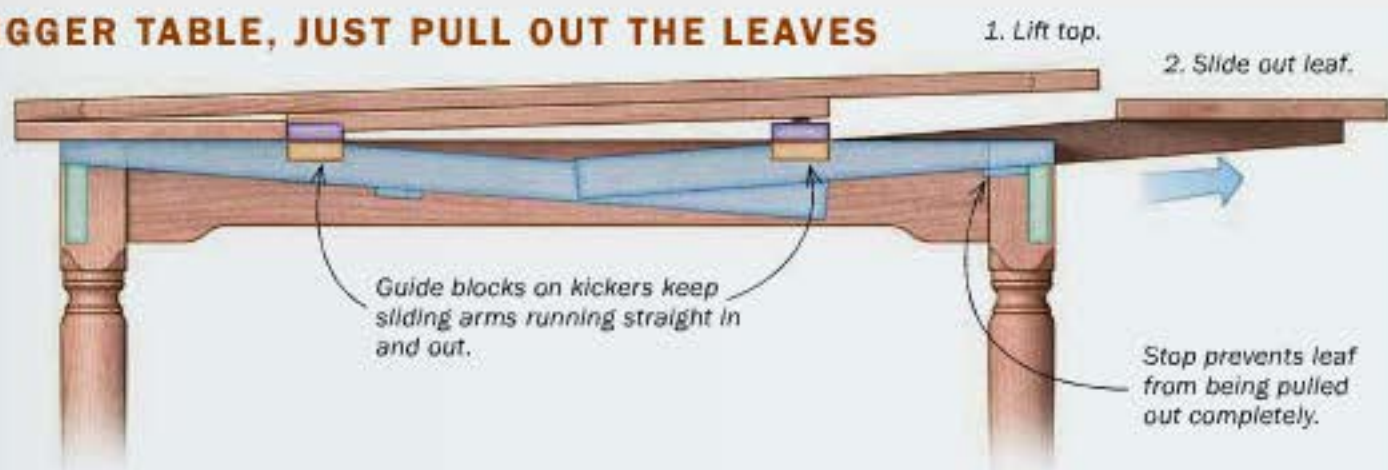
Leaves within easy reach

The problem with most expanding tables is storing the leaves when they're not being used. This dead-simple expanding mechanism solves that problem.

LEAVES STOW UNDER THE TABLETOP UNTIL THEY'RE NEEDED



TO MAKE A BIGGER TABLE, JUST PULL OUT THE LEAVES

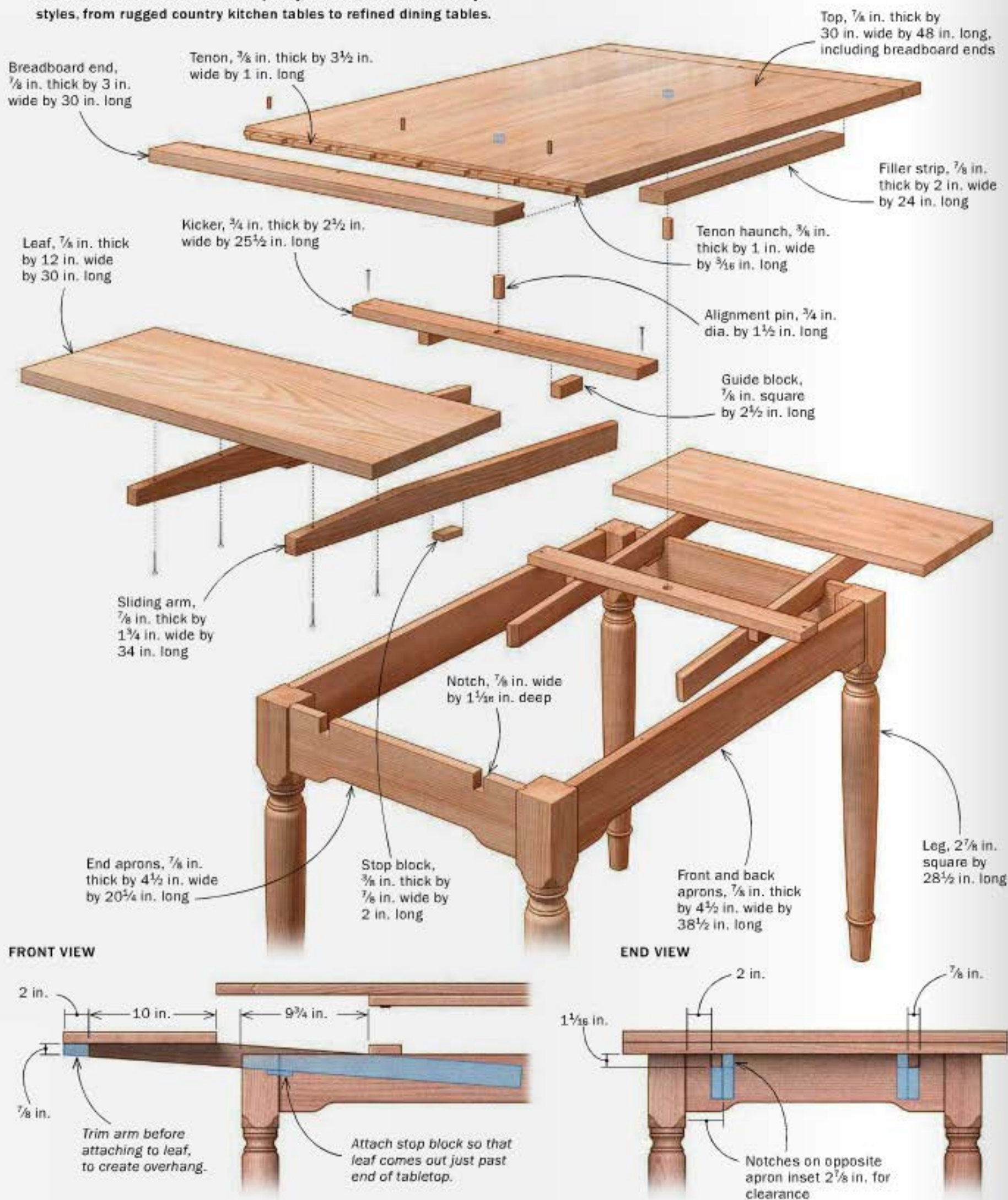


READY FOR EXTRA GUESTS



TABLE WITH AN EXPANDING TOP

Because of the mechanism's simplicity, it can be used with many styles, from rugged country kitchen tables to refined dining tables.



Make and attach the sliding arms

Each leaf has two arms that slide in notches in the end aprons. The notches are cut after the base's joinery has been completed.

Notch the end aprons. Use the rip fence to register the apron so that both notches are inset the same distance. Cut them using a dado set, then mill the arms to fit.



Taper the arms. Cut proud of the layout line (above). The drop from the high end to the low end equals the leaf's thickness. The taper's length is equal to the leaf's width. Clean up with a handplane. To ensure uniformity, plane the arms in pairs (right).



Mark the arm locations. With the table dry-assembled, transfer the notch locations to the leaf (above). Use a square to carry them from the edge to the leaf's bottom face. Then temporarily attach the arms (right). Align them with the layout lines for the notches and flush to the end of the leaf. You'll take them off later and trim the ends to make the overhang.



can put leaves between the two halves. It's simple, but you have to store the leaves somewhere—and that's a hassle.

This design is a good compromise between these two options. It has two expansion leaves, one under each end, that are pulled out from under the top, and the top drops down between them. To close a leaf, just pick up the end of the top and push the leaf back under. You get the convenience of storing the leaves in the table combined with uncomplicated operation.

The simplicity of this expanding table is truly beautiful. Each leaf is attached to two arms that slide in notches in the end aprons. The arms not only guide the leaf

Prepare the base for the leaves

After attaching the sliding arms to the leaves, it's time to install them in the table base.



Place the kickers first. With the leaf clamped in its final location, set the kicker against its back edge.



Screw them to the aprons. Clamping the kicker to the leaf ensures perfect placement.



as you pull it out and push it in, but they also keep the leaf level when it's extended.

Because the expansion mechanism is so simple, it's quite easy to build. And the design can be adapted to fit almost any table base you can imagine. □

Tommy MacDonald, a graduate of North Bennet Street School in Boston, is the host of Rough Cut: Woodworking with Tommy Mac, now in its fifth season on PBS.

Make way for alignment pins. Drill holes through the kicker and into the tabletop (above). Glue the pin (right) into the top only. Chamfer the end that goes into the kicker so that it's easier to fit into the hole. After this step, you can trim the arms to their final length.



Add filler strips. When the leaves are closed, the strips make the edge appear to be the same thickness around all four sides.

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The facts are hard to ignore.

Titebond® III outperforms polyurethane glues.

Reference Guide

Glue comparison

What woodworkers need to know!

	Titebond III	Polyurethane Glues
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Shorter Open Time	✓	
Doesn't Stain Skin	✓	✓
Bonds Most Materials	✓	
Bonds Oily / Exotic Woods	✓	
Lower Cost - Better Value	✓	
Longer Usable Shelf Life	✓	

Woodworking Handbook

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readers gallery

BRIAN DiGEORGE

Lyme, N.H.

DiGeorge's piece was inspired by an old Japanese tea cabinet. The ethereal circle is solid wood, its segments carved individually and then assembled. "I envision a person storing personal or sacred items in the cabinet," DiGeorge says. "Perhaps the circle gives the cabinet a spiritual quality."

CHERRY AND WALNUT, 12W X 41L X 47H

Photo: David Gordon



MARIO RODRIGUEZ

Philadelphia, Pa.

To streamline his armchair, Rodriguez used bent laminations and angled joinery. The arm rail is a 20-piece lamination and the seat was carved with a shopmade jig using a cove-cutting technique at the tablesaw. To simplify the undercarriage and increase the chair's strength, Rodriguez used angled stretchers that meet in the center of the seat.

SAPELE, 19W X 22L X 28H

Submissions

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

MIKE KORSAK

Pittsburgh, Pa.

Korsak was hired to build this sideboard to commemorate the 60th birthday of a Pennsylvania family's matriarch. "The design was an opportunity to create something elegant, playful, and functional," Korsak says. To achieve consistency of color and grain, Korsak milled all the black-cherry parts from a single air-dried flitch.

BLACK CHERRY, BIRD'S-EYE MAPLE, AND ROSEWOOD,
19½W X 41L X 39H

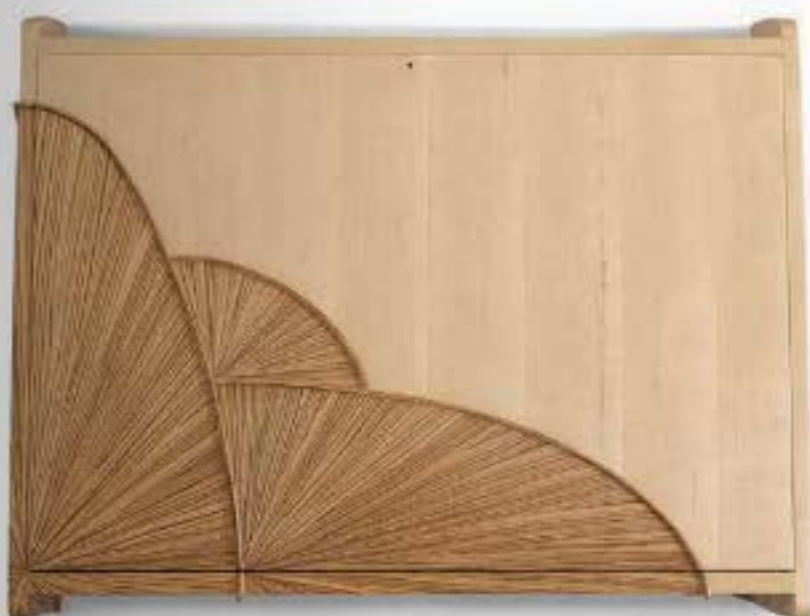


JACQUES BREAU

Kingston, Ont., Canada

"My inspiration for this liquor cabinet came primarily from sculptor Andy Goldsworthy's work, coupled with a wall-hung child's desk from mid-century France that I stumbled across," Breau says.

MAPLE AND ZEBRAWOOD,
9W X 29½L X 24H



AARON MAES

Arena, Wis.

Built for a client's new Florida condominium, Maes's bed and nightstands are accompanied by a matching dresser, entry table, coffee table, and entertainment cabinet. "The set was designed after another bed I had made, but the original purpleheart, maple, and cherry were swapped out for rich black walnut and book-matched panels of solid curly maple," Maes says.

BLACK WALNUT, CURLY MAPLE, AND
POPLAR, 89W X 90½L X 57½H



BOB HUGHES

Eagle, Idaho

This table was inspired by a John and Thomas Seymour piece found in Robert D. Mussey Jr.'s *The Furniture Masterworks of John and Thomas Seymour* (2003, Peabody Essex). Hughes recalled that the variation on a work table "looked quite challenging, but not hopelessly beyond my skills."

WALNUT AND BIRD'S-EYE MAPLE, 19½" W X 42" L X 35" H

Photo: Dan Kolsky



HANK TYLER

Hallowell, Maine

"Sandpipers are my favorite subjects," says Tyler, "and this 9-in.-dia. piece of Australian gum wood offered me the opportunity to create a compact and balanced carving." Tyler used chisels, carbide carving bits, and a Nicholson #49 rasp to do all his carving.

AUSTRALIAN GUM WOOD, 9" DIA. X 4½" H

Photo: Bill Duffy



STEVE AHN

Jeju, South Korea

"I wanted to create a cabinet where the drawers could be opened in two directions, while being aesthetically pleasing from all angles of view." The curved side of Ahn's cabinet represents the contemporary, while the opposite side is modeled after traditional Korean paper window screens and Chinese medicine boxes, with common Chinese ingredients in marquetry on the drawer fronts. Ahn used rare-earth magnets to provide positive stops for the drawer at both open positions.

WALNUT, CHESTNUT, AND RIPPLED SYCAMORE, 15½" W X 21½" L X 38" H

Photo: Tony Marsh



STEPHEN KINNANE

Tiverton, R.I.

Kinnane designed his reversible coffee table with simplicity in mind, to make a table for families and younger generations who are looking for well-built furniture at an accessible price. "The initial design was not reversible," Kinnane says. "While reviewing some sketches, I saw the table upside down and it hit me." The bent-laminated base supports the ½-in. plate glass top and was embellished with ebonized cherry accents.

CHERRY AND PLATE GLASS, 22W X 52L X 18H



JOEY PEPPER

Brooklyn, N.Y.

Pepper's Hendrick lamp is one in a series of six lamps that share the same shade design. "The pierced shades have a very rigid and unforgiving geometry," he says, "so I tried to balance this out by using more organic shapes and curves for the bases."

WALNUT AND WALNUT BURL, 10W X 10L X 14H

Photo: Jonathan Mehring



SERGEJ KIRILOV AND MARINA KOROTKAJA

Arnhem, The Netherlands

The one-of-a-kind finish on this African blackwood liquor cabinet was developed by Kirilov and Korotkaja using traditional Japanese Urushi lacquer. This finish was applied in 20 layers, each taking two to three days to cure, and then polished by rubbing the piece with bare hands and polishing compound. The liquid appearance is achieved by mixing tin powder into the lacquer coats. Due to the lengthy finishing technique, this piece took 400 hours to complete.

AFRICAN BLACKWOOD, BIRD'S-EYE MAPLE, AND STAINLESS STEEL, 16 $\frac{3}{4}$ W X 41L X 66H

Photo: Bob Sas





A special excerpt from Pocket Hole Joinery by Mark Edmundson (The Taunton Press, 2014). For more tips and techniques, plus eight complete furniture projects, buy the book at Taunton.com.

Pocket-hole joinery is fast and strong

LEARN HOW TO HIDE THE HOLES, AND THE REST IS EASY

BY MARK EDMUNDSON

Pocket-hole joinery provides real advantages for beginning woodworkers and veterans alike. The first benefit is the relatively low cost of the tools, with the most basic jig and clamp set priced under \$75. Second, pocket-hole joinery is easy to learn. If you can place a clamp and pull the trigger on a drill, you can start joining wood with pocket screws. The third advantage is speed. Pieces go together so quickly with this joint that it will redefine what you're able to build within a limited time. Last, if the joint is to be glued, there is no need to wait for the glue to dry to keep going with assembly.

None of this would matter if the joints weren't also strong. Luckily, pocket-hole joinery has that covered, too. The joint won't come apart without a good

GET A GOOD JIG

Edmundson recommends the Kreg Jig K4 Master System, at roughly \$140 online. It includes the jig, the drill and driver bits, and a good face clamp.



Online Extra

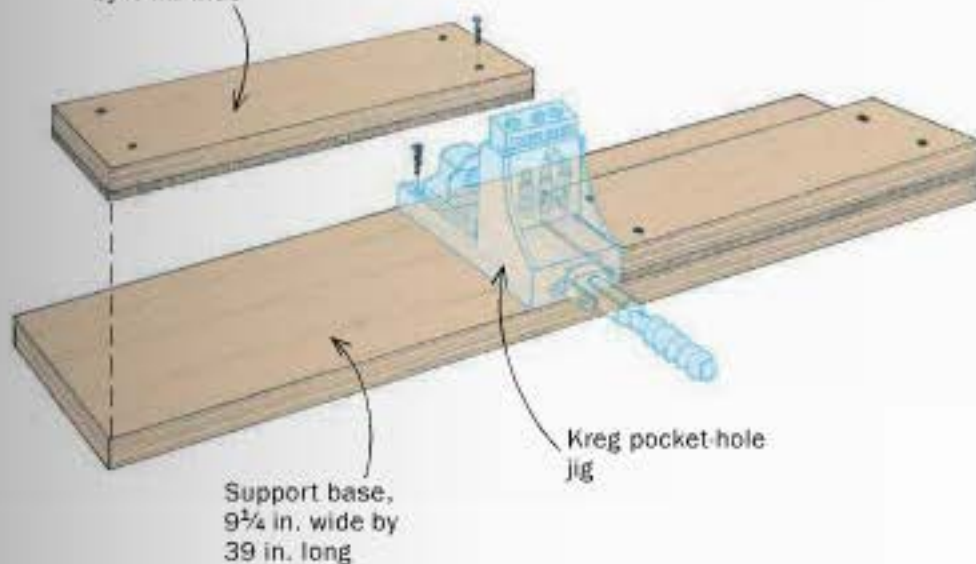
For more tips on pocket-hole joinery, watch the video at FineWoodworking.com/extras.



Getting started

USE A PLATFORM TO SUPPORT LONG WORKPIECES

Table supports, 1 in. thick by 4 in. wide



Support base, 9 1/4 in. wide by 39 in. long

Kreg pocket-hole jig

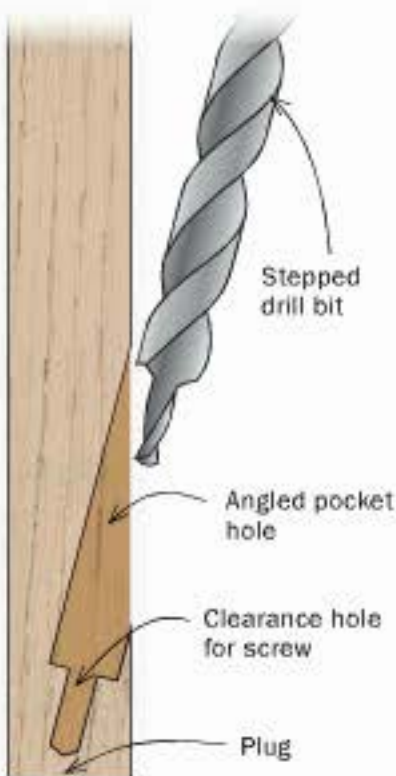


Build a base for the jig. To support long workpieces, build a platform from layers of plywood—a base below and two support tables on top. The support tables are equal to the thickness of the jig itself. The whole assembly can be quickly and easily clamped to a benchtop.



Drilling is fast and easy. Just make sure the jig and stop collar are set properly for your stock thickness.

HOW IT WORKS



Self-tapping threads drill through plug.

Pan-head screw secures the joint.

Notice how the stepped drill bit leaves a small plug of wood at the bottom of the smaller hole (left). That is critical, as it stops the screw from creeping sideways when it enters the mating piece of wood. The screw's self-tapping tip will drill its own pilot hole in most woods, and the pan-type head seats firmly in the stepped hole (right).

deal of force ... and without taking a fair amount of wood with it. Of course, the pocket hole itself is not pretty. So this joinery method is not appropriate for everything you make. Even if you can hide the holes, you might not want them lurking under an edge where hands might find them. I avoid situations where the screw cannot be hidden from view and the pocket hole has to be plugged. Gluing and trimming the plugs is more difficult and time-consuming than you'd imagine. They don't pare very well and the fit is not exactly tight. In the end, they don't look good.

Fortunately, I can almost always hide the holes: on the back or underside of pieces, on the wall side of a cabinet, behind an end cap, or inside a drawer opening, for example.

The basics

Like a toenail in carpentry, a pocket screw goes into the side of one board at an angle and then down into the board below. But the screw threads make these joints many times stronger than their nailed counterparts.

Before getting started, you have to buy a few pieces of equipment. First, you need a jig, which guides a stepped drill into the workpiece. The drill bit creates a "pocket" that lets the screw seat firmly in the top piece, and includes a stop collar that bumps against the jig to control drilling depth. Pocket screws have a self-tapping auger point that eliminates the need for a pilot hole in the lower workpiece. Occasionally, if the

Where to use pocket screws



FLAT FRAMES

Clamp them flush. To keep the joints level, use a face clamp to align the frame parts when driving screws.

bottom piece is especially knotty or narrow, and thus prone to splitting, you will need to drill a pilot hole.

Last, you need some way to immobilize the pieces when you are screwing them together. A face clamp handles the situations where both pieces are lying flat, as when building a face frame (see photo, left). For right-angle joints I make a simple clamping jig (see photos, below).

If you're buying your first pocket-hole jig, my advice is to go with the Kreg Jig K4 Master System, at roughly \$140 online. This jig can be mounted both to the bench, for speed, and directly onto the workpiece, which is essential on big panels. It comes with everything you need to get started.

Don't let the workpiece move

Other than the look of the pocket holes themselves, the complaint most often heard with pocket-hole joinery is that pieces shift as they are joined. This occurs because the screw pulls the wood in the direction that it is driven.

The first key to preventing shift is clamping the workpieces firmly in place as you screw them together, either with the face clamp or bar clamps. The second key is to have the stop collar on the

CASEWORK



How to clamp big panels. When building a cabinet, use a simple right-angle jig to support the big plywood pieces (above) while you attach lightweight bar clamps. Place a clamp at each screw hole to keep the parts from shifting (right).



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fundamentals continued

Where to use continued



PARTITIONS



Use spacers to locate them. To keep vertical partitions from shifting as he screws them in, Edmundson uses horizontal drawer partitions as spacers at the top and bottom (left). He makes other spacers to locate the horizontal partitions (above).



ATTACHING FACE FRAMES

DRAWERS, TOO

Easy drawer boxes with false fronts. Edmundson uses his right-angle clamping jig to hold the drawer parts for assembly (right). Then he attaches a false front to hide the screw holes at the front of the drawer box (below).



Hide the holes. In this area, the drawer will hide the pocket holes. Apply the first vertical piece (stile), then the next row of rails, then another vertical, and so on.

drill bit set up properly. Notice in the drawing on p. 79 that the pocket hole does not go all the way through the top piece, but stops about $\frac{1}{16}$ in. from the bottom edge. This last little piece of wood is important. It serves as a plug around the tip of the screw to keep it from wandering as the tip transfers from the vertical piece into the mating piece.

If all else fails, try pre-shifting the workpieces as you clamp them, offsetting them slightly away from the direction of the shift. The screw action will then pull them into alignment. □

Mark Edmundson builds furniture and cabinetry in Sandpoint, Idaho, and is the author of *Pocket Hole Joinery* (The Taunton Press, 2014).



INDEX TO ADVERTISERS

ADVERTISER	WEB ADDRESS	PAGE	ADVERTISER	WEB ADDRESS	PAGE
Alderfer Lumber Co.	www.alderferlumber.com	p. 88	Lee Valley	leevalley.com	p. 19
All Star Abrasives		p. 89	Leigh Industries	leighjigs.com	p. 13
Alfred & Associates, Inc.	www.wood-carver.com	p. 88	Leigh Industries	leighjigs.com	p. 81
Anderson Ranch Arts Center	andersonranch.org	p. 19	Lie-Nielsen Toolworks	www.lie-nielsen.com	p. 3
Arbortech Tools	www.arbortechusa.com	p. 88	Lignomat Moisture Meters	www.lignomat.com	p. 19
The Beall Tool Co.	www.bealltool.com	p. 88	Londonderry Brasses, Ltd.	www.londonderry-brasses.com/ finewoodworking	p. 13
Berea Hardwoods Co.	www.bereahardwoods.com	p. 13	Lonnie Bird's School of Fine Woodworking	www.lonniebird.com	p. 3
Berkshire Products	www.berkshireproducts.com	p. 89	Newport Nautical Timbers	newportnauticaltimbers.com	p. 89
Cabinetparts	cabinetparts.com	p. 88	Oneida Air Systems	www.oneida-air.com	p. 7
Cabinets Quick	www.cabinetsquick.com	p. 89	Osborne Wood Products	www.osborneturnings.com	p. 9
Center for Furniture Craftsmanship	www.woodschooll.org	p. 11	Philadelphia Furniture Workshop	philadelphiafurnitureworkshop.com	p. 88
Connecticut Valley School of Woodworking	www.schoolofwoodworking.com	p. 13	Pygmy Boats	www.pygmyboats.com	p. 88
Contempo Living	www.contempolivinginc.com	p. 89	Quality Vakuu Products	www.qualityvak.com	p. 17
Corob Cutters	corobcutters.com	p. 88	Rockler Woodworking & Hardware	rockler.com	p. 11
Charles G. G. Schmidt & Co., Inc.	www.cggschmidt.com	p. 81	Rosewood Studio	www.rosewoodstudio.com	p. 9
Custom Branding Irons	www.branding-irons.biz	p. 16	<i>Rough Cut Woodworking with Tommy Mac</i>	roughcutwoodworking.com	p. 9
Diamond Machining Technology	dmtsharp.com	p. 19	<i>Shop Talk</i>	shoptalklive.com	p. 16
Felder-Group USA	www.felderusa.com	p. 13	States Industries	buyappleply.com	p. 16
<i>Fine Woodworking</i> E-Letter	finewoodworking.com/eletter	p. 17	SuperMax Tools	supermaxtools.com	p. 81
Forrest Manufacturing	www.forrestblades.com	p. 7	Titebond	www.titebond.com/ tblilvspolyurethane	p. 73
The Furniture Institute of Massachussetts	www.furnituremakingclasses.com	p. 88	West Penn Hardwoods	www.westpennhardwoods.com	p. 88
G&G Trade Corp.	www.tablemechanism.com	p. 89	Whitechapel Ltd.	whitechapel-ltd.com	p. 3
Goby Walnut Products	www.gobywalnut.com	p. 88	Whiteside Machine Co.	whitesiderouterbits.com	p. 7
Groff & Groff Lumber	www.groffslumber.com	p. 88	Williams & Hussey	www.williamshussey.com	p. 3
Hearne Hardwoods	www.hearnehardwoods.com	p. 3	Woodcraft	woodcraft.com	p. 17
Highland Woodworking	highlandwoodworking.com	p. 19	Woodworkers Source	www.101woods.com	p. 88
Infinity Cutting Tools	infinitytools.com	p. 3	Woodworker's Supply	pro.woodworker.com	p. 3
Inside Passage School	insidepassage.ca	p. 17	Woodworker's Supply	pro.woodworker.com	p. 9
Kay Industries	www.kayind.com	p. 17	The Woodworking Shows	thewoodworkingshows.com	p. 91
Keller & Company	www.bestdovetails.com	p. 89			
Knew Concepts	www.knewconcepts.com	p. 88			



Two pulls that pack a punch

FINE DETAILS CARRY
A MESSAGE OF MASTERY

BY ROSS DAY

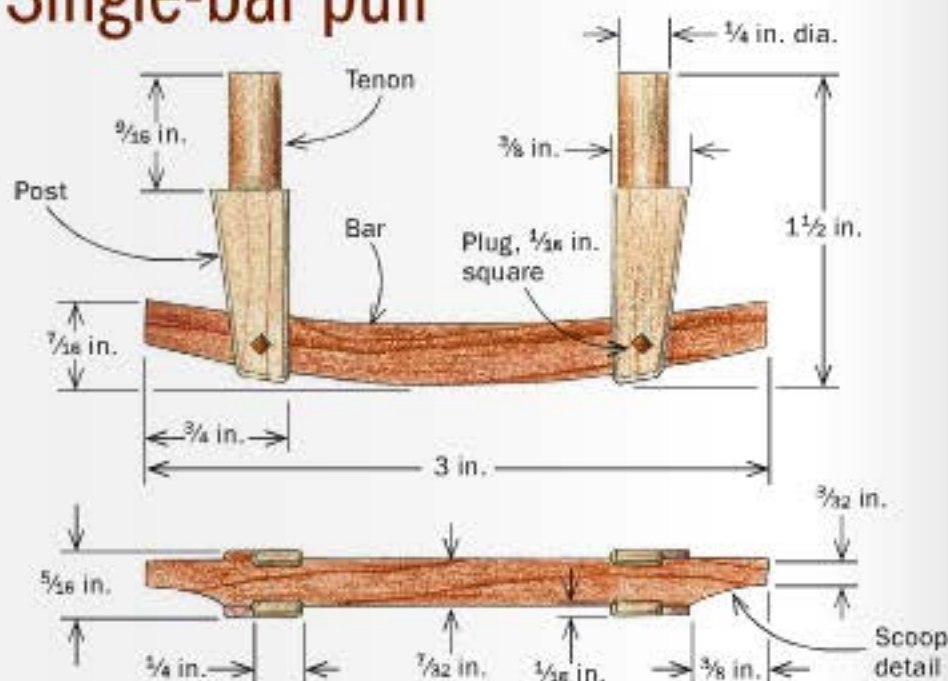
The overall shape of a piece of furniture is primary to the impression it makes, but so much also depends on the details. Architect Mies van der Rohe, whose buildings were beautifully made right down to the doorknobs, liked the phrase “God is in the details.” But many furniture makers, anxiously searching for just the right handles at the end of a project, can relate to its corollary, “the devil is in the details.”

My mentor, James Krenov, believed that with a successful piece of furniture the closer you look, the more interesting discoveries you make. In this article, I’ll describe how to make two pulls that should repay close inspection and finish your piece with a flourish.

Both these pulls can be made in a variety of sizes, and can be used horizontally for drawers or vertically for doors. I often graduate the size of the pulls on a single piece of furniture to match the different sizes



Single-bar pull



BEGIN THE BARS



Tiny dados. With the bar blanks still milled square, use a crosscut sled with a stop block to cut the pairs of dados at both ends (left). Use a chisel to chop the outside shoulder of the dado to match the taper of the post (above left). Then carefully bandsaw the inner curve (above right), and fair the curve with files and sandpaper.



POST PRODUCTION



One stick, many posts. Day mills a long workpiece that will yield a batch of posts. He roughs out the tenons on the posts by dadoing across all four sides.

of the drawers or doors. I've also scaled these pulls all the way up and used them on interior and exterior entry doors.

The single-bar pull, made here in cherry and cocobolo and sized for a small drawer, is made with true tenons that join the posts to the drawer front. Alternately, you can join the pull to the piece of furniture with epoxied metal pins, as I do with the double-bar pull.

In both these pulls the bars are curved and the posts are tapered to add visual interest. On the single-bar pull, the bar is also scooped out at the ends on one face; these scoops face downward when the pull is used for drawers; when it's used for doors, the scoops face outward—toward the hinges.

Made at this scale, both these pulls involve shaping and joining very small parts. For safety, be sure to use zero-clearance throat plates on your tablesaw



Slot for the bar. After crosscutting the ends of the workpiece at an 85° angle, use an angled guide block to cut the slot. Then cut a post blank from each end of the workpiece and repeat the process.

Tenoning by eye. Use a circle template to lay out the tenon, then chop it to an octagon with a chisel and file it round.



Fitting the posts to the bar. Using a block plane inverted in his vise as a finger-powered jointer, Day angles the outer face of the post to fit the dadoes in the bar.

JOINING POSTS AND BARS



Make the convex cut. Once the posts have been fitted to the bar, saw the top edge of the bar to its convex shape. A piece of $\frac{1}{4}$ -in. MDF creates a zero-clearance table surface.



Scoop with the sander. Day uses his belt sander, clamped on its side and fitted with a shopmade "table," to shape the scooped sections at both ends of the bar.

and bandsaw and use push sticks whenever possible, making custom sticks as necessary.

Making the single-bar pull

To make the posts, I mill up a long workpiece that will yield multiple blanks. After laying out the posts, I use a dado blade on the tablesaw to rough out the tenons. Then I crosscut both ends of the workpiece at 85° and cut a slot in each end. The posts at each end are then ready to be cut free. Since the tablesaw is set up to cut the slots, I do the crosscut at the bandsaw or by hand.

Once I've cut all the posts, I shape their tenons round. I put the post in a jeweler's vise, draw a circle on the end, chisel the tenon to an octagon, then file the tenon round. I use a scrap with a test hole to check my progress. When I've shaped the bar and fitted the posts to it, I carefully chamfer all the exposed edges of the



Drilling for diamonds. Before chiseling out the diamond-shaped mortise for the plug, drill a $\frac{3}{16}$ -in.-dia. hole through the post and into the bar.



Follow with the chisel. Use a $\frac{3}{16}$ -in. chisel to chop the miniature mortises. To remove waste during chiseling, Day redrills with the $\frac{3}{16}$ -in. bit.

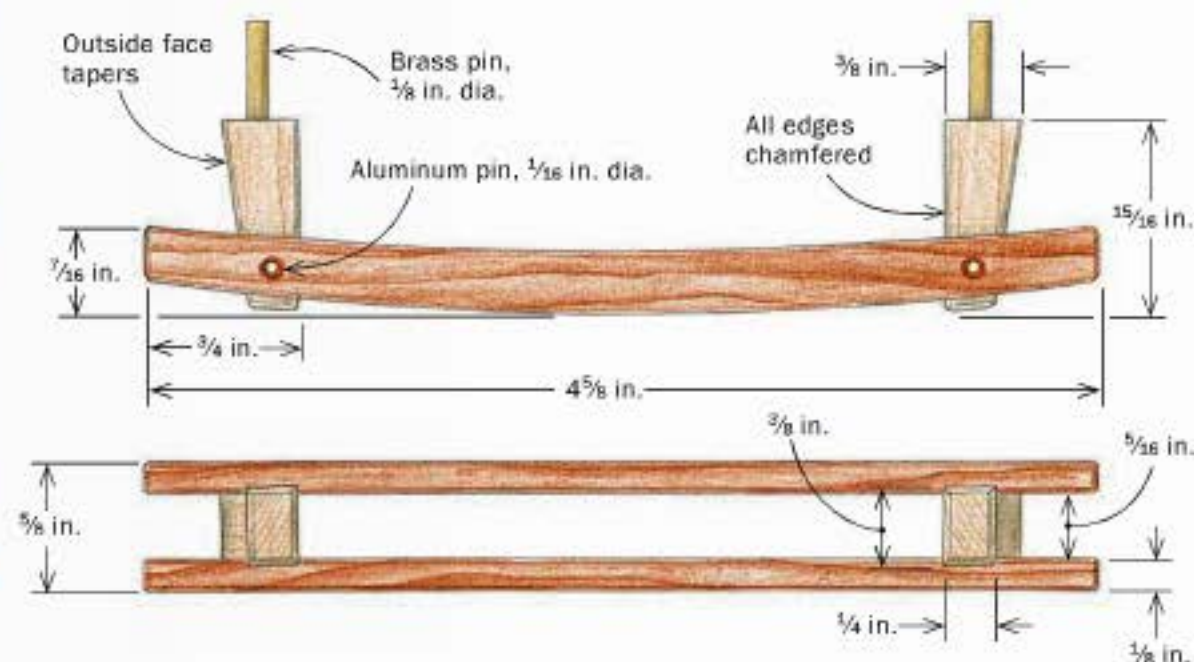


Pegged. Day clinches the joint with tiny pegs. He chamfers the show end of the peg before cutting it to length from a long, tablesawn strip.



Adjust the shoulders. After dadoing the inside face of the bars at the tablesaw, use a chisel to angle one shoulder to match the post.

Double-bar pull



Hold still while I drill. A stepped fence and a stick with a V-shaped notch hold the post for drilling. The hole accepts the metal pin that will be epoxied in and takes the place of a tenon.



Drill straight through. With the pull dry-fitted and with a sacrificial table to back up the cut, drill right through both bars and the post with a 1/16-in.-dia. bit.



Quick chamfer. A countersink bit in the drill press makes a clean, decorative chamfer at the mouth of the pin hole.

posts and pre-finish the posts and bar before glue-up. To create the diamond plugs, I make a long strip 1/8 in. by 1/8 in. I chamfer the ends of the strip with a file, then cut a plug from each end with a small handsaw. Before tapping the plug in place, I chamfer the sawn ends as well.

A note on the double-bar pull

The posts for the double-bar pull are made in the same way as for the single-bar pull, but without the true tenons. I make the pin tenons from 1/8-in.-dia. brass rod. I handsaw each pin to length and chamfer both ends with a file. After drilling a hole in the bottom of the post, I use five-minute epoxy to glue the pin in place. A small bamboo skewer works well to spread the epoxy inside the hole.

For this pull I used aluminum pins instead of wooden pegs to clinch the bars to the posts, and I drilled through-holes instead of stopped ones. To give the pins a finished look, I used a countersink bit to chamfer the pin hole and I chamfered the ends of the pins. □

Ross Day makes furniture in Poulsbo, Wash.



Glue, assemble, tap. After spreading glue on the dados, assemble the parts and hammer in the pins. Use a spacer beneath the pin to keep the pull stable.

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how they did it

Expressive but efficient

BY JONATHAN BINZEN

Dean Pulver's tables (see the back cover) may be idiosyncratic, but they are efficient to make, and he's made dozens of them to the same design. All the stem-like curved parts are bent laminations clamped up on the same form. By angling them differently in the table and twisting them, he achieves the impression of arcs in a variety of radii. Despite all the odd angles, the assembly is relatively straightforward. Pulver uses screws and epoxy to secure the vertical pieces to the bottom

board, and threaded rod and epoxy to join them to the top. After assembly, he colors the table with aniline dye, then sands the finish back so the warmth of the wood shows through in the high spots.



1. PRODUCE THE PARTS



The curved elements are bent laminations made with 1/4-in.-thick solid-wood plies clamped on a particleboard form. The lollipop-shaped elements are laid out on a plank and bandsawn to shape.

2. ROUNDING WITH THE ROUTER



All the vertical elements get shaped with a roundover bit in either a handheld router or on a router table. Before routing the bent-laminated pieces, Pulver uses a power plane to flatten the surface and roughly round the corners on the convex side.



3. ADD TEXTURE



Pulver uses spokeshaves, rasps, and files to refine the shapes and to add the texture that gives his pieces their tactile appeal.



4. CROSSCUTS PERFECTLY IN LINE



For crosscutting, a plywood jig festooned with clamping blocks holds the vertical elements exactly as they'll be in the table. A 4-in.-wide spacer against the fence permits uncut ends to overhang the jig.

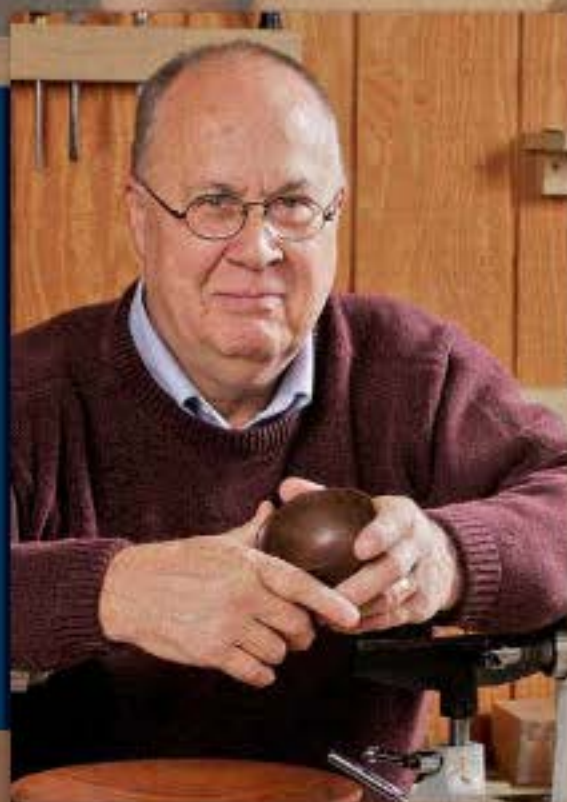
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Detroit, MI, Feb. 13 - 15
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Putting the Primal into Production

Dean Pulver brings a sculptor's eye and a craftsman's hand to the challenge of building distinctive furniture at speed. Pulver, who lives in Taos, N.M., studied sculpture in college, but afterward was drawn toward furniture and spent three years in a 25-man production shop building Shaker-style pieces. He acquired machine skills there and an appreciation for efficiency. But after all the clean lines

and flat surfaces, he was hungry for "the raw and honest feeling you get with handwork." To make his current pieces, with their echoes of modernist sculpture and the primal quality of crafts from primitive cultures, Pulver works mostly by machine, which keeps them affordable. But to find the resonance he seeks between smooth and textured surfaces, he finishes the work with hand tools.

—Jonathan Binzen



Photos: Dean Pulver

How They Did It Turn to p. 90 to see Pulver's techniques for shaping and texturing wood.

Pro Portfolio To see the full range of Pulver's innovative work and hear him discuss it, go to FineWoodworking.com/extras.