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Perfect cope-and-stick doors, p. 42

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contents

SEPTEMBER/OCTOBER 2007 ISSUE 193

features

36 **Arts & Crafts Wall Shelf**

Hollow, quartersawn columns and traditional inlay elevate an easy project

BY NANCY HILLER

42 **Frame-and-Panel Doors Made Easy**

Cope-and-stick router bits are quick but tricky. Here's how to get perfect results

BY MICHAEL PEKOVICH

48 TOOL TEST **New Breed of Bandsaws**

New 14-in. models have serious resaw capacity, with more power to handle bigger boards

BY THOMAS McKENNA

54 FINISHING PINE

Cover photo: Michael Pekovich

58 FLAWLESS FITTING

36 ARTS & CRAFTS WALL SHELF

54 Best Finish for Pine

Thin layers of shellac and stain add age and warmth without blotching

BY TOM WISSHACK

58 The Secret to Making Perfect Joints

Trim hidden areas to quickly produce a flawless fit

BY STUART LIPP

63 Router-Made Bandings

Dress up your work with these unique designs

BY MARK ARNOLD

68 Lumber From Mini-Mills

Unusual woods at bargain prices might be closer to home than you think

BY MARIO RODRIGUEZ

72 COVER STORY Shaker Dining Table

Form meets function in this classic design

BY CHRISTIAN BECKSVOORT

80 What's Your Sign?

Readers, editors, contributors sign their work in distinctive ways

BY CHARLIE REINA

42 FRAME-AND-PANEL DOORS

up front

6 On the Web

8 Contributors

10 Letters

14 Methods of Work
- Tablesaw tapering jig
- Magnetic cabinet catch

22 Tools & Materials
- Powermatic drill press
- Freud premium sawblade
- Work Sharp sharpening machine

30 What's the Difference?
Pin gauges vs. slicing gauges

32 Fundamentals
Is it time to get a fresh edge?

in the back

84 Readers Gallery

88 Q & A
- Drying freshly cut lumber
- A tabletop finish

96 Master Class
Free-form steam-bending

106 Finish Line
Original Arts & Crafts

110 How They Did It
The back cover explained

Back Cover
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Mark Arnold *("Router-Made Bandings")* got into furniture making via the well-traveled path of trim carpenter and built-in-cabinet maker, with much help from a two-year course at the North Bennet Street School in Boston. He and his wife edit *American Period Furniture*, the annual journal of the Society of American Period Furniture Makers. You can learn about weekend classes in Arnold's central Ohio shop on his Web site, www.bostonwoodworking.com.

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Stuart Lipp *("The Secret to Making Perfect Joints")* **lives and works in New York City. Lipp studied woodworking in Maine and Scotland before moving to New York in 2003. That is when he began building custom pianos at Steinway & Sons; now, he oversees workplace safety and the construction of various limited-edition pianos.**

FineWoodworking.com

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

Charlie Reina *("What's Your Sign?")* **came to *Fine Woodworking* a year ago after a 30-year career in broadcasting. Having worked as a writer and producer for *Good Morning America* and other national news programs, he took up woodworking as a hobby in the 1980s after Norm Abram visited *GMA* to promote his brand-new show, *The New Yankee Workshop*.**

Nancy Hiller *("Arts & Crafts Wall Shelf" and Finish Line)* **learned early to appreciate British design. When she was 12, she and her family moved to England, where she later trained in furniture making and made a living as a woodworker. Returning to the United States to earn bachelor's and master's degrees in religious studies, she found her way back to woodworking and has operated NR Hiller Design Inc. since 1995. She also teaches a cabinetmaking class at Kelly Mehler's School of Woodworking.**

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letters

Spotlight

ISSUE NO. 192
August 2007
p. 36

COMMENTS ON GLUE TEST POUR IN

Thanks for an eye-opening test. I was disappointed that you did not include cyanoacrylate glue, a favorite of wood turners. I ran my own tests and yellow glue did beat polyurethane. But the overall winner was Satellite City's Super 'T', a cyanoacrylate (or "Super") glue.

—EDWARD H. RUSSELL, West Tisbury, Mass.

There's so much "information" floating around that it's refreshing to have some real comparisons and conclusions, with data to back them up. I applaud you for being willing to upset advertisers for the sake of the reader. My only quibble is that there was not a urea-formaldehyde glue included in the comparisons. I know they're not as popular as the others, but with their low creep factor, they work very well for bent laminations.

—JEFF BRATT, San Diego, Calif.

A glue absent from your article was (Weldwood) plastic resin. Its long open time and low creep make it the go-to adhesive for complex glue-ups and bent laminations. After conducting tests similar to the ones described in your article, I found that joint strength with plastic resin glue increases as much as nine times during its viable pot life of roughly two hours. I now tell my students that after mixing their glue to let it rest (slake) for 30 to 45 minutes prior to use, dramatically strengthening the adhesive bond.

—PAUL KINSEY, College of the Redwoods, Eureka, Calif.

One methodological issue seems problematic: These open bridle joints didn't seem to be clamped tight while the glue cured. Yet polyurethane glue expands as it cures. Does this not imply that the gaps in the joint would be widened by the glue itself, thereby weakening the bond for this type of glue?

—PETER WELLS, Marigny l'Eglise, France

I wonder if you used any type of filler with the epoxy when used in the loose joint. After building six boats, I've concluded that straight resin without a filler does not result in a strong joint.

—HANS WENDLER, Epsom, N.H.

Author replies: This article has generated a lot of letters, email, and online chatter. I'll respond here to the three comments raised most often.

First, why didn't we include other woodworking glues such as white glue, urea formaldehyde, "Super" glue, and a fast-set epoxy? The complexity of the test limited us to six of the glues most commonly used for furniture making. It still took considerable time to make and destroy 162 joint samples.

Second, readers were surprised by the poor performance of the polyurethane glue, especially on loose joints. They asked whether we dampened the wood before applying the glue and clamped the joint afterward. We did dampen all polyurethane glue surfaces. We put a spring clamp across all of the tight joints, regardless of the glue, because in trial joints, shop manager John White noticed that some glues caused the tight bridle joints to open up. The snug and loose joints were clamped away from the glue area to maintain an even gap (or pressure) on both sides of the tenon.

Last, a number of readers, in particular those who have built wooden boats, noted that epoxy is much stronger, especially when asked to fill gaps, if a filler such as wood flour is added. This may be, but no mention of it was made in the instructions for the System Three epoxy used in the test.

—MARK SCHOFIELD, managing editor

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READER SERVICE NO. 25

Emmert's great invention

Thanks for the article on vises ("Making Sense of Vises," *FWW* #191). Besides books and glossy magazines, one of my other big vices is vises.

I have one quibble: You included a "patternmaker's vise" on p. 51. That is true, of course, but the one you show appears to be an Emmert #1 or one of its copies (since the patent has long expired). Would it have been a lot of trouble to include the name of the great tool designer who invented this wonderful device?

—RICK SHAFFER, Cottonwood, Ariz.

Editor replies: Better late than never. Joseph F. Emmert patented this vise in 1891, and the near-perfect tool has remained largely unchanged since then. Part of its greatness is that it allows you to reposition a workpiece at almost any angle without having to loosen the jaws.

Is someone copying your design?

Dear colleagues: Is someone else copying your original design? If you search the Internet for Maloof-style rockers, you'll find a hundred-plus woodworkers using Sam's ideas and techniques for commercial gain. The other day I found a person and company that I believe traced my 1975 stool from *The Custom Furniture Source Book* (The Taunton Press, 2001) and put my design into production in China. An even cheaper knockoff is sold at Costco.

In a world of Wal-Mart and globalization, can I protect my little object? Should I bother to try?

In the reproduction furniture community, everyone copies the tried and true. So where does that leave today's studio furniture makers and designers?

Fine Woodworking has offered to host a discussion on this issue. If you have a thought, photo, or legal opinion about authorship and design protection, or have a personal experience with this question, please go to www.finewoodworking.com/extras for a link to an interactive discussion on this topic.

—JOHN GREW SHERIDAN, San Francisco

Metric system better for mixing shellac

In a recent *FWW* email newsletter (May 25, 2007; sign up at FineWoodworking.com for the free eLetter) there was an article on mixing your own shellac. I suggest going metric, by weight only, making it far easier to scale up or down for bigger or smaller quantities.

If you have a digital kitchen scale (or any scale that measures grams), you weigh a volume of denatured alcohol and add the appropriate weight of shellac for the cut you want (see the listing below).

To mix half a cup of a 2-lb. cut, put your empty jar on the scale, push the button to zero the scale, pour in 100g of alcohol, and add 30g of shellac flakes. That 100g of alcohol will measure 125 ml, or 4¼ oz., a little over ½ cup in volume.

For thicker and thinner cuts, add the following amounts of shellac to 100g of alcohol:

15g of shellac for a 1-lb. cut
30g for a 2-lb. cut
45g for a 3-lb. cut

Working by weight simplifies mixing tasks. I weigh directly in my mixing container, with no measuring spoons or cups, and with more accurate quantities.

A decent electronic scale can be had for $30 or so in cooking-supply stores.

—PETER ZIMMER, Halifax, NS, Canada

Writing an Article

***Fine Woodworking* is a reader-written magazine. We welcome proposals, manuscripts, photographs, and ideas from our readers, amateur or professional. We'll acknowledge all submissions and return those we can't publish. Send your contributions to *Fine Woodworking*, PO Box 5506, Newtown, CT 06470-5506.**

Use a handsaw to carry plywood?

Yours is a great magazine, so I was surprised to see a tip (Methods of Work, *FWW* #192) that suggests using a handsaw to carry a sheet of plywood. I can't imagine a craftsman laying the teeth of a handsaw across an expensive piece of plywood with thin walnut veneer.

—CARL WILLIAMS, Pasadena, Calif.

Editor replies: Good point. The teeth might damage a sheet of fine hardwood plywood. We think a strip or two of masking tape along the teeth would solve the problem. But for most of the general-use sheet goods we haul around the shop (construction-grade plywood, hardboard, medium-density fiberboard, and the like), the tip works well as shown.

Better way to make a slotted dowel?

I think I have a quicker way to "Cut a lengthwise groove in a [1-in.] dowel" (Q&A, *FWW* #192). Use a piece of stock 1 in. sq. and several inches longer than the required length of the dowel. Then saw the slot in one face of the square. Now position the blank on a router table and cut all four sides with a ½-in.-radius roundover bit, keeping an inch or so square on each end.

—BOB SELKIRK, Fort Myers, Fla.

Buy generic router bits in cheap sets

I appreciated your recent shop test of router bits (*FWW* #191). This may sound like heresy, but where are the generics? Sure, I indulge in the top brand names, but in recent years I have succumbed to offers from department stores, home centers, and catalogs for large and small sets of bits, usually of indeterminate origin. The average price per cutter is $2 to $3!

I never worry about chipping an edge or having to send them for re-sharpening; the bits cost about as much as twist drills.

—ROGER APTED, Milton, Wis.

Correction

In a recent article, "Tool Test: Benchtop Drill Presses" (*FWW* #192), we inadvertently put the Best Value logo on the wrong Grizzly drill press (there were two in the test). The winner, as indicated elsewhere in the article, was the Grizzly G7943.

Drawing: John Hartman

EDITED AND DRAWN BY JIM RICHEY

Best Tip

Tapering jig for the tablesaw

A self-taught woodworker, Alan Carter has been designing and building contemporary furniture full-time for about eight years. He was an artist in his previous career, too, creating photorealistic paintings of cityscapes while enjoying furniture-making as a hobby.

This versatile jig not only makes tapered legs, it also makes angled cuts on sheet goods as wide as the tablesaw will allow. It consists of a sliding base, fences, and a workpiece support for tapering sheet goods.

The long fence can be used to cut tapers up to 15° on pieces up to 40 in. long. I also have a shorter fence for cutting steeper tapers on shorter pieces.

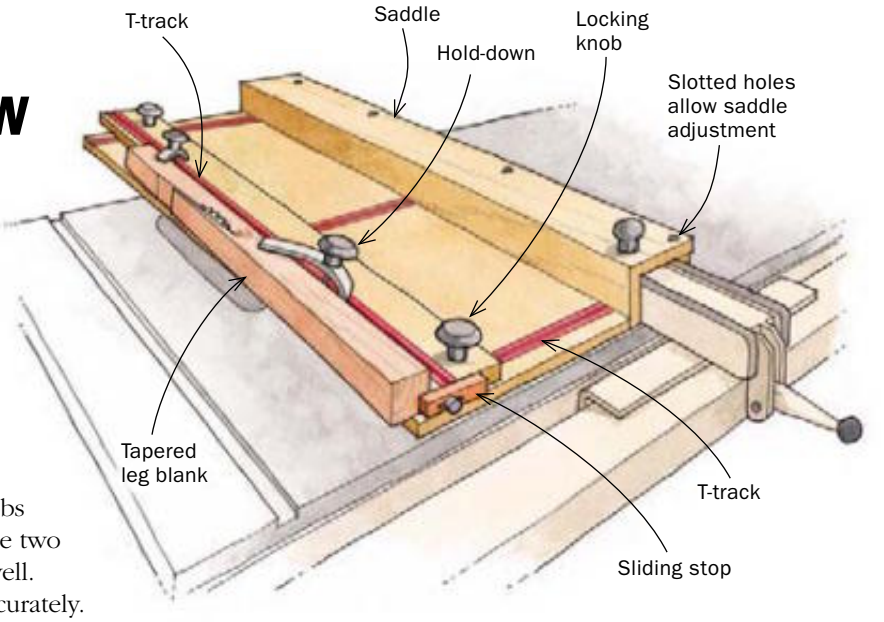
The fence locks into position with knobs and T-slot bolts that slide in T-tracks. The two hold-down clamps ride in a T-track as well. The sliding stop registers workpieces accurately. (Knobs, T-slot bolts, T-track, and hold-down clamps are available from www.hartvilletool.com.)

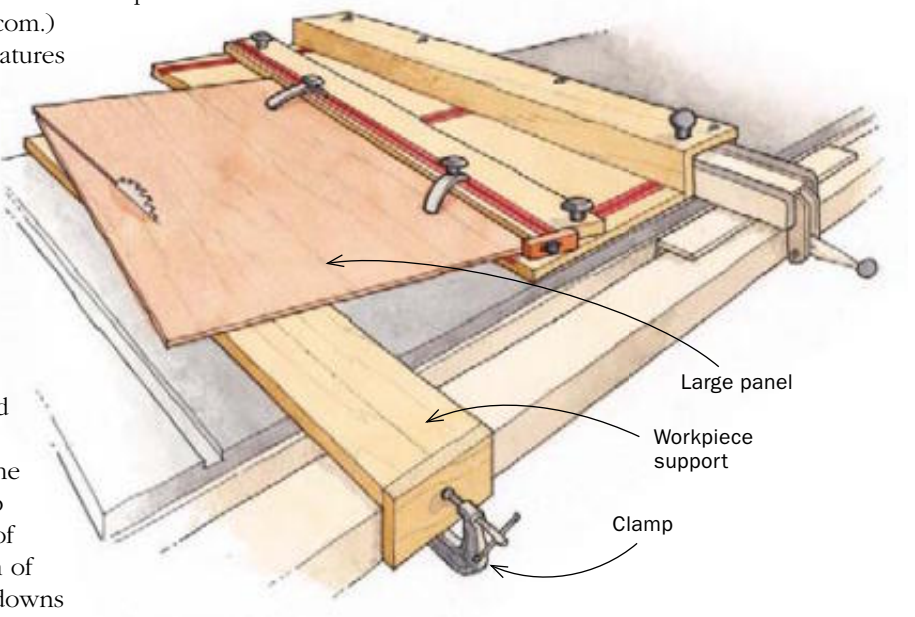
The right side of the sliding base features a channel that rides the saw's rip fence for maximum accuracy. The far side of the saddle is adjustable with slotted holes for the screws, so the jig will slide smoothly over the fence without slop or binding.

To taper a leg, I first adjust the base position using the rip fence so that the jig is right next to the blade. I then mark each end of the workpiece to get the taper I want and line up the marks with the edge of the jig, which is also the cut line of the blade. After that, I move the fence up to the leg blank, butting the bottom of the leg against the stop at the bottom of the fence. Finally, I tighten the hold-downs and make the cut.

When tapering wider pieces, I use a workpiece support that straddles the blade. The support is a piece of Baltic-birch plywood the same thickness as the base of the jig, with a sawcut partway through it and a fence attached to the front that I clamp to the saw's fence rail. I have drawn a line down the center of the support in line with the blade to assist in lining up the workpiece for the cut. With this support I can move the jig as far away from the blade as necessary for cutting wide panels.

—ALAN CARTER, Lisle, Ill.





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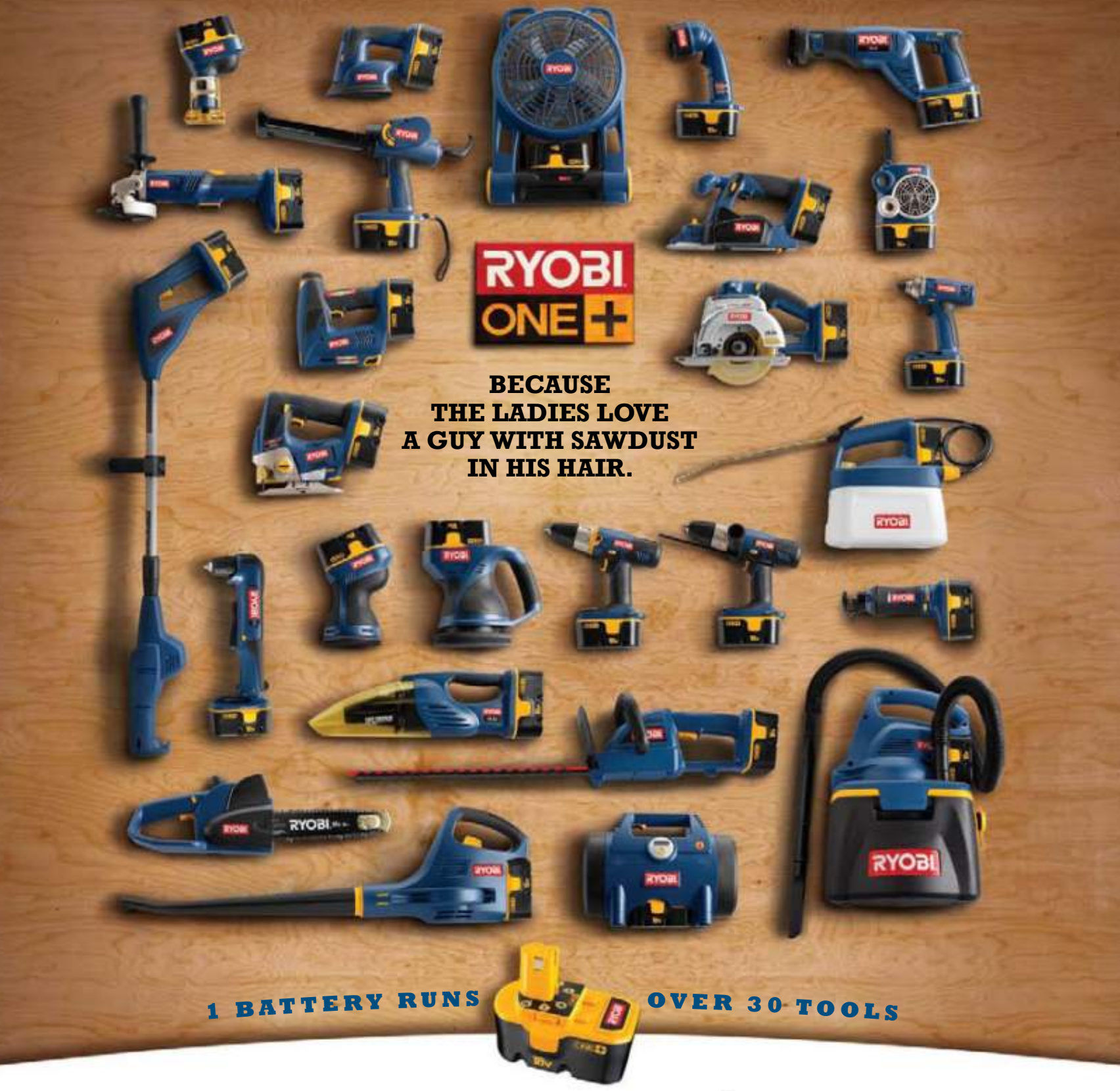

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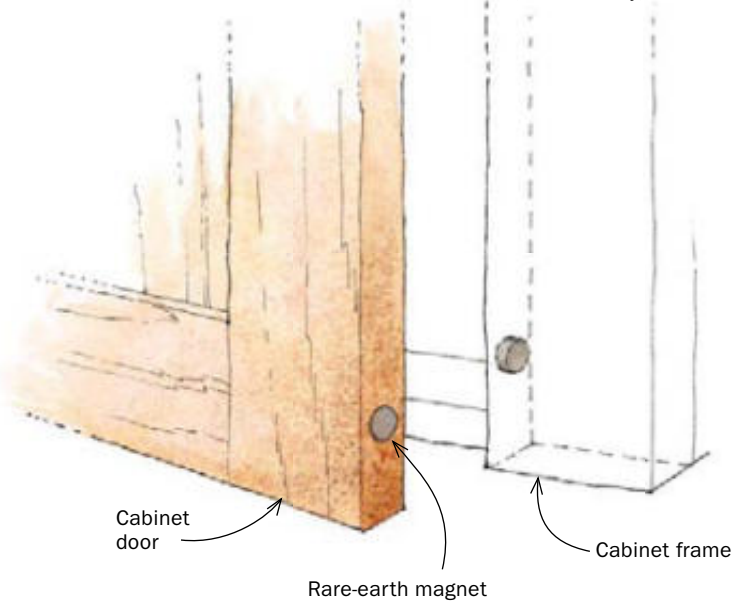
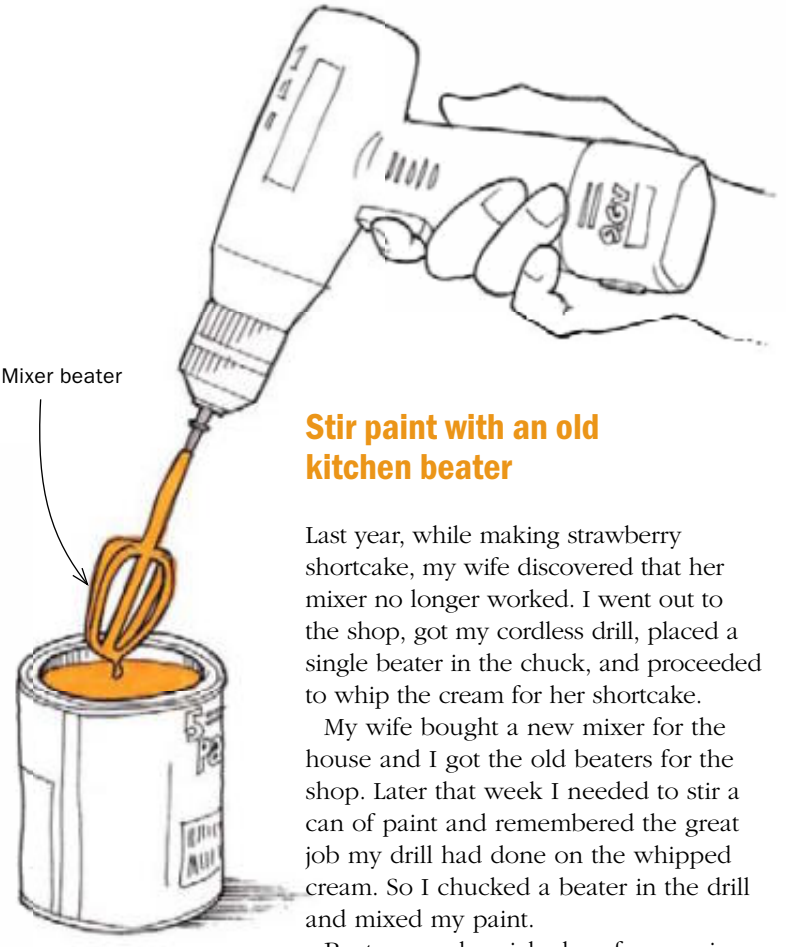
Magnetic cabinet catch

A cabinet door that always opens on its own is a big nuisance. However, the problem can be solved easily with a pair of rare-earth magnets. The magnets install in minutes, and they keep the door securely shut. One magnet goes in the door, one in the stile. Drill a ½-in.-dia., 5mm-deep hole in both. Be sure the polarity is right, then glue the magnets flush with a drop of cyanoacrylate glue. You'll be amazed at how well they hold.

—LES ROBERTSON, Carson City, Nev.





Stir paint with an old kitchen beater

Last year, while making strawberry shortcake, my wife discovered that her mixer no longer worked. I went out to the shop, got my cordless drill, placed a single beater in the chuck, and proceeded to whip the cream for her shortcake.

My wife bought a new mixer for the house and I got the old beaters for the shop. Later that week I needed to stir a can of paint and remembered the great job my drill had done on the whipped cream. So I chucked a beater in the drill and mixed my paint.

Beaters can be picked up for pennies at yard sales and thrift shops.

—DAVE HEBBLETHWAITE, Homosassa, Fla.

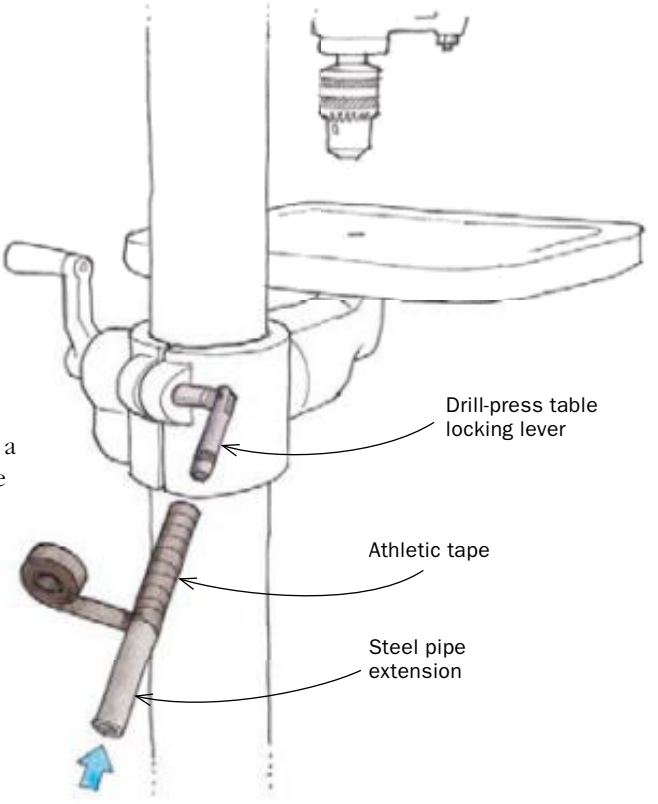
Extend the locking lever on your drill press

My drill press is a big floor model, but the locking lever for the table is too small to apply adequate torque to lock it in place. Further, it is located on the left side of the tool and I'm right-handed.

My solution was to remove the lever and bring it to the hardware store. There I found a 6-in. length of steel pipe that was close to the diameter of the lever.

Back at home, I used a cordless drill and a 31/64-in. twist bit to enlarge the inside of the pipe for a good tight fit on the lever. Then I jammed the pipe in place and wrapped it with black athletic tape. Now it's a lot easier to lock the table securely.

—SERGE DUCLOS, Delson, Que., Canada



Quick Tip

To add "soft jaws" to any vise, all you need is hardware-store variety aluminum angle and a little carpet tape.
Cut the angle into two pieces. Use the double-sided tape to attach a piece to each of the jaws. When attached, one leg of each angle rests on top of the jaw and the other leg butts up against the inside face.

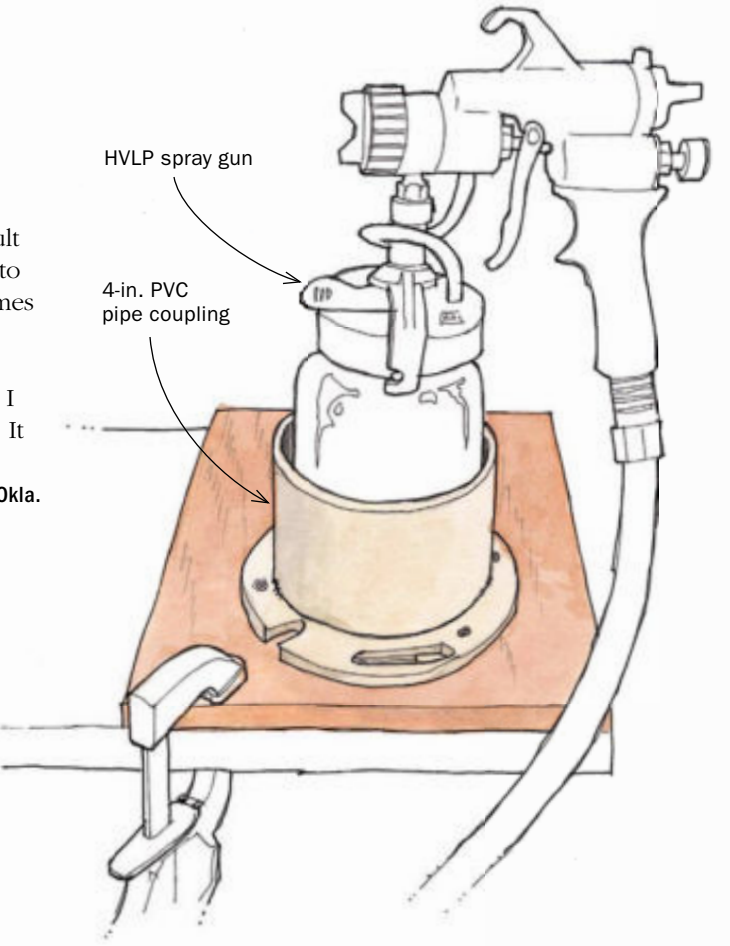
—ROGER S. APTED, Milton, Wis.

Spray-gun holder from plumbing parts

When setting up a new high-volume, low-pressure (HVLP) finishing system, I realized that the spray gun would be difficult to set down because the hose is large and causes the sprayer to tip. Knowing that I might have to set the gun down several times while spraying, I needed a holder of some kind.

To make one, I slid a 4-in. PVC pipe coupling onto a 4-in. PVC toilet flange, then I screwed the flange to a board. Now I move the board anyplace I'm working and clamp it in place. It works great.

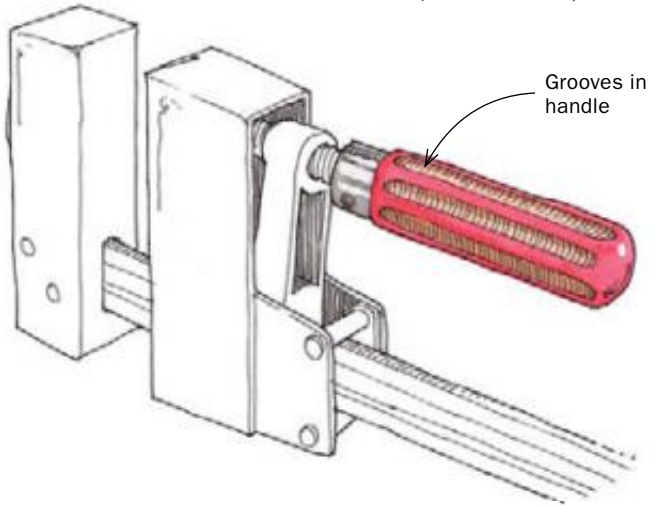
—BOB BULICK, Tulsa, Okla.



Improving the grip on clamp handles

Here's a quick and easy improvement that really increases the gripping pressure on clamps with wooden handles. Just cut seven or eight grooves the length of the handle with a #9-sweep carving gouge. To avoid nicking the gouge, though, be careful not to let it hit the ferrule at the base of the grip.

—CHRISTIAN BECKSVOORT, New Gloucester, Maine



Quick Tip

Large chunks of latex rubber (called abrasive cleaning sticks) are sold for cleaning clogged sanding belts. Quite by accident, while using my belt sander to sand the end of a piece of an ABS drainage pipe, I discovered something that works better. The ABS cleaned away stubborn lumps the latex rubber couldn't remove, and left the belt looking new.

—JOHN COOK, Tottenham, Ont., Canada

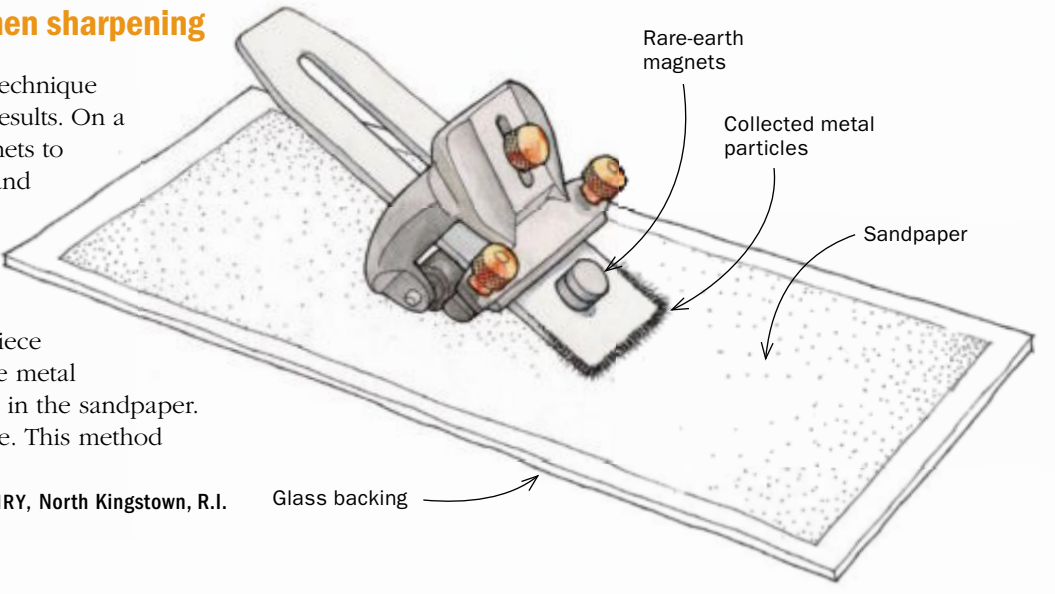
Magnet keeps abrasive cleaner when sharpening

I tried Brent Beach's sandpaper-sharpening technique (*FWW* #184, pp. 64-67) and have had great results. On a hunch, I attached two round rare-earth magnets to the shaft of my chisel while sharpening. Lo and behold, the metal sharpening particles stuck to the chisel.

When done sharpening, I just take off the magnets, remove the chisel from the honing guide, and tap the chisel on a piece of wood (or blow it with an air gun). All the metal particles drop in the trash and none are left in the sandpaper.

No oil, no mess, and it's as clean as can be. This method works with any sharpening technique.

—RALPH HENRY, North Kingstown, R.I.



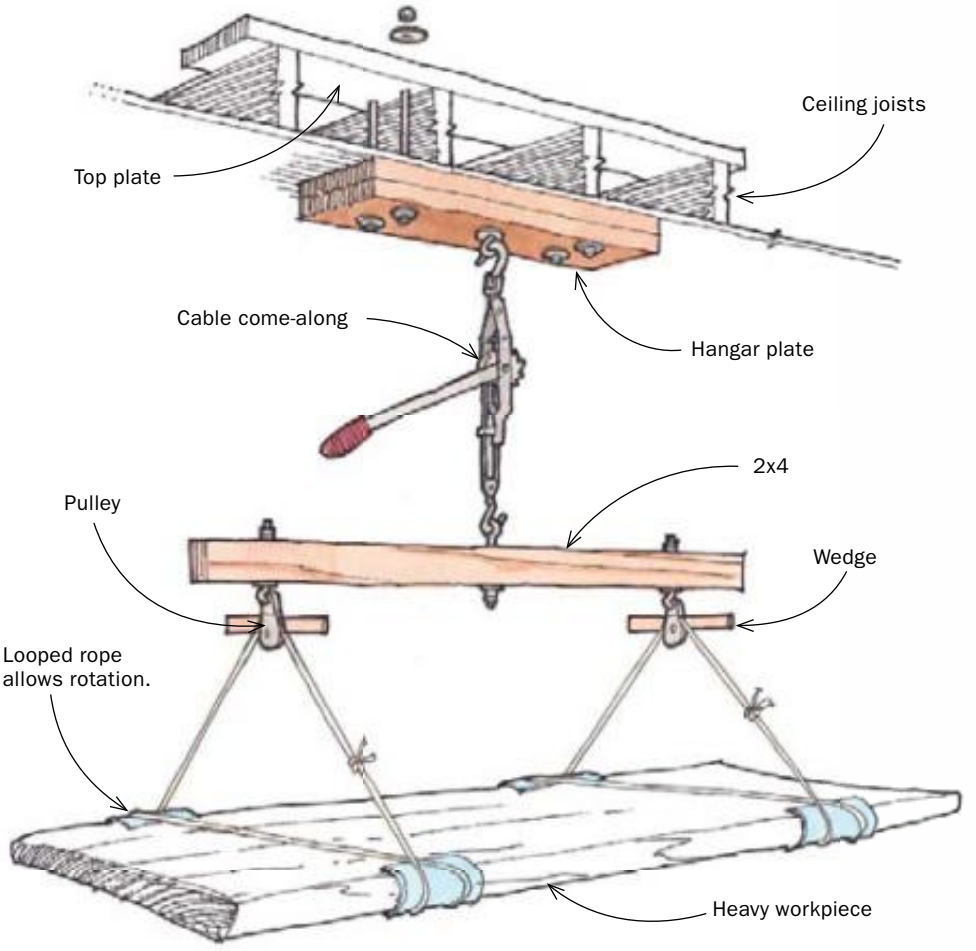
Hoist for heavy workpieces

I recently made a desk from a 200-lb. walnut slab. Because I work alone, picking up this monster or turning it over was a back-breaking chore. So I designed a hoist system that uses a commonly available 4-ton cable come-along (available at farm-supply stores) and common hardware.

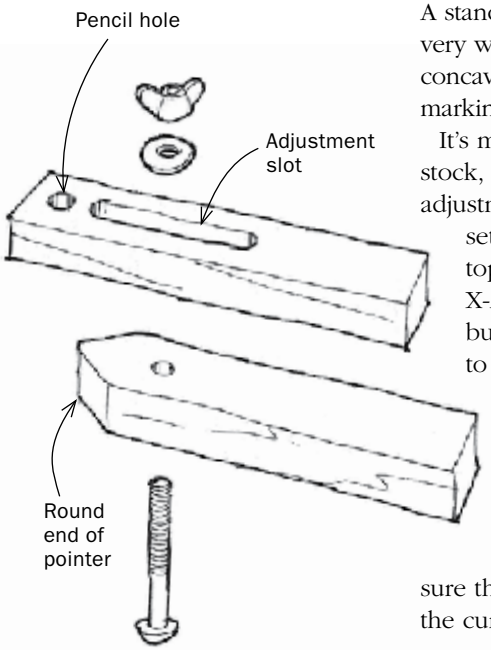
To make the hoist, first install a top plate in the shop ceiling above the joists. You might need to span several joists if the workpiece is really heavy. The other parts of the hoist and the hardware are shown in the sketch. Be sure the eyebolts are strong enough to carry the weight—mine are made from ½-in.-dia. stock.

To use the hoist, first attach the workpiece with the rope-loop system shown at right. Add scraps of carpet under the ropes to protect the workpiece. Use the cable come-along to raise or lower the workpiece. The rope-loop attachment system has the advantage of allowing the workpiece to be rotated. When the workpiece is in position, lock the pulleys with wedges to keep it from rotating further. Then it can be lowered onto sawhorses and the rope system removed.

—MIKE HARDIN, Nevada City, Calif.



Marking gauge handles curved edges

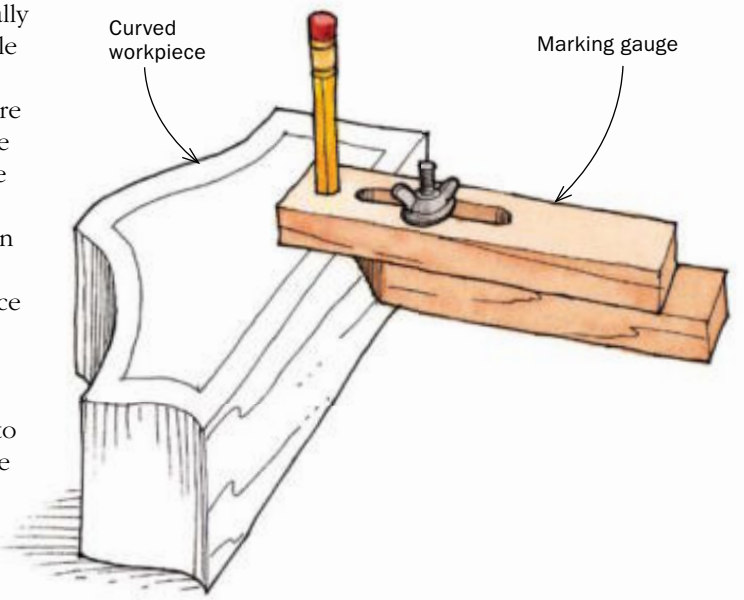


A standard marking gauge doesn't work very well on curved profiles, especially concave ones. So, I designed a simple marking gauge for curved parts.

It's made from two pieces of square stock, the top one slotted to provide adjustment. A thumbscrew locks the setting. I drilled a hole in the top piece to hold a pencil (or an X-Acto knife) and rounded the business end of the bottom piece to allow it to follow a curved profile.

To scribe a line, butt the rounded end of the gauge to the edge of stock, then slide the gauge along the curved edge. As you scribe, make sure the gauge always stays 90° to the curve.

—LONN LORENZ, San Jose, Calif.



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STATIONARY TOOLS

Drill press offers new level of convenience

Powermatic's new model 2800 drill press is a precision drilling machine with lots of convenient features.

It offers easy-to-adjust variable speed control and accompanying digital readout. The 1-hp motor provides adequate power for big bits—even hole saws. In fact, I had no problem boring a 4⅛-in.-dia. hole through 5/4 hard maple.

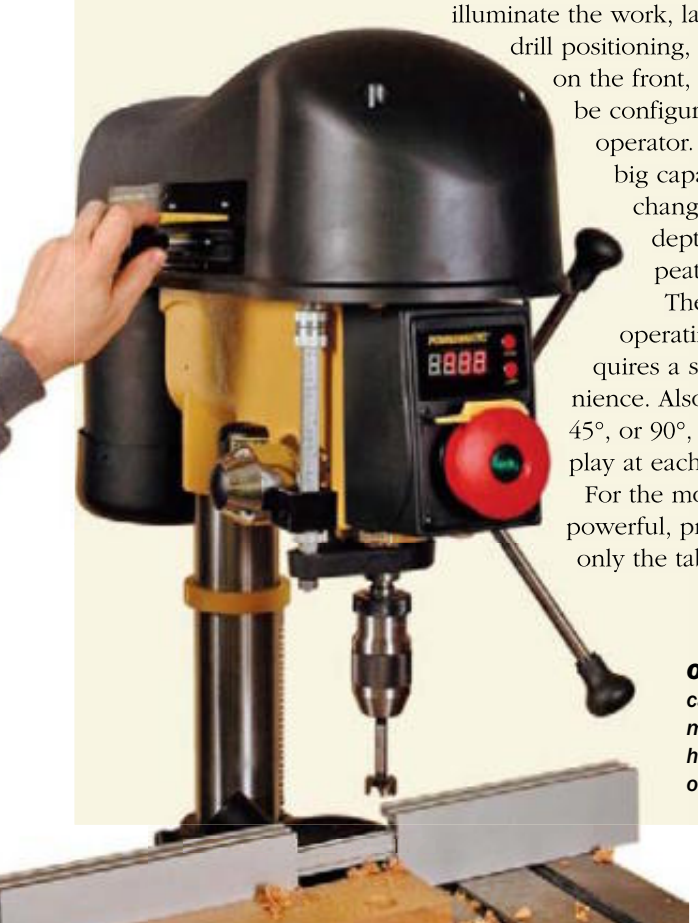
The large cast-iron table features sliding extensions that create an even bigger worksurface. T-slots in the table accommodate an aluminum adjustable split fence, which includes a 2-in. dust port, and provide the possibility of creating custom hold-downs. Other convenient features are the twin LED lights that illuminate the work, laser crosshairs for pinpoint drill positioning, a large lighted power switch on the front, and feed handles that can be configured for a right- or left-handed operator. A keyless ⅝-in. chuck offers big capacity and quick, secure bit changes, and a double-nut locked depth gauge assures accurate repeatability.

The table tilts left or right, but operating the tilt mechanism requires a socket wrench—an inconvenience. Also, a lock pin positions it at 0°, 45°, or 90°, but the pin had about 4° of play at each position.

For the money ($900), the PM 2800 is powerful, precise, and convenient, with only the table-tilt falling short.

—Roland Johnson is a contributing editor.

POWERMATIC PM 2800
www.powermatic.com
Street price: $900
Table size: 16 in. by 20¾ in., opens to 30¾ in.
Quill stroke: 4⅜ in.
Chuck-to-post distance: 9 in.
Motor: 1 hp, TEFC
Speed: Variable (400 to 3,000 rpm)
Weight: 287 lb.
Runout: 0.001 in.



One-handed speed changes. *You can dial in the speed on the Powermatic using a lever on the motor head. The digital speed readout on the front is hard to miss.*

BLADES

Freud's sawblade takes on the Forrest

In a recent shop test, I found Freud's new Premier Fusion 10-in. tablesaw blade to be a smooth cutter that performed as well or better than the Forrest Woodworker II, judged best overall in a *FWW* blade review a few years back.

Like the Forrest, the Freud is a 10-in.-dia. combination blade with a 40-tooth, alternate top bevel (ATB) grind. It's a thin blade that makes a kerf just under ⅛ in. wide (the Forrest cuts a kerf just over ⅛ in. wide). Both feature laser-cut plates, although the Freud ran quieter, and both blades come with a lifetime warranty. The Freud blade also comes with a nonstick coating designed to resist corrosion and pitch buildup and, like the Forrest, is pretensioned for stable flatness during its lifetime.

I compared the two blades head-to-head. Both made excellent ripcuts and crosscuts, making it hard to choose a winner. In the end, I chose the Freud because of its slightly lower price, as well as the fact that it resists pitch buildup and makes a very narrow kerf. The Freud Premier Fusion blade (www.freudtools.com) sells for about $100 at Amazon.com and other online sites.

—Fred Sotcher is a woodworker and a retired mechanical engineer.

Photos, this page (left two): Roland Johnson

SHARPENING

VERSATILE SHARPENING MACHINE IS A GOOD VALUE

The Work Sharp horizontal disk sharpening machine is designed to sharpen most chisels and plane irons, as well as turning and carving tools. The machine comes with a basic kit that includes two tempered-glass disks, a slotted see-through disk, and a variety of adhesive-backed abrasive papers that attach to the disks.

To establish and hone the bevel of blades 2 in. wide or less, you work from underneath the disk through a sharpening port (see photo, right). On wider blades, you work from above on the tool rest. The blade is registered against the disk via an adjustable tool rest that can be set in 5° increments from 20° to 35°. An integral fence and guide rail keep the tool 90° to the disk. A small square of abrasive-backed paper on the rest is designed to remove the burr created by grinding. The blade is plunged into the spinning disk and pulled back along the rest to remove the burr. The slotted disks allow you to sharpen turning and carving tools from below while eyeing the edge from above.

The Work Sharp quickly flattens the backs of plane irons and chisels from above, although the smaller-diameter disk is not as versatile and easy to use as the more common 8-in.-dia. disks on other machines I've looked at.

Overall, though, the Work Sharp system performed well, producing edges sharp enough to shave arm hair, and has a reasonable price tag ($200). It is available at www.rockler.com.

—Tim Albers reviewed sharpening machines in *FWW* #182.

Push-pull sharpening method. *The blade is guided into the disk on an adjustable tool rest that keeps the blade square to the disk. An abrasive on the bed of the rest removes the burr from sharpening as the blade is pulled back.*

HAND TOOLS

Reproduction backsaws cut flawlessly

Wenzloff and Sons, a small saw-making firm in Forest Grove, Ore., has introduced a line of saws—two handsaws and four backsaws—patterned after a set found in the famous 18th-century tool chest of Benjamin Seaton. The Seaton saws were made by the renowned Sheffield saw maker John Kenyon. The Wenzloff saws are handmade, hand set, and hand filed.

I tried a carcass saw and a sash saw. Like the other backsaws, the carcass and sash saws have folded brass backs and finely sculpted beech handles. Initially, I was impressed with the way they felt in my hand, but I was even more impressed with the way they cut.

The 11-in. carcass saw yields a 0.024-in.-wide kerf. Its razor-sharp rip teeth (14 tpi) cut fast and track straight, which makes it perfect for cutting dovetails. The 14-in. sash saw has 13 tpi filed with a rip pattern. This saw produces a narrow 0.029-in.-wide kerf and cuts even faster than the carcass saw, while still tracking a perfect line. Its size and precision make this saw great for cutting tenons.

The Wenzloff saws are among the best being produced today and are true to their 18th-century roots. The carcass saw sells for $140, the sash saw for $175. Both are available at www.thebestthings.com, along with the other saws in the Wenzloff line.

—Chris Gochnour is an avid hand-tool user and collector.

FineWoodworking.com/ToolGuide

Visit our Web site to post ratings and reviews of the tools you own and to browse our free archive of editor reviews from the last five years of *Fine Woodworking* magazine.

Photos, except where noted: Thomas McKenna

POWER TOOLS

Precision miniature plunge router

Proxxon, a German tool maker, has created a micro-router that offers the precision of a plunge router on a miniature scale.

This little router is the real deal with smooth-operating plunge mechanism, die-cast aluminum base, replaceable polycarbonate base pad, and an adjustable depth-stop. An easily operated depth lock is integrated into the grip pad on the motor housing with the power switch located on the opposite grip pad. Designed for detail work, the router features a small keyless chuck with three-jaw collets for a number of small-diameter shanks, from 1/32 in. to 1/8 in. A spindle lock integrated into the router housing simplifies bit changes, although the small scale of this router makes changing bits a challenge for those of us with sausage-sized fingers. The kit includes an edge guide and a circle-cutting guide.

Handy little router for inlay work. *The Proxxon mini plunge router comes with an aluminum edge guide that adds precision to your work.*

Weighing in at a svelte 2.4 lb., this little gem is ideal for inlay and small detail work. The Proxxon micro-router sells for the small price of $79 at www.minicrafttools.com.

—R.J.

DVD RENTAL

Mail-order woodworking classes

Based on the success of Netflix, a Web-based DVD rental service, a Massachusetts outfit has created a Web rental service for hobbyists, including woodworkers. The service offers a large number of woodworking DVDs, with such notable makers as John Alexander, Sam Maloof, Tage Frid, and Norm Abram. It's a simple way to learn more about woodworking at home. Each rental costs $9.99 per week. The DVD arrives with a prepaid return packet, so when you are finished, simply pack up the disk and drop it in the mail. For information about rentals, go to www.smartflix.com.

—Tom McKenna is an associate editor.

STORAGE

LITTLE TOOL CABINET IS BIG ON STORAGE

Versatile storage accessory for the shop. *The Concept 2001 Tool Cabinet goes together quickly and can hold a lot of tool accessories without eating up much space.*

This little orange cabinet packs a lot of storage into a 7-in.-deep by 27-in.-wide by 19-in.-tall. space. The Concept 2001 Tool Cabinet uses slotted walls and doors to secure an assortment of clever hooks and brackets, which are included with the cabinet and lock securely and easily into place.

The funky colors may be a turnoff for some (strangely, I like them), and the system probably won't work for hand tools that need specialized holders. However, at $50, it is a great value for anything else you want to keep in one place, away from layers of shop dust. In my shop it made a perfect depot for tablesaw accessories. Hanging bins also are available, adapting the cabinet to hardware storage. Made from light-yet-sturdy foamed PVC, the cabinet can handle a lot of weight. Go to www.stor2000.com to learn or buy.

—Asa Christiana is the editor of *Fine Woodworking*.

Photos, this page: Roland Johnson (top); Asa Christiana (bottom right); John Tetreault (bottom left)

TURNING

Midi-lathe is precise but lacks power and convenience

Shopping for a midi-lathe these days is like cruising a rental-car parking lot: You see lots of products, but they're all Chevrolets.

I recently looked at the variable-speed Turncrafter Pro from Penn State Industries. Like many of its competitors, it has a 10-in. swing (the maximum diameter it can turn), 17 in. between centers, a ½-hp motor, and stepped pulleys to change from one speed range to another.

Penn State says the Turncrafter is "the most powerful variable-speed midi-lathe on the market" and that it delivers "full torque at all speeds." But my testing couldn't support either of these claims.

I subjected three midi-lathes, the Turncrafter, the Rikon 70-100, and the Steel City 60100, to the same weighted test used to check low-speed torque in a recent review of heavy-duty lathes (*FWW* #191). The Penn State was the weakest of the three. At its slowest speed, the lathe slowed or stalled with the least weight, 7½ lb. At the top of its low-speed range, about 1,000 rpm, it slowed or stalled at only 5 lb., a sign that it had less torque at the higher speed. In contrast, it took at least 15 lb. to stall the Steel City at its slowest speed, and at least 10 lb. to stall the Rikon.

In other respects, the Penn State performs well. It's quiet and low in vibration, with nicely machined surfaces on the bed. Headstock and tailstock align precisely, and the tool rest and tailstock move smoothly. It was as good as any other midi-lathe I've used for small turnings. It does have three noteworthy drawbacks: The 6-in. tool rest is too short; the plastic locking levers for the tool rest and tailstock feel flimsy; and the access to the drive belt is at the back of the headstock, making belt changes awkward.

—David Heim is an associate editor.

TURNCRAFTER PRO

www.pennstateind.com

Street price: $180 ($220 with bed extension)

Weight: 78 lb. (100 lb. with extension)

Motor: ½ hp

Swing: 10 in.

Distance between centers: 17 in.

Speed settings (rpm): 500 to 3,200 overall, in three ranges

Headstock spindle: 1-in. by 8-tpi Morse taper

Tailstock spindle: Live center, #2 Morse taper

Faceplate included: Yes

Outboard turning option: No

ACCESSORIES

DIAL IN YOUR MACHINE SETUPS

If you're looking for digital accuracy in your machine setups, check out the Wixey Digital Angle Gauge. With this gadget, you can dial in tablesaw blade angles, micro-adjust a jointer fence for precision, and adjust table angles on drill presses and bandsaws. It also works well to dial in miter cuts on a compound-miter saw. We checked the accuracy of the gauge using machinist's angle plates, and its readings are dead-on. The angle gauge sells for $40 and is available from www.wixey.com.

–T.M.

Using the gauge. *Before setting the blade angle, you need to zero out the gauge on the tablesaw surface to account for any surfaces that are not level (above). Magnets hold the gauge in place while you dial in the desired blade angle (right).*

Pin gauges vs. slicing gauges

BY STEVE LATTA

It's all in the blade. *The pin gauge (left) uses a pointed steel pin that makes a V-shaped cut. Slicing gauges tend to make cleaner cuts. The traditional version (center) uses a knifelike cutter, while the wheel gauge (right) employs a beveled circular cutter.*

Pin gauges and slicing gauges fall under the umbrella of marking gauges and are primarily used to scribe lines for joinery.

Pin gauges are simple and inexpensive. They consist of a steel pin mounted near the end of a bar that's most often made of wood. Without refinement, the pin makes a V-shaped cut that tends to rip the fibers when marking across the grain, as for a tenon.

On slicing gauges (often called cutting gauges), the pin is replaced by a knifelike cutter that typically is flat on the outside face and beveled on the inside. This wedge shape pulls the main body of the gauge tight to the edge of the stock and discourages the blade from wandering. This profile also leads to tighter joinery because the bevel is on the waste side of the cut.

A modern variation of the slicing gauge is the wheel gauge, which uses a beveled circular cutter mounted at the end of a bar or a round steel shaft. The cutter does not rotate during use. When a section of its edge dulls, it can be loosened and rotated to expose a new section.

The all-metal versions of the wheel gauge come with disk-shaped fences that typically are smaller than the rectangular wood fences common to traditional slicing gauges. To me, they feel awkward and provide too little bearing surface along the edge of the workpiece. Still, many folks I know would be reluctant to give theirs up.

I prefer a shopmade slicing gauge (mine is shown in *FWW* #183, p. 46). Commercially made slicing gauges with wide fences include traditional Western designs (for example, by Crown Tools) and Japanese versions, which have especially large fences.

If you have a pin gauge, you can convert it to a slicing gauge. Just file the pin's outside face flat and its inside face on an angle to form an edge that actually will cut the wood. □

PIN GAUGE

The bane of the pin. *Marking across the grain with a pin gauge leads to torn wood fibers and a ragged cutting line.*

SLICING GAUGES

Clean cutting. *Both the knife gauge (right) and wheel gauge (below) make clean cross-grain marks, but the square fence of the knife gauge offers more bearing surface.*

Photos: Charlie Reina

Is it time to get a fresh edge?

SIGNS THAT YOUR TOOLS ARE LOSING THEIR CUTTING POWER

BY STEVE SCOTT

Showing some wear. *As a handplane blade dulls and gets nicked, the shavings no longer come off as a wide ribbon but are sliced down their length.*

Beginning woodworkers are told often about the importance of keeping tools sharp. Deciding when to stop and resharpen or replace a tool ultimately depends on how much poor performance you're willing to accept. Applying that lesson, however, takes practice. For starters, how can you tell when a tool is losing its edge?

Christian Becksvoort calls the descent from sharp to dull "a gentle, downward curve, with steadily declining results and ever more effort required."

We asked Becksvoort and other contributing editors to describe some indicators that it is time to sharpen. The three warning signs: effort, results, and tool condition.

How hard are you working?

When deciding whether a tool is losing its edge, "my first clue is an increase in cutting resistance," says Garrett Hack.

Simply put, a dull cutting edge on a hand or power tool requires more force to cut the wood. On router tables, for instance, a dull bit means you'll have to exert more pressure to keep the wood against the fence.

"A dull bit will tend to push the material away," Roland Johnson says. "A sharp bit just cuts." In similar fashion, a dull jointer knife wants to lift a board off the table.

You'll have to push harder to move stock through a cut if a bandsaw or tablesaw blade is dull. A dull tablesaw blade requires extra effort even if cleaned of gum and pitch, Becksvoort says.

On the bandsaw, you'll find yourself pushing the blade against the rear thrust

Power tools

The brute force provided by an electric motor can't overcome the effects of a dull blade or bit. You'll work harder to feed the stock or guide the tool, and the finished cut will not be clean.

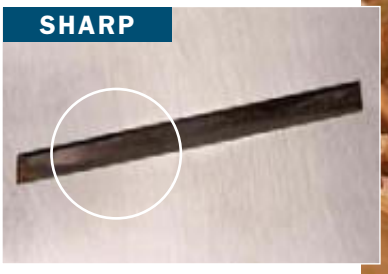
More push needed. *The extra force required to feed stock into a dull bandsaw blade can cause the blade to wander. A rough, wavy cut is the result.*

Slow going. *A dull tablesaw blade requires more effort to feed stock into the cut, and the difference shows in the work. Although a dull blade won't look markedly different from a sharp one, it can leave stock looking burned and scarred.*

Photos: Kelly J. Dunton

Hand tools

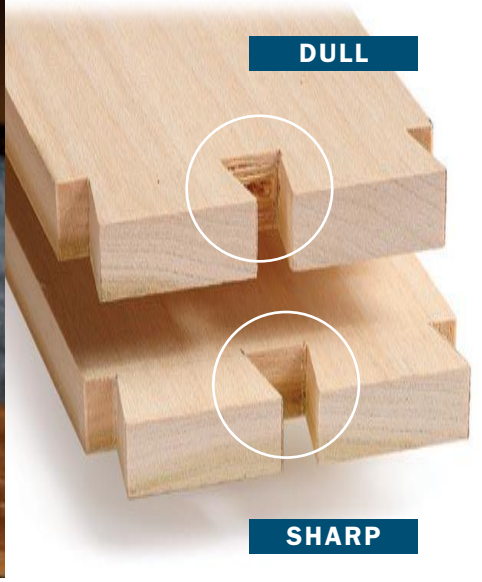
As it dulls, a chisel or plane iron will gradually offer more resistance to the force you apply.



A sign of wear. *A dull plane iron will show a telltale line of light near the cutting edge. A sharp blade won't.*

DOVETAILS ARE A GOOD TEST

Torn-out end grain between the tails indicates a dull chisel. Soft woods like white pine show tearout sooner.



bearing as you force stock through a cut, according to Gary Rogowski. This is more apparent with thicker stock.

With handplanes, Hack says, a dull edge is most noticeable on end grain. And dull chisels are harder to handle.

"On long grain I have to push harder," says Hack, "and I sometimes lose control because the dull edge wants to dive into the fibers rather than sever them."

Becksvoort sharpens his chisels after one large dovetailed case or two or three smaller pieces.

What do the results look like?

If increased effort is the first sign of a dulled edge, poor results are the surest.

Jointers and planers will leave tearout when blades are dull. Becksvoort changes them after two to four months of frequent use. The dulled blades give the wood a polished appearance that is "very shiny, but not particularly smooth."

A router with a dull bit can burn the stock, but that also can happen with a slow feed rate. A surer sign, Hack notes, is a cut with feathery or splintered edges.

On the bandsaw, Rogowski says, a dull blade will wander and yield a wavy cut, or begin to drift increasingly to one side.

With chisels, Becksvoort finds that when chopping dovetail slots, "I begin to get an unacceptable amount of tearing as I chop down across the grain."

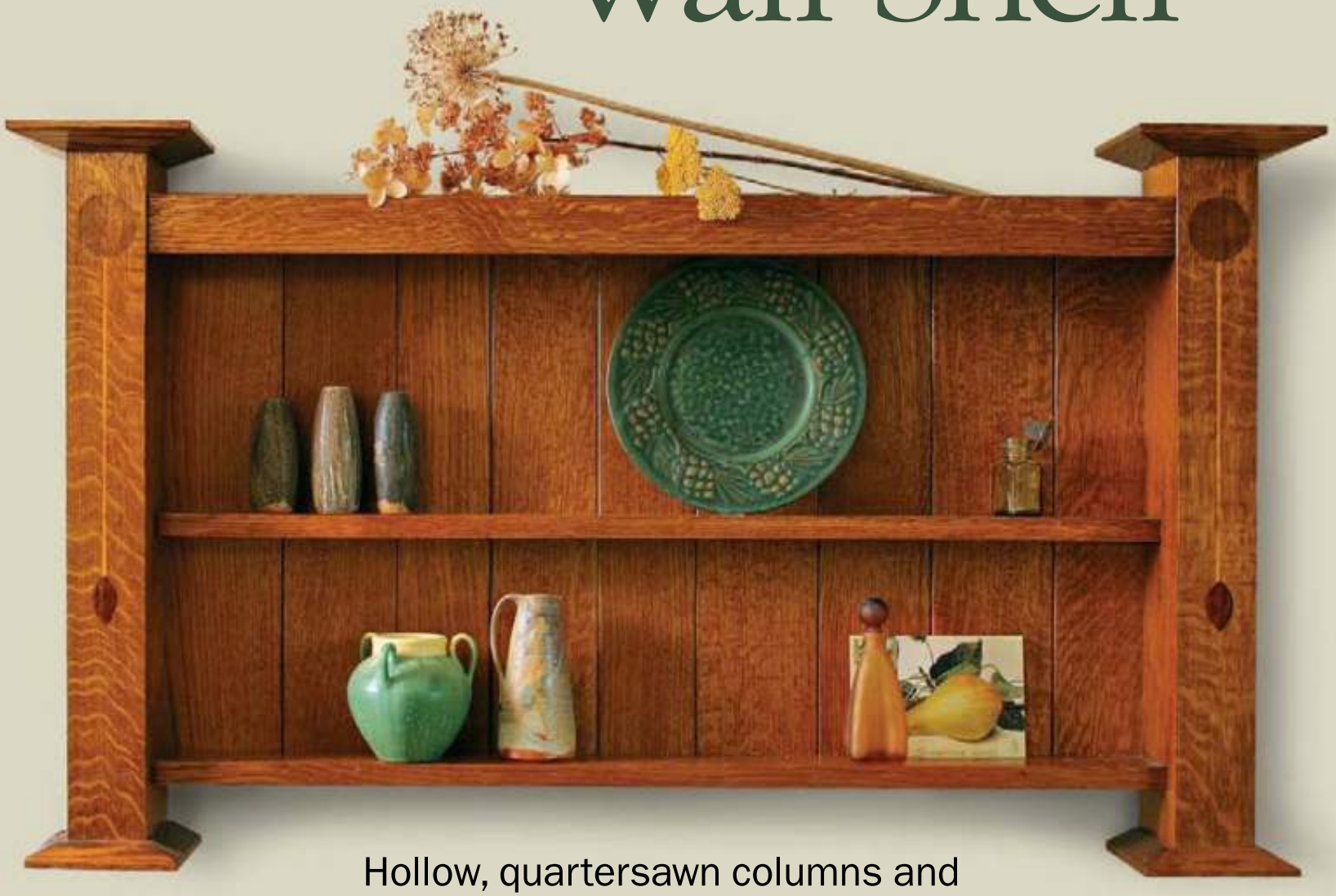
Hack gauges the sharpness of a handplane edge "by looking at the shaving and by feeling the surface." On long grain, he looks for tearout and a dull or slightly rough surface. "The shavings no longer come off as a continuous thin ribbon but are getting sliced down their length at each nick, or they have holes where tearouts occur."

How does the tool look?

If you are still unsure that you have a dull blade, look at the edge itself.

On plane irons and chisels, a dull blade will reflect a line of light at the cutting edge. Dull sawteeth are much harder to see. They won't look or feel any blunter than sharp ones. But if a good cleaning doesn't improve their cutting ability, you'll know the edge is suffering. □

Arts & Crafts Wall Shelf



Hollow, quartersawn columns and traditional inlay elevate an easy project

BY NANCY HILLER

While looking through a book on home design several years ago, I noticed a small cabinet hanging above a claw-foot bathtub. With its inlaid columns and beveled caps, the shelf was wonderfully British in style and was quite distinct from American interpretations of Arts and Crafts design. Although the original cabinet had a pair of doors, its shallowness seemed more suited to open shelves.

The design of this cabinet may be simple, but making it involves using a number of valuable techniques such as mitered joints for the columns, decorative inlay, and a finish for quartersawn oak that makes new work look old (see Finish Line, pp. 106-107). Although quartersawn oak is the traditional choice for English Arts and Crafts furniture, this piece would look equally good if it were made of cherry or nonfigured maple.

Mitered columns showcase oak grain

The columns are the focal point of this piece. They are hollow, made of three vertical boards mitered together at the front corners so that the quartersawn figure is visible on each face, with a fourth board inserted as a back filler.

Even if you are not using oak, these mitered corners will give the columns a much cleaner look than simple butt joints. While you certainly could use a single,

Photos: Anissa Kapsales

MITER AND GLUE UP HOLLOW COLUMNS

This method of construction allows the hallmark Arts and Crafts ray-fleck figure to appear on each face.

Attach an auxiliary fence. *Using a supplemental fence on a right-tilt saw prevents the thin, already mitered edge from creeping under the sliding rip fence.*

thick block of wood for the columns, doing so seems clumsy for a delicate piece of furniture, and the columns would be less stable when subjected to seasonal changes in humidity.

Cut the miters in one pass on the tablesaw, holding the board down firmly all the way along the cut. If it lifts even a little or wanders away from the fence, the mitered edge will not fit tightly.

After cutting the miters, you can go ahead and cut the pieces to length. Dry-clamp one of the columns to work out any kinks in the process. Now you are ready to glue them.

There are a number of ways to approach this glue-up, but the method I use has proven efficient and easy for somebody working alone, and it yields great results. I use Ulmia picture-framing miter clamps (www.garrettwade.com or www.collinstool.com) because they are lightweight and easy to handle. While the pointed ends of the wires do leave small indentations in the wood, the coarse grain of the oak distracts the eye enough that the marks disappear when filled with wood putty.

I match the putty to the piece only after the third step of the finishing process (see Finish Line, p. 107). If you don't want to buy Ulmia clamps or if you are using a finer-grained lumber such as maple or cherry, you can use tape (see "The Miter Joint for Casework," *FWW* #190, p. 66, for the taping method) or picture-framer's miter clamps to avoid these marks.

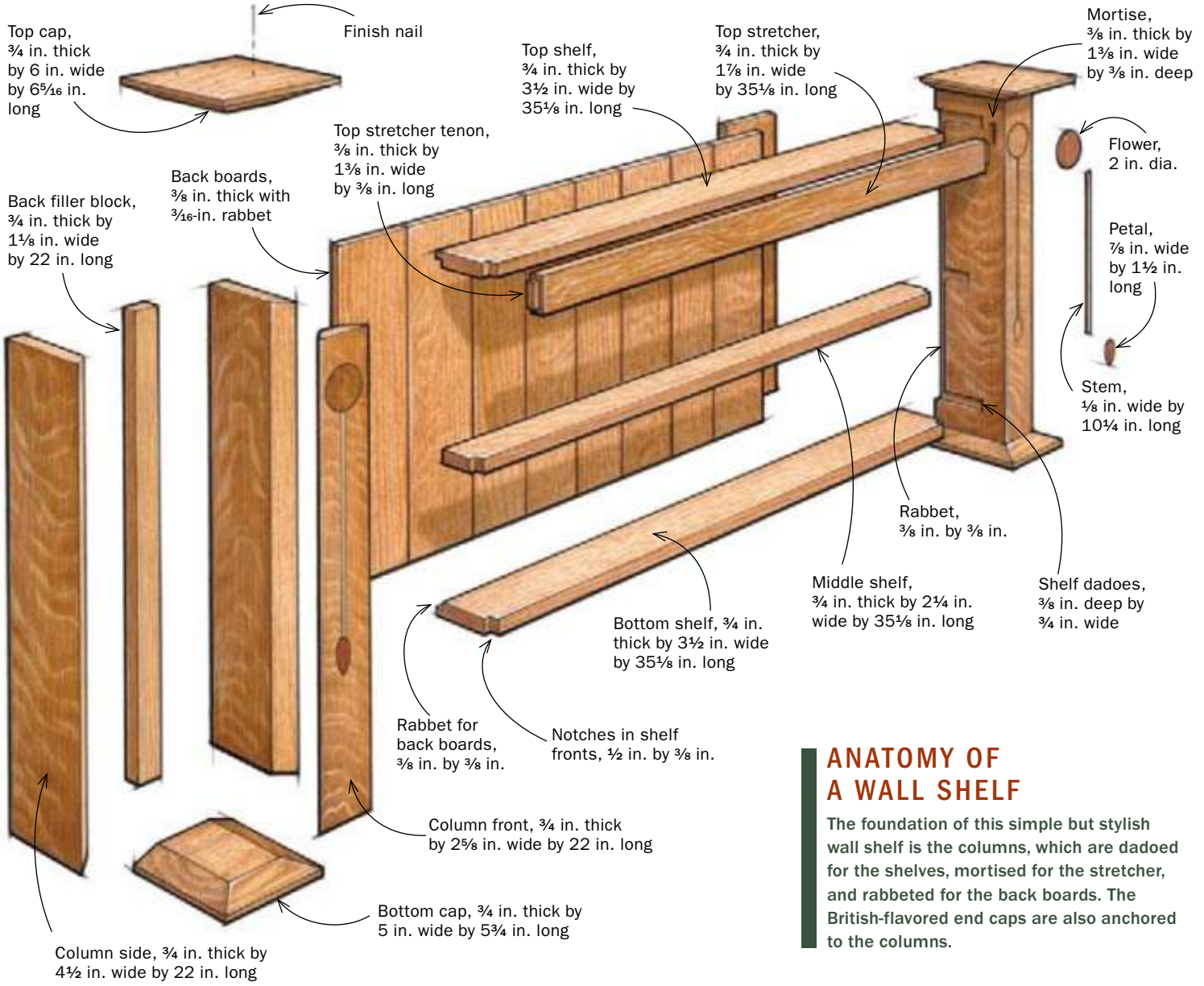
Start clamping at the front of the column. *Because the pieces that form the column are now cut to length, make sure to get the ends level with each other.*

As soon as each column's miters are clamped, insert and clamp the filler board at the back. After the glue is dry, run the back face of each column over the jointer to level the joints.

Rout the shelf dadoes, rabbets, and stretcher tenons

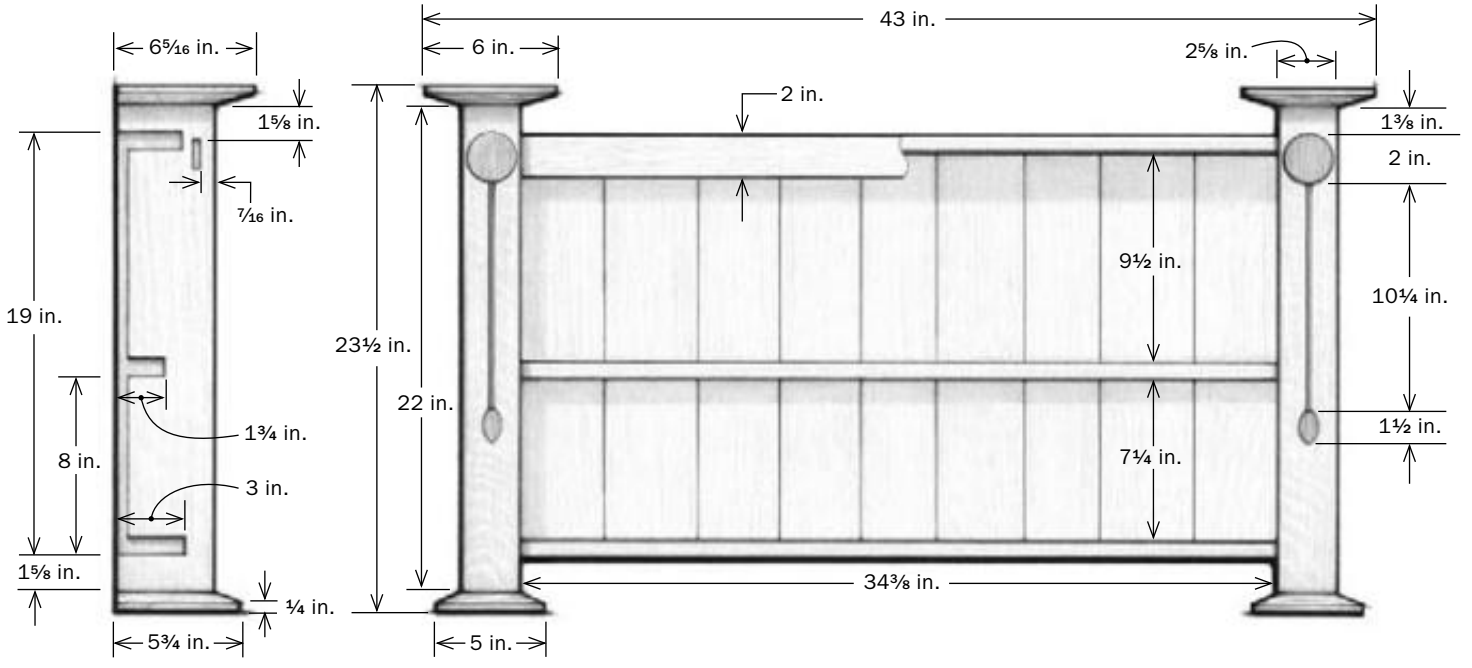
The shelves will be housed in stopped dadoes routed into the columns. Mark the columns and rout the dadoes while the two columns are clamped together. When marking the dadoes, there are two things you must remember: Because the center shelf is set back more than the other shelves, its dado begins farther back than

Insert the filler piece in the back. *Once the back is in place, use bar clamps to apply pressure.*



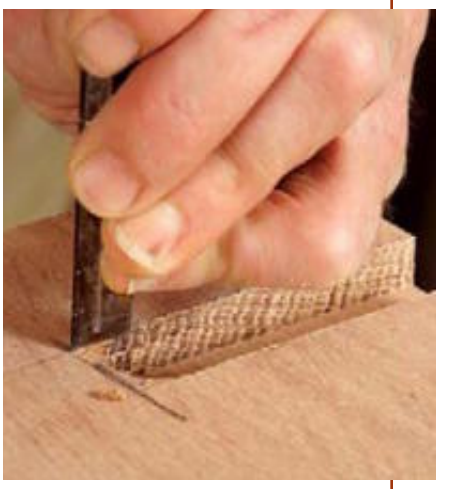
ANATOMY OF A WALL SHELF

The foundation of this simple but stylish wall shelf is the columns, which are dadoed for the shelves, mortised for the stretcher, and rabbeted for the back boards. The British-flavored end caps are also anchored to the columns.



Drawings: Christopher Mills

CUT THE DADOES AND RABBETS



Rout shelf dadoes while columns are clamped together. *Clamp a straightedge to the columns to guide the router (left). Use a chisel to square up the front edge of the dadoes by hand (above).*

the dadoes for the top and bottom shelves; and all of the dadoes are stopped short of the shelf fronts to accommodate the notch in the front of the shelf.

Cut the dadoes in one or two passes using a ¾-in. straight bit, guiding the router with a straightedge clamped to the work. With a chisel, square up the front ends of the dadoes.

While milling stock for the shelves (after you have finished cutting the dadoes), be attentive when you get close to ¾ in. thick and keep checking the stock against the dado. The fit should be hand-tight, requiring some pressure to push the stock home but not so tight as to need heavy pounding with a mallet.

Next, rout a rabbet for the backboards on the underside of the top shelf and on the upper side of the bottom shelf. The columns also need a rabbet to hold the backboards. When cutting the rabbets in the columns, stop them in the upper and lower shelf dadoes. Check how everything lines up.

The top stretcher will be tenoned into the columns. The small mortises for these stub tenons can be cut using a router guided by its own fence or just drilled out and then finished with a chisel. I cut the stub tenons by hand with a backsaw.

Rout a rabbet for the backboards. *A rabbeting bit works well, with the guide bearing running against the side of the column. Stop the rabbet in the shelf dadoes.*

Fit the shelves

When the piece is finished, there will be three distinct shelf setbacks. The top shelf will have a stretcher in front of it, so even though the top and bottom shelves are cut to the same depth, the top shelf will sit nearly at the front of the column. The bottom shelf, which does not have a stretcher, will be set back about ¾ in. more, and the center shelf will be the farthest back.

Cut the shelves to size, remembering to rip the center shelf narrower than those at the top and bottom in order to accommodate the extra setback as well as the backboards. Mark out for the notch on the front edge and use a backsaw to remove the waste, or you can cut these notches and the joints for the stretcher on the tablesaw. Test-fit the shelves in their dadoes.

Create the decorative inlay and assemble the case

I do my inlay with the aid of a magnifier that mounts to my workbench. The first step is cutting out templates (using

A simple inlay technique

Score the outline. *Press lightly at first to avoid getting caught in the grain, then more deeply a second and third time.*

Remove most of the recess. *Rout close to the inlay border, leaving a bit of waste to clean up by hand.*

Pare to the line. *Carving gouges make it easy to clean up and shape the recess accurately.*

Prepare the inlays by resawing stock (on the tablesaw or bandsaw) to 3/32-in. thickness. Regular commercial veneer is too thin and doesn't leave any margin for error.

Trace the outline onto the inlay stock and cut each part to shape, using a scrollsaw or a coping saw, files, and coarse sandpaper. After the inlays are shaped, mark the position of the flower and leaf on each column, taking care to center them in the width and align each element with the other. You can use double-sided tape to ensure that the inlays don't slip out of position while you are scribing around them. Score the outline with a sharp knife or awl. Carefully rout out the main portion of the recess, using a ¼-in. straight bit set at just less than 3/32 in. deep.

Pare away the remaining waste with carving gouges and a knife, making sure the bottom of the recess is uniformly flat. Cut the recess for the stem using a ⅛-in. straight bit (also set at slightly under 3/32 in.), and a router equipped with a fence.

Using yellow glue, with cauls to distribute clamping pressure, glue in the flower and leaf. After the glue is dry, sand them flush. Finally, trim the stem to fit and glue it in place.

Rout for the stem. *After routing the groove, rip stock to fit tightly into it.*

Glue in the flower and leaf. *Use a caul to apply even pressure. Newspaper prevents the caul from sticking to the inlay.*

Insert the stem and finish up. *Glue and clamp the stem in place (above). Once the glue is dry, scrape and sand the inlay flush (right).*

ASSEMBLE THE SHELF

Clamping the case. *Use enough pressure to pull the shelves into their housings, but avoid excessive strain on the hollow columns (left). Apply finish to the parts before screwing the back boards in place (above).*

cardstock) for the flower and leaf. Select a species that will show up against the background wood (for more about the inlay technique, see the facing page).

At this point, the piece should be ready to dry-fit. First, sand all of the parts to P180-grit. Dry-fit first and then glue the front stretcher and the shelves into place at the same time. The stretcher should also be glued and clamped to the front edge of the top shelf. When the assembly is dry, sand the entire piece to P180-grit.

While the columns are the visual anchor, the beveled end caps give the piece its British flair. Cut the caps and bevel them on the tablesaw.

Now mill the backboards, rabbeting alternate edges on the tablesaw. Sand the backboard faces and use a block plane to work a small bevel on the front edge of each board. Apply finish to the backboards (see Finish Line, pp. 106-107). Once all the other parts also have been finished, attach the backboards using small screws.

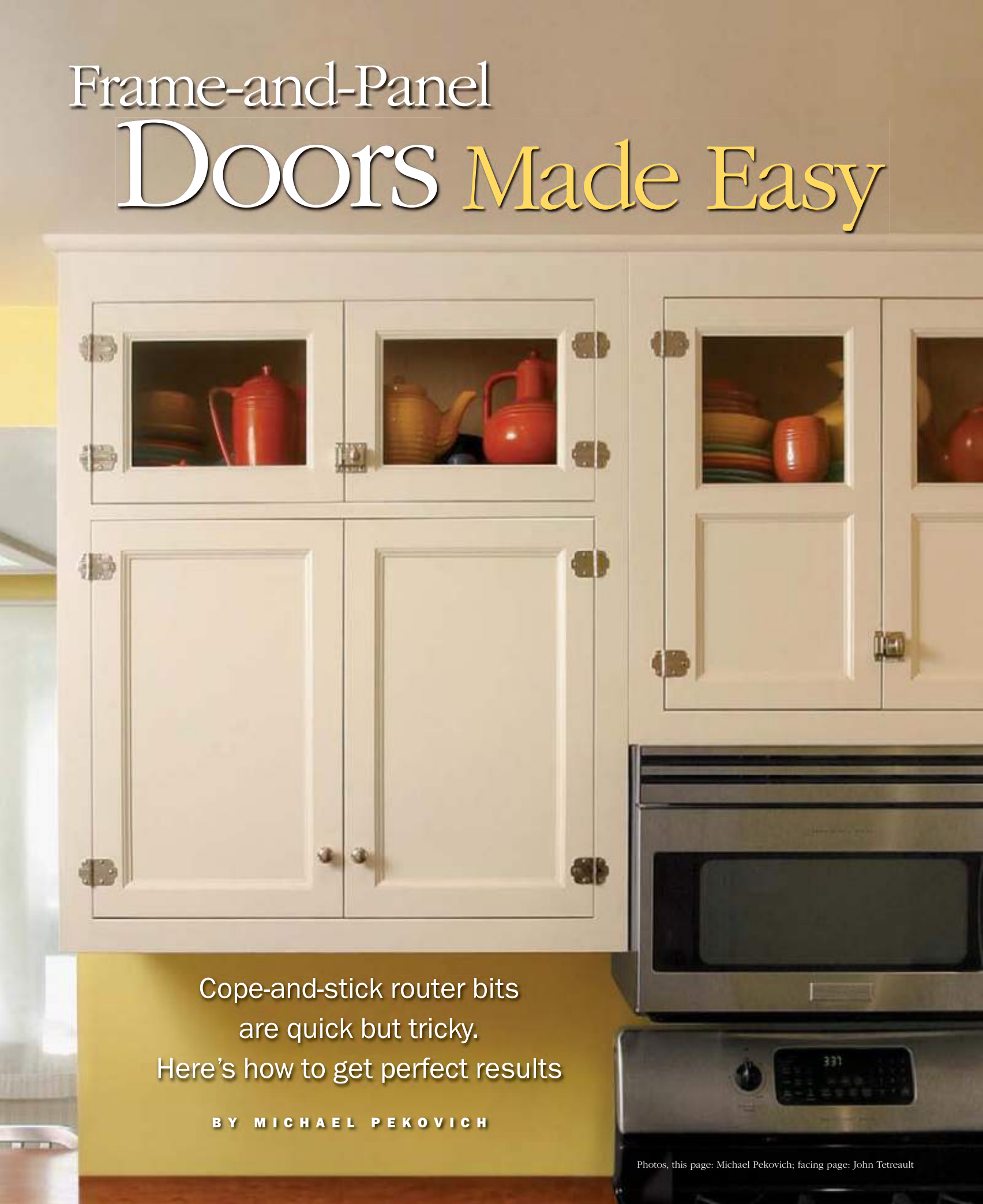
When the shelf is completely assembled, rout the slots for keyhole hanging and install the hardware. Attach the caps to the columns with finish nails. □

Nancy Hiller owns and operates NR Hiller Design Inc. in Bloomington, Ind.

Rout two depths for hanging hardware. *The first step will hold the hardware, while the deeper step allows the hanging screw to be inserted.*

Attach the end caps. *Countersink the finish nails and fill the holes with matching wood putty.*

Frame-and-Panel Doors Made Easy



Cope-and-stick router bits are quick but tricky. Here's how to get perfect results

BY MICHAEL PEKOVICH

Photos, this page: Michael Pekovich; facing page: John Tetreault

This past summer, during the remodeling of my kitchen, I was faced with the task of making 31 cabinet doors. I needed speed and simplicity, so I broke out my router table and a set of cope-and-stick router bits. These bit combinations allow you to rout door frames quickly, in two steps. The first bit routs a profile and panel groove on the inside edge of all the frame parts. The second bit is a mirror image of the first, routing a coped profile and a stub tenon on the ends of the frame rails.

What you create is not a traditional mortise-and-tenon joint. But done right, it gives you a cabinet door that's just as strong. The key is to use a flat panel of plywood or medium-density fiberboard (MDF) that's glued in place—not a raised panel, which is designed to float. All in all, I was able to build all 31 doors in the course of a weekend, from milling lumber to finish sanding.

Different types of cope-and-stick bits are available, with an array of profiles from simple thumbnails to more ornate ogees (see sidebar, right.) In general, these bits are designed for ¾-in.-thick doors, but there are cope-and-stick bits available for stock ½ in. or thinner.

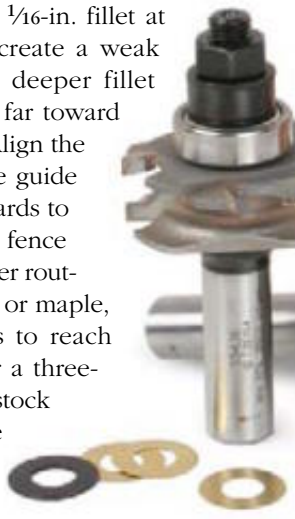
Start with straight, square stock

I began by milling the door-frame stock. I prefer quarter-sawn or rift-sawn boards because the tight, straight grain is both good-looking and stable. It's important that the stock be straight and square. Any slight bow or twist will make fitting the door a nightmare.

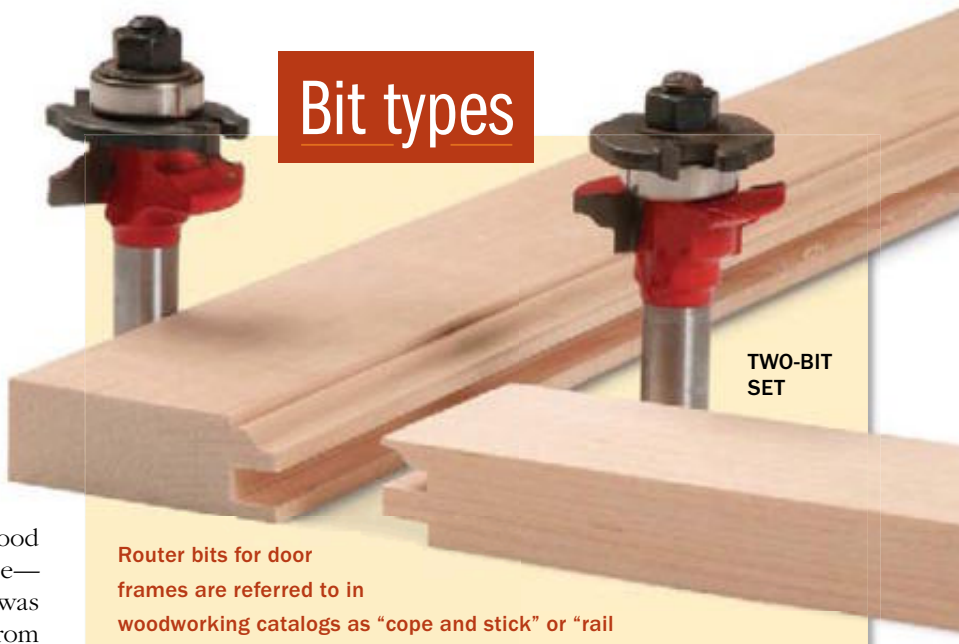
Don't be tempted to flatten an entire wide board and then rip the frame parts from it; that will lead to bowed or twisted stock. Instead, start with rough-sawn 4/4 stock and rip the parts oversize on the bandsaw. Crosscut the stock to remove any serious twist, bowing, or knots, but keep it as long as possible to reduce the number of pieces you'll have to rout. Then joint and plane the boards to final thickness (mine finished at ¾ in.), and rip to the exact width on the tablesaw.

Rout the edge profile on all pieces

Now you can rout the edge profile on all of the door-frame pieces while they are still long. Start with the "stick" bit in your router. Adjust the height until you produce a profile with a 1/16-in. fillet at the top. A shallower fillet would create a weak upper portion of the joint and a deeper fillet would locate the panel groove too far toward the back, creating a thin rear wall. Align the router-table fence precisely with the guide bearing on the bit. Attach featherboards to hold the stock against the table and fence when routing. If you're using a smaller router or a very hard wood such as oak or maple, you may need to take two passes to reach final depth. In that case, set up for a three-quarter-depth cut and rout all the stock before adjusting the fence for the



Bit types



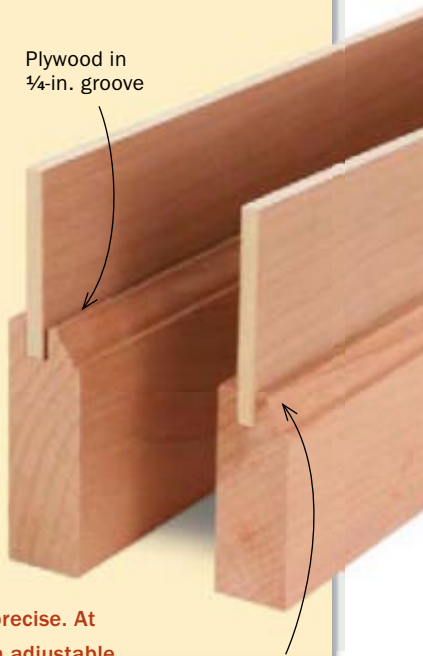
TWO-BIT SET

Router bits for door frames are referred to in woodworking catalogs as "cope and stick" or "rail and stile" bits. Their function is to rout a profile and a panel groove on the inside edge of the frame parts and to cope the ends of the rails to fit that profiled edge. The bit style I use consists of a pair of matched bits (above). Another style of bit that is available is a stacked bit (left), in which the cutters necessary for each profile are included on a single bit. The stacked style does away with bit changing and may be more convenient for occasional use, but the two-bit style can be used with two dedicated routers for a better production setup. Both styles range from $80 to $150. A less-expensive alternative is a reversible bit, with cutters that are reconfigured on a shaft for each cut. These sell for $80 to $100, but I don't think the savings is worth the inconvenience.

STACKED SINGLE BIT

ADJUSTABLE BIT FOR PLYWOOD PANELS

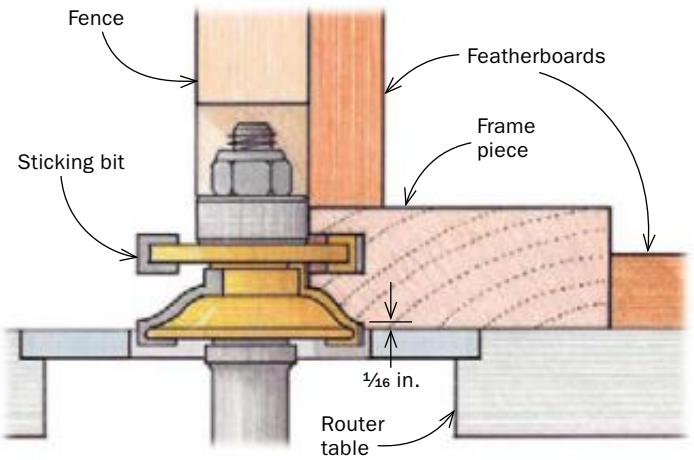
Most bit sets cut a ¼-in. groove in the stiles and rails. And that works fine for MDF panels, which are a true ¼ in. Unfortunately, veneered plywood typically measures less than that and will leave an unsightly gap. One solution is an adjustable bit set, made by both Freud and Amana. These feature a pair of stacked cutters that can be adjusted from 3/16 in. to 9/32 in. for ¼-in. plywood by installing or removing shims. It took me about a half hour to set up the bits, but the resulting fit was precise. At $160 to $180, an adjustable set is worth it if you work with plywood.



ADJUSTABLE BIT SET

1 Rout the profile

Make the edge profiles first. *Even before the frame pieces are cut to size, rout their edge profiles to accept the panel. Do this in one or two passes, using the sticking bit.*



final pass. Removing the bulk of the waste on the first pass will yield a cleaner surface on the second.

Use a story stick for crosscutting

Once the edges have been profiled, it's time to cut all the parts to final length. Instead of a tape measure, I made a "story stick" to record the width and height of the case openings, along with the number of doors that fit in the opening. For cases with two doors, I measured the width and marked the halfway point.

I then used the story stick to set up the tablesaw for crosscutting. I started with the stiles, which run top to bottom in the case opening. First I clamped a stop block to the rip fence in front of the blade, to prevent the stile from binding between the blade and the fence during cutting. Then it was simply a matter of aligning the mark on the story stick with the blade and setting the fence so that the stop block was flush with the end of the stick. Cut the stiles, making sure to mark the door number on each piece.

Cutting the rails to length is a bit trickier. Because they fit between the stiles, you must account not only for the width of the stiles but also the depth of the stub tenons. This can lead to some head-scratching, but I found a simple method that let me dispense with the math. First, make a setup block that is equal to the width of the two stiles minus the depth of the panel grooves. Use this setup block in conjunction with the story stick to quickly dial in

2 Cut the stiles

Put away your tape measure. *Mark the door-frame length and width measurements on a thin "story" stick. You'll transfer the marks directly to the tablesaw.*

Clamp a stop block to the rip fence. *Use the story stick to set the rip fence for crosscutting the stiles.*

Photos, except where noted: Charlie Reina; drawings: Vince Babak

the right dimensions for the rails. Because rails are usually short, use a stop block clamped to the crosscut-sled fence to set the length. Again, align the mark on the story stick with the blade; then rest the setup block on the story stick flush with the end, and pencil a line on the sled to mark the end of the rail. Clamp the stop block at the line and cut the rails.

A sled for end-routing

With the parts cut to length, it's time to install the coping bit and profile the ends of the rails. Do not try to run these rails against the router-table fence without additional support; the pieces are too narrow to stay square against the fence. Instead, use a simple plywood sled fitted with hold-down clamps to run the stock squarely and safely across the bit. But before setting up the sled, cope the long edge of an extra piece of frame stock to make a special backing block. This piece will marry with the profiled edge of the rail stock and prevent tearout. When the other end of the rail is routed, the trailing edge will be flat, and a flat backer block will suffice.

After the backing block is made, clamp an offcut in the sled and take a test cut. Adjust the bit's height until the two pieces are flush and you're ready to cope the rails. Start with the flat edge against the sled fence and cope the first end. Then rotate the rail, insert the backing block into the panel groove, and cope the second end.

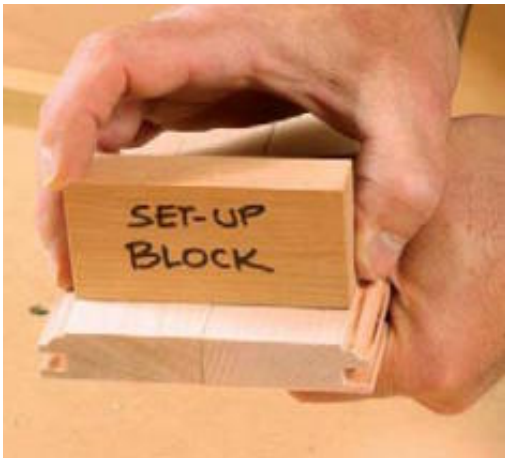
Make the panels undersize in width

With the frames complete, all that's left to do is to size the panels. I made them 1/16 in. narrower than the length of the rails. This is to accommodate the slight amount of seasonal movement (yes, even MDF moves), and to make sure the panel allows the frame parts to seat fully during glue-up. The panels' length equals the stile length minus the setup-block length. The MDF I used fit very snugly into the panel groove, so I knocked the panels' corners off quickly with a

Cut all the stiles. *Lead with the profiled edges to keep them free of chipout. A well-made crosscut sled keeps the cuts square.*

3 Cut the rails

Cutting the rails requires an extra step. *Start by cutting a block to the width of two rails minus the combined depth of their grooves. When you subtract this distance from the door width, you'll get the correct length of the rails.*

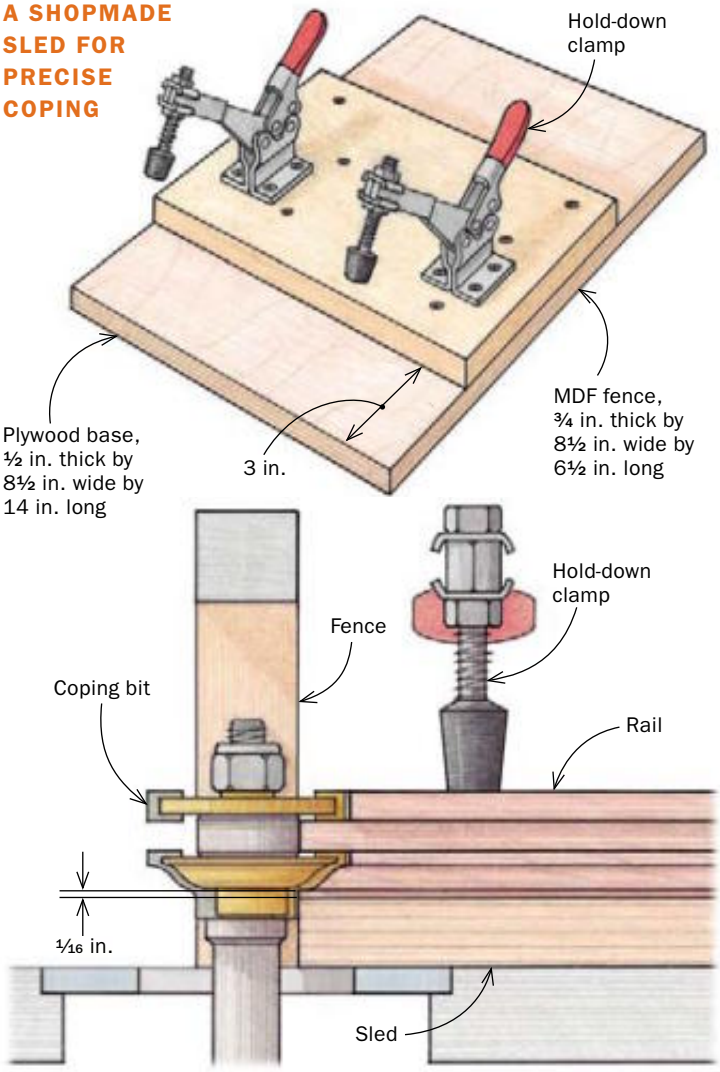


Use the block to set up the cut. *With the story stick's door-width mark aligned with the sawblade, use the block to draw a line on the sled fence.*

Cut the rails. *With a stop block clamped at the line, you can cut all the rails to a precise and uniform length for a specific door size.*

4 Cope the rails

A SHOPMADE SLED FOR PRECISE COPING



Profile the rail ends. *Switch to the coping bit and use the sled to keep the rails square and secure for their end cuts. After making test cuts to ensure the faces will be flush (left), begin by coping the rail with the flat edge against the fence (above).*

Back the profile with its mate. *Before coping the opposite end, run a short length of scrap past the coping bit to make a backer block for the rail's profiled edge (above). With the backer block mated behind the piece, cope the second rail end (right).*

Mark and glue one stile. *After marking the location of the panel on one of the stiles, apply glue inside the entire length of the stile's groove. The panel will be glued to the stiles only.*

block plane. (Unlike plywood, which is thinner than its nominal thickness, MDF measures out on the mark.)

How to keep it all square

Gluing up cope-and-stick doors is a challenge. One concern is that the stub tenons could slide along the panel groove, making it difficult to glue up the parts square. Or, the panel could fit so tight that it seizes up on contact with the glue, making it very difficult to square up the parts. Fortunately, this procedure eliminates both potential problems. I installed the panel in a stile groove first, then slid the rails on, and finally, added the second stile.

To position the panel correctly, mark its location on the stile by holding a rail in place and marking the width of its tenon. Apply glue along the panel grooves of the stiles only. Then apply glue to the coped ends of the rails. If there is glue in the rail grooves, they won't slide along the panel. Install the panel, making sure it's fully seated. Then push a rail onto the panel, fully seating it, and slide it down onto the stile. Install the second rail in the same manner, using the panel to align the rails parallel to each other and square to the stiles. All that's left is to install the last stile.

Once that's done, clamp along the entire joint. Be careful not to apply too much pressure across the panel, because it's slightly narrower than the rails, and the stiles could bow inward. Use a straightedge to make sure the stiles are flat with the rails. The short tenons provide little resistance against flexing upward. □

Michael Pekovich is Fine Woodworking's *art director.*

5 Assemble the panels

Placing the panel is key. *Line up the panel precisely between the layout marks, and push it down to the groove bottom. This will keep the rest of the assembly square.*

Attach the rails. *After applying glue to the leading end of one rail, slide it down the panel edge and fit its stub tenon into place in the stile groove. Do the same with the second rail. Complete the assembly by gluing on the last stile.*

Check and clamp. *Before tightening the clamps, use a straightedge to make sure the panel is flat in all directions. Adjust the clamps if necessary, and tighten.*

New Breed of Bandsaws

New 14-in. models have serious resaw capacity, with more power to handle bigger boards

BY THOMAS McKENNA

AUTHOR'S CHOICE
BEST OVERALL

Smooth cutter with power to spare

The Laguna LT14SE is a quiet, powerful machine that makes the most demanding curve and resaw cuts with ease. It's the only saw of the bunch that came fully assembled. Fit and finish are excellent with large knobs to adjust tension and tracking, though the table could use a bit more width to the right of the blade. The machine does not have a tension scale, so you have to test the blade tension using a gauge or your finger. Ceramic guides offer support very close to the top of a workpiece. The insert plate is large, and its throat provides wide-open access to the guide adjusters below the table, all of which make blade changes easy as pie.

AUTHOR'S CHOICE
BEST VALUE

Lots of features for a good price

The Grizzly G0457 saw has plenty of resaw power and capacity. The fit and finish are great. The wheel covers are hinged, and they slide off easily so you have greater access to the interior and you don't hit your head on a corner (don't ask) when the door drifts closed. Dust collection works well, though installing a blade is tough. The tension is easy to set and adjust, with an intuitive quick-release mechanism. The tracking knobs are a good size. The tall fence included with the saw slides smoothly, locks surely, and is great for resawing. Curve cuts were no problem, and resaw cuts were of fine quality.

Photos, except where noted: Kelly J. Dunton; this page (bottom two): Thomas McKenna

The bandsaw is one of the most versatile tools in a woodworking shop. It can resaw, cut curves, and rip lumber more safely than a tablesaw. It also can be used to cut joinery, such as tenons or even dovetails. The most common bandsaw *Fine Woodworking* editors see in our travels is the 14-in. model. It offers a great blend of price and performance for the small-shop woodworker.

The toughest task for these bandsaws is resawing, those slicing cuts into the edge of a board that turn one piece of thick lumber into thinner boards or sheets of veneer with minimal waste. Older 14-in. saws had a limited resaw capacity of only around 6 in. (although some did offer a riser-block accessory to increase capacity by 6 in. or so), and many had small ¾-hp or 1-hp motors, not ideal for heavy work.

A new generation of 14-in. saws offers more resaw capacity and power than their forerunners. I looked at eight machines with a minimum resaw capacity of 10 in. and with motors of at least 1¼ hp.

Some of the saws in this group, such as the Delta, General, Grizzly G0555X, Jet, and Powermatic, have the familiar cast-iron frames but with enclosed bases. Except for the General, all of the saws in this cast-iron family require the installation of a riser block to achieve the minimum resaw capacity for this review. The other saws—Grizzly G0457, Laguna, and Rikon—are European style, with welded steel frames.

Close inspection of key components

With the exception of the Laguna, which arrived ready to roll, each machine required assembly, which took anywhere from two to four hours per machine.

After assembly, I took a close look at the essential components, checking roundness and alignment of the wheels, table flatness, versatility and functionality of the fence, and guide-post alignment.

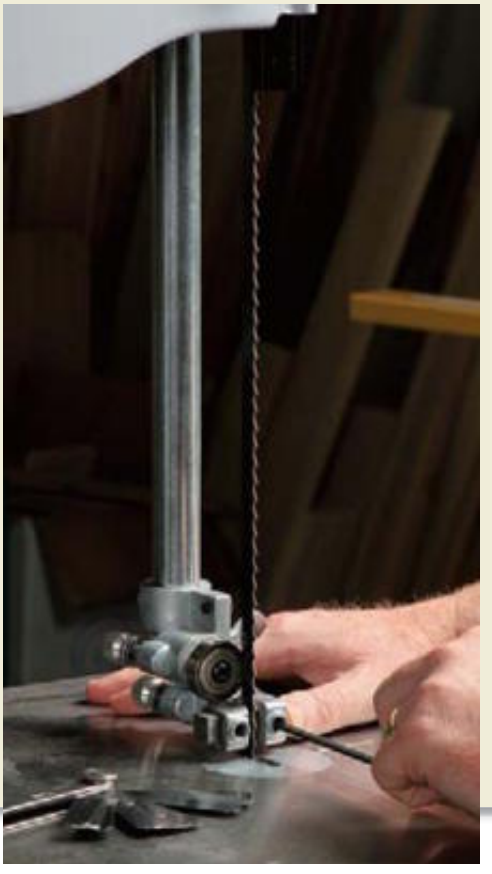
Wheels should be round and in line— Wheels that are severely out of round will cause significant vibration in the saw, making it difficult to cut to a line. All of the machines had round wheels.

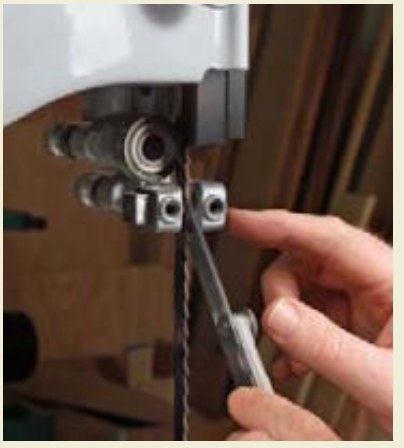
Alignment also is an issue. For the saw to work properly, the top and bottom wheels should lie in the same plane; otherwise, it will be tough to track a blade in the center of both wheels. Wheels on the Delta and the Grizzly G0555X aligned perfectly. The Jet and the Powermatic had the worst

MEASURING WHEEL AND POST ALIGNMENT

WHEEL ALIGNMENT AFFECTS TRACKING

Misaligned wheels will make it hard to track a blade in the center of the wheels. We checked alignment by laying a dead-flat straightedge across the wheels. Any discrepancies were measured with a feeler gauge. Wheels on the Delta and the Grizzly G0555X aligned perfectly; wheels on the Powermatic and the Jet were the most misaligned and could not be fixed with shims.





MISALIGNED GUIDE POST MEANS TROUBLE

Serious misalignment will require adjusting the guides whenever the post is moved. To measure for this, we lowered the post and snugged one guide against the side of the blade (left). Then we raised the post and measured any gap at the top (above). The sequence was repeated for the thrust bearing.

FEATURES THAT EASE BLADE CHANGES

QUICK RELEASE AND LOTS OF OPEN SPACE

A quick-release tension mechanism (right), like that on the Grizzly G0555X, allows you to release and retension a blade by flipping a lever. Having removable guards and open access around the wheels for your fingers also eases the pain of blade changes.

ERGONOMIC TRACKING ADJUSTMENTS

After installing and tensioning the blade, it needs to be centered over the tires, a process known as tracking. The Rikon makes it easy to see the blade as you track it and has a large, easy-to-grip adjustment knob.

misalignment. The problem may be fixed by shimming out the wheel that's behind. It's easier to do on the top than the bottom. However, the misalignment on the Jet and the Powermatic could not be fixed because their bearing shafts are too short.

Flat tables and effortless tilting are pluses—A bandsaw table doesn't have to be perfectly flat to get good cuts, but serious dips or imperfections could make squaring the table to the blade a frustrating task. All of the tables are made from cast iron, and all were very close to dead-flat.

The tilting tables are supported by cast-iron or die-cast trunnions. I saw no discernible differences in performance between the two materials, and all of the tilting mechanisms worked fine.

The best fences slide smoothly, lock soundly, and are adjustable—Ideally, you want a fence that slides without hiccups and locks down securely. And because a bandsaw blade tends to drift (run off square) as it wears, a fence that can be adjusted to compensate is handy.

In terms of fence quality and versatility, both Grizzly saws win hands-down. Their fences are heavy-duty, tall for resawing, run smoothly, lock securely, and are adjustable for blade drift. The Laguna fence gets a nod because it is heavy duty and has a smart way to attach an auxiliary fence via a T-slot along one face.

A straight-running post means fewer guide adjustments—The guide post, the rod that holds the upper guides, is a diminutive part of the bandsaw. But if the post is significantly out of alignment (chart, p. 53), either front to back or side to side, you'll have to fiddle with the guides and thrust bearing every time you move the guide post to keep the guides close to the workpiece. That's a serious time-killer.

If the post is out of alignment on a cast-iron saw, there's no way to fix it. The Euro-style saws have mechanisms for correcting a misaligned post, but it's a fussy procedure and varies from machine to machine.

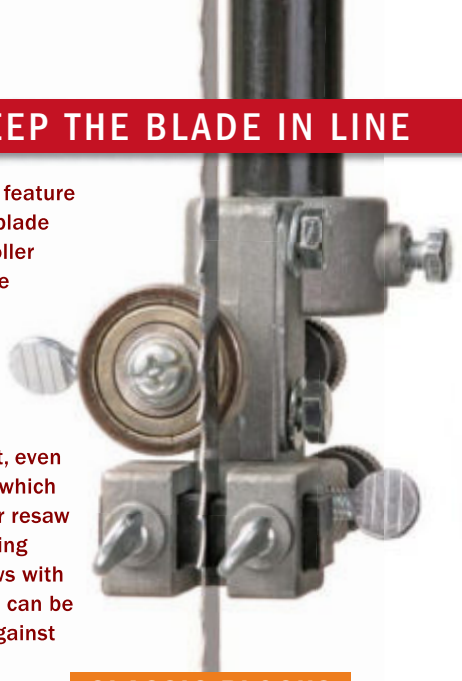
Blade changes should be bloodless

Regardless of how often you change the blade in your bandsaw, you want the process to be painless. Having changed blades on eight machines repeatedly during our

Photos, facing page (top three): Thomas McKenna

GUIDES KEEP THE BLADE IN LINE

Saws in this review feature two basic types of blade guides: blocks or roller bearings. Block-type guides, like those on the Jet and the Delta, work well. But Laguna's ceramic guides offer better support, even closer to the work, which was reflected in our resaw tests. Also performing better were the saws with roller guides, which can be snugged right up against the blade for very solid support.



CLASSIC BLOCKS

LAGUNA'S BLOCKS

ROLLER BEARINGS

tests, I've come to appreciate a saw that makes things easier, from blade tensioning and tracking to fine-tuning the guides.

Having the space to work makes blade changes less frustrating. Blade guards are the biggest obstacle, and on most machines you can remove at least the top guard. Another tricky area is space around the wheels to slide or wiggle a blade over the tire. The Laguna was tops in terms of wide-open access to the wheels and guides.

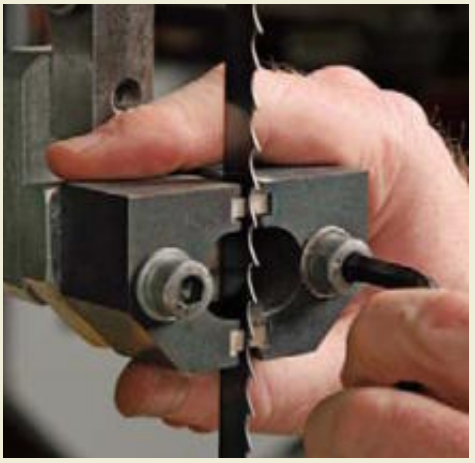
Tension and tracking are important—Once you have the blade in place, you need to tension and then track it for proper performance. The tension mechanism lifts the top wheel to bring the blade taut. Tracking angles the upper wheel to keep the blade centered across the width of the slightly rounded upper tire.

One notable difference among these new 14-in. saws is the inclusion of a quick-release tension device (except for the General and Laguna). Many manufacturers claim that removing tension from the saw when it's not in use prolongs the life of both blade and tires. In any case, the quick release makes blade changes faster.

Most machines track the blade from the back of the saw via a knob or thumbscrew. Small knobs on the Jet and the Powermatic and a small thumbscrew on the Delta were difficult to turn.

Easy-to-adjust guides save time—A bandsaw's top and bottom guide systems use a thrust bearing to counteract front-to-back deflection as you push the work through the blade. Side guides prevent the blade from twisting as you cut curves. Guides on the Grizzly G0555X, Jet, Laguna, and Powermatic were the easiest to adjust.

TOOL VS. TOOLLESS ADJUSTMENT



Ceramics 101. *Laguna's ceramic guides are easy to adjust once you get used to them. The nontraditional design requires you to steady the guides with your fingers as you tighten them in place.*

Dial M for microadjust. *To move guides forward and backward, threaded, microadjustable mechanisms work well and are precise. Except for the General and the Laguna, all the saws have microadjustable guide systems.*

Cutting tests gauge capacity and power

I did a series of cutting tests in hard maple, both curve cuts and resaw cuts. For consistency, I used the same brand of ½-in., 3-tpi, hook-tooth blade in each machine for the gradual curves and resawing. For the tight curves, I used a ¼-in., 6-tpi, hook-tooth blade. I set the tension as suggested on the saw's built-in gauge for the blade width in question and tested the tension with finger pressure to be sure deflection was no more than ¼ in.

First, I made gradual curve cuts along the length of a ¾-in.-thick board; then I made tighter, more demanding cuts, 2 in. and 1¼ in. dia. All of the saws did OK or better in the curve-cutting tests, with the Grizzly G0457, Laguna, and Powermatic the smoothest cutters.

Moment of truth—To gauge the resaw ability of each saw, I resawed ½-in.-thick boards as well as ⅛-in.-thick slices from a 10-in.-wide, 12-in.-long hard maple blank. My goal was quality resaw cuts, with edges

READY, SET, RESAW!

To gauge the resaw performance of each machine, I ran two tests on hard-maple blanks, 10 in. wide by 12 in. long. I equipped each machine with the same brand ½-in., 3-tpi, hook-tooth blade and set the tension according to the blade width. First, I made ½-in.- and ⅛-in.-thick resaw cuts, feeding the stock by hand. Then, to test the speed and power of each machine, I used a resaw sled that employed weights to pull the workpiece through the blade (below).

MODEL	STREET PRICE	MOTOR	FENCE HEIGHT	WHEEL ALIGNMENT
Delta 28-475X www.deltamachinery.com	$1,230, with optional riser-block kit and fence	1½ hp, 115v	2½ in.	Perfect
General 690-1 www.general.ca	$2,609, includes fence	1½ hp, 230v	2 in.	0.090 in., top forward of bottom
Grizzly G0457 www.grizzly.com	$795, includes fence	2 hp, 110v	6 in.	0.040 in., top behind
Grizzly G0555X www.grizzly.com	$635, includes fence and optional riser-block kit	1½ hp, 110v	6 in.	Perfect
Jet JWBS-14DX www.jettools.com	$743, with optional riser-block kit and fence	1¼ hp, 115v	2⅜ in.	0.22 in., top forward
Laguna LT14SE www.lagunatools.com	$1,500, includes fence	2 hp, 220v	3¼ in.	0.050 in., top forward
Powermatic PWBS-14CS www.powermatic.com	$975, includes fence and optional riser-block kit	1½ hp, 110v	2⅜ in.	0.150 in., top forward
Rikon 10-325 www.rikontools.com	$750, includes fence	1½ hp, 115v	3 3/16 in.	0.080 in., top behind

BEST VALUE — AUTHOR'S CHOICE

BEST OVERALL — AUTHOR'S CHOICE

that were parallel and consistent from one end of the workpiece to the other. The General, Grizzly G0457, and Laguna sliced through hard maple the fastest and with excellent results.

To gauge the speed and power of each machine in a more scientific way, I employed a resaw sled that uses weights to draw the blank through the blade. I started with a 5-lb. weight on the sled, working up to a 7½-lb. weight. When I tried a 10-lb. weight, only one saw was able to handle the load (the Rikon), so the results are not shown. Again, the General, Grizzly G0457, and Laguna were the faster cutters.

FineWoodworking.com

Watch us use the resaw sled to push each saw to its limit.

During all of the cutting tests, I also kept a close eye on dust collection, which was good or better on most machines when hooked up to an appropriate dust collector.

And the winner is...

Picking one of these saws as best overall was not easy. In the end, I chose the Laguna LT14SE, which is the perfect combination of performance, capacity, fit, and finish. The downside? As equipped, the model I reviewed retails for $1,500.

For best value, I chose the Grizzly G0457. It's a very solid package for $795. □

Thomas McKenna is an associate editor. Fine Woodworking *shop manager John White made valuable contributions to this article.*

DELTA 28-475X

The Delta has plenty of capacity and a large tilting table, but it's loud and vibration prone and made unsatisfactory resaw cuts. For the most part, fit and finish are poor, and dust collection is subpar.

GENERAL 690-1

The General has a massive frame and no-frills adjustments, and it performed well in the cutting tests. But dust collection wasn't great, the table is small, and the fence is clunky and short.

Product photos, this spread: Thomas McKenna

POST MISALIGNMENT	RESAW CAPACITY	GUIDES/ THRUST	GUIDE ADJUSTMENTS	BLADE CHANGES	QUALITY OF RESAW CUTS	TIMED RESAW TEST	
						5 LB.	7½ LB.
Side, 0.012 in.; back, 0.010 in.	11¾ in.	Steel blocks/ bearing	Upper: easy Lower: difficult	Very difficult	Poor	5 min. 36 sec.	3 min. 37 sec.
Side, 0.012 in.; back, 0.050 in.	12⅛ in.	Double bearing/ bearing	Upper: easy Lower: difficult	Very easy	Excellent	57 sec.	23 sec.
Side, 0.005 in.; back, 0.001 in.	10⅛ in.	Double bearing/ bearing	Upper: very easy Lower: difficult	Difficult	Good	59 sec.	24 sec.
Side, 0.010 in.; back, 0.018 in.	12⅛ in.	Bearing/bearing	Upper: very easy Lower: easy	Easy	Good	3 min. 23 sec.	1 min. 25 sec.
Side, 0.035 in.; back, 0.015 in.	12⅛ in.	Graphite-impregnated blocks/bearing	Upper: very easy Lower: easy	Easy	Good	57 sec.	Stalled
Side, 0.000 in.; back, 0.017 in.	12 in.	Ceramic blocks/ ceramic block	Upper: easy Lower: easy	Very easy	Excellent	60 sec.	25 sec.
Side, 0.007 in.; back, 0.000 in.	12 in.	Double bearing/ bearing	Upper: very easy Lower: easy	Easy	Very good	2 min. 50 sec.	1 min. 4 sec.
Side, 0.000 in.; back, 0.040 in.	13⅛ in.	Bearing/bearing	Upper: difficult Lower: difficult	Very difficult	Good	3 min. 12 sec.	1 min. 33 sec.

GRIZZLY G0555X

This bear is a sound performer at a bargain price. Fit and finish overall are good, blade changes are easy, and the fence is high quality. The saw did fine in all of the cutting tests.

JET JWBS-14DX

Wheel misalignment and lack of power are the big issues with the Jet. It performed well in all the curve-cutting tests, but if you plan to do a lot of resawing, this machine is not your best bet.

POWERMATIC PWBS-14CS

The Powermatic comes loaded with accessories and has plenty of mass and power. It ranked high for performance among its cast-iron brethren, but the wheels were misaligned by more than ⅛ in.

RIKON 10-325

The Rikon has plenty of cutting capacity and power and some great features. But it dropped in the rankings because of its overly complicated and poorly machined guide mechanisms.

Best Finish for Pine

Thin layers of shellac and stain add age and warmth without blotching

BY TOM WISSHACK

I have never understood why so many woodworkers consider pine an inferior wood. I think it's one of the most beautiful woods available, and it only gets better with time, taking on a marvelous color and patina. But poor staining and finishing techniques have given pine a bad rap.

Pine does present unique challenges. You want the wood to look as if it has aged naturally to its present color. You'll never achieve that look if you apply stain directly to pine, because the color penetrates deeply and unevenly. Softer portions of the wood become very dark, while the harder and more resinous areas resist the stain. Worse, this blotchiness is irreversible. That is, the drastic measures you'd have to take to correct the blotchiness could ruin the piece.

Fortunately, you can achieve superior results if you apply thin layers of shellac and stain with patience and a delicate touch. When you wipe away the excess stain, some will remain in the crevices of moldings and joints, giving the subtle feeling of age that I prefer on pine.

Let the pine age naturally

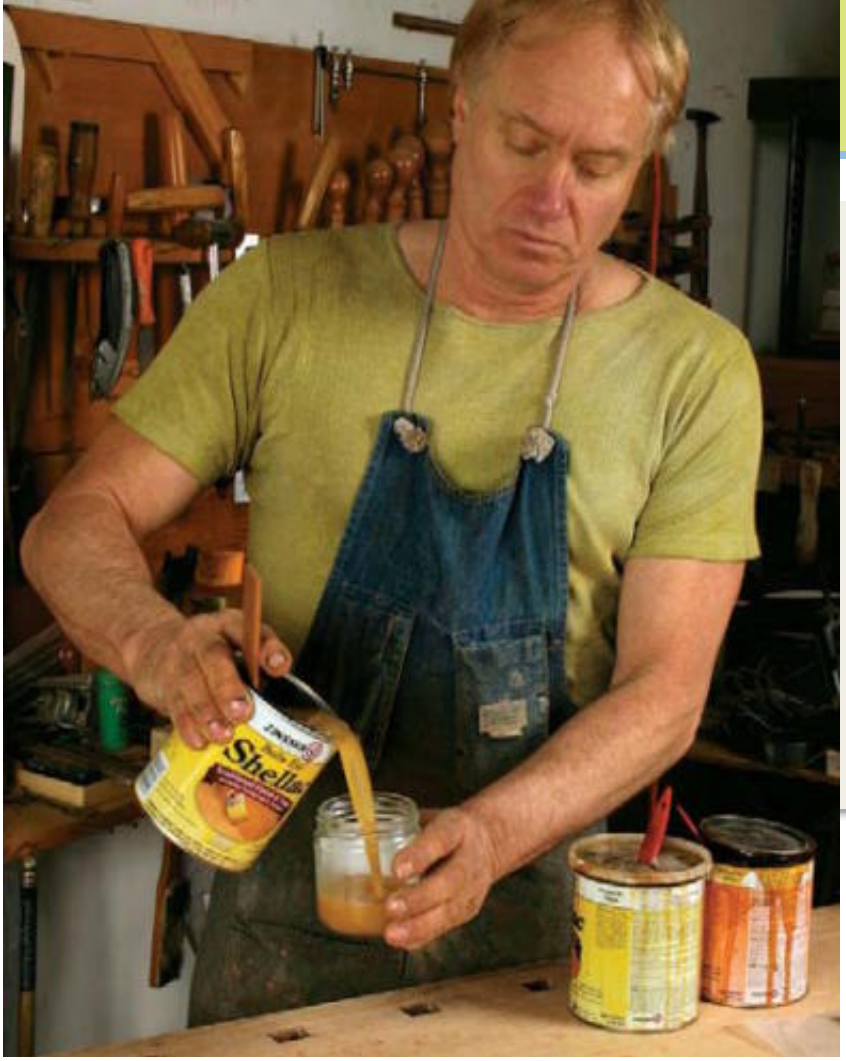
I smooth my pieces with a handplane and polish them by hand with P600-grit wet-or-dry

TIP

First, do nothing

Unfinished pine will take on a golden color naturally after a few weeks' exposure to the air, as the top half of the sample board shows. This patina will enhance any color you apply.

Photos: David Heim



Shellac prevents blotching

COMBINE COLORS FOR SUBTLE WARMTH

A washcoat of thinned shellac partially seals the wood pores, ensuring that subsequent coats of stain will be absorbed evenly. The washcoat also can add a hint of color, as shown in the panel above. Mixing clear shellac (left panel) and amber (right) produces a nice intermediate shade (center).

paper. If you use sandpaper alone, begin with P120- or P180-grit, then work up to P320- or P400-grit.

Whenever I build a piece from pine, I sand it and then allow it to stand in the shop for at least a month before finishing. Pine will take on a natural patina, which I call shop aging. When I apply the finish, the resulting color is always deeper and richer than it would be if I finished the piece right away, so a very light stain normally is adequate. Waiting for the wood color to change is a luxury, but the results are worth it. Applying a finish too soon after constructing a piece of furniture is, in my opinion, a mistake.

Seal the grain

A washcoat of shellac comes first. This serves as a sealer; it's essential to close the pores of the pine and provide a foundation for the stain. Shellac dries very quickly and gives the wood absolute clarity. You can stain over it and—what's critical—remove most or all of the stain if you make a mistake or don't like the look.

I have had good luck with Zinsser shellac, which is widely available. I usually mix the clear and amber varieties, which gives the wood a warm, antique hue. Fill a quart glass jar about one-fourth full of clear shellac. Add small amounts of amber shellac until the mixture is about the color of honey. Note how much shellac you have, then add about half that amount of denatured alcohol. The result is close to a 2-lb. cut, but exact proportions aren't critical.

Brush the shellac onto one horizontal surface at a time, using long, even strokes. Rotate the piece as needed to coat all the

Two washcoats, light sanding. *Brush on the shellac with long, single strokes. Two coats are best. Wisshack left the door attached, an unorthodox technique, to ensure that he applied the stain uniformly. He allowed the finish to build up on the brass, giving it a patina similar to the wood. Lightly scuff-sand the dry shellac with P600-grit paper.*

Diluted stain adds color gradually

STAIN RECIPE FOR PINE

Mix well. *Fill a jar with the mineral spirits and linseed oil, then add the stains. You don't have to measure precisely. Let the color of the mixture tell you when you have the right amounts. Err on the side of making the stain too thin.*

This recipe makes about 1 qt. of stain. It uses three Olympic oil stains, which I've found to be very heavily pigmented. If you use another brand, it may not contain as much pigment, so you may have to adjust the amounts.

1 pt. mineral spirits

⅓ cup boiled linseed oil

⅔ cup Olympic Dark Walnut oil stain

⅔ cup Olympic Colonial Maple oil stain

⅓ cup Olympic American Cherry oil stain

Mix the ingredients and stir well.

The resulting mixture should have a medium golden-brown look and the consistency of 2% milk. Test the stain on a sample board. If the stain looks too dark, add more Colonial Maple; too light, more Dark Walnut; too brownish, more American Cherry.

surfaces with this thin washcoat. When covering a wide surface, work quickly, overlapping strokes only slightly. Seal a piece of scrap, too, so you can dial in the stain color before tackling the workpiece.

For best results, apply two washcoats. Wait about an hour between coats and two hours after the second coat. Then scuff-sand with worn P600-grit wet-or-dry paper.

Mix and apply the stain

Oil-based stain is the best type for pine. It can be brushed or wiped on, and it dries relatively slowly. Regardless of the brand, thin it with mineral spirits. That not only gives you more working time, it also keeps the addition of color subtle. A small amount of boiled linseed oil makes the stain more translucent.

Off-the-shelf stains vary considerably in the amount of pigment they contain. The Olympic stains I usually use are very heavy-bodied and require considerable thinning. Stain/sealer products that contain some tung-oil varnish are watery and weaker.

Don't be afraid to experiment with color, intermixing stains and trying different dilutions to get just the shade you want. The box at left gives a good basic stain recipe to use as a starting point. The amount of thinner required depends on the opacity and thickness of the stain you choose. Start with a mixture that's roughly 30% mineral spirits to 70% stain. If that's too intense or opaque, add more spirits. Very often, I end up with 60% thinner to 40% stain.

When the color is right, brush a liberal amount of stain onto the wood, let it stand about five minutes, then

TIP

Test the stain on a sample board

Test the color on a sample board that's been given a washcoat of shellac. This lets you tweak the proportions of the stain recipe before finishing the real piece.

Apply stain generously. *Brush on a thick coat of stain, working in a defined area such as this door panel. Use the brush to work the stain into corners and the recesses of moldings.*

Wait, then wipe lightly. *Let the stain dry for 15 to 20 minutes (temperature and humidity will affect drying times). Then wipe away the excess. Work in a circular motion at first, then with straight strokes. Use a very light touch—no pressure on the wood at all.*

Additional coats provide depth

Subsequent coats of stain give the wood a warm, amber tone. The layers of finish also add uniformity, minimizing differences in color from one area or board to the next. A coat of thinned shellac seals in the color.

More stain if needed. *Brush on a second coat of stain (above), then wipe carefully (right) to avoid hitting an area you've already wiped. If you slip, dab on more stain, then wipe again.*

Brush on more shellac. *Let the initial coats of stain dry thoroughly, which can take as long as a week. Then brush on another washcoat of shellac. Rotate the piece as needed so you're always working on a horizontal surface.*

remove the excess very lightly. A soft cotton cloth works well; quilted bathroom tissue, even better.

The stain mixture normally will stay workable for 15 to 20 minutes. If it begins to set up, lay down another coat of stain before continuing to wipe. A single coat of stain may have a minimal effect on the wood's color. But if you layer three or more coats of stain, you will steadily achieve a rich and increasingly aged look. Let the individual coats of stain dry for at least a week.

Add another coat of shellac, then the topcoats

Once you are happy with the color of your pine, protect the stain with another coat of shellac. If you don't, the stain may dissolve when you apply a topcoat. Use a somewhat thicker mixture this time, say 70% shellac to 30% denatured alcohol.

Don't overbrush or overwork the barrier coat because the alcohol can dissolve the stain beneath. Allow the barrier coat to dry several hours or overnight.

I've found that varnish makes the best topcoat because it adheres well to shellac and gives the wood an additional amber tint. Avoid polyurethane varnish, though; it won't adhere well to the waxy shellac.

Lightly scuff-sand the piece with P400- or P600-grit paper, dilute the varnish by 30% to 40% with mineral spirits, and brush on three thin coats. Smooth the final coat with P600-grit wet-or-dry paper and rub the surface with 0000 steel wool and mineral oil for a satin sheen. □

Tom Wisshack is an artist, furniture historian, and restorer in Galesburg, Ill.

Add protection with a topcoat. *Use a mixture of varnish and mineral spirits, brushing it on with long, smooth strokes.*

The Secret to Making Perfect Joints

Trim hidden areas to quickly produce a flawless fit

BY STUART LIPP

It is a common misconception that fitting a joint means methodically paring the entire area until all the surfaces match perfectly, but in many cases, wood needs to be removed only from hidden surfaces to allow a joint to close completely. I call this technique undercutting.

Do not mistake undercutting as taking the easy way out; undercutting is part of being a conscientious and concerned woodworker. The secret is knowing when to employ the technique. First, dry-fit a joint. Then decide if undercutting is the best option, or the entire joint needs trimming.

Undercutting can mean a few different things, but it usually involves angled relief cuts on surfaces that are not essential for glue strength. For example, when fitting a mortise and tenon, rather than planing the entire shoulder just chisel out the inner surfaces. By the way, if you undercut a joint and it still needs trimming at the edges, you have less material to remove.

I'll show you ways to apply undercutting to a wide variety of joints and situations. Over the past few years I have noticed myself employing this method more frequently, and in every situation the result is improved quality in far less time.

Stuart Lipp lives and works in New York City, where he oversees the construction of custom and limited-edition pianos at Steinway & Sons.

Photos: Anissa Kapsales; drawings: John Tetreault

TRIM SHOULDERS ON MORTISES AND TENONS

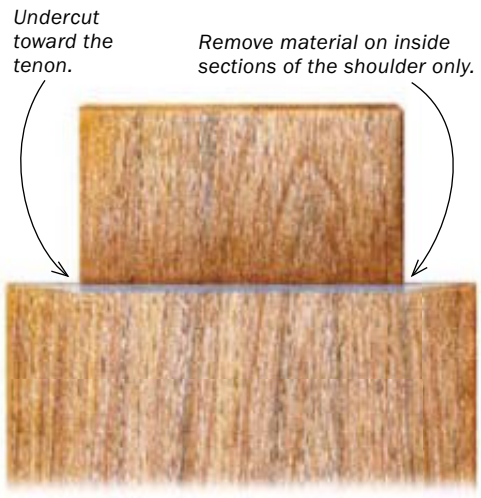
Gap-free table legs. *Undercutting is an efficient method for improving the fit of a mortise-and-tenon joint.*

Mortise-and-tenon joints employ two forms of undercutting. The most well known is to make the depth of the mortise greater than the length of the tenon, giving excess glue a place to go and allowing the joint to close. But what if the tenon shoulder still does not fit well? You can spend a lot of time with a chisel or shoulder plane trying to pare a perfect 90° shoulder, or you can quickly undercut it.

Put the workpiece in a vise, tenon up, and use a chisel to pare the end grain in from the edge of the shoulder to the tenon. Remember to keep the outermost edge crisp. Undercut enough material for the shoulder to fit, but be careful not to take too much; a 1/32-in. bevel should be more than enough. Do this all the way around the shoulder and you will improve the fit of the joint. The technique is not magic—you still may need to pare the visible edges—but undercutting leaves less area to fit.

Undercut tenon shoulders. *Use a chisel to cut a slight downward bevel (no more than 1/32 in.) on the tenon shoulder.*

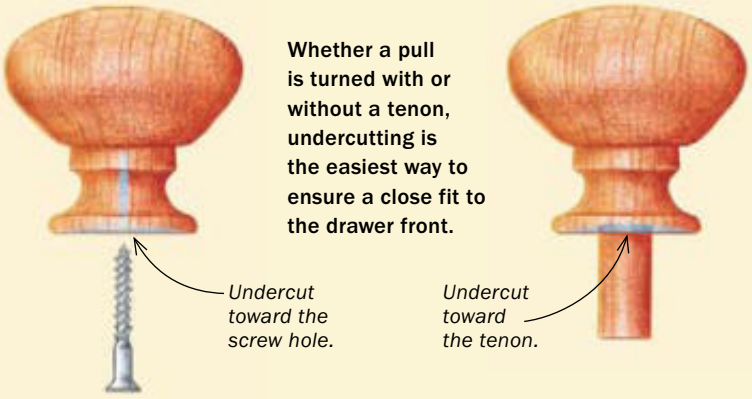
Carry the bevel around the shoulder. *Work your way around the perimeter of the tenon, leaving the outermost edge intact.*



BACK-BEVEL DRAWER PULLS

Flush-mount. *Pulls should sit flush against a drawer front.*

Turning your own drawer pulls can elevate the look of a piece of furniture, but not if the pulls don't fit tightly to the drawer front. A very quick and easy way to accomplish this is to turn a slight hollow in the back side of the shoulder, leaving the outer edge untouched. You will be ensured a nice, tight joint.

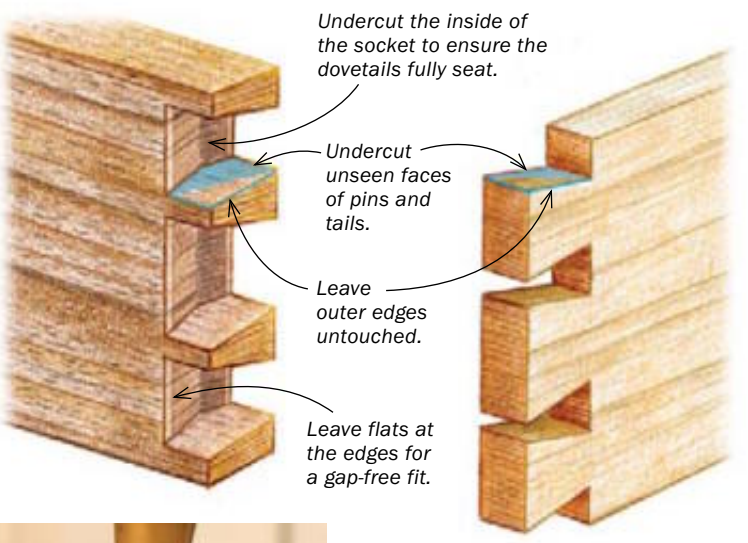


Whether a pull is turned with or without a tenon, undercutting is the easiest way to ensure a close fit to the drawer front.

One-touch technique. *Use a skew chisel to undercut a pull while it is still on the lathe.*

UNDERCUT DOVETAILS

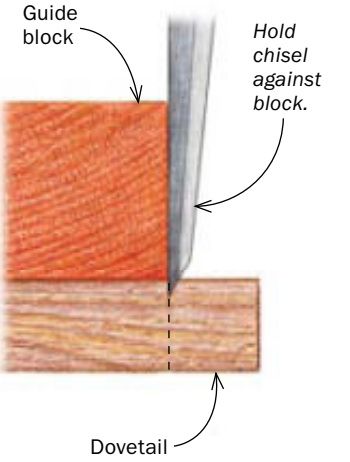
Good fit where it counts. *As long as the outer edges of the tails and pins are kept clean and tight, the dovetail is aesthetically correct.*

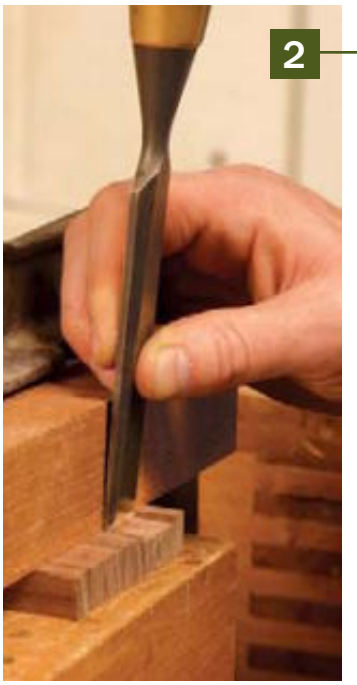


1

START WITH A VERTICAL CUT

Clamp a guide block to the baseline. Make the first chop with the chisel against the block to establish a flat at the edge.

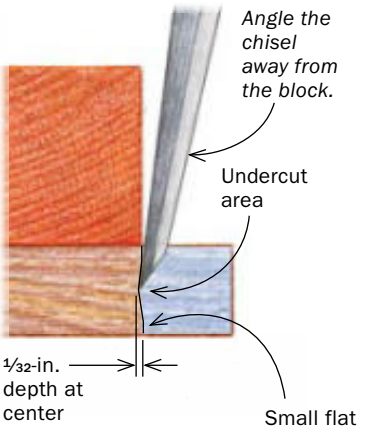




2

ANGLE THE CHISEL SLIGHTLY TO UNDERCUT THE JOINT

Angle the chisel away from the block for subsequent chops. At the halfway point, flip the board and repeat on the other side.



Hand-cut dovetails can be a measure of a craftsman's skill; they also can frustrate and overwhelm. Undercutting dovetails allows for more precise joinery with much less fussing.

Not every face of a dovetail or pin is visible, so the most important edges are the outer ones. First, the bottoms of sockets can be undercut while simultaneously being chopped (see drawing). When doing your final fitting, you can always take a larger shaving from the bottom side of a dovetail or pin. Doing this creates a slight wedge, and as you hit the joint home you will see it getting tighter and tighter. Don't worry about joint failure or lack of strength. The joint will have great contact, plenty of glue surface, and the inherent mechanical strength of the dovetail.

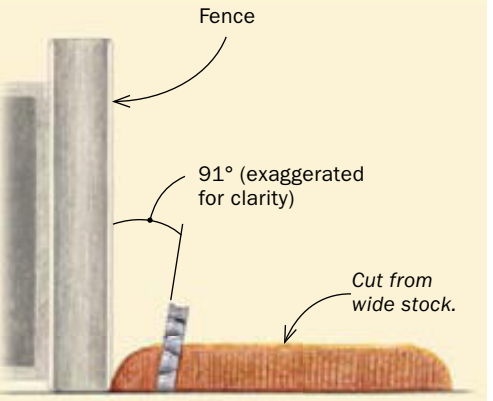
Focus on hidden sections. *The key to paring dovetails? If you won't see it, undercut it.*

Easy-fit molding. *Cutting edges at 91° and chamfering the back corner allow for a flawless fit on molding details.*

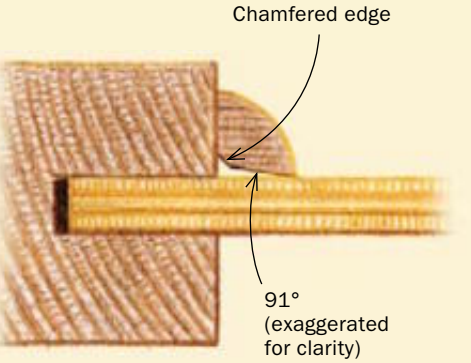
ANGLE MOLDINGS

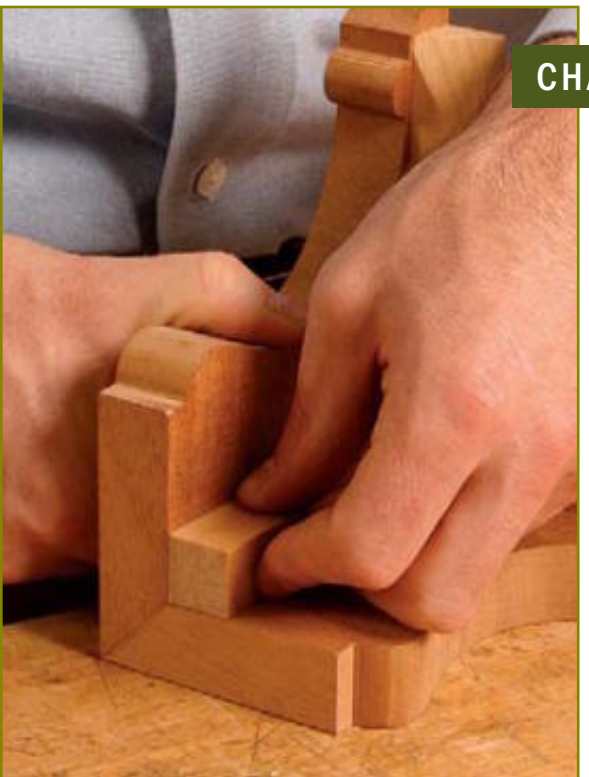
I was making some cabinet doors recently that had flat panels and an added detail of quarter-round molding glued into the step between the panel and the frame. When I milled the molding, I cut the edges intended for the step at 91° instead of the standard 90°. This technique not only guaranteed a nice tight joint at the two visible edges, it also created a recess on the inside that trapped extra glue, thus reducing squeeze-out and minimizing cleanup. I also used a block plane to put a slight chamfer on the molding's inner corner for additional clearance.

After the profile is cut, rip the molding to thickness with the blade set at 91°.



Chamfering the molding's back edge creates additional clearance for a good fit and for hiding glue.





CHAMFER GLUE BLOCKS

Glue blocks are great for adding strength to joints. They can be used to support drawer or chest bottoms, to strengthen bracket feet and mitered joints, and to attach tabletops. However, if there is dried glue squeeze-out in a corner, you won't be able to press the glue block against both sides of the joint. Put a slight chamfer on the inner corner of the glue block, providing clearance for glue or debris.

No clamps needed. *A simple rub joint works to adhere glue blocks. Apply the glue and rub the block back and forth until it sticks where you want it.*

Create a chamfer. *Using a block plane is the easiest way to chamfer a glue block.*

Bombproof joint. *A nearly imperceptible gap, 1/32 in. at most, toward the center of an edge joint ensures a tight fit for decades.*

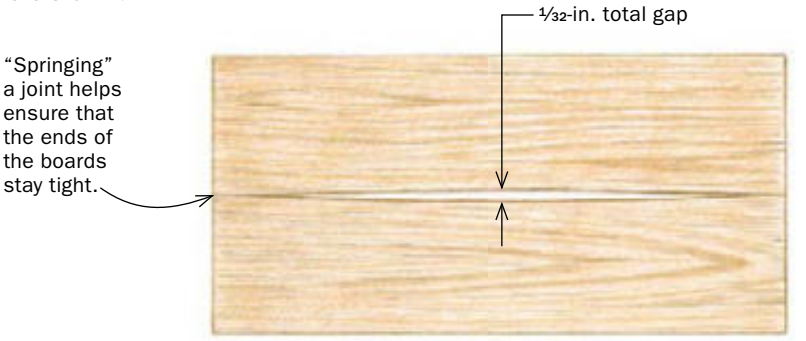
Lay out a visual guide. *Separate the boards into five equal sections. Plane the middle section, the middle three, and then the entire edge.*

Plane both mating edges at once. *This will help compensate for any misalignment in the planing angle.*

SPRING LONG EDGE JOINTS

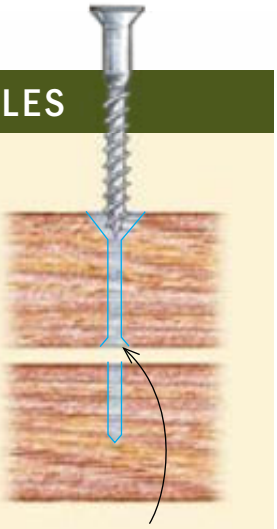
The most common place for an edge joint to fail is at the ends. The rate of shrinkage is greater there than in the middle; this means more stress is put on the glue joint at the ends. A way to solve this is to undercut the center section, leaving a little extra wood at the ends to accommodate the shrinkage, so the tension that would usually be put on the glue joint is now absorbed by that extra material. Known as springing a joint, this technique also helps ensure that the ends of the boards stay tight during glue-up. You can spring any size joint, but unless it is over 18 in. long, the benefits are negligible.

To spring a joint, start with machine-jointed edges; that way you know you are dealing with straight, square surfaces. Next, put the boards horizontally in a vise, and break up the distance into five equally spaced sections. With a handplane, take three light passes: the first over the center section, the second over the middle three sections, and the last over the entire length of the boards. It is crucial that you get a complete shaving on the last pass because any snipe or chatter will compromise the fit of the joint. When you put the boards together with the ends touching, there should be a small gap in the middle, often almost invisible, never more than 1/32 in.



CHAMFER BACKS OF HOLES

When drilling clearance holes for screws, I find that even with a sharp bit I often get some type of tearout or fuzz on the exit hole. When screwing the piece down, there is a good chance that the little fibers of wood will prevent the joint from closing completely. The remedy is pretty simple: Just kiss each exit hole with a countersink. That removes the fibers and creates the slightest hollow, ensuring a tight fit.



Router-Made Bandings

Dress up your work with these unique designs

BY MARK ARNOLD

OGEE BANDING

Use contrasting woods and a reversible ogee bit to make either a narrow banding (below) or a wider one (bottom).

Most woodworkers associate banding with Federal period furniture, when its primary role was protecting the edge of a veneered panel. However, the use of banding is not restricted to veneered work or to period furniture. It is a great way to embellish solid pieces of almost any style.

The advantages of making your own banding are that you can customize the wood to match a project, create designs with curved elements not available commercially, and make them to a length that suits you. As I'll demonstrate, you can make two such bandings easily using readily available router bits. I demonstrate a third on FineWoodworking.com. Not only will these bandings give your projects a dramatic effect, they'll also give them that personal touch.

Design starts with a router bit and the right woods

When selecting the woods for a particular banding, consider where it will be inlaid. A banding easily can be lost in the motion of a highly figured burl or crotch, or it can appear as an afterthought if the species or colors do not complement the primary wood. Contrast is desirable, but it should not detract from the subject being framed. The most successful bandings are those that appear three-dimensional, like the banding I demonstrate on FineWoodworking.com, or make use of chatoyancy, like the ogee banding (above). Certain woods, such as the curly maple in this example, change in color and luster when viewed from different angles.

A banding blank will yield less than half its width in usable strips and the rest will end up as sawdust, so always make more than you'll need. A 1-in.-wide blank can yield up to 10 usable strips.

SCALLOP BANDING

A pair of matched beading and fluting bits yields identically shaped bandings whose woods are reversed. Use one to edge an apron and give your table a touch of sophistication.

Mark Arnold is a woodworker near Columbus, Ohio.

FineWoodworking.com

Learn to rout and assemble a third type of banding, a lunette, with step-by-step photos.

An ogee bit yields two types of banding

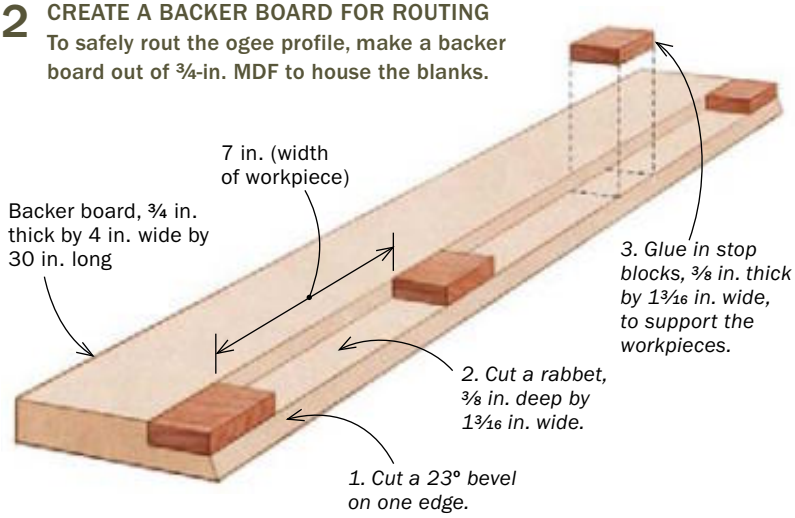
A router bit with a symmetrical S-curve is used to create nested pieces of contrasting color. These pieces can be veneered for a narrow banding or stacked and veneered for a double-wide design.

1 MAKE THE BLANKS

To begin, mill equal amounts of contrasting woods, in this case cherry and maple, to ⅜ in. thick by 7 in. wide by 30 in. long. Then cut them into strips, 1³⁄₁₆ in. wide for this specific bit (see below).

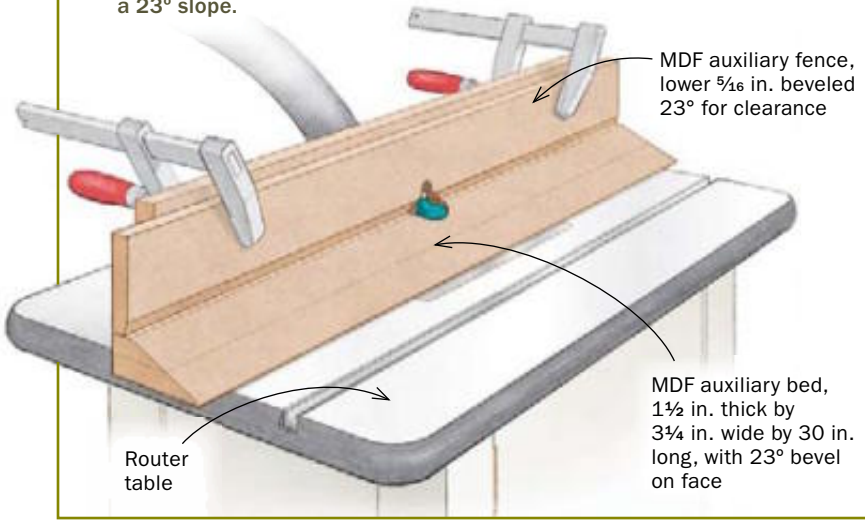
2 CREATE A BACKER BOARD FOR ROUTING

To safely rout the ogee profile, make a backer board out of ¾-in. MDF to house the blanks.

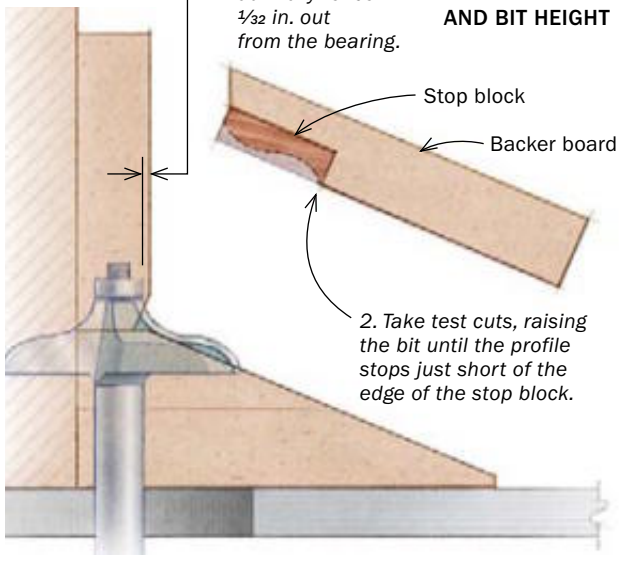


3 MAKE AN ANGLED BED FOR THE BACKER BOARD TO RIDE ON

The centerline of the workpiece must be aligned with that of the router bit's cutter, so you need to build an angled auxiliary bed with a 23° slope.



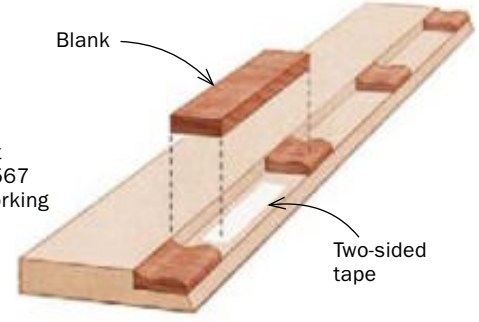
SETTING THE FENCE LOCATION AND BIT HEIGHT



ROUT THE OGEE PROFILE

Secure the blanks in the backer board with double-sided tape. Use a fresh piece of tape for each run. When routing, keep the backer board tight to the fence.

Ogee Bit Part No. 8567 (mlcswoodworking.com)



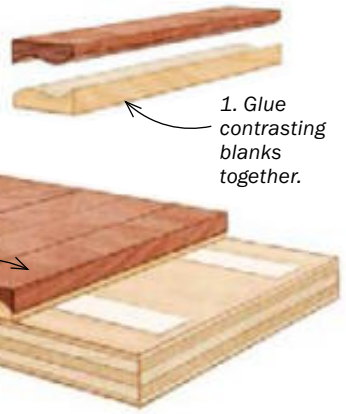
Use push blocks to keep the work against the fence. *If the backer board moves away from the fence during routing, the workpiece will be ruined.*

Photos: Mark Schofield; drawings: John Hartman

Match the pairs. *Glue each cherry piece to a maple piece by nesting their profiles. Clamp several at a time, placing a layer of plastic between each pair to avoid gluing their flats together.*

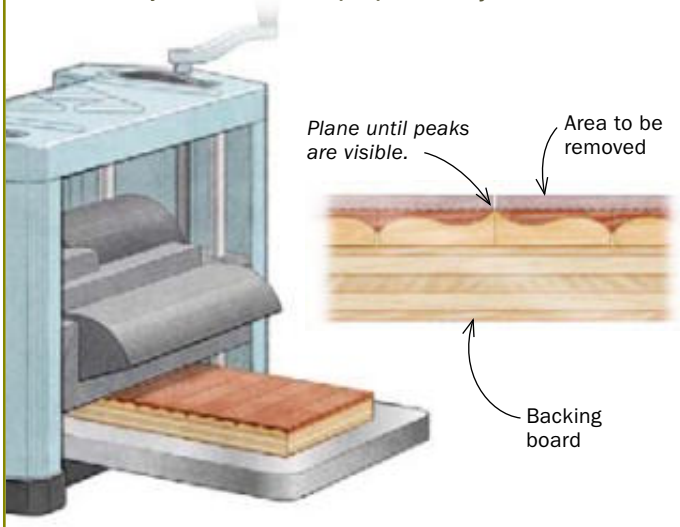
5 GLUE AND MOUNT THE BLANKS

After the glue has cured, tape the pieces to a flat board, maple-side down, so that they form a series of mirror-image pairs that butt together tightly.



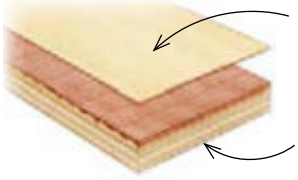
6 PLANE THE FIRST FACE

With the blanks mounted to the backing board, plane the cherry face until the maple peaks are just visible.



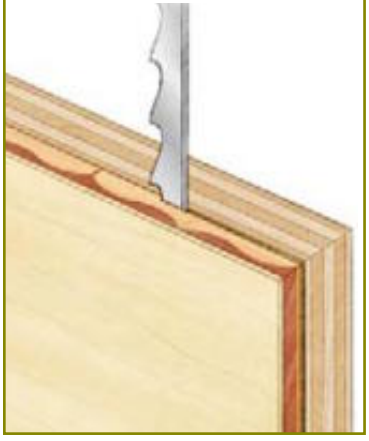
7 VENEER THE BLANKS

Glue a piece of 1/16-in.-thick holly or maple veneer to the just-planed cherry. If you can't get the extrathick veneer, use a couple of sheets of standard commercial veneer.



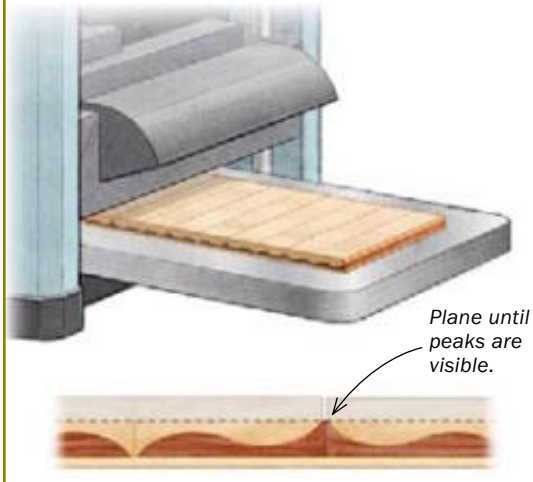
8 SAW AWAY THE BASE

Prying the veneered blanks off the backing board could damage them, so it's better to saw it off on the bandsaw.



9 PLANE THE SECOND FACE

With the veneer face down, plane the maple side of the blanks until the cherry peaks just appear.



10 COMPLETE THE BANDING AND RIP INTO STRIPS

You have two options at this point. Simply add cherry veneer to the maple face for narrow banding, or stack the blocks for a wide banding.

NARROW BANDING OPTION

For narrow banding, apply a sheet of 1/16-in.-thick cherry veneer to the non-veneered side.

WIDE BANDING OPTION

For the wider banding, rip the blank in half, then place the two non-veneered faces together, offsetting the top by half a pattern.

Rip the bandings. *Arnold uses a thin-kerf blade to rip his bandings to 3/64 in. thick. A piece of MDF acts both as hold-down and blade guard. He pushes the strip as long as is safe, then pulls it from the back side of the blade.*

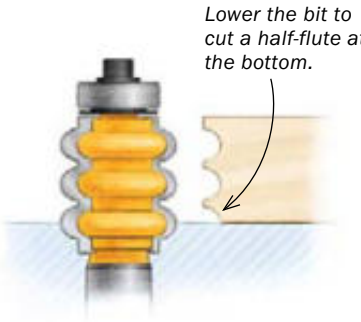
Matched router bits make contrasting bandings

For this banding you'll need two cutters, a beading bit and a fluting bit, whose profiles nest together with the beading bit creating small quirks between the beads.

1 FLUTE THE END GRAIN

For this specific bit, mill holly and walnut stock ⅞ in. thick by 3 in. wide by up to 2 ft. long. Cut flutes on each end.

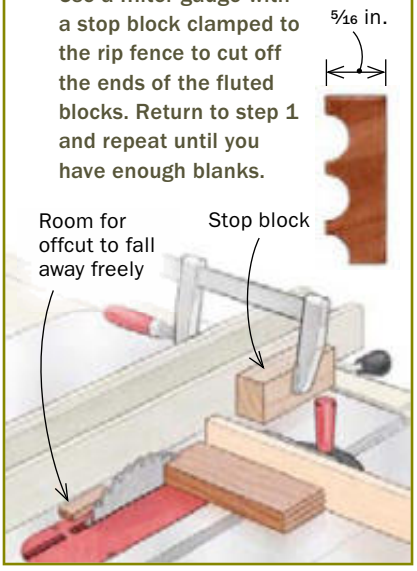
Woodtek Triple Flute Router Bit No. 921-446 (woodworker.com)



Rout the flutes. *Rout the end grain of the holly and the walnut stock using a push block and backing board to control the workpiece and prevent chipout.*

2 SLICE OFF THE BLANKS

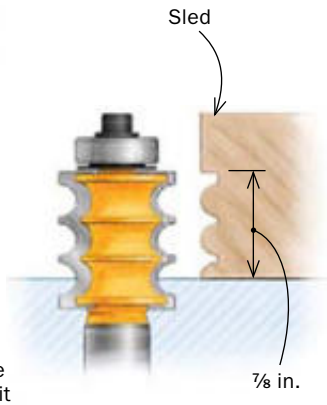
Use a miter gauge with a stop block clamped to the rip fence to cut off the ends of the fluted blocks. Return to step 1 and repeat until you have enough blanks.

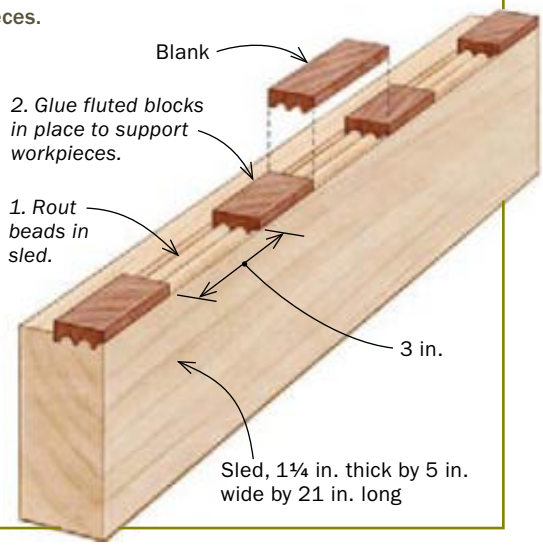


3 MAKE A SLED TO BEAD THE BLANKS

With the triple-beading bit, bead the long edge of a board. Into these beads glue short pieces of the fluted profiles to act as stops for routing the second side of the walnut and holly workpieces.

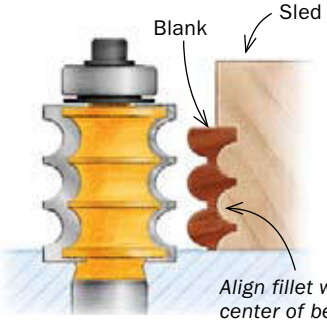
Woodtek Triple Bead Router Bit No. 921-432 (woodworker.com)

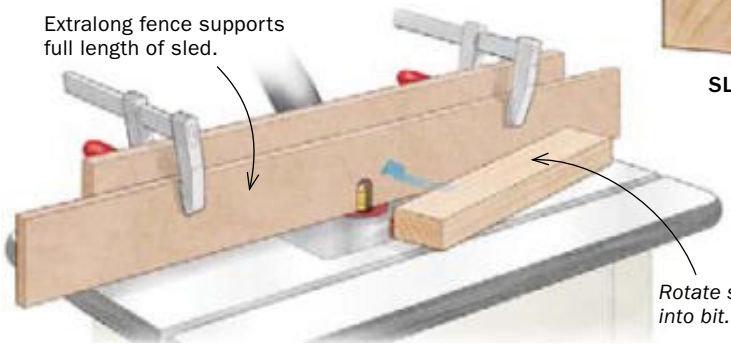




4 BEAD THE BLANKS

Adjust the bit so that it will cut a full bead at the bottom. Insert the pieces in the sled. Pivot the sled into the bit in the middle of the front end block and stop routing before cutting all the way through the rear end block.



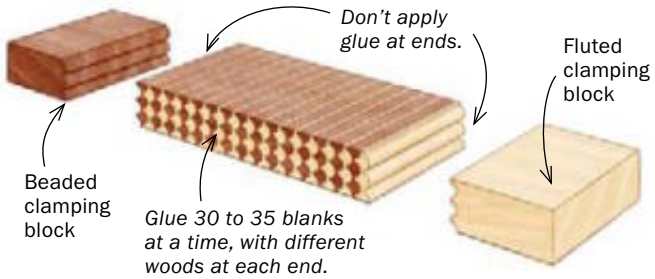


Note: Don't rout the ends. The unrouted portions ride along the fence.

SLED END DETAIL

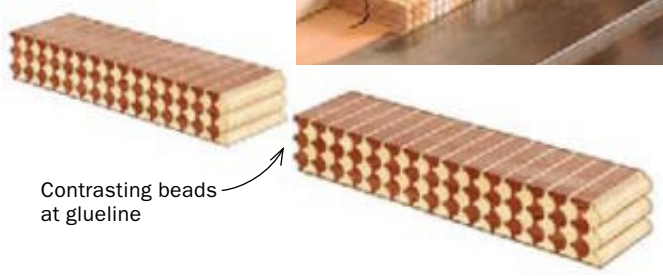
5 GLUE THE SECTIONS TOGETHER

Glue together alternating pieces of holly and walnut. Because the pieces are nested, it takes quite a few to create a long banding.



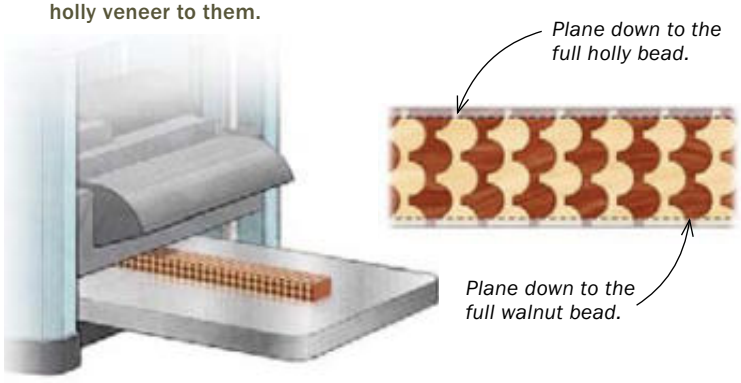
6 RIP THE BLOCK TO CREATE A LONGER BANDING

If need be, rip the assembly in half and glue the two halves end-for-end to create a longer banding blank. Use the clamping block to back up the cut.



7 PLANE THE BLOCK AND ADD VENEER

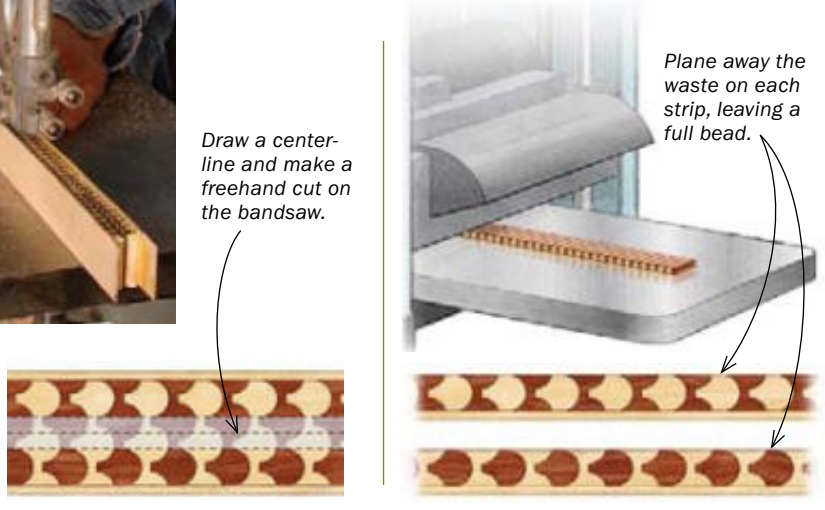
After planing both faces, glue pieces of 1/16-in.-thick holly veneer to them.



Veneer the blank. *After planing, glue pieces of 1/16-in.-thick holly veneer to each face.*

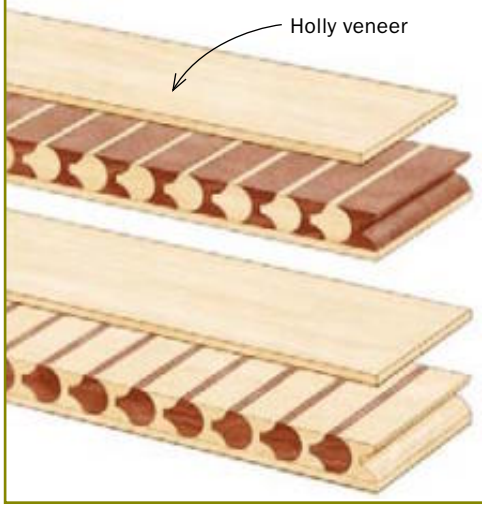
8 RESAW THE BLANK AND PLANE THE STRIPS

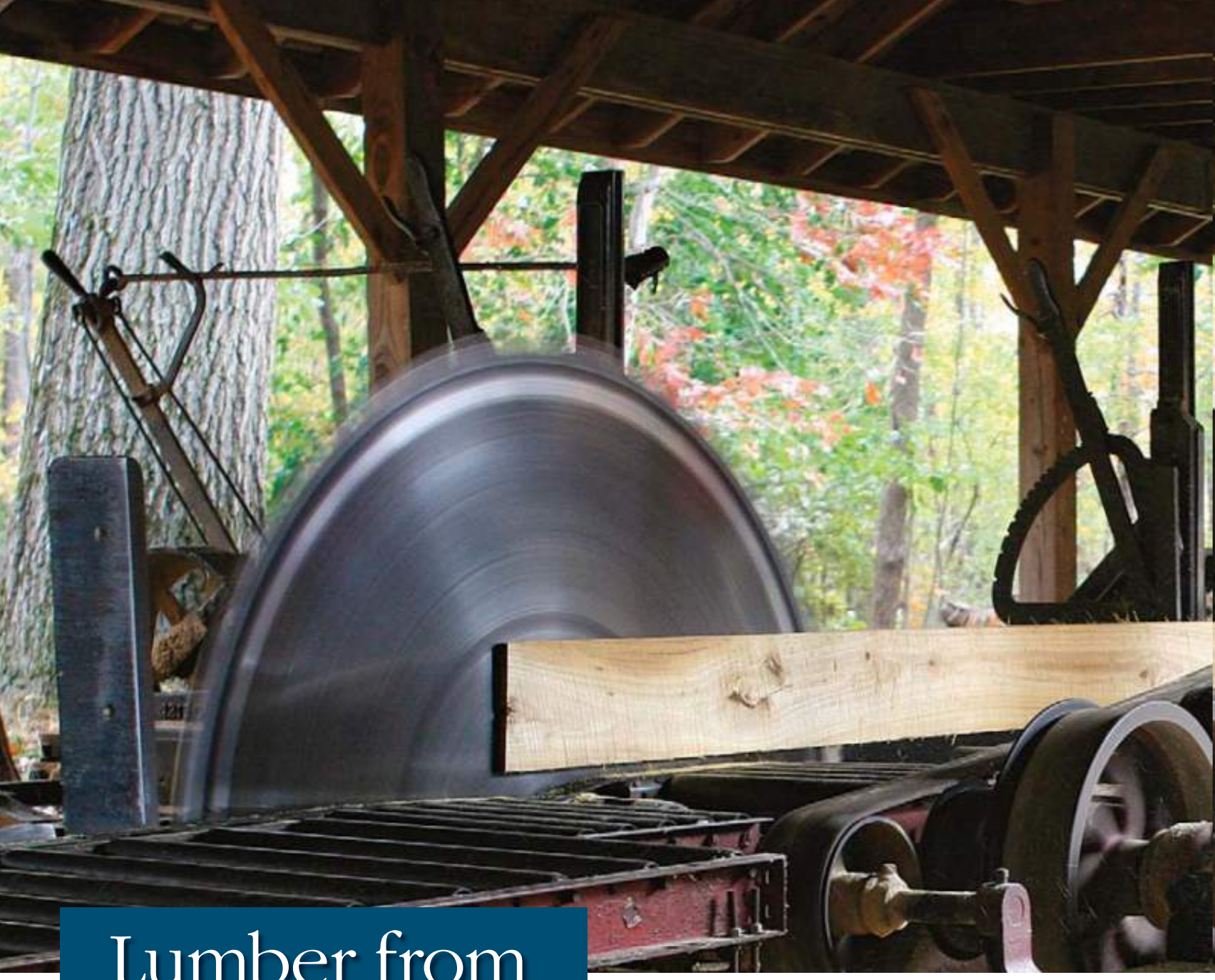
Carefully bandsaw down the middle of the blank to create the two contrasting moldings.



9 VENEER BOTH BANDINGS

After planing both pieces to the correct width, veneer the planed faces with 1/16-in.-thick holly veneer.





Lumber from Mini-Mills

Unusual woods at bargain prices might be closer to home than you think

BY MARIO RODRIGUEZ

As the name suggests, a mini-mill is simply a small sawmill, typically run by a single person. You find them almost everywhere across the United States. Some of them cut with a monster-size circular sawblade, while others do the work with a gi-normous horizontal bandsaw.

But it's not the machinery that gives mini-mills their appeal. Unlike the big mills that supply lumber to your local hardwood dealer or lumberyard, mini-mills are likely to be a source for unusual and interesting boards—the ones that can make a woodworker's pulse spike.

Some of these finds will be "exotic domestics," locally grown woods that show unusual figure or color. Such woods aren't normally carried by hardwood suppliers because the supply is limited and the demand is light. On the other hand, this is exactly the stuff a mini-mill values the most.

At a mini-mill, you just might discover a gorgeous length of crotchwood for a door panel, a board with exceptional wild grain

Photos, except where noted: Mario Rodriguez; facing page (bottom): John Tetreault

for the top of an end table, or a stack of rarely available local wood such as apple, buckeye, or pecan. You might even come across a 3-in.-thick slab of your favorite wood that would be perfect for a long-planned dining table.

That's why I go to mini-mills. They have material you just won't find anywhere else.

Many of these little sawmills offer custom cutting, so you can request quartersawn boards or special thicknesses. If the mill is mobile, and many are, you can have a log on your property cut to your specs. Or, you can transport a log to their site for milling.

Mini-mills appeal to me for yet another reason. They often offer their stock at bargain prices. Mainly because they have low overhead, you generally can save from 10% to 50% over prices charged by hardwood dealers and lumberyards. That's partly because small sawyers aren't competing with larger mills for premium logs. Much of their wood comes from

WHAT LOCAL MILLS HAVE TO OFFER

Large boards. *Unique boards, like this stately book-matched pair of 2½-in.-thick walnut crotch slabs, are what you might find at one of these small, independent mills.*

Boards from the same log. *At mini-mills, it's not uncommon to find a log that has been flatsawn into boards and then restacked in the order cut. A log cut and stacked like this is a good way to get boards with matching color and grain.*

Local woods. *Mini-mills can be great sources for underutilized local woods. Not far from Philadelphia, Rodriguez found several local woods in stock (from left): pear, sassafras, mulberry, and spalted curly sycamore.*

Photos (top right): Tom Begnal

landscapers and property owners who are happy to get a felled tree off their property.

Potential problems

Because mini-mills tend to be mom-and pop operations, most won't have a drying kiln. That means the wood might not be adequately dry for furniture making. It might even be green, or close to it. You'll need to air-dry the wood further when you get home. Basically, that means stacking it so air can flow freely around it, and sealing the end grain to avoid checking (cracks). A moisture meter comes in handy here; one costs around $100. (For more information on how to dry wood, see p. 88, or go to www.fpl.fs.fed.us, click "Publications," and "Drying hardwood lumber.")

Drying time. *Boards cut from logs need to air-dry. Sticker the boards to allow air circulation and cover only the top ones.*

Trees that grow near houses, barns, or fence rows can have embedded metal, typically old nails, bullets, or barbed wire. Some mills flat-out refuse to saw such trees. Should you supply the log, many mills require a signed waiver stating that you are responsible for the cost of repairing or replacing the blade if it is damaged by an encounter with steel.

That said, before they saw a log into boards, most mill operators use a metal detector to check for steel. A metal detector not only helps them avoid problems, but it also helps you by ensuring that the board you buy won't likely have an unpleasant hidden surprise waiting for your tablesaw blade.

Finding a mini-mill

Little mills can be hard to find because they often fly just below the radar. Usually, they don't run ads in the Yellow Pages or the local paper, and they don't hang signs out front. So don't be surprised if you have a mini-mill in town and don't know about it.

FineWoodworking.com

See a mini-mill in action and browse our directory of mills.

The best way to find one is simply to ask around. Landscapers sometimes have mini-mill contacts. If you belong to a woodworking club, raise the question at a meeting. Your hardwood lumber dealer or lumberyard just might be able to help. So, too, might any local furniture builders or wood turners.

You also can use the Internet. One good source is www.woodweb.com. Another source is a list of owners of Woodmizer portable sawmills, as some have wood for sale. To find out if there's an owner in your area, you can call 800-553-0182.

If you like unusual woods, I suggest you make an effort to track down and visit a mini-mill or two. That special board you've had in mind might just be waiting there for you, ready to speed up your pulse rate. □

A former contributing editor, Mario Rodriguez teaches woodworking at the Philadelphia Furniture Workshop.

Three mini-mills

Mini-mills can be as different as the wood they cut. To get a general idea of what you can expect in your region, Rodriguez located three mini-mills, all within an hour's drive of his home in southern New Jersey.

Have mill, will travel

Dave Peregmon of Pennsville, N.J., works full-time as a physical therapist at a rehabilitation clinic. His passion, however, is milling wood. He parks his portable Timber Harvester mini-mill on a lot owned by a busy landscaper, where he cuts whatever they drop off. He can mill logs up to 36 in. dia. and 20 ft. long. The morning I visited, there were about a dozen logs stacked to the side. Peregmon and Bill Curnow, his 93-year-old assistant, were about to load and saw a poplar log.

In order to get the most from a log, each sawyer performs various rituals, double checks, and adjustments. I was surprised at their efficiency. In about 30 minutes, they had moved the log to the mill, hoisted it onto the carriage, and cut it into a neat pile of boards.

Peregmon's inventory varies from month to month, depending on what the landscapers bring. Locally grown woods are most common, but landscapers sometimes leave some interesting non-native species.

Lumber maker. *Peregmon pulls a log up to the mill with a tractor. The log is held stationary as the bandsaw moves on rails (above), cutting a board from the top.*

Photos, this page (left) and facing page (top right two): Tom Begnal

Furniture maker to lumber maker

Dan Hudock finds wood fascinating. You can tell that from the furniture he builds. “I’ve always been excited about the material,” he said. “Often, I put as much effort into selecting the wood for a furniture piece as I do building it.”

Although he still builds furniture, most of his time these days is spent running Hudock’s Hardwoods in Perkiomenville, Pa., on the site of a former dairy farm (www.hudockshardwoods.com).

Hudock is in touch with every local source for newly felled wood: contractors, landscapers, developers, property owners, and even the municipal services department. While I was visiting, he was cutting a huge elm tree cleared from a large estate nearby.

The centerpiece of his operation is a custom bandsaw mill he designed and built. It can cut a log up to 55 in. dia. He also has a kiln that handles 2,000 board feet of lumber. It takes between five and 10 days to dry a load. Hudock’s inventory includes some of the more common native woods, among them cherry, walnut, red and white oak, hard and soft maple, and poplar. But it also includes a most-wanted list of rare domestics: apple, catalpa, elm, spalted elm, spalted curly maple, butternut, curly red oak, black locust, hickory, holly mulberry, aromatic red cedar, pear, sassafras, and sycamore.

Setting up. *Hudock adjusts his bandsaw mill to cut a 2½-in.-thick sycamore slab.*

Woodworking education. *At Dave Spacht’s mill in Worcester Township, Pa., it’s not uncommon to see a school bus arrive with a bunch of children, there to learn how lumber is made. Each visitor gets a sample.*

Keeping history alive

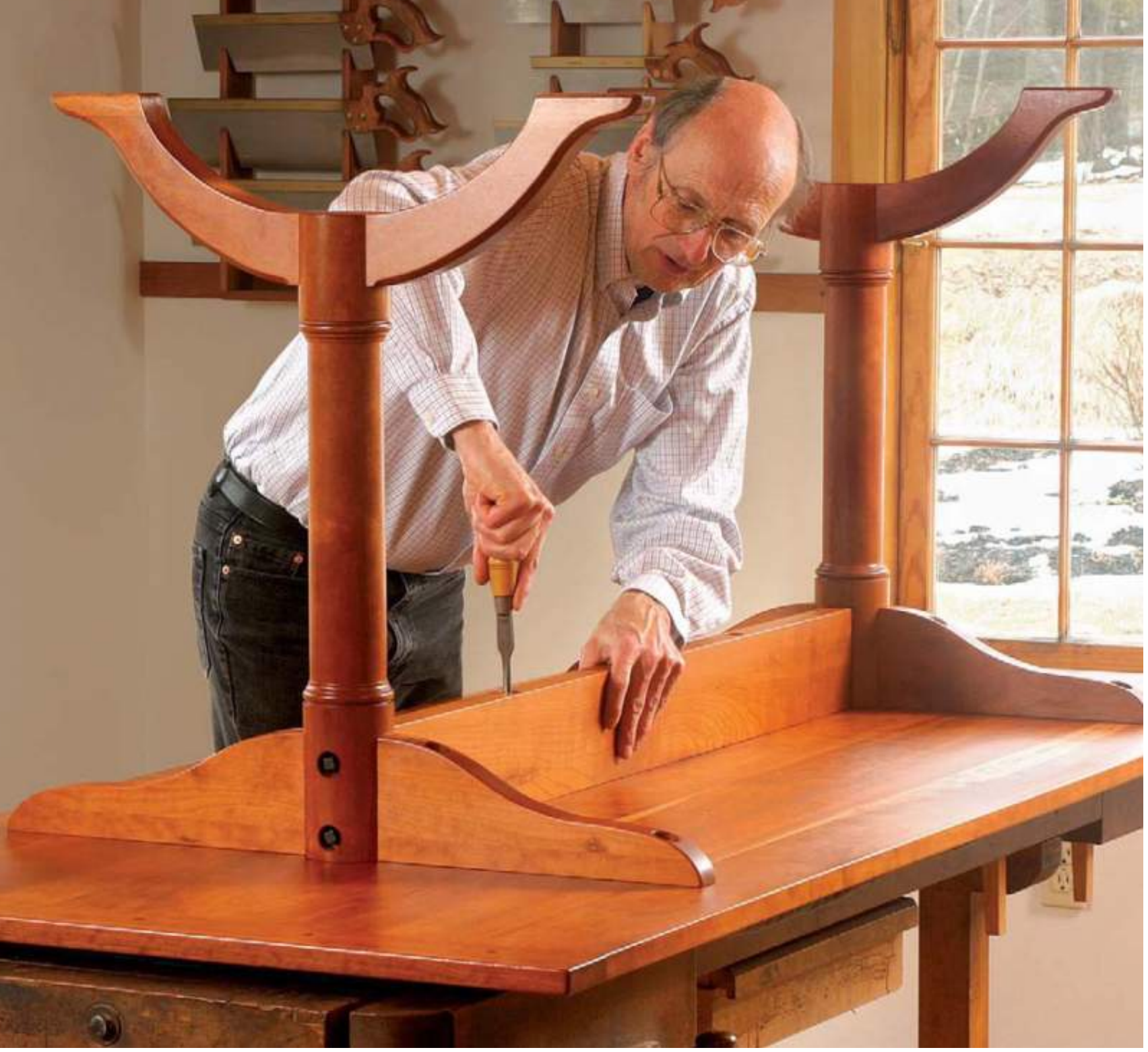
Dave and Carol Spacht’s sawmill has been a part of Worcester Township, Pa., since 1928. When they purchased the mill in 1983, however, it had long since fallen on hard times, reduced to little more than a collection of decrepit buildings and rusting equipment. Ever optimistic, the Spachts saw it as a business opportunity.

Since buying the property, the Spachts have turned the abandoned mill into a hive of local activity. They maintain the property as a rural sawmill, selling local hardwoods to local craftsmen and woodworkers, and welcoming student tours. Today, the mill is a manicured collection of barns and sheds, housing an amazing 1950s circular saw, drying and storage sheds, wood kilns, an office, and a woodworking shop. On weekends, professional and amateur woodworkers visit, looking for a deal on wood or the perfect plank for a pet project.

Spacht has plenty of ash, oak, maple, poplar, and walnut. And the barn holds several dozen wood slabs averaging 8 ft. long and 3 ft. wide.

Raw material. *Rodriguez looks over some of Spacht’s inventory. Custom cutting isn’t an issue at most mini-mills.*

No-nonsense sawblade. *Spacht uses a 48-in.-dia. circular sawblade that can cut a log up to 30 in. wide.*



Shaker Dining Table

Form meets function in this classic design

BY CHRISTIAN BECKSVOORT

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

The posts are simple turnings

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

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

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

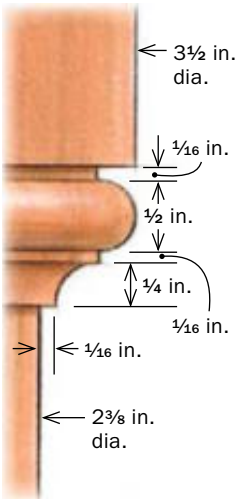
Most lathes will handle these posts

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

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

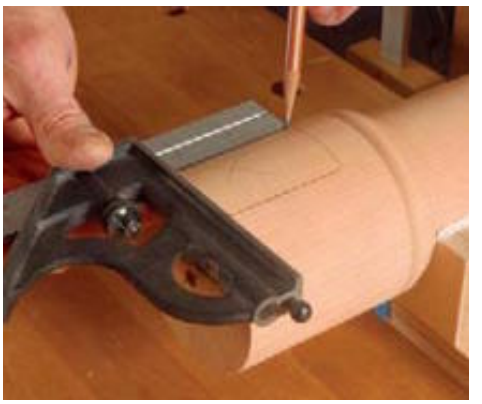
Continue using the parting tool to make a series of 2⅜-in.-dia. cuts between the end cuts. With these cuts serving as a depth guide, use a gouge to reduce the entire center section to 2⅜ in.

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

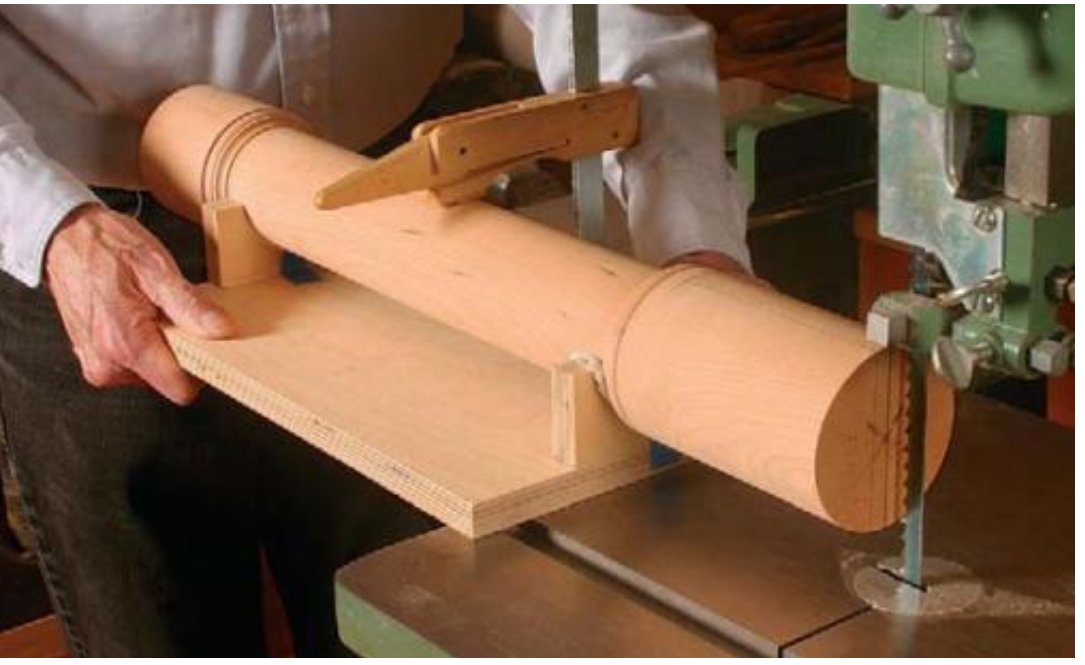


Notch the posts

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



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



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

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

dia. At each end of the center section, turn a small cove and a bead with a small flat at each end of it (see drawing, p. 73). If your turning skills are rusty, practice first on a shorter blank.

Jig simplifies post joinery

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

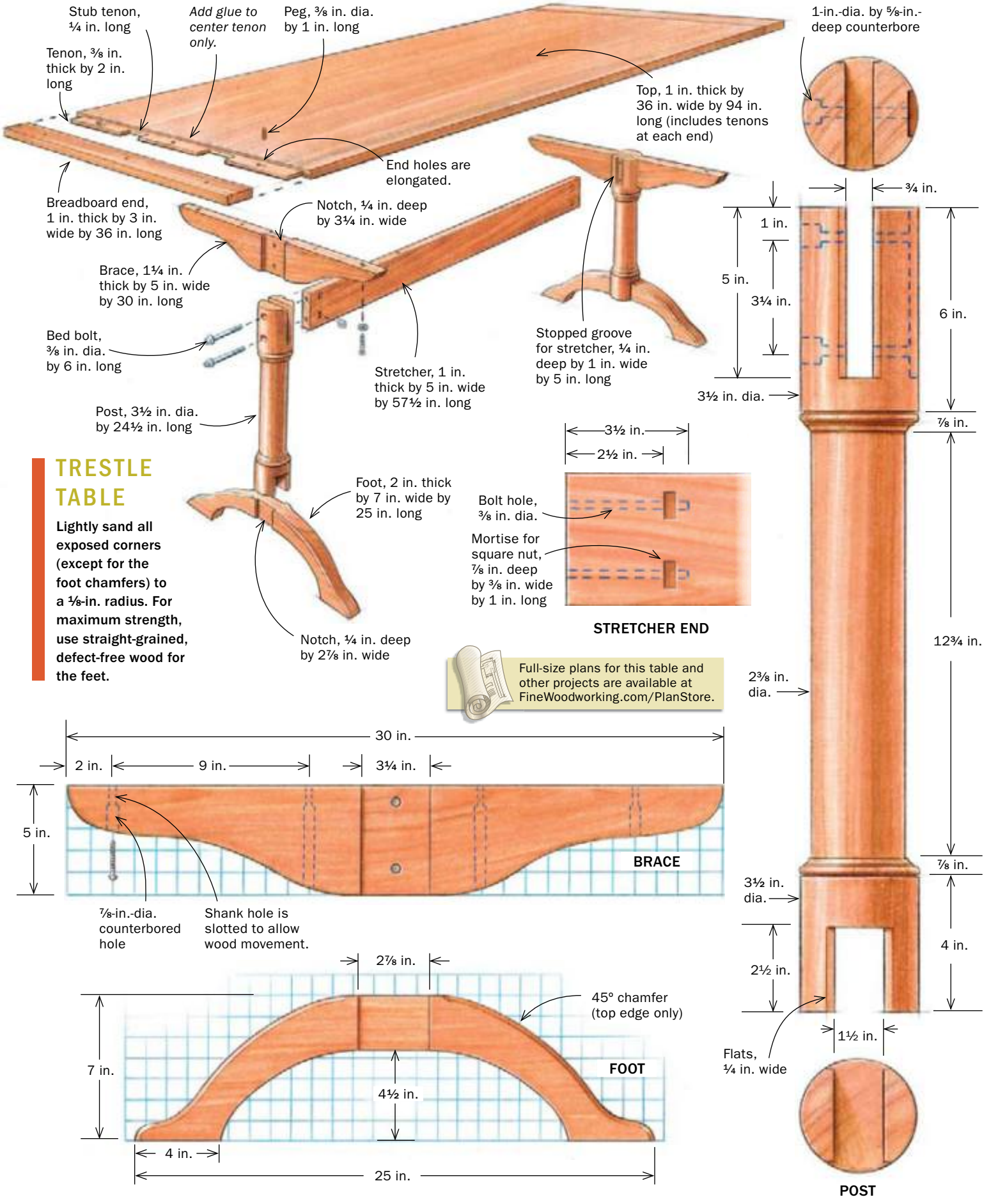
Place the cradle on a bench (with the clamp between the opened jaws of the vise so the cradle can rest flat). Use a square to lay out the width and length of the notch on each end of the post. To lay out a notch, first use a square to mark a vertical line through the center of the turning. Using that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

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

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

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

Drawings: Bob La Pointe



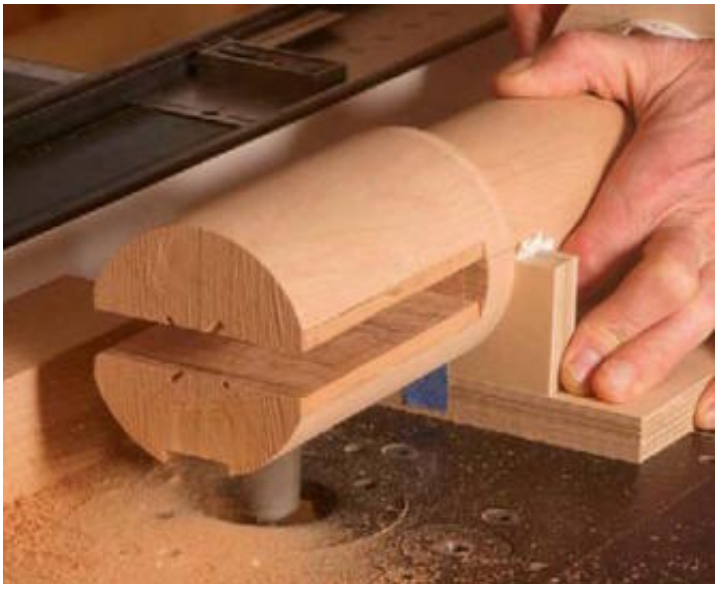
TRESTLE TABLE

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

Full-size plans for this table and other projects are available at FineWoodworking.com/PlanStore.

Notch the posts (continued)

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



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

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

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

Fit the other parts to the posts

Templates for the brace and feet can be found on p. 75, but you'll need to enlarge them to full size. I'm not fussy about pattern stock; light cardboard or poster paper works just fine.

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

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

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

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

Complete the trestles

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

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

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

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

How to install bed bolts

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

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

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

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

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

Add the bed bolts

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

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

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

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

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

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

Photos, facing page: Michael Pekovich

Assembly is easy

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

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

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

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

Build the top and breadboard ends

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

Breadboards are applied to either end. The original table, made from ⅞-in.-thick stock, had a ¼-in.-thick by ½-in.-long tongue cut fully across each end of the top and pinned to allow for wood movement. The tongue fit into a corresponding groove cut across the entire length of the breadboard end. I make my tenons longer for added strength (see "Keeping Tabletops Flat," *FWW* #183, pp. 32-37, for more detailed instructions).

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

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

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

What's Your

Readers, editors, contributors sign their work in distinctive ways

BY CHARLIE REINA

You've spent weeks, months even, making that fine piece of furniture. You take pride in your work and want the world—or maybe just future clients—to know who made it. So how do you sign your work for posterity?

We put that question to members of our online discussion group, Knots (www.finewoodworking.com), along with some frequent contributors and *FWW* editors, and found that woodworkers use signing techniques as varied and personal as their names, and often as creative as their best work. Some go the clean-and-simple route. Some leave their mark with subtle bits of flair, while others get bold and brassy.

Here are some of the best examples and signing techniques that came up most often. Take your pick, or join our online forum and weigh in.

Charlie Reina is an associate editor.

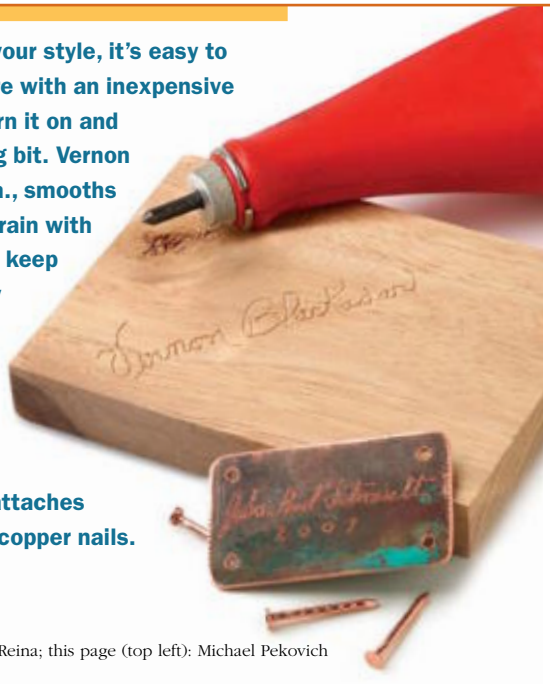
Wood burning

Burning a signature into the wood saves you the step of inking or staining in a dark color, and you get a choice of methods. In his Chardon, Ohio, shop, Bruce Schroeter uses an electric branding iron to stamp in his signature. These irons also come in the heat-by-flame style, typically used with a propane torch. They're less expensive than plug-ins but take longer to heat. In either case you get another choice: Just supply your name (as Schroeter did); or, for a higher price, supply your own design (as we did for the stamp in the top photo.)

Paul Weber of Tinton Falls, N.J., uses a standard, plug-in wood-burning tool. Its advantage? It allows you to restyle your signature for each piece.

Engraving

If block letters aren't your style, it's easy to "handwrite" a signature with an inexpensive engraving tool. Just turn it on and write with the vibrating bit. Vernon Blackadar of Lithia, Fla., smooths out any coarse wood grain with fine sandpaper first, to keep the bit from constantly bouncing off course.



***FWW* assistant art director John Tetreault engraves his signature on pieces of salvaged copper, and attaches them to his work with copper nails.**

Photos, except where noted: Charlie Reina; this page (top left): Michael Pekovich

Sign?

Carving

Dennis Soden of Leawood, Kan., uses carving tools to produce his name and the year in letters 1 in. to 2 in. tall. Matt Mulka of Mokena, Ill. (not shown), uses chisels for letters twice that size. Like many of those who sign their work, Soden creates the letter characters on his computer, which gives him a choice of fonts. Then he prints the characters and traces them onto the wood with carbon paper. For more on letter carving, see "The ABCs of Letter Carving," *FWW* #187, pp. 84-87.

Inlaying

If a quick ink-on-wood scrawl is at the low end of signing techniques, inlaying is at the high end. It typically involves more work, more precision, and sometimes more cost. You can get fancy with the size and shape of the inlay and use a router and template to clear the way. Or you can make the process a lot easier, just by thinking circular.

Jim Howell of Portland, Ore., makes inlays out of contrasting wood. Using a 1-in. plug-cutter and tablesaw, he cuts out a disk ⅛ in. thick. He inscribes his floral-design signature with a wood burner or engraver, drills out the receiving hole with a Forstner bit, and glues in the disk.

Several signers inlay pennies minted the same year as the piece was made. Lane Carter of Edgemont, Ariz., epoxies in a new penny and burns in his name alongside it with an electric stencil. Mike Rylander of Mill Valley, Calif., has his own coins minted and epoxies them into the piece. His coins have consecutive years on opposite faces to get two years from each batch. Custom coin makers typically charge about $2.25 each for up to 300 bronze coins ($2.75 each for silver), plus an initial die-making fee of $210. Prices drop significantly for larger orders.

Some of our signers use Dremel-type tools to achieve varying effects, starting with a 1/32-in. ball bit for the smallest letters. Max Mayer of Steamboat Springs, Colo., opts for a squiggly "worm-line" design and rubs in a contrasting stain before sanding and finishing the wood. Michael Ochinda of San Jose, Calif. (not shown), uses a block-lettered "Handcrafted by ..." signature.

Sand coarse wood first. *Vibrating-bit engraving tools work better after coarse wood grain is sanded smooth. Wiping a contrasting stain over the signature fills the lines and brings out the words.*

Writing

HANDWRITING ON WOOD

Taking a pen directly to your workpiece is as simple as signing gets. Rancher/woodworker David Doyel of San Jose, Calif., uses a felt-tipped pen to handwrite a version of his family's cattle brand. Our advice to ink-on-wood signers: Keep a steady hand, and don't misspell. "Erasing" with 60-grit sandpaper can take a while.

HANDWRITING ON PAPER

To reduce the chance for error, several signers put pen to paper, then paper to wood. Ken Werner of Hamilton, N.Y., made, and "signed," a plane box for his young son.

LASER PRINT ON PAPER

Mike Harris of Atlanta, Ill., shows what you can do with a computer printer and parchment paper. He glues these signature ovals onto a hidden part of his workpiece, then brushes on a polyurethane finish.

SOURCES OF SUPPLY

BRANDING IRONS, WOOD-BURNING TOOLS, ENGRAVING TOOLS

www.woodcraft.com
www.leevalley.com
www.rockler.com

CARVING TOOLS

www.highlandwoodworking.com

STAMPING TOOLS

www.infinitystamps.com

MINTED COINS

www.wemakecoins.com
www.coinable.com

Stamping

If you've ever accidentally pounded a loose nail into the surface of a board, you know how stamping works. Just about anything metallic with a sharp, well-defined edge can be your signature "stamp." Then again, you might want something more personalized—your name, the date, or a whimsical design like the one Aurelio Bolognesi of Hardwick, Mass., uses. For that, you can have a metal stamp made to your specs. (Bolognesi paid $140 for his hardened steel stamp.) Then it's just a matter of one solid blow with a hammer. Just make sure to do that before the piece is assembled.

FineWoodworking.com managing editor Matt Berger was living in San Luis Obispo, Calif., when he had this rubber stamp made at a print shop. Matt supplied the design, and paid less than $20 for the stamp and ink pad. He stamps his work in its unfinished state, then wipes on the finish.

Photos, facing page (center): Kelly J. Dunton; (bottom): John Sheldon

Where to sign your work

Proud as they are of the furniture they make, most of our signers opt for modesty when it comes to leaving their mark. Or maybe they just don't want anything to mar the beauty of the work. Whatever the reason, they tend to sign their work in places you have to look for.

CHAIRS

We get to see wooden chairs from just about every angle, and just about every surface is visible. But there's at least one out-of-the-way place for a signature. Kevin Rodel of Pownal, Maine, signs his Arts and Crafts chairs (featured in *FWW* #190) on the inside of the seat's back rail.

DRAWERS

Drawers give the signer an even chance of being recognized or staying anonymous. Paul Weber's wood-burnt signature can be seen only with the drawer out.

FRAMES

FWW associate art director Kelly Dunton took pen to finished wood on the back of this cherry frame.

TABLES

And then there's a signature that hides in plain sight, courtesy of one of our contributing editors. Look closely at the inset photo of the box on his demilune table, which was featured in *FWW* #177. Can you see the signature? It's inlaid in Morse code. The short and long ebony lines around the inner semicircle are the dots and dashes. Cherry spacers separate the letters. They spell H (....) A (._) C (_._.) K (_._), as in Garrett Hack.

readers gallery

JANEL JACOBSON
Harris, Minn.

Jacobson finds the inspiration for her tiny sculptures in the natural world surrounding her home. This one is a mere 1¼ in. deep by 5¼ in. wide by 1½ in. tall. She roughed out the shape with a microgrinder and used files and small carving tools to create the details. To raise the bumps on the frogs' skin, Jacobson compressed tiny dimples in the surface, scraped the entire surface level with the bottom of those dimples, and then immersed the piece in hot water. The boxwood piece is finished with artist's oil paints.

DOUG KING
Missoula, Mont.

King made this madrone and claro walnut curved-top box for his mother, and the feet were inspired by period antiques in her house. In keeping with the rest of the box, the frame-and-panel lid is solid wood, shaped with a spokeshave and a round-bottom plane. The finish is shellac; the box is 9 in. deep by 15 in. wide by 7 in. tall.

KERRY MARSHALL
Mendocino, Calif.

Living and working in wine country, it's only natural that Marshall would incorporate that tradition into his work. This chair (24 in. deep by 24 in. wide by 36 in. tall) is made from a reclaimed oak wine barrel. After five years of use, the wood stops imparting desirable flavors to the wine and the barrels are discarded. The natural curve of the staves drove the chair design, and Marshall left the barrel's existing grooves and other details on the leg pieces. The Bordeaux-soaked color on the inside of the staves (apparent on the seat and back rails) is sealed in with shellac and a finish coat of Bioshield resin oil.

JOHN McALISTER
Charlotte, N.C.

McAlister, the 2001 recipient of the Society of American Furniture Makers' Cartouche Award for lifetime achievement, made this mahogany and poplar Newport clock for his eldest daughter. The dial was painted by Chad and Kay Mitchell of Rock Hill, S.C., who paint and repair dials for museums. It is true to the period, except for McAlister's name in script (the maker of the movement might have his name there, but never the cabinet maker). Also on the dial, hidden in the thistle foliage in each corner, are the initials of McAlister's daughter, her husband, and their two daughters. The clock, finished with varnish, is 13½ in. deep by 24 in. wide by 96 in. tall.

PHOTO: PAT SHANKLIN

SETH DEYSACH
Chicago, Ill.

This table (22 in. deep by 18 in. wide by 18 in. tall) was built to sit next to an original Eames lounge chair. Deysach was commissioned to design a table to complement the mid-20th-century style of the iconic chair. He used MDF and poplar as substrates under the Santos rosewood veneer and lined the drawers with leather. The finish is catalyzed lacquer and wax.

SCOTT GUTIERREZ
Heber City, Utah

The design for this padauk and wenge hall table came as Gutierrez thought about the architecture (particularly the bridges) and countryside of Vietnam and Thailand, which he finds particularly appealing. These influences are apparent in the faux bamboo legs and arches. Finished with Waterlox polyurethane, the table is 16½ in. deep by 68 in. wide by 30 in. tall.

HIKMET C. SAKMAN
Victoria, B.C., Canada

Sakman's interpretation of this Arts and Crafts dresser includes graceful elements that break up the typically rectilinear style, such as a tapered carcase and curved corbels. The dresser (25 in. deep by 66 in. wide by 46 in. tall) is made primarily from quartersawn white oak. The curly white oak side panels have wenge details, and the drawers have yew sides and are lined with Tennessee cedar bottoms. Sakman finished the piece with aniline dye, orange shellac, glaze, and hand-rubbed varnish.

GREGORY STODDARD
Gansevoort, N.Y.

Stoddard refers to this chest (28 in. deep by 58 in. wide by 28½ in. tall) as "The Phoenix." About 30 years ago, an antiques dealer photographed a number of sale pieces. One was a 400-year-old dowry chest with brass images of Judgment Day. Shortly afterward, a fire destroyed everything except the brass and the photos. Years later, Stoddard was given the hardware and was commissioned to reproduce the original. He used Honduras mahogany, finished with an oil varnish, and aromatic cedar.

PHOTO: STOCK STUDIO

DUFF THURY
St. Paul, Minn.

This black walnut "Jax" table (inspired by the children's game) is Thury's version of the modern trestle table. Thury developed a technique to invisibly reinforce the mitered corners with welded steel. The table, finished with fortified tung oil, is 42 in. deep by 72 in. wide by 30 in. tall.

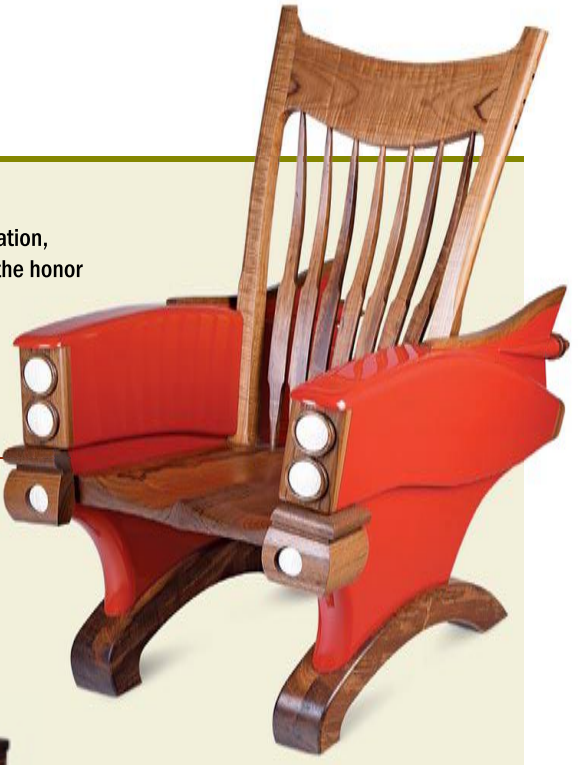
ANDY WARD
Ophir, Colo.

The geometric shapes in this veneered blanket chest (14 in. deep by 40 in. wide by 26 in. tall) were inspired by the mountains that surround Ward's Colorado home. The peaks and valleys are English walnut, the horizontal lines and base are Macassar ebony, and the interior is pearwood. Unlike a traditional blanket chest, this one has a top that lifts like a piano lid and is secured by a hand-braided silk cord. Ward finished the piece with Liberon finishing oil.

PHOTO: DAVID WELTER

2007 DESIGN IN WOOD EXHIBITION, SAN DIEGO COUNTY FAIR

This international juried competition, organized by the vibrant San Diego Fine Woodworkers Association, draws roughly 300 pieces each year to the Del Mar Fairgrounds. *Fine Woodworking* magazine has the honor of choosing the best piece in the show. PHOTOS: ANDREW E. PATTERSON



GARY CLARK
Hermosa Beach, Calif.

Maloofallac

Third place, art furniture; first place, excellence in finishing

This chair (38 in. deep by 26 in. wide by 42 in. tall) is a blend of one of the most famous American chairs, the Maloof rocker, and one of the most classic of American cars, the 1959 Cadillac. The Maloof part of the chair is curly teak finished with an oil polyurethane. The car part is MDF finished with a two-stage automotive paint with a base coat and a clear coat.

CRAIG THIBODEAU
San Diego, Calif.

Gardenia sideboard

Best of show, *Fine Woodworking*; first place, veneering/marquetry

Thibodeau's sideboard (16 in. deep by 72 in. wide by 36 in. tall) combines marquetry with bent laminations on a curved front. Finished with varnish, the piece is primarily figured anigre, wenge, and maple. The marquetry is dyed poplar, holly, pau ferro, mother of pearl, and abalone.

KEN COWELL
Yorba Linda, Calif.

Vessel 701

First place, wood turning laminated/segmented

Cowell spent 98 hours making this vessel (8 in. dia. by 9½ in. tall). He says 10% of the time was spent designing and creating a scale drawing, and 10% was turning and finishing. The rest was cutting and assembling the 1,145 pieces.

ADRIAN SANDU
La Mesa, Calif.

Steps in time

First place, clocks

Sandu knew he wanted to make a clock for this show, and he has always been drawn to spiral staircases. This original design (22 in. deep by 46 in. wide by 96 in. tall) merges those elements. The black walnut is finished with a hand-rubbed oil finish.

Q&A

Drying freshly cut lumber

Q: I recently found a treasure trove of fresh-cut curly maple. It's mostly 4/4 and 5/4, with some 6x8s that I will cut into 3x8s to encourage drying within my lifetime. Aside from painting the ends with shellac and stickering it, how should I go about drying it?

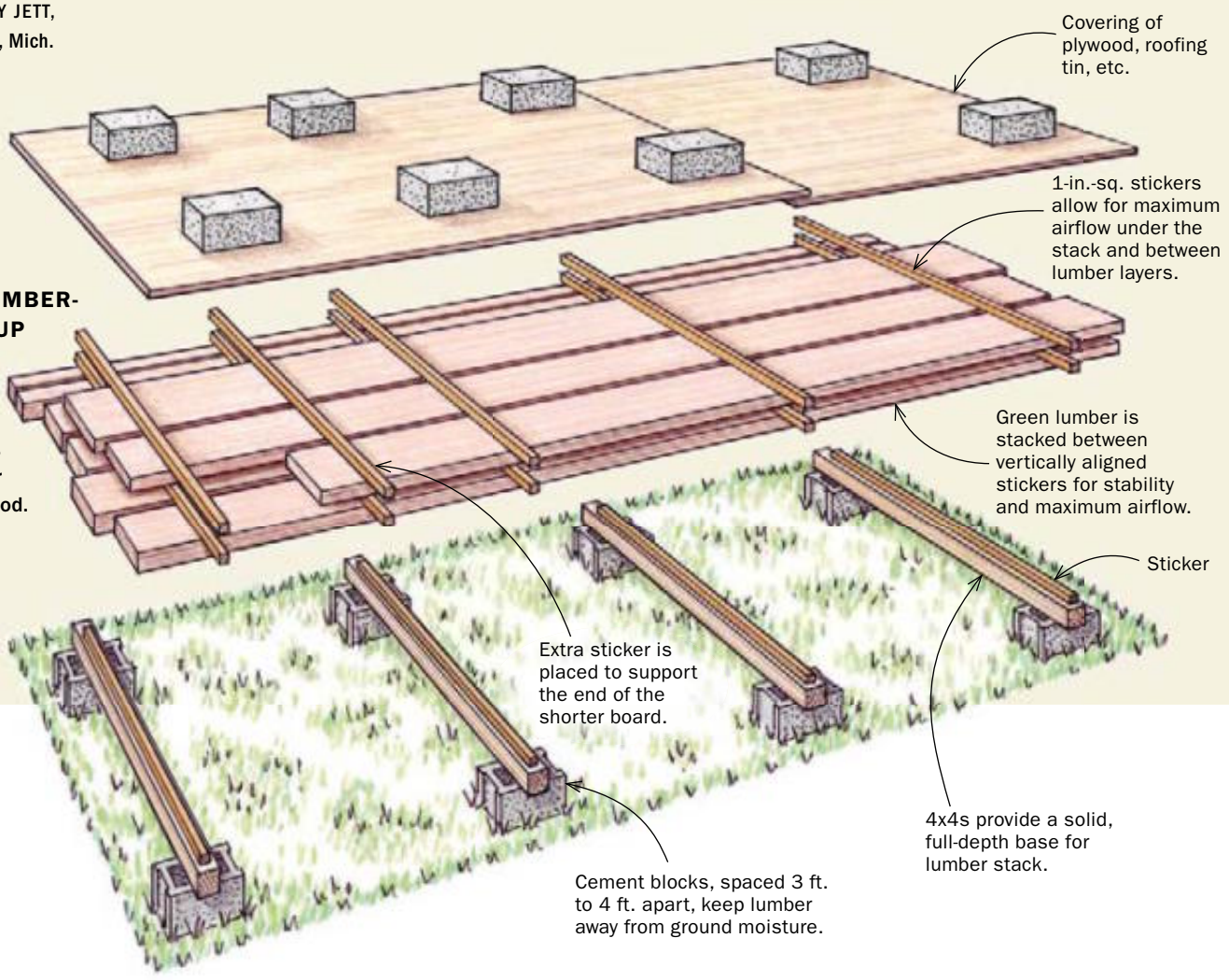
—STANLEY JETT,
Warren, Mich.

A: I AIR-DRY A LOT OF WOOD and it isn't difficult. The key is to get air moving through the pile, so all surfaces of the boards dry evenly. I don't bother to paint the ends, since end checks will still happen and I'd rather know where these natural weaknesses are and cut around them later.

Build your pile in an airy location, either outside or in an open shed. Get the base well off the ground, so air can circulate around the bottom as well as the sides. Place 1-in.-sq. stickers no more than 3 ft. to 4 ft. apart. Line these up vertically and over the main timbers of the base. (Offsetting them can dry a sag in the boards.) Put a sticker close to the end of each board, even if it means adding an extra one. Keep the ends of the stickers within the overhang of the covering so that they don't catch rain and drip it into the pile. The best covering is old roofing tin or plywood acting as a roof to shed rain and/or snow. Don't use plastic or any other cover that drapes down on the pile; it will cut off air circulation and lead to mold. Dry the wood at least a year per inch; 12 to 15 months or longer for your 4/4 and 5/4 stock, and at least three years for your 3x8s.

Check the wood often for any signs of bugs, such as tiny holes with fine sawdust surrounding them. If you do find holes, apply a liberal wash of paint thinner to them.

—Garrett Hack is a contributing editor.



OUTDOOR LUMBER-DRYING SETUP

A simple setup of cement blocks and lumber provides an airy place for drying green wood.

Drawings: Vince Babak

Best tabletop finish

Q: I'm making a kitchenette table and want protection against watermarks. Is there a finish that comes close to the water resistance of Formica?

—JOHN WILLOZ, Columbus Junction, Iowa

A: YOU HAVE A CHOICE, depending on how proficient you are with spray equipment. A sprayed, two-part, catalyzed conversion varnish such as Duravar Plus will give you water and abrasion resistance approaching that of Formica laminate.

This type of finish is no harder to apply than any other spray finish; however, make sure you follow the finishing schedule printed on the can. Usually, two or three coats are needed to achieve maximum protection, and all coats should be applied within an 8- to 12-hour window. Before you start, make sure you have enough time to completely finish the project—and to clean your spray gun after you're done. Any finish left inside it will turn to stone by morning.

If you're like many nonprofessional woodworkers, you probably don't have spray equipment. In that case, a standard brush-on polyurethane varnish is a good choice. While not as bulletproof as a conversion varnish, it is more than adequate for most conditions. I finished my dining table in that way 30 years ago and, despite daily use, it still looks almost as good as the day I brought it into the house.

—Chris A. Minick writes frequently on finishing.

A user-friendlier finish. *For the non-sprayer, the best tabletop protection is a brush-on polyurethane, either oil-based (above) or water-based.*

Bulletproof, but at a price. *A sprayed, two-part, catalyzed conversion varnish is the best defense against tabletop watermarks. However, it's expensive (Duravar Plus varnish; $22/gal.; catalyst, $30/gal.; www.mlcampbell.com), and it requires spraying know-how.*

Is it a waterstone or an oilstone?

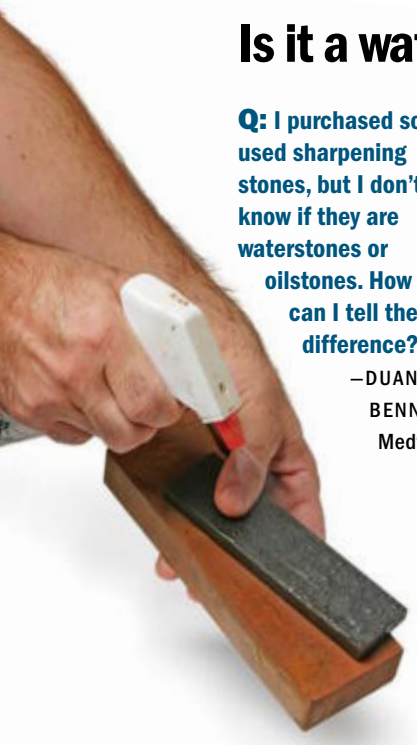
Q: I purchased some used sharpening stones, but I don't know if they are waterstones or oilstones. How can I tell the difference?

—DUANE C. BENNETT, Medford, Ore.

A: UNTIL RECENTLY, MOST SHARPENING STONES were oilstones, so chances are, that's what you have. Yes, there were some natural waterstones to be found 30 or more years ago, but nothing like the variety and quality of the manmade and natural ones you can buy today. One way to check is to smell the stone and box (if there is one) to see if there is any residue of oil. Also, if you find greasy sludge on the side of the stone, it probably was used with oil. To make sure, drop some water on the stone; if the water beads up, the stone definitely has been used with oil. If the water is absorbed readily into the stone, it was used with water.

Used stones probably will be worn out of flat. Flatten them against a diamond stone well lubricated with kerosene, or on coarse wet-or-dry sandpaper on plate glass. If you think you have waterstones, use water as a lubricant for this flattening. Otherwise, flatten and use them as oilstones.

—G.H.



To bead or not to bead. *If you're unsure of whether a stone was used with water or oil, spray water on it. Water will bead up on an oilstone but will soak into a waterstone.*

Ask a question

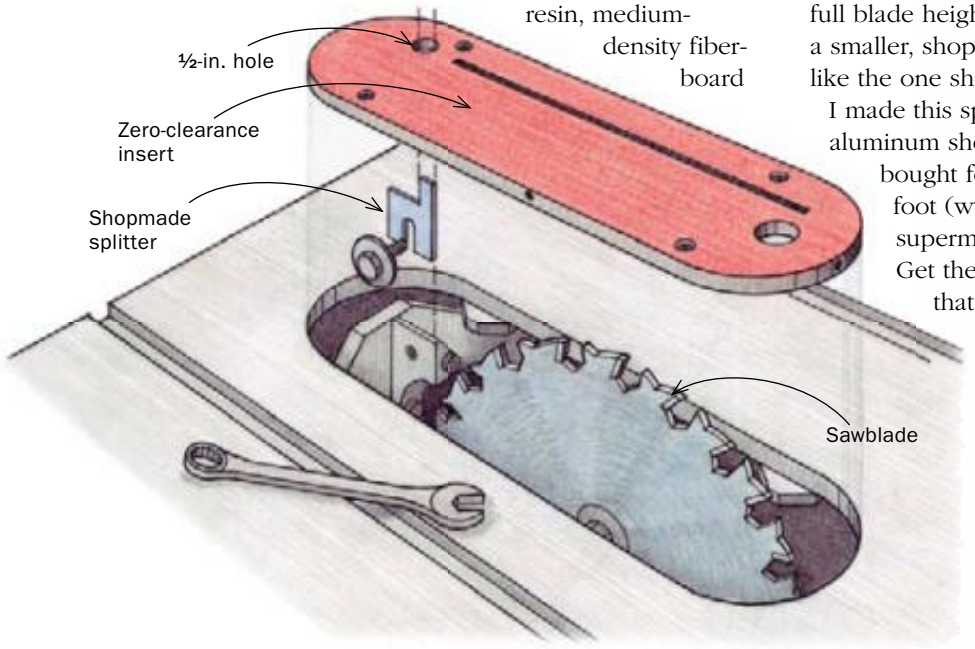
Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

Photos, this page: Kelly J. Dunton (top); Charlie Reina (center); Thomas McKenna (bottom)

Custom splitters for zero-clearance inserts

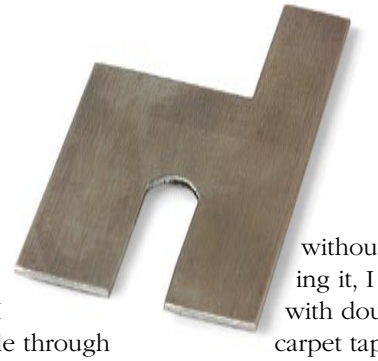
Q: Is it possible to use a splitter with a zero-clearance insert?

—LEO CHEE, Southbury, Conn.



A: THE LONG SPLITTER SLOT at the back of a regular steel insert usually comes to within ½ in. of the blade slot. If you copy this in a zero-clearance insert made from phenolic resin, medium-density fiberboard (MDF), or plywood, the insert probably will crack. Instead, I drill a ½-in.-dia. hole through the insert close to the back of the tablesaw blade slot (cut at full blade height) and insert a smaller, shopmade splitter like the one shown.

I made this splitter from aluminum sheet stock that I bought for $7 a square foot (www.metalsupermarkets.com). Get the thickness that matches the kerf of your blade—0.100 in. for most thin-kerf blades, around 0.125 in. for standard blades. To cut the aluminum without damaging it, I attach it with double-sided carpet tape to ⅛-in.- or ¼-in.-thick Masonite or MDF. I use a fine-tooth metal cutting blade in my jigsaw and it cuts like butter. Be sure to use a blade that can handle curves, and don't use the orbital action on the jigsaw, just the up-and-down motion. I cut the mounting slot by drilling a hole at the top of the slot and then cutting two straight lines up to the hole's widest points.



Like any splitter, this one is designed to prevent kickback, not accidental blade contact. So be sure to use it with a blade guard.

—Hendrik Varju is a professional woodworker near Acton, Ont., Canada.

Reseating a socket chisel handle

Q: Humidity changes are causing my socket chisel handles to pop out. Rapping them back in is aggravating. Can I glue in the handles? If so, what type of glue should I use?

—GUY FORTHOFER, Columbus, Ohio

A: IT IS OK TO GLUE THEM, and epoxy is the way to go. Marine epoxies such as West and System III, and gunsmith epoxies like Acraglass, work best. You'll need a container each of resin, hardener, and powdered high-adhesive thickener, along with a small amount of walnut or mahogany aniline dye.

Following the manufacturer's instructions, thoroughly mix a bit of the resin and hardener, and add a small amount of dye to reach the color you desire. Don't add thickener yet. Let the epoxy sit for 15 minutes, and in the meantime clean the chisel's socket and the handle's wood tenon thoroughly with coarse sandpaper. Spread the unthickened epoxy on the tenon and let it soak in for a few minutes. Then add high-adhesive thickener to the remaining epoxy until it's the consistency of peanut butter.

Spread the thickened epoxy over the unthickened coat, and set the handle into the socket using a light rap with a small hammer. Keep the chisel upright to cure overnight, and you can use it the next day.

—Bob Smalser is a woodworker and a boatbuilder in Seabeck, Wash.

***Tap it together.** Once mixed, spread the epoxy on the handle and in the socket, and seat the handle with the rap of a hammer. The chisel is ready to use the next day.*

Photos, this page and p. 94: Charlie Reina

Polishing wooden-bodied planes

Q: I am a user/collector of wood-bodied planes. Often the wood is very dry. How do I clean and preserve these wooden bodies so that they remain useful?

—JOHN MICHAEL, Hickory Creek, Texas

Make your own polishing mix. *Combine beeswax, turpentine, and boiled linseed oil to create a polishing paste.*

A: MY SIMPLE METHOD FOR CLEANING and brightening up wooden planes is a mixture of beeswax (chipped finely or grated on a cheese grater), boiled linseed oil, and turpentine (a mixture the consistency of soft butter) rubbed on with 0000 steel wool and buffed dry. Go lightly, as there is a fine line between preserving the original patina and aggressive overcleaning.

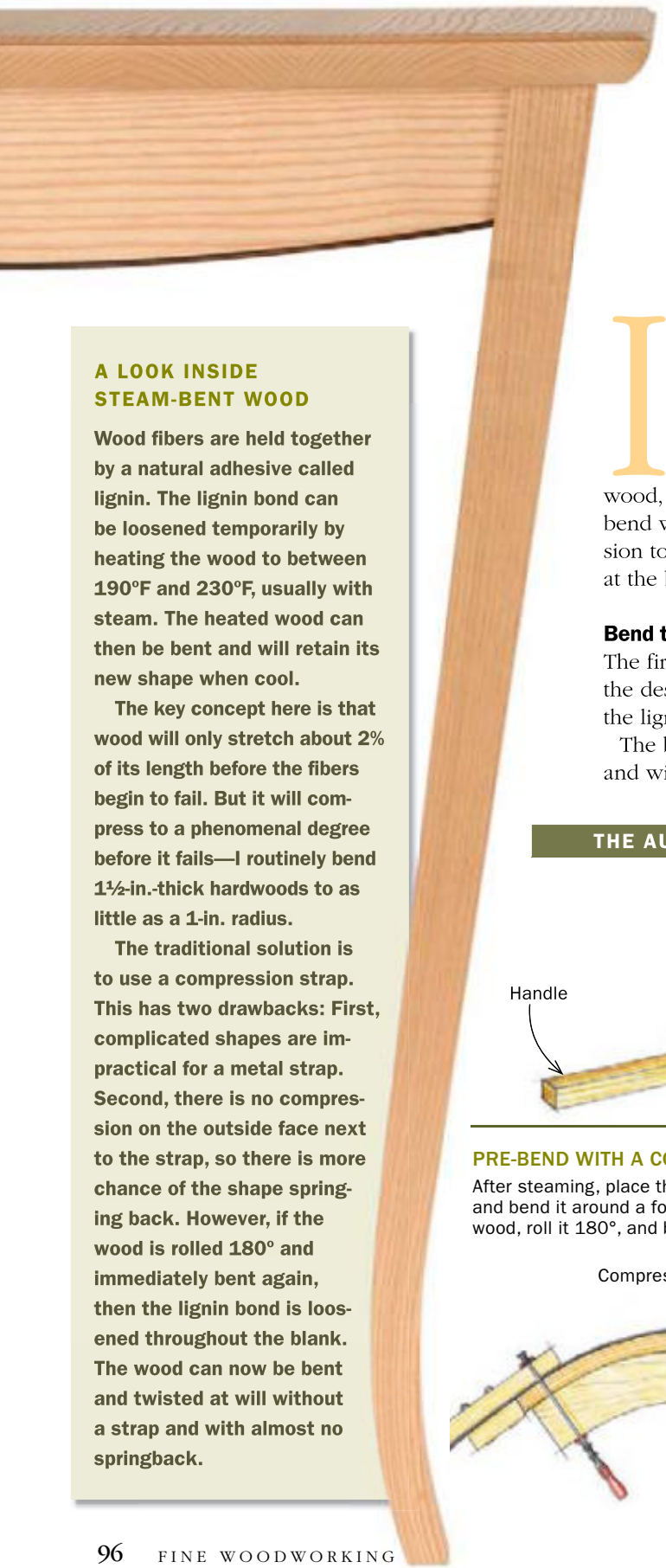
—*G.H.*

Wax cleans and polishes. *Rub the mixture onto the plane body with fine (0000) steel wool. Then buff to a final shine.*

Free-form steam-bending

USE A STANDARD STRAP TO PRE-BEND THE WOOD, THEN WRAP IT AROUND ANY FORM

BY MICHAEL FORTUNE



A LOOK INSIDE STEAM-BENT WOOD

Wood fibers are held together by a natural adhesive called lignin. The lignin bond can be loosened temporarily by heating the wood to between 190°F and 230°F, usually with steam. The heated wood can then be bent and will retain its new shape when cool.

The key concept here is that wood will only stretch about 2% of its length before the fibers begin to fail. But it will compress to a phenomenal degree before it fails—I routinely bend 1½-in.-thick hardwoods to as little as a 1-in. radius.

The traditional solution is to use a compression strap. This has two drawbacks: First, complicated shapes are impractical for a metal strap. Second, there is no compression on the outside face next to the strap, so there is more chance of the shape springing back. However, if the wood is rolled 180° and immediately bent again, then the lignin bond is loosened throughout the blank. The wood can now be bent and twisted at will without a strap and with almost no springback.

If you can create a shape with a strip of paper without tearing or folding it, in theory you can bend wood to that same shape. However, because wood compresses much better than it stretches, conventional steam-bending requires the use of a compression strap (see below), and it can be difficult to create a compression strap for unusual shapes.

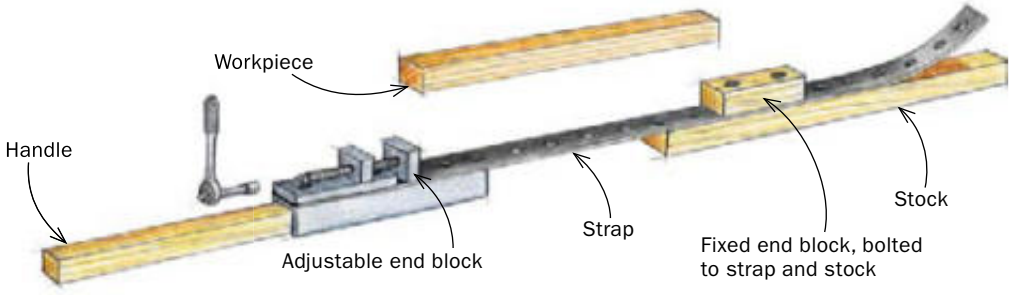
The method I'll describe uses a compression strap to pre-bend the wood, but does away with it when bending the desired shape, allowing you to bend wood through two planes at once and even twist it, adding a new dimension to your woodworking. For example, the table leg at left sweeps outward at the bottom along a 45° axis.

Bend the wood twice to make it pliable

The first step is to make a traditional bending form with a radius tighter than the desired final shape. This will allow the wood fibers to be compressed and the lignin bonds loosened in the areas that you will later bend free-form.

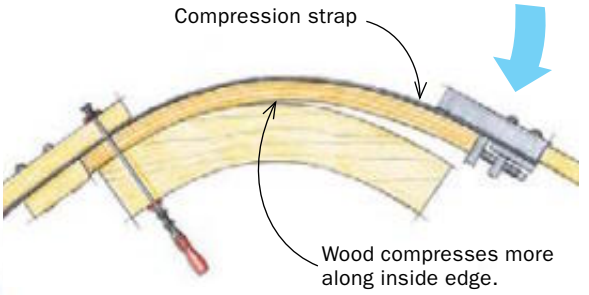
The blanks to be bent should be approximately ⅛ in. larger in thickness and width and about 4 in. longer than the final length. In this way, any torn

THE AUTHOR'S METHOD STARTS WITH A COMPRESSION STRAP



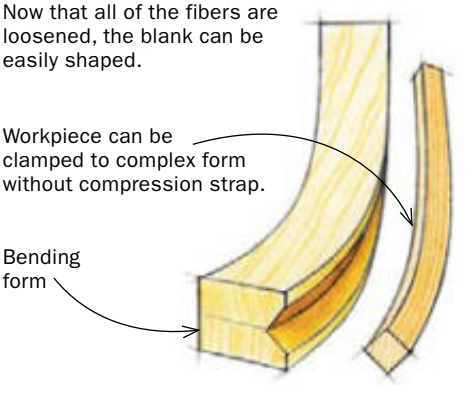
PRE-BEND WITH A COMPRESSION STRAP

After steaming, place the blank in a compression strap and bend it around a form. Then quickly remove the wood, roll it 180°, and bend it in the opposite direction.



THEN BEND TO DESIRED SHAPE

Now that all of the fibers are loosened, the blank can be easily shaped.



Photos: Mark Schofield; drawings: John Tetreault

1 Steam the wood

In the box. *Let the blank steam for an hour per inch of thickness. Use gloves when removing the hot wood.*

wood fibers can be removed when the wood is shaped to the desired dimensions.

Steam the blank for an hour per inch of thickness, then take it from the steambox, secure it in the strap assembly, and bend it around the form. Almost immediately, straighten out the blank (holding one end in a vise if needed), roll it over face-for-face in the strap assembly, and bend it around the form again. Remove the blank from the strap and straighten it again. Now that the entire bent section has had the lignin loosened, the blank can be bent free-form without a compression strap.

Although the wood cools fairly slowly, complete all the steps as quickly as possible and get the blank clamped onto its final form. If it takes more than five or 10 minutes, the blank can be reheated in the steambox. This should take only five or 10 more minutes because the inside of the blank has remained hot.

Bend the softened wood into free-form designs

When you bend the wood a third time, without the compression strap, you'll be able to create shapes beyond the scope of traditional steam-bending.

Bend a leg that is strong and elegant—A leg that sweeps out near the bottom along a 45° axis usually must be cut from a large blank. This invariably leaves short grain, making the foot weak and unattractive. Steam-bending would make more sense as it consumes less wood and allows the grain to follow the shape of the leg, maintaining its strength and improving the look.

However, using a compression strap is impractical because there is only a corner of the blank for the strap to bear on. By double-bending the leg as described, you can then bend it along the edge without a compression strap. The first step is to build a V-shaped form made from two sections shaped with a

2 Double-bend the wood to loosen the fibers

Bend, straighten, and bend again. *Place the blank in the compression strap, tighten the end clamp, and then bend it around the form (left). Remove the blank from the strap, place it loosely in a vise, and lever it until it is almost straight (center). Flip the blank so that the face that was against the strap is now against the form, and bend it again. In this way the lignin that bonds the wood fibers is loosened across the width of the blank (right).*

3 Bend the wood around a form...

Create an angled form. *To make the bending form that holds the blank on its edge, use a 45° chamfer bit in a router table to shape the two halves of the form (above). There is no need to use a compression strap on the double-bent blank, but you do need "V"-shaped clamp blocks (right).*

Wood that steam-bends well

When wood is kiln dried, the lignin is set permanently in place, so try to steam-bend only air-dried wood with a moisture content of around 15%. This is usually available from smaller sawmills and lumberyards. Among the best woods for steam-bending are ash, red and white oak, walnut, hickory, and elm. Slightly more difficult are cherry, maple, and birch. Woods that do not steam-bend include softer hardwoods like basswood and poplar, curly domestic hardwoods, all softwoods, and most exotic woods including mahogany and teak.

...or give it a twist

Twist the wood and preserve the new shape. *With one end of the blank clamped in a vise, twist the wood 180° using a long board as a handle. To let the wood dry in its new shape without springing back, clamp the turning handle to a fixed object.*

large chamfer bit. You'll also need to cut some clamping blocks with V notches. Clamp the double-bent blank into the form and leave it to dry. The drying time depends on the size of the blank and the temperature and humidity in the workshop. A 1½-in.-sq. piece of ash will take about a week to dry down to 7% to 8% humidity if there is a modest airflow across the wood.

A new twist on steam-bending—With conventional steam-bending, getting wood to twist is difficult and the results often are disappointing. You'd be lucky to achieve 90° of twist before the fibers separate, and then the shape will untwist even after the wood is dry because the lignin bond was not completely broken. Wood that has been double-bent can be twisted to around 180° before the wood fibers fail.

FineWoodworking.com

Michael Fortune demonstrates the double-bending process in a video.

Square or rectangular cross sections work best for twisting. Before you start, cut a hole that matches the end of the blank in the middle of a piece of wood 3 ft. to 4 ft. long and at least 3 in. wider than the blank. This will serve as a handle. Double-bend the blank around a form with about a 20-in. radius. Reheat it and then clamp one end of the hot blank in a heavy-duty vise and insert the other into the handle, applying a clamp on either side.

Twist the blank slowly. There will be some springback, so I recommend overtwisting by about 10° to 15°. When you've achieved the desired twist, clamp the handle to a stationary object and allow the blank to dry.

Variations on the twist include tapering the wood before it is twisted to cause the twist to "speed up" as the wood narrows. You also can rabbet the corners and inset a contrasting wood (use epoxy to withstand the temperature and moisture). □

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Original Arts & Crafts

BY NANCY HILLER

Whenever clients want cabinets to look original to a late-19th- or early-20th-century-style home, I use this finish. I have borrowed techniques from two well-known finishers to create a period look. While the five steps to this Arts and Crafts finish may seem daunting, the execution is actually quite painless.

Dye and stain increase color and contrast

Before applying any finish, sand all parts to P180-grit, then use water to raise the grain and gently sand again with P180-grit.

Jeff Jewitt introduced me to using dyes under oil-based stains to bring out the contrast between the basic grain and the ray-fleck patterns of quartersawn oak ("Safe and Simple Arts and Crafts Finish," *FWW* #157, pp. 42-45).

First, dye the oak with a water-based dye solution (I use TransTint's honey amber, dissolved in water at the ratio of 1 oz. to 1 qt.), applying it quickly and liberally with a foam brush and wiping off the excess with a lint-free cloth. During this step and the next (depending on the woods used), it may be necessary to block out and/or stain the inlay to maintain contrast. In this case, I carefully placed a sealer coat of clear shellac over the inlay after it had been glued in place and sanded, but before applying the amber dye. To knock back any raised grain, lightly sand with P320-grit paper.

Next, use an oil-based stain (in this case, Minwax's Early American) to bring out the wood's full figure. Apply the stain generously using a foam brush and leave it on for 5 to 10 minutes. Wipe off any excess stain using a clean, lint-free cloth and allow the piece to dry overnight. Make sure to check

Apply the dye and stain

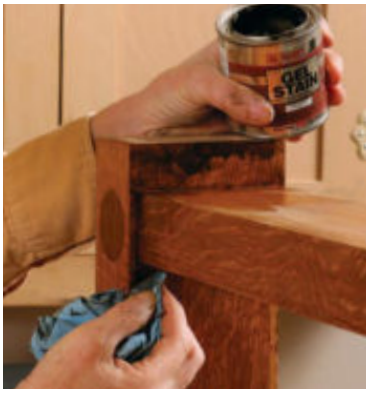
Color the wood. *Dyeing the wood adds color without accentuating the grain. Wipe off the excess dye. The wood is dry enough for the next step when a rag remains clean and dry after rubbing.*

Pop the grain. *Brush on and then wipe off a stain to enhance the grain and figure of the wood.*

Photos: Anissa Kapsales

Seal, age, and topcoat

Seal in the dye and stain. *With a fine-bristle brush, apply amber shellac quickly in long strokes to avoid lap marks.*



Imitate dirt buildup. *Gel stain, applied with a rag and allowed to set 10 minutes, ages the finish easily.*

Wipe off excess gel stain. *If the stain sets too long, a rag with paint thinner will return the stain to a workable state.*

periodically for stain weeping out of the oak's open pores, removing any you find.

Seal in the previous steps with shellac

A professional floor finisher once advised me that I could get an old look on pine floors by adding amber shellac. So once the stain has dried, I brush on a thin coat of Zinsser's premixed amber shellac to achieve a look similar to the shellac-based varnish that was used in many older houses. The shellac also seals the piece before the aging steps. When the shellac has dried, scuff-sand with P320-grit paper and wipe off the dust with a tack cloth. Now you can judge the final tone of the finish and fill any holes with matching wood putty. Scuff-sand again.

Simulate signs of aging

Teri Masaschi's suggestion to use gel stain for shading ("Three Finishes for Bird's-Eye Maple," *FWW* #163, pp. 44-47) enables me to mimic signs of age without heavy-handed distressing, and make built-ins look like part of the original fabric of the home.

Apply gel stain in a compatible color (for this application, I used Old Masters' dark walnut) to areas where dirt would typically have built up, such as joints, crevices, and around hardware. Let the gel stain set for 10 minutes or so, then with a lint-free cloth, gently rub and feather out the shading to create a natural-looking patina. Allow the gel stain to dry overnight.

Two coats of oil-based polyurethane finish the piece. You can follow it with a generous application of paste wax, applied with 0000 steel wool and buffed out with a soft, lint-free cloth. □

Safeguard all the steps. *Two coats of polyurethane seal and protect the piece. Rub out the topcoat with steel wool and wax.*

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INDEX TO ADVERTISERS

Use reader service card - inside back cover.

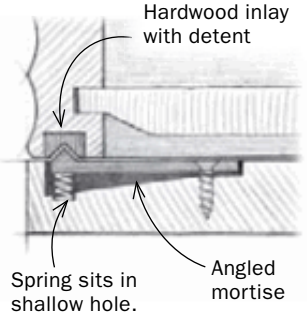
For quick access to their websites, go to ADVERTISER INDEX at www.finewoodworking.com

Reader Service No.	ADVERTISER, *page #*
97	Accurate Technology, *p. 101*
35	Adria Toolworks, Inc., *p. 102*
142	Affinity Tool Works, *p. 95*
18	Allabouttoolslive.com, *p. 102*
108	Allred & Associates, Inc., *p. 105*
19	Amana Tool Company, *p. 33*
73	Andrews Toolworks, *p. 104*
62	Ball & Ball Reproduction Hardware, *p. 19*
	Barr Specialty Tools, *p. 105*
61	The Beall Tool Co., *p. 102*
	Berea Hardwoods, *p. 17*
8	Berkshire Veneer Co., *p. 103*
3	Blue Spruce Toolworks, *p. 103*
95	Blum Tool Co., *p. 33*
153	Burgess Edge, *p. 93*
20	CMT USA, Inc., *p. 101*
122	Cabinetparts.com, *p. 103*
65	Cape Cod Air Grilles, *p. 13*
	CarveWright, *p. 103*
	Center for Furniture Craftsmanship, *p. 93*
33	Certainly Wood, *p. 105*
39	Chesapeake Light Craft, *p. 9*
52	Chicago School of Violin Making, *p. 104*
133	Classic Designs by Matthew Burak, *p. 7*
126	Colonial Chair Co., *p. 103*
106	Connecticut Valley School of Woodworking, *p. 101*
152	Contempo Living, *p. 104*
79	Cook Woods, *p. 105*
34	Cormark International, *p. 102*
25	Craftsman, *p. 11*
30	Craftsman Studio, *p. 105*
5	Crown Plane Co., *p. 103*
88	Curious Woods, *p. 104*
71	Delmhorst Instrument Company, *p. 27*
128	Delta/Porter-Cable, *p. 2-3*
43	Diefenbacher Tools, *p. 102*
32	Dimitrios Klitsas, *p. 103*
96	Dovetail Master, *p. 101*
24	Dowelmax, *p. 95*
	Eagle Woodworking, *p. 102*
145	Engraving Arts, *p. 104*
94	Epilog Laser, *p. 3*
125	Fein Power Tools, *p. 94*
72	Felder USA, *p. 93*
77	Festool, *p. 111*
	Fine Homebuilding.com, *p. 99*
	Fine Woodworking.com, *p. 100*
115	Forrest Manufacturing, *p. 91*
91	The Furniture Institute of Massachusetts, *p. 104*
31	Furnituremaking Workshops, *p. 102*
28	General Manufacturing Co, Ltd, *p. 27*
110	German Timber, *p. 9*
100	Gilmer Wood Company, *p. 102*
57	Gizmo Lab, *p. 102*
143	Goby Walnut Wood Products, *p. 104*
14	Good Hope Hardwoods, *p. 102*
60	Gorilla Tape, *p. 33*
23	Groff & Groff Lumber, *p. 105*
9	Guillemot Kayaks, *p. 105*
129	Hartville Tool Woodworking, *p. 89*
80	Hearne Hardwoods, Inc., *p. 89*
141	HerSaf/Safranek, *p. 23*
150	Hibdon Hardwood, Inc., *p. 105*
78	Highland Woodworking, *p. 89*
81	Hoffmann Machine Co., Inc., *p. 102*
21	Holbren Precision Cutting Tool, *p. 29*
22	Home Depot Business Card, *p. 21*
90	Inside Passage School of Fine Woodworking, *p. 29*
67	International Yacht Restoration School, *p. 104*
29	Iturra Design, *p. 95*
66	J.W. Winco, Inc., *p. 103*
4	The Japan Woodworker, *p. 23*
40	JessEm Tool Co., *p. 35*
6	Kay Industries, Inc., *p. 17*
46	Keller & Company, *p. 95*
44	Kreg Tool Company, *p. 19*
54	Kuffel Creek Press, *p. 33*
138	Laguna Tools, *p. 23*
139	Laguna Tools, *p. 91*
	Leigh Industries, *p. 91*
103	Lie-Nielsen Toolworks, *p. 17*
45	Lignomat Moisture Meters, *p. 89*
58	Luthiers Mercantile International p. 105
111	MEG Products, *p. 105*
92	M.L. Condon Company, *p. 105*
	Makers-Marks, *p. 102*
47	McFeely's, *p. 35*
55	Mini Max USA, *p. 19*
93	Miracle Truss, *p. 105*
107	Misugi Designs, *p. 101*
116	Noden Adjust-A-Bench, *p. 104*
124	North Bennet Street School, *p. 104*
27	Northwest Woodworking Studio, *p. 105*
114	North West School of Wooden Boatbuilding, *p. 102*
118	Old English Academy of Fine Woodworking, *p. 104*
146	Oneida Air Systems, *p. 17*
151	The Original Saw Company, *p. 29*
15	Osborne Wood Products, *p. 27*
16	Osborne Wood Products, *p. 89*
48	Outwater Plastics Industries, *p. 31*
113	Peck Tool Company, *p. 103*
7	Phase-a-matic, Inc., *p. 89*
86	Philadelphia Furniture Workshop, *p. 103*
149	Philadelphia Windsor Chair, *p. 105*
102	Powermatic, *p. 95*
56	Pygmy Boats, Inc., *p. 101*
	Quality Vakuum Products, *p. 17*
64	Rare Earth Hardwoods, *p. 103*
140	RichLine Wood Working Machines, *p. 9*
147	Rikon Power Tools, *p. 31*
82	Robert Larson Company, Inc., *p. 105*
112	Rockingham Community College, *p. 105*
41	Ronk Electrical Industries, *p. 7*
105	Router Bits.com, *p. 9*
121	Ryobi America Corp., *p. 15*
13	SATA, *p. 29*
	The St. James Bay Tool Co., *p. 103*
104	Scherr's Cabinet & Doors, Inc., *p. 23*
117	School of Woodworking, *p. 102*
50	Screw Products, Inc., *p. 93*
120	Shaker Workshops, *p. 29*
135	Shelburne Art Center, *p. 103*
70	Space Balls, *p. 13*
137	Storage Concepts, Inc., *p. 103*
148	Suffolk Machinery, *p. 105*
109	Talarico Hardwoods, *p. 103*
63	Teak & Woods of Distinction, *p. 104*
144	Tech Mark, Inc., *p. 35*
101	Texas Knifemaker's Supply, *p. 102*
119	Timberwolf Tools, *p. 103*
75	Titebond Wood Glue, *p. 13*
99	Tools for Working Wood, *p. 19*
51	Totally Bamboo, *p. 102*
130	Trend Routing Technology, *p. 7*
	Trident Associates Company, *p. 104*
134	Triton Woodworking, *p. 7*
74	Vac-U-Clamp, *p. 95*
	The Veneer Store, *p. 101*
132	Veto Pro Pac, *p. 35*
12	W. Moore Profiles, *p. 13*
127	West Penn Hardwoods, *p. 103*
76	West System, *p. 95*
	Whitechapel, Ltd., *p. 33*
68	William Ng Woodworks, *p. 23*
17	Williams & Hussey Machine Co., *p. 29*
87	Wood Rat, *p. 93*
37	Woodcraft, *p. 25*
38	Woodcraft, *p. 33*
	Woodcraft, *p. 89*
	Woodfinder, *p. 103*
131	Woodjoy Tools, *p. 104*
69	Woodmaster Tools, *p. 93*
98	Wood-Ply Lumber Corp., *p. 102*
10	Woodworkers Source, *p. 102*
154	Woodworker's Supply, *p. 95*
123	Wrist Writer, *p. 9*

Details make the difference

BY ANISSA KAPSALES

While a student in the College of the Redwoods Fine Woodworking Program, Kevin Kauffunger did what the school is famous for. He hyper-focused on design, hand skills, and carefully chosen grain. However, rather than creating a Krenovian cabinet on a stand, as many students do, Kauffunger designed the contemporary coffee table seen on the back cover. Confining himself to handwork wasn't easy, especially when it came to fluting the drawer fronts and registering the two-way drawers consistently. □



Spring catch for two-way drawers

The through-drawers are accessible from both sides of the table. To keep the reveal consistent, Kauffunger made spring catches that register in notched hardwood blocks that are inlaid into the bottom edge of the drawer fronts.

Handmade plane for hand-fluting

Douglas fir can be difficult to work by hand, and Kauffunger could easily have taken the perfect fir drawer fronts to the router table for quick flutes. Instead, he made a plane with a radiused sole to create scallops that are uniform yet subtly maintain an organic, hand-cut inconsistency.

For the first groove, Kauffunger clamps a ⅜-in.-thick block of wood with a rounded edge to the side of the plane (1) with the block registering on the edge of the stock (2). All the subsequent grooves are made with the same block of wood clamped even with the sole of the plane (3) and riding in the previous flute.

Photos, except where noted: Anissa Kapsales; completed table: David Welter: drawing: John Tetreault

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Masterful Apprenticeship

When designing this coffee table, Kevin Kauffunger was guided more by what he wanted to learn than by what he already knew. At 30, with experience in carpentry, cabinetmaking, and millwork, he had a desire to go deeper. "I wanted a Parris Island woodworking experience," he said, "in a place that would be obsessive about the craft." He found it at the College of the Redwoods in Fort Bragg, Calif., in the program founded by James Krenov.

This table was Kauffunger's first major project at the school, and he used it as a vehicle for refining hand-tool skills. The fluted Douglas-fir drawer fronts offered a tutorial in planemaking: He custom-made a narrow, Krenov-style wooden plane with a convex sole. By the way, the drawers can be opened on either side of the table. The table also provided a seminar on handcut dovetails—100 in all. And the 8/4 plank of Bulgarian walnut for the carcase presented lessons in resawing.

Even after it was done, the table had something to impart. On the drive home from the humid Pacific Northwest, Kauffunger visited bone-dry Zion National Park. When he unpacked the car in Pittsburgh, he found that the table's flatsawn top had curled up at the edges. Kauffunger accepted the mishap as another piece of his education.

—Jonathan Binzen

Photos: David Welter

How They Did It Turn to p. 110 to see Kauffunger's shopmade drawer stops and his method for shaping the drawer fronts.

Pro Portfolio At FineWoodworking.com, the recent College of the Redwoods graduate talks about getting started as a furniture maker.