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Fine WoodWorking

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June 2006
No. 184

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TOOL TEST: New, safer tablesaws

12 great finishing tips

Install drawers the easy way

Fireplace mantels


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Fine WoodWorking

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Cover photo: Michael Pekovich

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Pencil-Post Bed

Download a 36 in. by 48 in. plan, print it at your local copy center.

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- **READER TOOL REVIEWS**
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Assembling a New Tablesaw

APRIL 17: Shop manager John White assembles a tablesaw from box to first cut and shares some helpful tips along the way.

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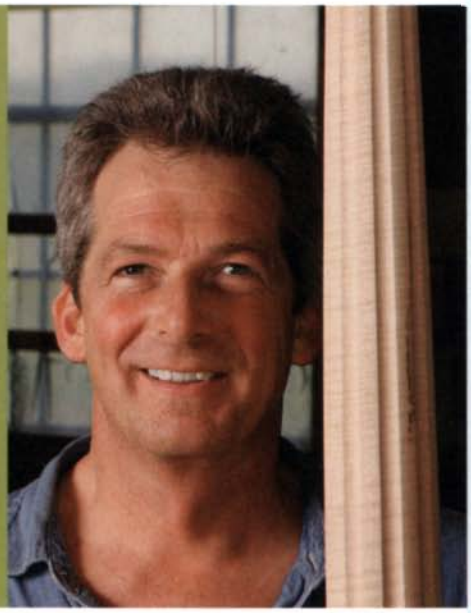


Jeff Headley *(Master Class)* is a fourth-generation cabinetmaker who runs the family business, Mack S. Headley & Sons, in the beautiful and historic Shenandoah Valley of northern Virginia. With one colleague, he builds to order any piece of pre-1820 American furniture. "We try to build as close to the originals as possible: We do use machines for the work once done by apprentices, but everything else is done by hand." Clients include The Colonial Williamsburg Foundation, (where his brother, Mack, runs Anthony Hay's Cabinetmaking Shop), Mount Vernon, the White House, and the National Park Service. Headley lives with his wife, Susan, four dogs, and three cats. He also raises a small herd of Hereford cows on the family farm.

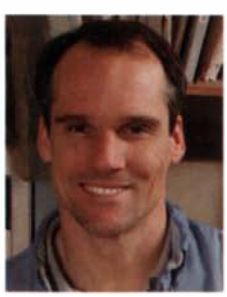
As the temperature dropped at the start of another New England winter, **Peter Gedrys** *("The Clearest of Finishes")* prepared to take to the ice with his hockey team at Yale University's Ingalls Rink in New Haven, Conn. Stopping slap shots and deflecting sarcastic remarks about gray hair are all part of the fun: "Goal-tending is a great physical release from teaching, finishing, and gilding," he says.

Like many woodworkers, **Brent Beach** *("Sharpen With Sandpaper")* developed an interest in the craft in public school. When he bought a house with room for a small shop, he began filling it with power tools. Eventually, though, he found hand tools more to his liking and sold the big machines. That affection for handwork led to a passion for keeping his plane blades and bench chisels always sharp and at the ready.

Fine WoodWorking.com

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

We welcome **Lonnie Bird** *("Build a Pencil-Post Bed")* as our newest contributing editor. Author of five books including *Taunton's Complete Illustrated Guide to Using Woodworking Tools* (The Taunton Press, 2005), Bird teaches woodworking at his school in the foothills of the Smoky Mountains near Knoxville, Tenn.



Mark Edmundson *("Side-Hung Drawer Slides")* served a two-year apprenticeship under James Krenov at the College of the Redwoods before starting his own custom woodworking business in 1997. When he's not in his shop, Edmundson spends much of his time changing the diapers of his infant twin daughters, cleaning the kitchen, and doing laundry. He lives with his family in Sandpoint, Idaho, the ideal location to indulge in some of his other favorite activities with his two sons: mountain-biking, snowboarding, and skiing.

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letters

From the Editor

THE PERFECT DOVETAIL

Turns out that computer scientists have appropriated the term "dovetail" to describe complex calculations that run algorithms, the math that lets us search the Web for information. My analog brain doesn't totally comprehend how this all works, but I love the way that the Web allows me to find information fast, at any time of the day.

We've learned that woodworkers rely on the Internet a lot, so we've restructured the way we work, dovetailing the efforts of our editorial team with the online group to produce a greater variety of content in different media. Part of that process included redesigning our Web site to make it a more powerful research tool.

At FineWoodworking.com, you can interact with an active community of woodworkers via Knots, our online forum. You can get in touch with our authors as they file updates on projects in their Web logs, or "blogs." You can see videos that tie in to the current issue. These and other features such as our index, gallery, and portions of the Tool Guide are all available for free.

If you become a member of FineWoodworking.com, you can read the current issue online and have access to 30 years' worth of content. The member site has more than 1,000 articles on subjects such as design, project plans, techniques, product reviews, and profiles. We've also amassed 150 how-to videos and are adding more. If you've balked at becoming a member, the good news is that we lowered the price of membership recently.

Starting with this issue, we've added a Table of Contents page inside the magazine to let you know what's new online. In the coming months we're going to try out a number of new online features. The aim is to offer woodworkers of all stripes high-quality content in the magazine and on the Internet.

And in case you're wondering about the future of the print version of *Fine Woodworking*, fear not. At the end of the day, I still like flipping pages.

—Anatole Burkin, editor-in-chief
aburkin@taunton.com

Another way to do breadboard ends

In reference to the article "Keeping Tabletops Flat" (*FWW* #183, pp. 32-37), I don't understand why every article that I see on breadboards always directs one to make them flush with the width of the tabletop. You then end up with the problem of them being flush for only part of the year as mentioned in the article. My solution is to make the breadboards wider than the top, put a slight chamfer on the ends, and turn them into a decorative element. In my opinion, this looks better than having the top extend past the ends of the breadboards for part of the year.

—JIM PROBST, via email

Dial caliper error

There is an error concerning the measuring accuracy of fractional dial calipers in the article "11 Essential Measuring and Marking Tools" (*FWW* #182, pp. 74-79). A photo caption states that the decimal scale included on the fractional calipers can measure within 0.001 inch, but I suspect that he meant within 0.01 inch. Machinist's calipers measure to the thousandths of an inch, not fractional calipers.

—TED WEBER, via email

2x4 coffee tables

I was surprised and saddened by Christian Becksvoort's response to the question about using 2x4 pine lumber (*FWW* #179, p. 94). I started out building simple coffee tables out of 2x4s, and it was a good formative experience.

—JOHN NAPOLITANO, via email

Sacred humor

Regarding the letter in issue #180 from the reader who objected to the Viagra-inspired tape rule advertisement because "certain areas of our lives are sacred," I just wanted to thank you for publishing the letter. I enjoyed it a lot. Truth is, it was a lot funnier than the ad. Good work on the magazine. Keep it up (so to speak).

—PETER ANTHONY, via email

Sharpening machine test missed a few features

I think it important to point out that the article "Sharpening Machines" (*FWW* #182, pp. 38-43) did not mention some important features of the Lap-Sharp. For one, it has reversible rotation, useful when sharpening knives, including marking knives.

Also, without removing the tool bar and clamp, the user can alternate between the flat and bevel sides to remove the burr from sharpening.

A microbevel is automatically ground on a tool's edge by using the tool bar and switching to the 3-micron or 1-micron abrasives, thinner than the coarser disks.

Last, the Lap-Sharp employs an angle gauge to set the bevel angle from the

back of the tool to the abrasive surface. And the blade clamp has a square reference edge to ensure that the blade is square to the abrasive surface, so there is no need to double-check it with a square.

—DON NAPLES, managing member, Wood Artistry LLC, manufacturer of Lap-Sharp

Bloody angry over wood butchery

Does Cary H. Hall's little piece from 1977, "The Wood Butcher" (reprinted in *FWW* #180, p. 122) really ring true today?

To be charitable, the article may have been a conscious, cathartic, self-directed product of someone who was chronically plagued by the malady described. Only someone with intimate experience in wood butchery could so accurately describe it.

The reader cannot know whether Hall wanted to be taken seriously. Did Hall know? Perhaps it was tongue-in-cheek, meant only to aggravate the reader. Or were these the murmurings of Hall's mean-spirited, misanthropic alter ego?

Hall's motives remain unclear. If he was serious, his pretentious, elitist arrogance is almost beyond belief. The act of publishing this piece of effete snobbery suggests the publishers of *Fine Woodworking* support Hall's ridicule of the weekend woodworker who may—will—after all, make an occasional mistake. We are not all born experts but learn through our mistakes.

—D.W. TARMAN, Claremont, Calif.

Attention Toolmakers

Do you make your own woodworking tools? We want to showcase your shopmade wares in our annual *Tools & Shops* issue. We'd also like to include photos of restored vintage hand tools and machinery. Send entry forms (available at www.FineWoodworking.com) and photos (unaltered digital images, prints with negatives, or slides) to Readers Gallery, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwgallery@taunton.com. The deadline for submissions is July 31.

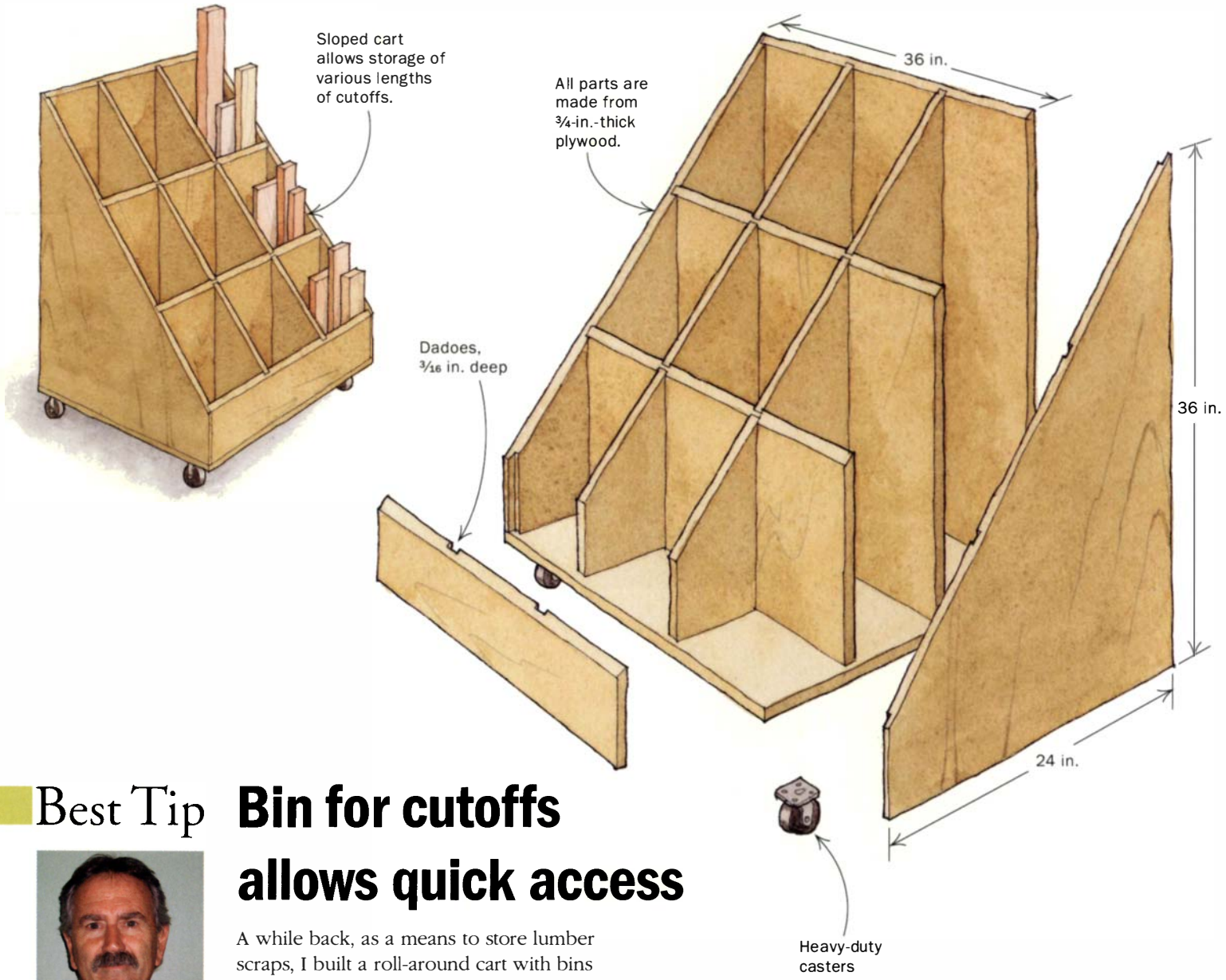
Editor-in-chief replies: We're still getting mail on this article, so let me say once and for all that the Hall piece was written tongue-in-cheek, one obsessed woodworker to another, a friendly poke in the ribs. If you're wondering, as far as woodworking skills go, we're a mixed bunch here at the magazine. Some of us are beginners; others are quite accomplished. We sometimes laugh about our mistakes; other times we feel like crying or throwing something across the shop. But we are not so mean-spirited as to suggest that anyone who does goof up should be ridiculed. We don't have much tolerance for snobbery. It only gives you ulcers.

Correction

A drawing with the pie safe article in *FWW* #182 (pp. 32-37) included an incorrect dimension. The rails on the side of the pie safe should be 14 in. long. Also, we mistakenly called poplar a softwood. We meant to say "soft hardwood."

methods of work

EDITED AND DRAWN BY JIM RICHEY



Best Tip

Bin for cutoffs allows quick access

After 25 years in the Army, Moore retired in 1992. He spent two years as a teacher in Atlanta, then moved with his wife to Texas to fulfill a lifelong dream, building a house. Today, he restores homes and builds period furniture.

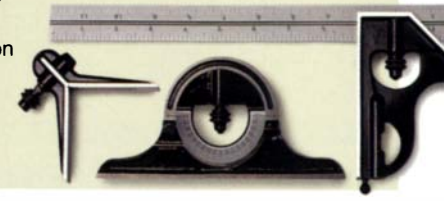
A while back, as a means to store lumber scraps, I built a roll-around cart with bins about 2 ft. deep. I soon found, though, that short cutoffs—anything less than 10 in. or so—tended to get lost in the bottom of the cart. I spent way too much time pulling out the long pieces to see what was hiding in the bottom.

My solution was to rebuild the cart with sloped bins. The bins vary in height, allowing me to store short cutoffs at the front of the cart and longer ones at the back. Now it's a lot easier to spot a small, choice scrap of wood.

—WILL MOORE, Georgetown, Texas

A Reward for the Best Tip

Send original tips to Methods of Work, *Fine Woodworking*, PO Box 5506, Newtown, CT 06470, or email fwmow@taunton.com. If published, we pay $50 for an unillustrated tip; $100 for an illustrated one. The author of the best tip will get a 12-in. combination square (with center head and protractor) from L.S. Starrett Co.

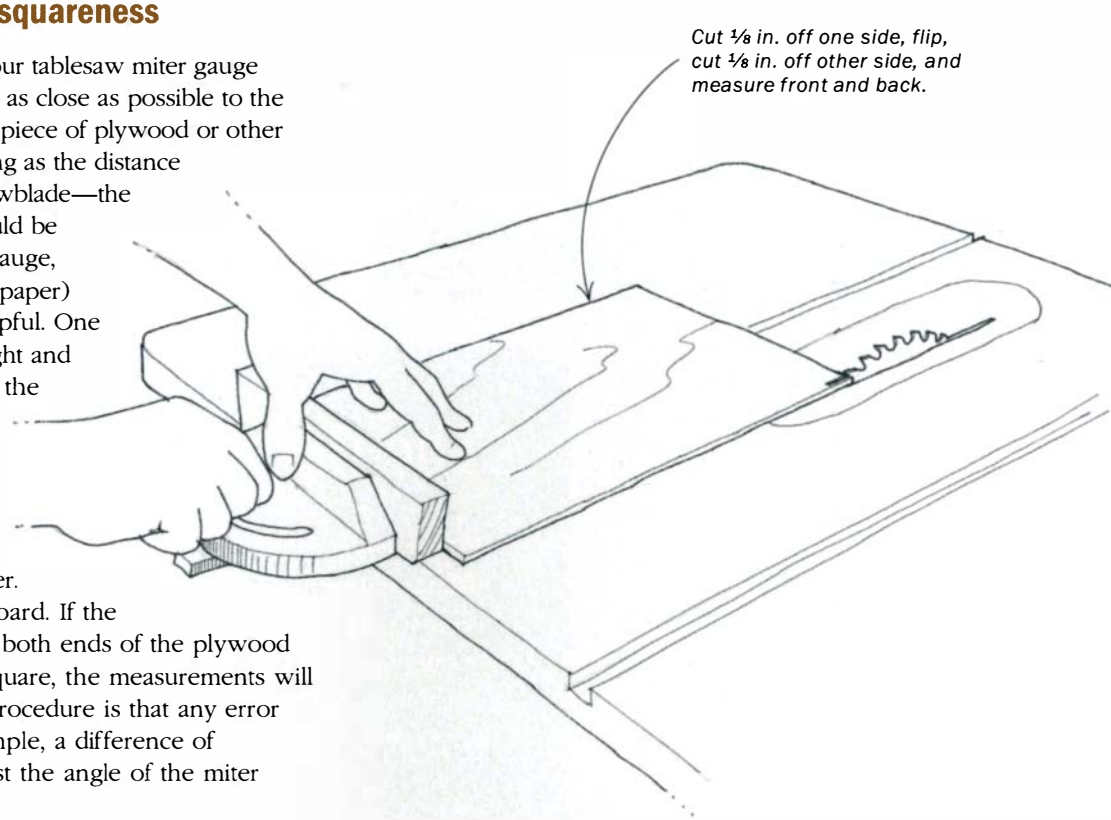


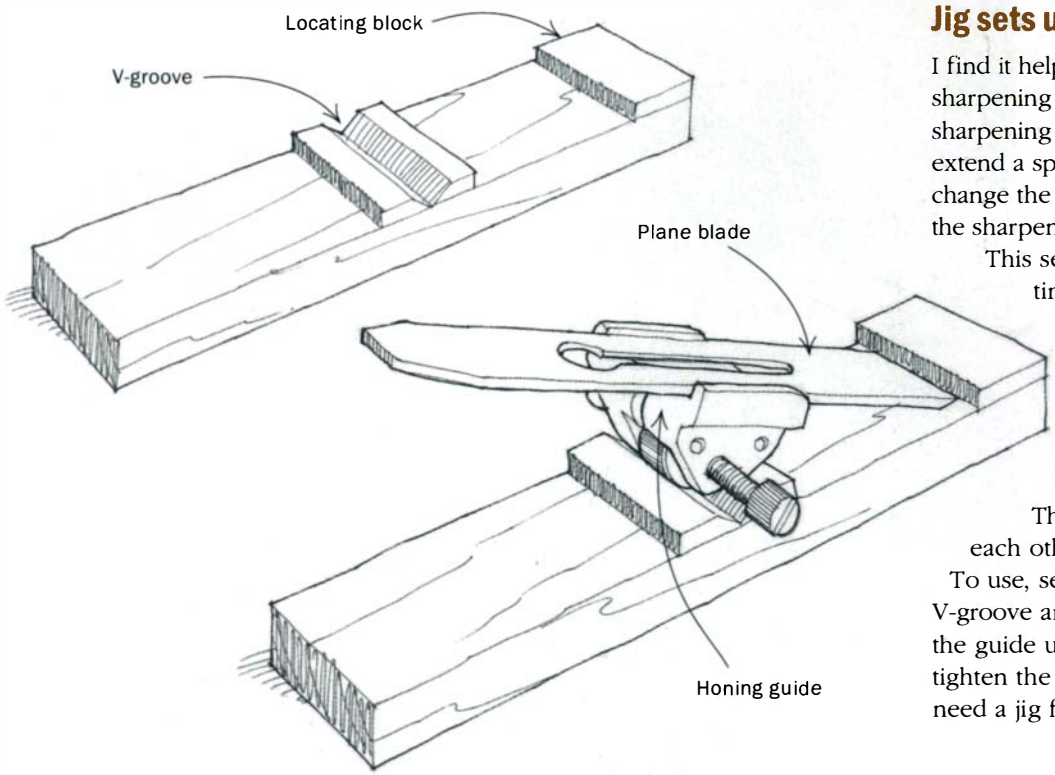
Checking a miter gauge for squareness

Here's a simple way to find out if your tablesaw miter gauge makes a square cut. Place the gauge as close as possible to the front edge of the saw table. Select a piece of plywood or other scrap sheet-stock that is about as long as the distance between the miter gauge and the sawblade—the longer the better. The plywood should be wide enough to hold tightly to the gauge, roughly 1 ft. A nonslip surface (sandpaper) on the face of the miter gauge is helpful. One edge of the plywood needs be straight and true—mark it as the true edge. Hold the true edge against the miter gauge and cut about ⅛ in. off one side of the plywood. Flip the board over so that the true edge is still against the miter gauge and cut ⅛ in. off the opposite side in the same manner.

Now measure both ends of the board. If the miter gauge is square to the blade, both ends of the plywood will be equal. If the gauge is not square, the measurements will be different. The best part of this procedure is that any error will be doubly magnified. For example, a difference of 1/64 in. will show up as 1/32 in. Adjust the angle of the miter gauge accordingly and recut.

—BILL WILSON, Warkworth, Ont., Canada





Jig sets up honing guide

I find it helpful to use a honing guide when sharpening plane blades. But to get the correct sharpening angle with these guides, the blade must extend a specific distance from the guide. If you change the distance the next time you use the guide, the sharpening angle will change.

This setup jig does two things for me. It saves time by making it easy to set the blade extension. It also helps me to be sure the blade is square to the guide.

Make the jig from hardwood. The V-groove positions the wheel of the honing guide and the block locates the end of the chisel or plane iron. The groove and block must be parallel to each other.

To use, set the wheel of the honing guide in the V-groove and slide the plane iron or chisel into the guide until it is square against the block. Then tighten the honing guide's clamping screw. You need a jig for each sharpening angle you use.

—MATT DANNING, Piedmont, Calif.

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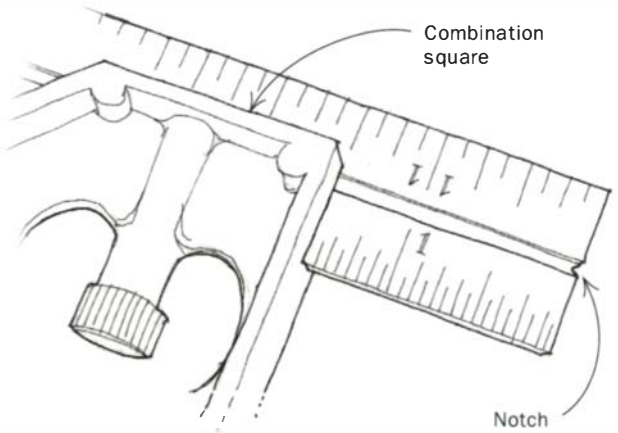
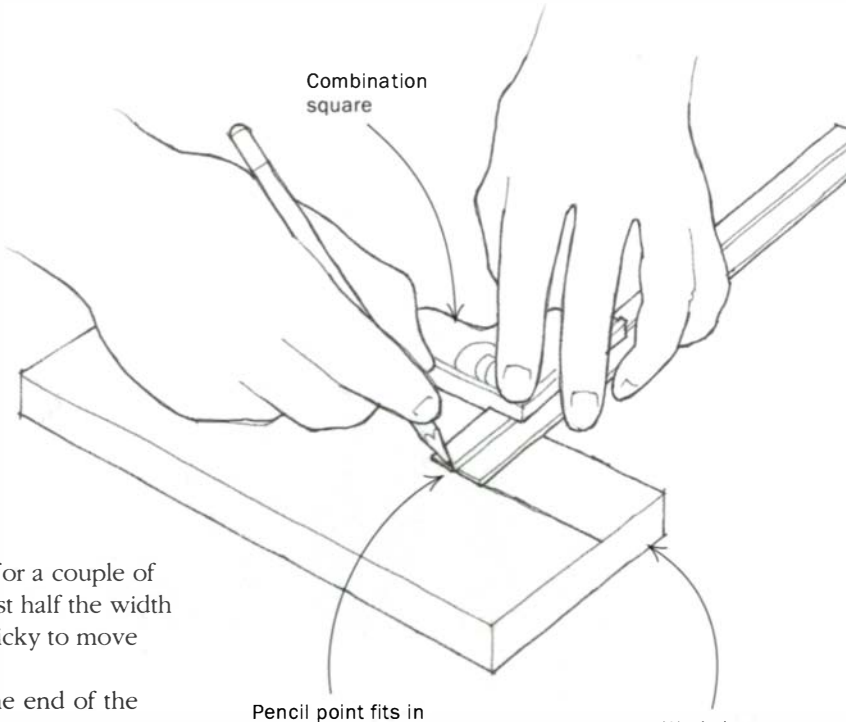




Modify a combination square for scribing

The combination square is a natural tool for scribing except for a couple of problems. First, the mark made is outside the blade by at least half the width of a pencil lead. Second, the flat end of the blade makes it tricky to move the pencil simultaneously with the square.

You can solve these problems by filing a small notch in the end of the combination-square blade. Size the notch to accommodate a sharpened pencil so that the point marks the exact measurement on the blade. The notch also makes it easy to move the pencil with the square when scribing.

—JAMES THORNEYCROFT, Norwood, Colo.

ROUTING

Woodpecker router table is a good value

THE WOODPECKER ROUTER TABLE combines a sturdy steel base, a medium-density fiberboard (MDF) top covered with plastic laminate, and a versatile fence to create a top-quality system. It compares favorably with the Hart Design table, which was listed as the best value in my recent review of router tables (*FWW* #181, pp. 36-41).

The leg set is easy to assemble, can be adjusted for table heights ranging from 36 in. to 42 in., and includes adjustable pads to accommodate less-than-flat shop floors.

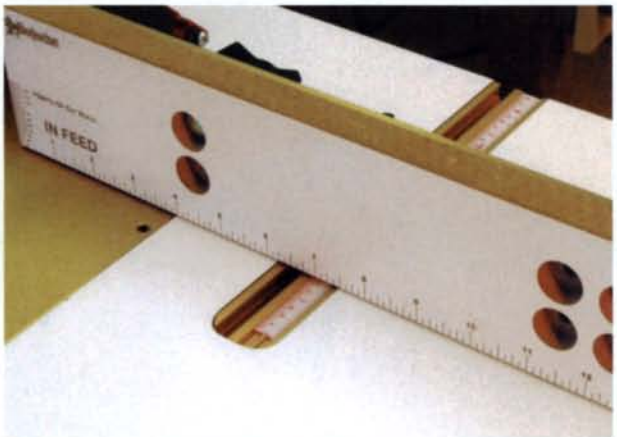
The top comes in a variety of sizes and is 1⁵⁄₁₆ in. thick. It tested very flat (less than 0.002 in. of sag) and should remain flat, thanks to a pair of steel angle braces supporting it on either side of the router insert plate. Plastic laminate covers the top, bottom, and all of the edges of the tabletop.

The insert plate can be ordered in phenolic or cast aluminum, predrilled for most routers. It features spacer rings that will accommodate various-diameter router bits and guides.

The router fence is mounted in two T-tracks that extend from the back of the table to near the centerline of the router opening. Scales attached to these T-tracks allow easy placement of the fence during initial setup or when you have to return the fence to a previous setup. Easily replaceable MDF fence faces are secured to the aluminum fence with carriage bolts and plastic knobs. For dust collection, there is a 2¼-in. dust port on the fence. A small cabinet is available that encloses the router motor and allows dust collection from below.

The basic table sells for $300, not including the insert plate. There are numerous configurations available. For more information, check out the company online at www.woodpeck.com, or call 800-752-0725.

—Roland Johnson is a contributing editor.



Easy placement. *Scales on the T-tracks allow for precise placement of the router fence, which comes in handy when duplicating a previous setup.*

MEASURING

STARRETT'S SMALLER PROTRACTOR

IN *FINE WOODWORKING* #175 (p. 34) we reviewed Starrett's 12-in. ProSite protractor (No. 505A), invented by trim carpenter Marc Shapiro. It was designed to take readings for miter cuts, and then to transfer them to setups on a miter saw or tablesaw miter gauge. A new, smaller version (No. 505A-7) was designed to perform the same tasks, but in many ways it's more convenient.

Lighter in weight and shorter in length, this tool has the same dual scales for reading miters and automatically bisecting them, but the 7-in. length gets into tighter spaces and fits comfortably in your back pocket. It sells online for about $34.

—William Duckworth is a contributing editor.

Photos, except where noted: Rodney Diaz; bottom left: Roland Johnson

POWER TOOLS

NEW LOW-COST SANDERS FROM HITACHI

AT $59, HITACHI NOW OFFERS a single-speed random-orbit sander (No. SV13YB) that spins a 5-in.-dia., 8-hole, hook-and-loop pad. It is a sturdy, no-frills machine with an excellent tactile grip. Its 2-amp motor refused to bog down during aggressive work. However, its dust collection, using a cloth bag, was only average. And that's the best it will do, as there's no adapter for connecting the sander to a vacuum.

I was surprised by two other design flaws. The on/off switch is a small, recessed slide that's hard to actuate, and the dust-bag connection is a flimsy split-mount attachment.

Hitachi (www.hitachi-koki.com) offers a variable-speed model of the same tool for $69.

—Andy Beasley reviewed random-orbit sanders in Fine Homebuilding *#165.*

An aggressive, inexpensive tool. *This tool fit comfortably in hand and held up well under heavy use.*

FINISHING

Pigment tints will color all finishes

These tints are compatible with any type of finish. *The concentrated and finely ground pigments are suspended in a liquid paste that will not harden in the bottle, affording them a long shelf life.*

ONE OF THE MOST IMPORTANT steps toward achieving the perfect finish is learning how to use color. By using layers of color in stains and glazes, you can produce finishes with a greater visual depth than a simple clear finish. As the color builds, you can manipulate the final look by tinting the finish.

One of my favorite new products for achieving various color effects is Mixol brand tinting colors, made of very finely ground pigments. They come in liquid form and are highly concentrated for outstanding tinting strength. Because they are pigments (unlike dyes that are more transparent), these tints can be manipulated from translucent to opaque, depending on how much you use. Mixol can be added to virtually any finishing product: stains, fillers, glazes, and topcoats (including shellac, lacquer, and oil- and water-based varnishes). They are sold in three container sizes in more than two dozen shades.

For more information, visit www.mixol.com. Mixol tints (made in Germany) are available from Woodcraft (www.woodcraft.com), Homestead Finishing Products (www.homesteadfinishing.com), and other online sources.

—Peter Gedrys is a professional finisher and gilder in East Haddam, Conn.

MEASURING

FLAT MEASURING TAPES ARE BENDABLE

LAST SUMMER, THE FOLKS FROM FASTCAP (www.fastcap.com) won an award for their new ProCarpenter FlatBack measuring tapes at the Association of Woodworking and Furnishings Suppliers show. Because these flexible tapes are flat, not curved to make them rigid, they bend easily for measuring curved surfaces. They also have a built-in stainless-steel pencil sharpener, a shock-absorbing rubber casing that's comfortable to grip, an erasable note pad, an easy-to-read scale, and a sturdy belt clip. You get all that in a 16-ft. length for $7.95.

The tapes come in three versions, with imperial or metric graduations (or both), and erasable tape surfaces. People who prefer to build furniture and cabinetry using the story-pole method can make pencil marks right on the tape.

—W.D.

Bendable, markable tape measures. *Fastcap offers three versions of these tapes, marked with imperial and metric scales, with erasable tape surfaces. The 16ths scale is printed in red; the other scales are printed in black on a flat white background.*

Chisels built for grunt work. *The design of these tools is based on English mortising chisels of the mid-20th century. Thick, Sheffield (D2) steel with tangs buried into the tapered oval beech handles and a bolster fit flush to the handles make these mortise chisels virtually indestructible.*

HAND TOOLS

ENGLISH-STYLE MORTISE CHISELS THICKER AND QUICKER

HAND TOOLS ARE FOR ENJOYMENT. No power tool gives the satisfaction of splitting a line with a handsaw or planing off paper-thin wisps of wood. That said, I never liked mortising by hand: At best it was tedious; at worst it ruined a good bench chisel.

But I recently had the pleasure of trying some new English-style bolstered chisels (unromantically called "pigstickers"). Pigstickers are shorter, beefier versions of the more common "sash" style mortising chisels. These production versions (sold at www.toolsforworkingwood.com), are handmade in Lincolnshire by Ray Iles, scion of an old Sheffield tool-making family. They are beautifully fitted with tapered oval handles that fit comfortably in hand. Thick of shank and steeply beveled, these tools are useless for anything but mortising. But what a job they do at that! They are meant to be driven deeply into hardwood by stout blows from a heavy wooden mallet, and to lever

out chips with impunity. The steep cutting-edge bevel holds up well to the abuses of the job. I can whack out a small run of mortises faster with a pigsticker than I can make a jig and set up my router to do the job.

Available in 1/16-in. increments from 3/16 in. to 1/2 in., a full set costs $400, and individual tools range from $54 to $100. But most woodworkers would use the 1/4-in. or the 3/8-in. chisel, and the pair costs only $140. Not bad for two chisels that will outlast you.

—Andy Engel is a former senior editor.

ACCESSORIES

Sawblades that hum, not whine

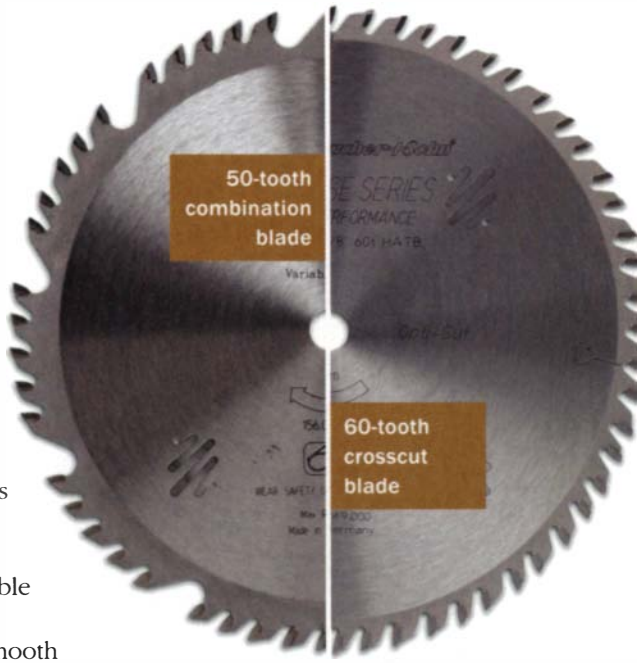
I WORK IN A SMALL BASEMENT SHOP and so I welcome any product touted to reduce noise levels. After seeing a press release about a new line of sawblades made in Germany by the H.O. Schumacher and Sohn company, I got hold of a couple of 10-in. blades (a 50-tooth combination blade and a 60-tooth crosscut blade) to try them out.

On close inspection, these are beautifully made sawblades: laser-cut, hand-hammered bodies fitted with thick carbide teeth. The secret to reduced noise levels is the varied spacing and pitch of the teeth, which reduces vibration and dampens the resonance created by a spinning blade.

Using a sound meter, I tested both blades against four other brands, both spinning free and under load. The 60-tooth blade was 2 db. to 4 db. quieter than any other. The 50-tooth blade ran 2 db. louder than two other brands, yet it *sounded* quieter. Then I realized that what was missing was the painfully high-pitched whining noise that blades often develop as they're running free. These blades don't whine; they hum at a lower, more bearable frequency.

Both blades made extremely smooth cuts in lumber and plywood. The list prices for the 50-tooth and 60-tooth blades are $80 and $88. For more information, go to www.itptooling.com, or call 336-862-5000.

—*W. D.*



Ear-friendly sawblades. *Though the overall noise level of these blades is not a whole lot less than several other brands, the variable spacing and pitch of the teeth prevent these blades from developing a high-pitched whining noise that can be painful.*

Setup kit for machines

THREE BASIC TOOLS WILL KEEP YOUR CUTS STRAIGHT, SQUARE, AND SMOOTH

BY GARY ROGOWSKI

If your woodworking machinery arrives needing only to be unpacked and plugged in, I suggest you buy lottery tickets that day. It's a lucky one.

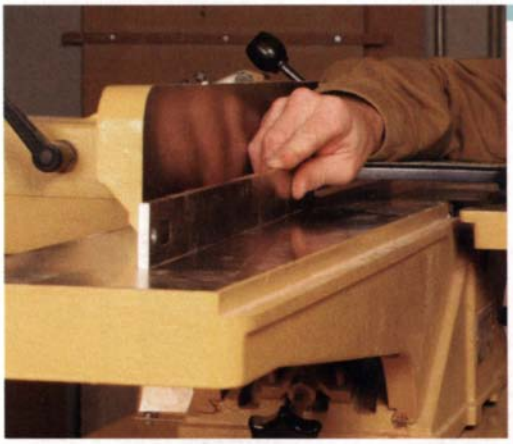
Woodworking machines always need tuning or tweaking before they really purr. Which tools do you need to set them up properly and to check them periodically so they keep running smoothly? Fortunately, the list is short. Some might be in your shop already: a good straightedge, a combination square, and a plunge-style dial indicator. With these basic tools, you can go a long way toward making your machines run true and your woodworking accurate.

A straightedge is the foundation

In the woodshop, flat surfaces are priceless. On them, you can mill lumber true, joint an edge square, and check pieces for twist after assembly. But how flat is flat? And how do you check?

You can't use a piece of wood to check for flatness unless you are sure it's flat. Instead, buy a good straightedge with a guaranteed tolerance of 0.002 in. over 24 in. This is more than adequate for setting up tablesaw tables and checking the flatness of jointer tables and other cast-iron or steel surfaces. A 24-in. straightedge will meet most needs, but for longer jointer tables or other especially large surfaces, you'll be better served if you can invest in a 36-in. edge.

Use the straightedge on the tablesaw to see that your extension tables and the main table form a continuously flat



STRAIGHT

Check for flatness with a straightedge

Jointer tables should be dead flat. *Measure any gaps with a feeler gauge. A variation of more than 0.002 in. on a new machine is reason to ask the seller for a replacement. Tables on older machines can be reground if necessary.*

Level the table and wings. *A tablesaw's bolt-on extension wing may need adjustment or shimming to bring its surface level with the rest of the table. Lay a straightedge across the junction of the table and wing and look for telltale gaps underneath.*

Photos: Steve Scott

SQUARE

Keep machines in line with a combo square

Check the fence. *Use the combination square to ensure that a jointer's fence is set at 90° to the tables. Make similar checks on the tablesaw and bandsaw.*

surface. Edges that appear flush where they meet are not enough. Stand the straightedge on its narrow edge and look for gaps between the edge and the surface you're checking. Check across the table's width and length, then check the diagonals. Measure any gaps underneath the straightedge with a set of feeler gauges. Acceptable tolerance for a tablesaw measuring 28 in. by 36 in. is 0.008 in. to 0.009 in. You might need to insert shims between the wing and the table to ensure a completely flat top.

Also check your tablesaw fence. The piece of composite material bolted onto the fence is not always perfect, but you can shim it to make it flat.

The jointer has three major cast-iron surfaces: the infeed and outfeed tables and the fence. A jointer table should be dead flat within 0.001 in. to 0.002 in. over any of its lengths. You can return a new machine to the seller if the surfaces are seriously out of flat or misaligned. On an older machine, a machine shop might regrind the surfaces for you.

On a belt-driven machine, the pulleys attached to the motor and the arbor should line up with one another in a flat plane to minimize bearing and belt wear. Use a straightedge to check by laying the narrow edge across both pulleys.

Combination square is a versatile setup tool

Just as important as checking flat surfaces is making sure that two machine surfaces meet up squarely.

You don't need a specialized machinist's square. If you use a combination square for joinery layout, it will work if it is truly square. Here's a simple test:

Hold the square up to a flat edge and mark a line. Then flip the square over and see if your mark again lines up perfectly with the blade of your square. Any variation means it's out of square.

Use the square to check the jointer fence. It can be adjusted and then locked into place. A tablesaw fence will need adjusting or shimming if it's not square to the table. A word of warning: Simply checking with the square isn't always enough. Squaring a blade to a table on a bandsaw, chopsaw, or tablesaw will

Adjust the miter slot. *The combination square also can help check whether a tablesaw's miter slot is parallel to the blade. Mark a tooth at the front of the blade and measure the distance from the blade to the slot. Next, rotate the marked tooth to the back of the blade opening and measure again. If the readings are different, you need to adjust your saw's tabletop or trunnions to bring the slot parallel with the blade.*

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mean making practice cuts and checking those (see "Use test cuts for accurate machine setups" by David Hyatt, *FWW* #181, pp. 90-94).

A combination square also is handy for aligning a tablesaw's miter-gauge slot parallel with its blade. This is crucial for safe operation and square crosscuts. With the machine unplugged, hold the head of your combination square against the gauge slot and check the distance to the blade at a single marked tooth, rotated to the front and then to the rear of the throat plate. You can adjust all cabinet and contractor-style saws to move the table into parallel with the blade.

A dial indicator measures runout

Runout is a measure of how true a rotating surface spins. If a surface wobbles or oscillates, then this runout will be magnified as you move away from the center of rotation. On a tablesaw, if the arbor is wobbling, then the end of its 10-in. blade will be rocking and rolling. This translates into rough, inaccurate, or dangerous cuts. The movement also wears on the bearings, cutting short their life.

A dial indicator measures movement such as runout with an arm mounted into a dial that usually reads 0.001-in. increments. The indicator itself must be held in place; the best way is to use a magnetic base to lock it into position. Then, on the tablesaw with the blade and throat plate removed, you can check the pressed-on arbor flange for runout. Set the magnetic base on the tabletop near the throat opening and tilt the arbor to 45°. Angle the dial's plunger to meet the surface of the arbor flange. Turn the arbor by hand to see whether the gauge registers any variation in the flange surface. A tablesaw arbor should have zero runout, but 0.001 in. of runout won't mean you have to trash your saw. Any more, though, and I'd send a new saw back to the factory or get a replacement arbor. On a used saw, I would remove the arbor and have it machined true.

A drill-press chuck also should have nearly zero runout. Set the magnetic base on your drill-press table and align the dial plunger to touch a bit or a piece of straight unthreaded rod mounted in the chuck. Turn the chuck by rotating the drive-belt pulleys and watch for variations registered by the dial. Acceptable tolerance is 0.001 in. or less. Drill-press chucks can be replaced.

You also can use a dial indicator to check whether your jointer knives are all set to the same height. Set the base on the jointer table with the plunger riding the tops of the knives as you rotate the cutterhead by hand. Note and adjust for any variations in the maximum height of the blades. □

Sources of Supply

VERITAS STEEL 24-IN. STRAIGHTEDGE
$39; www.leevalley.com

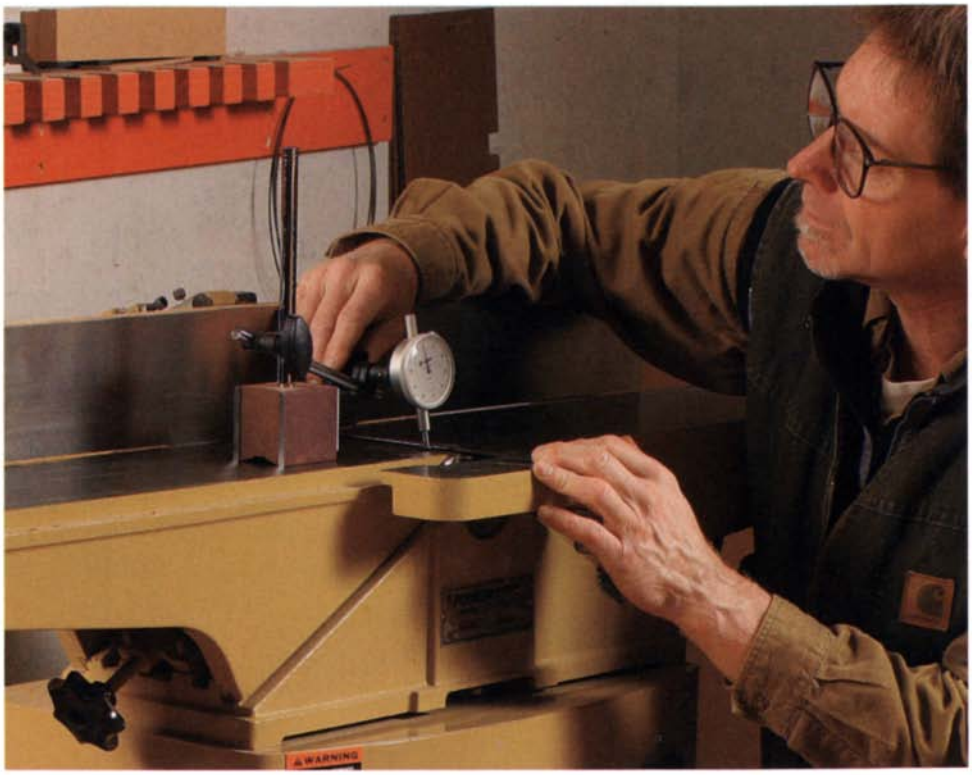
MAGNETIC BASE DIAL INDICATOR
$35; www.tools-for-woodworking.com

STARRETT 12-IN. COMBINATION SQUARE
$77; www.garrettwade.com

SMOOTH

Check runout and blade height with a dial indicator

Check for runout. *Use a dial indicator to check the tablesaw's arbor flange. Any variations in the flatness of the piece can cause blade wobble, which leads to rougher cuts.*



Blades should be uniform. *The dial indicator also helps check whether jointer knives are set to the same height and are even with the outfeed table.*

a closer look

A joint that exploits wood movement

BY JOHN ALEXANDER

KEY TO LOCKED JOINT IS DIFFERING MOISTURE CONTENT

Rungs, dried to about 5% moisture content, are inserted into posts whose center has about 15% moisture content. As the rungs absorb moisture from the posts, they swell and lock tight in the joint.

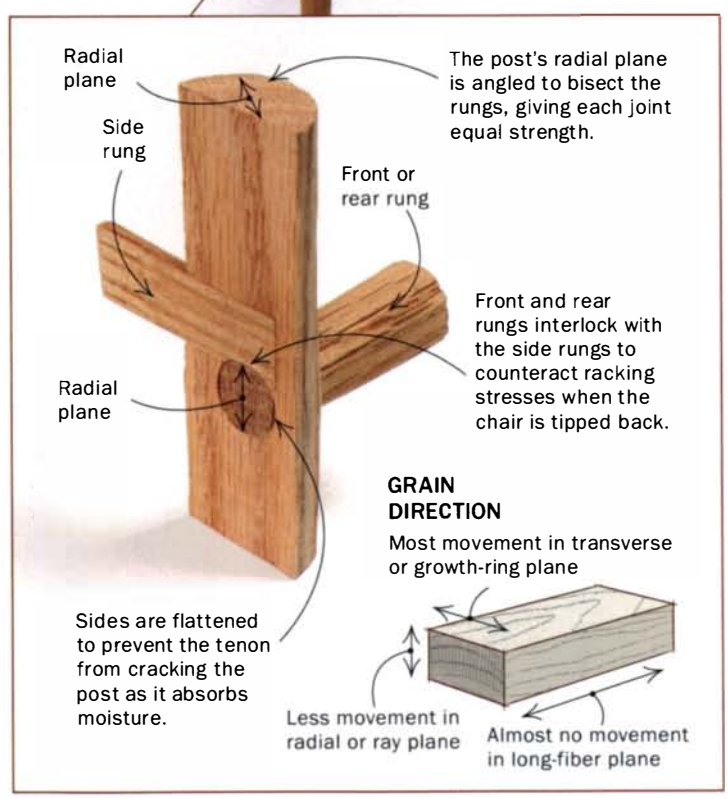
For most woodworkers, wood's tendency to expand and contract with changes in moisture content is a burden that must be borne. Ignore this movement when designing and building furniture, and sooner or later, boards will split and joints will fail.

However, there is a small corner of woodworking that for centuries has exploited this characteristic of wood. By harnessing wood movement, an 18th-century post-and-rung chair can remain rock solid while the joints in modern reproductions fail. The secret is commonly known as the wet/dry joint, but more accurately as the moist/bone-dry joint. Generations of chair-makers have relied on this joint to hold together both traditional post-and-rung and Windsor chairs.

How wood movement creates tight joints

The essence of the joint is a bone-dry, slightly oversize tenon driven into a mortised post that is slightly moist and compressible enough to accept the tenon without splitting. The tenon's rays are oriented parallel to the direction of the post's long fibers. In this way the joint takes advantage of wood's unique movement in response to moisture change in each of its three axes. Wood does not shrink or swell in the direction of its long fibers; the height of the mortise and the length of the tenon do not change. The movement happens along the other two axes: about twice as much in the direction of the transverse or growth-ring plane as in the radial or ray plane.

After assembly, the tenon absorbs moisture and its top and bottom swell slightly along its radial plane and bond against the mortise. The main movement in both tenon and post is in the width or growth-ring plane. As the two parts of the joint reach even moisture, the tenon has swollen in width and the mortise has shrunk around it. The tenon sides are flattened before assembly so these powerful opposing movements don't split the post.

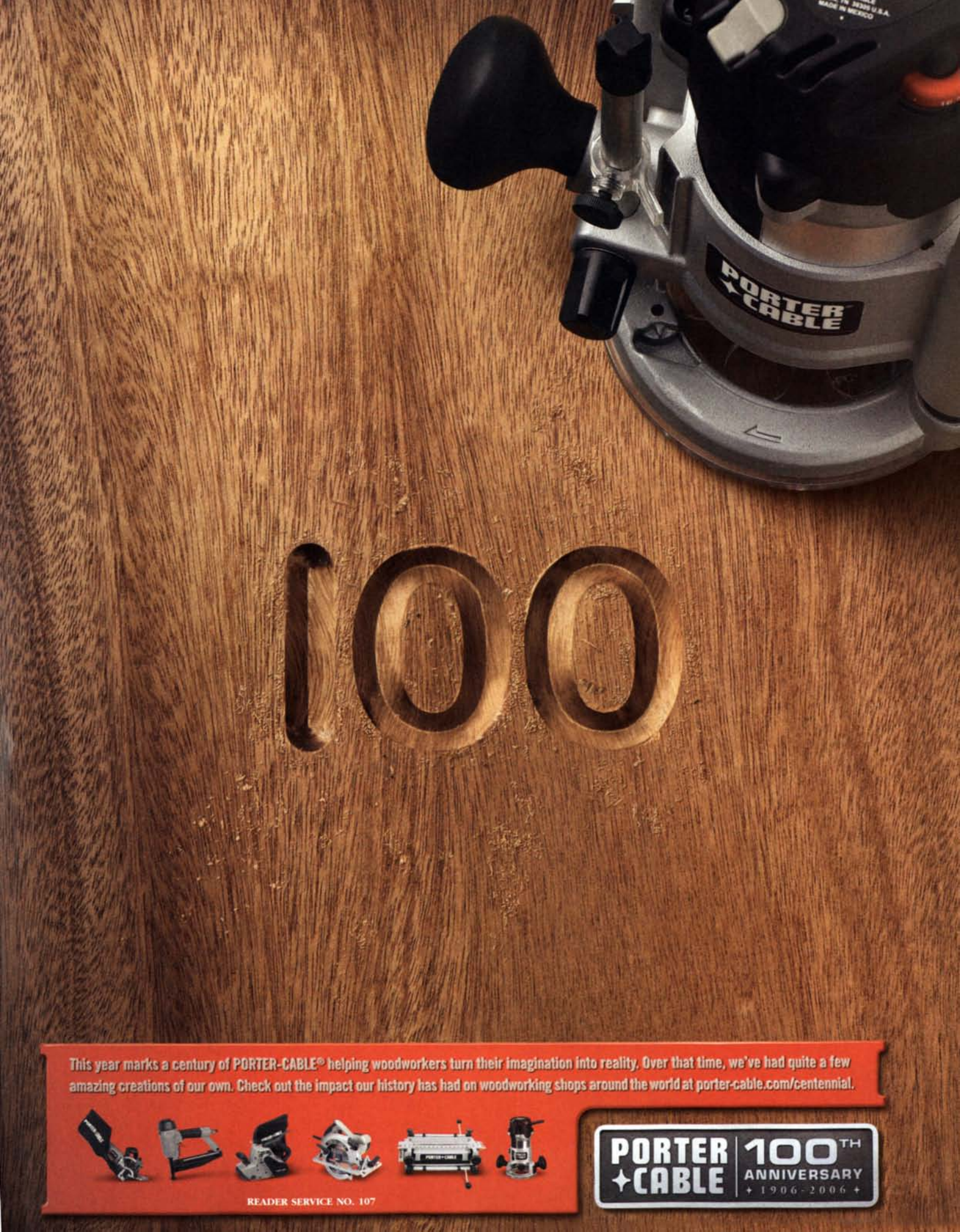


A brief guide to making this joint

Use straight-grained hardwoods such as oak, hickory, ash, maple, or beech that are split (rived) along the grain from green logs or boards. The straight grain of riven pieces gives critical strength.

Get the right moisture in the mortise—While the rung stock must be bone dry, the posts need to have about 5% more moisture than the ultimate moisture content of the joint after

Photos: Mark Schofield; drawings: Rodney Diaz



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assembly and drying. In Baltimore, the ultimate moisture content averages about 10%, so I want the posts at 15% at the time of assembly. Because a post dries much faster on its surface, it is difficult to measure this crucial interior moisture content with a moisture meter. Rather than create extra post stock (to split open), gauge the diameter of a typical green-wood post on its growth-ring plane halfway down its length. Mark this location. Slowly kiln-dry all the posts at 100°F and regularly check the diameter of the marked post. When its cross section begins to shrink and the gauge becomes loose, the marked post has lost all of its free water and has a moisture content of approximately 28%. Weigh all the posts and then continue to dry them until they have lost 13% more weight. The posts will be oval in cross section and will have an approximate moisture content of 15%.

Dry and tenon the rungs—Clearly mark the rung stock at both ends with a centerline in the direction of the ray plane. In the joint, this line will be vertical and parallel to the long fibers of the post. The tenons of rived green stock are first drawknifed to a ¾-in. square whose sides are parallel to the centerline, then to an octagonal cross section that just fits into a ¾-in.-dia. circle.

Fine WoodWorking.com

Watch an excerpt from Alexander's video, *Make a Chair From a Tree*, available from www.greenwoodworking.com.

Dry the rungs at 125°F and weigh them together until they stop losing weight. They are now bone-dry at less than 6% moisture content. Mark your tenon length with a light pencil mark and slightly flatten the tenon sides with knife cuts parallel to the ray plane centerline. Carefully shave the tenon's upper and lower domes until the tenon can be forcibly rotated by hand about 3/32 in. down into a ⅝-in., bone-dry test hole bored in the same wood as the posts. Reject all rungs with loose-fitting tenons. Return each rung to the kiln when it has been tenoned.

Drill the mortises and assemble the joints—Bore the side-frame mortises first. Glue isn't necessary but will substantially increase joint strength. Assemble the side frames by pounding the tenons home with a slightly round-faced hammer or a mallet. The tenon ray plane centerlines must be parallel to the direction of the post's long fibers.

After assembling the side frames, the front and rear frame mortises are bored so they interlock 3/32 in. up into the side frame tenons. In post-and-rung construction, the most common failure is side-tenon withdrawal due to fore-and-aft racking forces. The interlock opposes this. Assemble the remainder of the frame.

For more than 30 years, my students and I have made thousands of successful, lasting joints, each proving that the moist/bone-dry joint is superior to those joints assembled with their mortise and tenon at the same moisture content. □

Wet/dry joinery step by step

Rive green wood. *Splitting or riving straight-grained green hardwood is necessary for this type of joint.*

Shave the blanks. *With the blank for a rung held in a shaving horse, a drawknife is used to turn it into a rough octagonal shape.*

Dry the rungs. *Because the rungs must be bone dry when inserted into the posts, a homemade kiln with heat lamps is used to dry them.*

One strong frame. *As soon as the frame has been assembled (left), check that all the legs touch the floor. If they don't, place a block under the longest leg and then stand on the frame to rack it straight (above).*

Build a Pencil-Post Bed

Figured wood, subtle details, and a rich finish bring charm and elegance to this traditional design

BY LONNIE BIRD

The pencil-post bed remains popular several centuries after it was introduced—and for good reason. The design is classic yet highly adaptable. By varying the wood, the headboard shape, the post form, and even the finish, this bed will fit comfortably in a wide variety of settings, from traditional to contemporary.

The bed described here is one of the more popular variations on this timeless design. Unlike other early American beds, many of which have turned feet on the posts, this version features posts with simple octagonal feet and the classic tapered octagon on top. To add to the traditional period look, I hand-carved lamb's tongues at the ends of all the chamfers, added a tester frame on top, and used highly figured tiger maple, finished with rich amber shellac.

Tips for milling figured wood

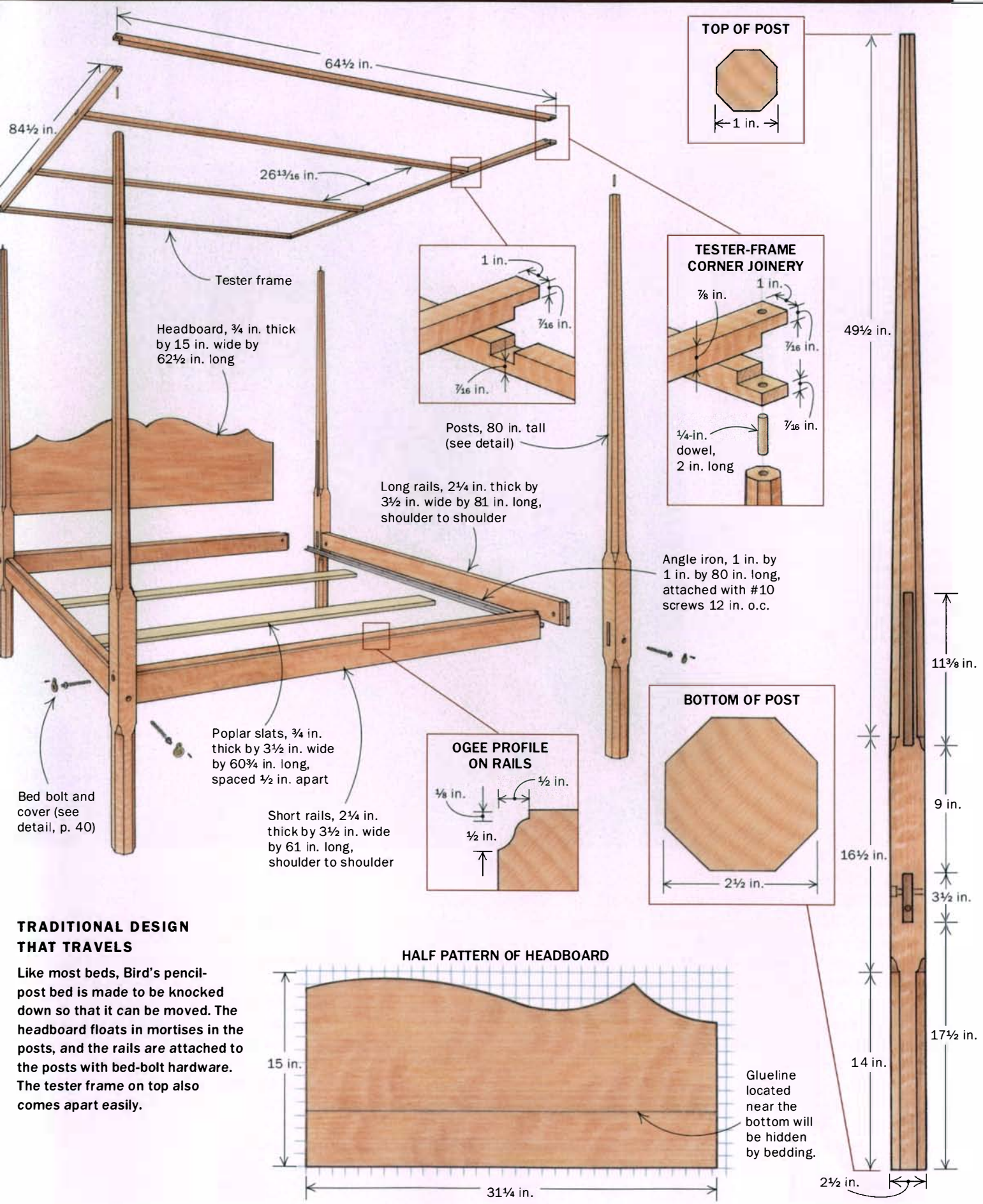
There are relatively few parts to mill up for a bed project, but almost all of the parts are large. Although sometimes I'll edge-glue boards to create a wide headboard, I never glue up bedposts to add thickness. In a figured wood like tiger maple, the seams would distract from the facets and chamfers in the posts. Therefore, you'll need 12/4 stock for the 80-in.-tall posts. If you can't find that at your local lumberyard, it's available through specialty lumber dealers (there are sources on the Web and in the back pages of *Fine Woodworking*). The stock doesn't have to be perfectly clear. You can live with small defects as long as they are located in areas that will be cut away for the tapers.

Begin by cutting the posts to rough length. Next, joint two adjacent faces square, and then run the stock through the planer to bring it to its finished 2½-in. thickness. Tiger maple can be difficult to plane without tearout, so be sure that the knives in your jointer and planer are razor sharp (when milling figured woods, I put new knives in my machines). Take very light passes with a slow feed rate. If you still get tearout with those precautions, moisten the wood surfaces with water just before you run the stock through the machine. The water will soften the fibers, making them less brittle.

Octagonal posts require no turning

The posts taper to a delicate 1 in. at the top. Begin by drawing the outline of the taper on one side of each post using a full-size pattern made from ¼-in.-thick plywood. When the layout is complete, use a bandsaw to cut carefully to the layout line. For a smooth cut in the figured stock, use a wide, sharp blade (½ in.

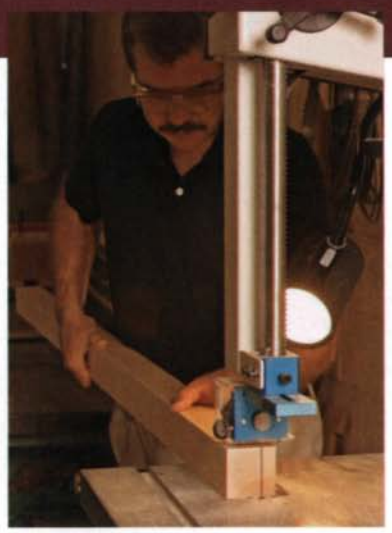
Photos: Thomas McKenna; drawings: Vince Babak



TRADITIONAL DESIGN THAT TRAVELS

Like most beds, Bird's pencil-post bed is made to be knocked down so that it can be moved. The headboard floats in mortises in the posts, and the rails are attached to the posts with bed-bolt hardware. The tester frame on top also comes apart easily.

Shape the octagonal, tapered posts



Cut four-sided tapers on the top of each post. *Lay out and cut the tapers for two opposing sides (above). Smooth away any sawmarks with a bench plane, then repeat for the two remaining sides.*

wide, 4 teeth per inch). Hold onto the offcuts; you'll use them later when cutting the mortises for the headboard.

Next, remove the bandsaw marks with a smoothing plane. To handle the tricky grain, I grind the iron to 43° to create a steep 55° cutting angle. You can use a jointer for this, but be sure that you have very sharp blades and that you take light passes. Now lay out the tapers on the faces you have just cut and repeat the process until all four sides have been tapered and smoothed.

Tapered chamfers? No problem—The next step is to chamfer the corners of the posts on a router table to create an octagon. Start by marking the octagons on the top and bottom of each post. Then draw lines around the post to indicate the stopping points of the chamfers.

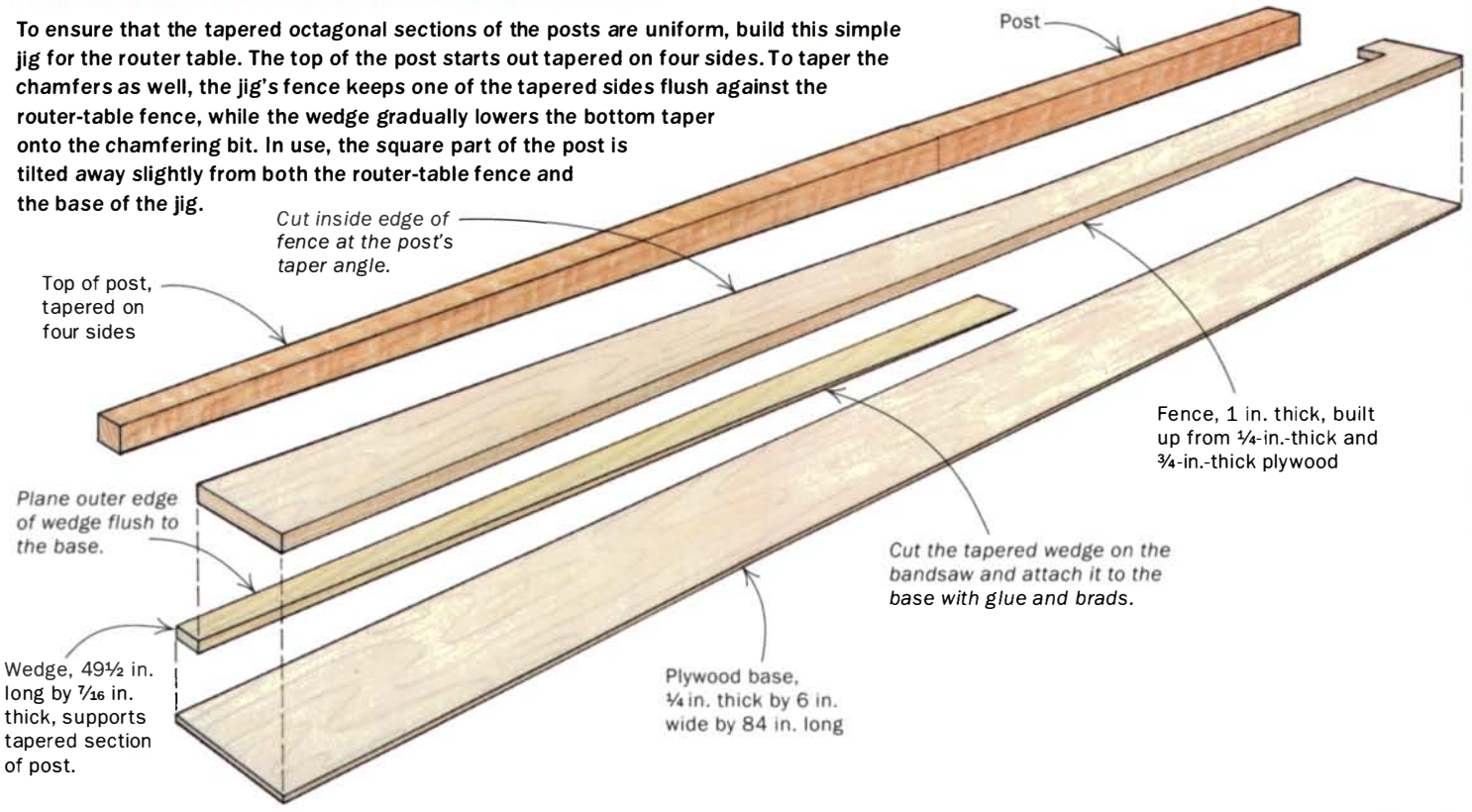
For uniformity among posts, cut the chamfers in the tapered section with the help of a jig (see drawing, facing page). As you push the stock across the router table, the jig will gradually lower the post to create a tapered chamfer that corresponds with the taper in the post.

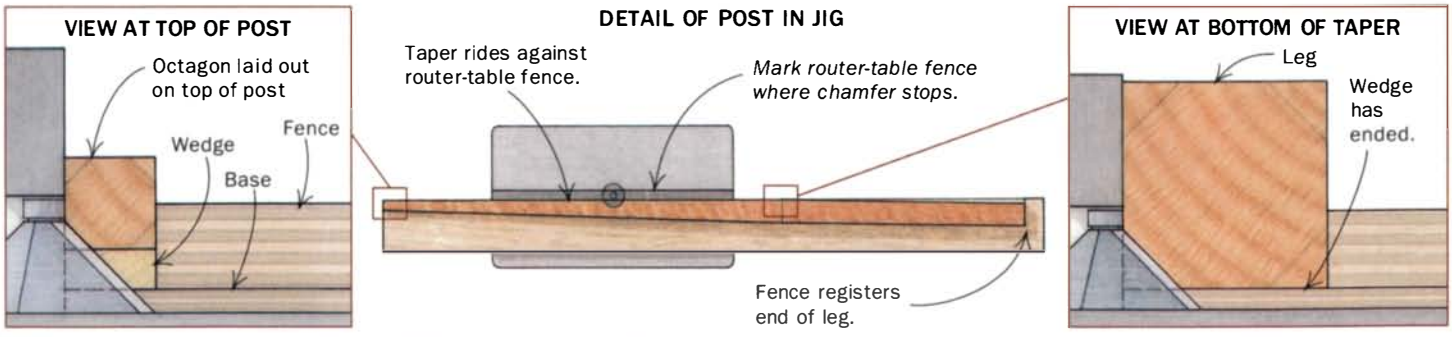
Setting up the cut is tricky because the bit is hidden from view, so take your time. Hold a post in the jig and take a series of light passes, gradually raising the bit. You're there when you are cutting on the line of one face of the octagon on the top of the post and the stopping point (at the lower, fat end of the chamfer) is about 1 in. wide. When the setup is right, position the jig and post at the stopping point of the cut, and transfer the stop line on the post to the router-table fence. On subsequent cuts, stop cutting when the marks align. (If you want to get fancy, you also could place a stop on the bottom of the jig.) Rotate the post until all four sides have been chamfered, and repeat for the three remaining posts.

Bottom of post is a straight octagon—You don't need a jig to chamfer the bottom of the posts. However, you do have to hold the bottom of each post firmly against the router table and fence

ROUTER-TABLE JIG CREATES TAPERED CHAMFERS

To ensure that the tapered octagonal sections of the posts are uniform, build this simple jig for the router table. The top of the post starts out tapered on four sides. To taper the chamfers as well, the jig's fence keeps one of the tapered sides flush against the router-table fence, while the wedge gradually lowers the bottom taper onto the chamfering bit. In use, the square part of the post is tilted away slightly from both the router-table fence and the base of the jig.

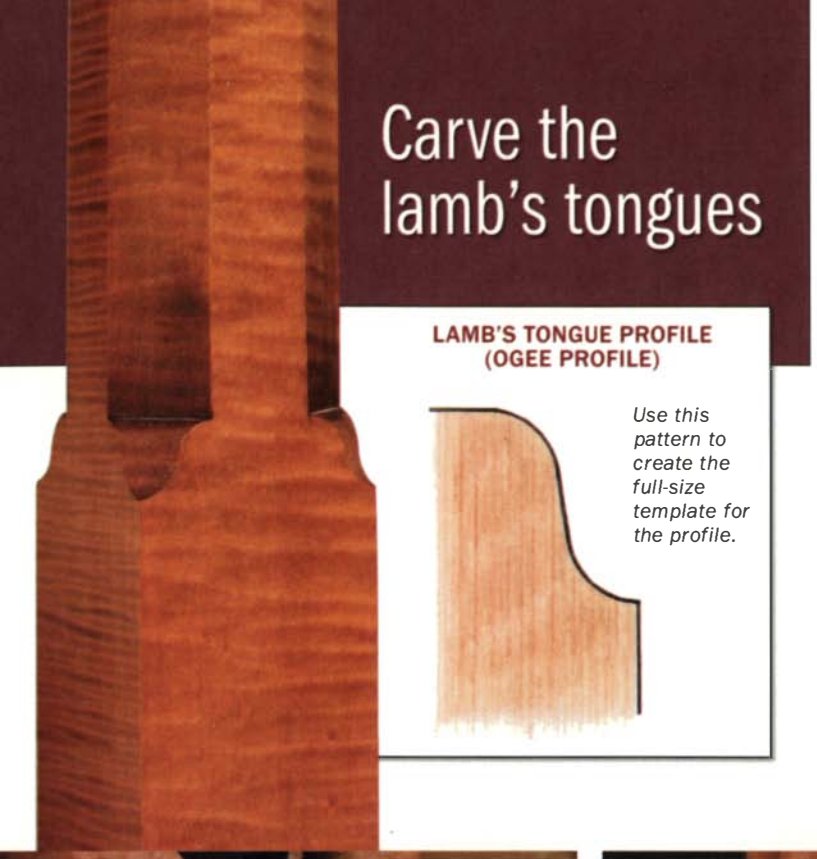




How to cut a tapered octagon. *Lay out the octagon on the top of a post, then place the post in the tapering/chamfering jig (see drawing, above). Gradually raise the 45° chamfering bit until it is cutting on the layout line marked on the top of the post and the fat end of the cut measures about 1 in. (right). Mark a stopping point for the cut on the table's fence and on the post.*

The bottom of the post is octagonal, too. *Bevel the bottoms of the posts with one setup and no jig. Lay out the octagon on the bottom of one post, then raise the bit until it is cutting on the line. Again, mark the stopping point.*

Carve the lamb's tongues



LAMB'S TONGUE PROFILE (OGEE PROFILE)

Use this pattern to create the full-size template for the profile.

to keep it from lifting and spoiling the cut. Again, raise the bit until you are cutting on one face of the octagon laid out on the bottom of the post. Mark the stopping point of the cut on both the post and router-table fence so that you will stop chamfering at the same point each time.

To smooth away mill marks, I use a standard-angle block plane with its iron ground to 35°. This grind creates a steep 55° cutting angle, which helps eliminate tearout while planing the curly maple. Next, carve the lamb's tongue, often called an ogee, at the end of each chamfer (see photos, this page and opposite).

Cut mortises in the posts for the rails and headboard

A four-poster bed must be made to knock down, or you'll never get it into the bedroom. The headboard slips into mortises in the posts, and the bed rails are connected to the posts with traditional bed-bolt hardware.

The first step is to lay out and cut the mortises for the headboard and rails. In most furniture construction, mortise-and-tenon joints are cut so that they can hold firmly with a friction fit. But for a bed, you'll want a slightly loose fit so that you can assemble and disassemble the bed without too much wrestling.

Lay out the lamb's tongues on each corner. *Use a full-size template to trace the profile (**1**). Transfer the tip of the tongue around all four sides (**2**). Use the baseline as a reference to lay out the rest of the tongues with the template.*

Scoop out the waste, then pare to the line. *Use a 1-in. chisel to remove most of the material (**3**). Carefully refine the shape of the tongue using a ¼-in. chisel across the grain (**4**).*

When laying out the joinery for the rails and headboard, the trick is to make sure that the mortises align perfectly from the straight to the tapered sections of the post. Mark a line for the bottom of the rail mortise 17½ in. from the bottom of the post. Mark another line 3½ in. from that first mark to indicate the top of the mortise. Next, find the center of the post, and use a long straightedge to transfer that line up into the tapered section. Now mark out the locations of the top and bottom of the headboard mortise. To find the width of both the headboard and rail mortises, simply measure ⅜ in. on both sides of the centerline. Be sure to make the headboard mortises about 1/16 in. longer than the headboard width to allow for seasonal expansion.

For accuracy, I use a hollow-chisel mortiser to chop the mortises, staying clear of the layout lines. Cutting the rail mortises is straightforward. But when you cut the headboard mortises, make sure that you slide the tapered offcuts under the post and between the post and the mortiser fence to hold the post level and square to the bit. Take time to get the offcuts adjusted just right; otherwise, you could end up with a mortise that's not cut at 90°. After the machine work, pare to the layout lines with a chisel. Next, mill up the rail stock and cut the tenons on the rail ends to fit the mortises.

Install the bed bolts

With the mortises cut, it's time to install the bed-bolt hardware. Bed bolts create a rock-solid post-and-rail framework while allowing you to disassemble the bed when necessary.

When laying out the mortises in the posts for the bed bolts, remember to offset the holes for adjacent rails so that the bolts don't interfere with each other. First, use a drill press to make a shallow 1-in.-dia. counterbore in the post for each bolt head. Make the hole deep enough that the head of the bolt sits just below the surface. Next, drill a 7/16-in.-dia. hole through the post (centered in the counterbore) to accommodate the ⅜-in.-dia. shank of the bed bolt.

Assemble the rail and post on your bench. Use the bolt to mark out its length on the inside face of the rail. Next, use a combination square to scribe a line from the center of the post mortise all the way to the line indicating the bolt length. Disassemble the rail and post and use a drill press to drill a 1-in.-dia. access hole at that point. Again, be sure to drill on the inside face of the rail. Now clamp the rail-and-post assembly firmly to a

Define the base. *Pound the tip of the 1-in. chisel into the base of the tongue to add definition to the detail (5). Clean up and smooth the surfaces with a 6-in. double-cut file (6).*

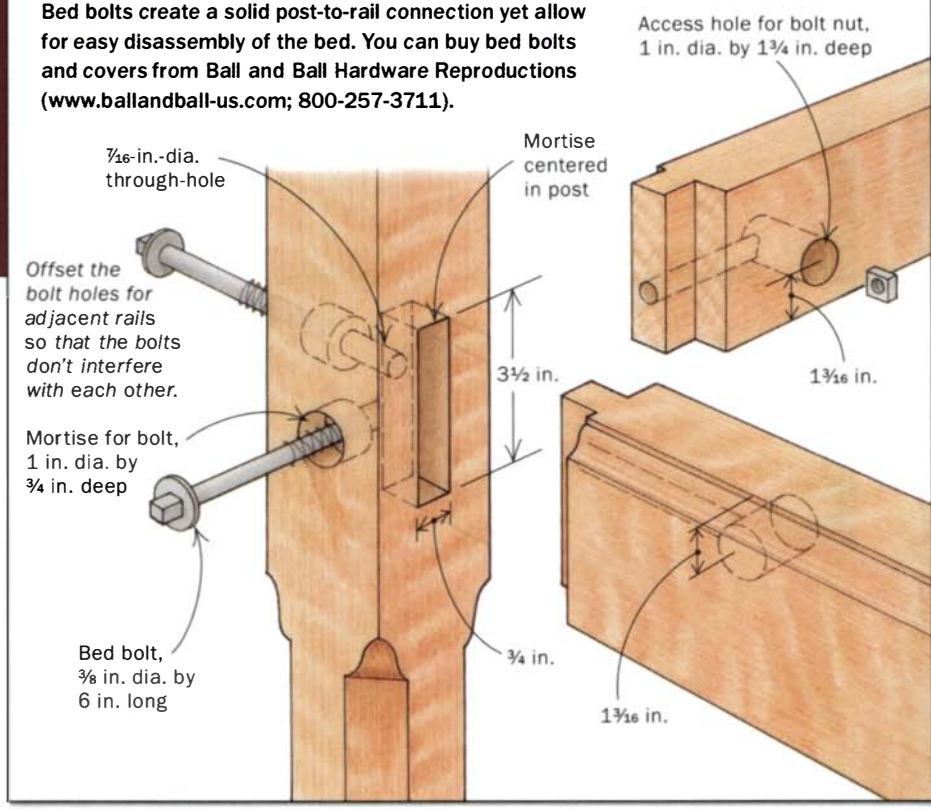
Cut mortises and drill for bed bolts

MORTISE

Cut the mortises for the rails first. *The square section is easiest to handle. A hollow-chisel mortiser makes the job go smoothly, though the mortises could be cut with a router or with chisels.*

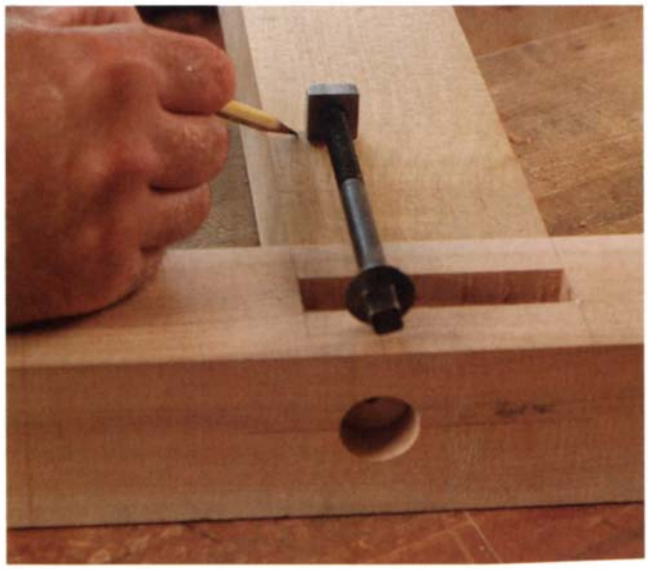
JOINERY DETAILS

Bed bolts create a solid post-to-rail connection yet allow for easy disassembly of the bed. You can buy bed bolts and covers from Ball and Ball Hardware Reproductions (www.ballandball-us.com; 800-257-3711).



Headboard mortises are cut in the tapered section. *Use the tapered offcuts (from the bandsaw) to level the post and to keep it perpendicular to the fence of the mortiser.*

DRILL



Drill holes for the bolts. *Slide the rail into the post mortise, then transfer the centerline of the through-hole across the post and onto the rail. Use the bolt to mark where the 1-in.-dia. access hole for the nut should be (above). After drilling the access hole in the rail, clamp the assembly to a bench, and drill the through-hole for the shank of the bolt (right). Use a long 7⁄16-in.-dia. bit and keep the drill level, using the centerline as a reference.*

bench and drill the through-hole for the bolt shank using a long (electrician's) 7/16-in.-dia. bit. The hole in the post will guide the bit accurately. After all the holes have been drilled, you can install the bolt. Follow this procedure for each bed bolt.

Assemble the headboard and shape the tops of the rails

The headboard for this bed is designed to slide into the mortises in the posts; there are no shoulders or tenons, per se. Although plans call for a 62½-in.-long headboard, for a precise fit it's a good idea to assemble the bedposts and rails and then measure from the bottom of one mortise to the corresponding mortise in the other post. Subtract 1/16 in. for clearance. If you don't have ¾-in.-thick stock that's 15 in. wide, you can glue up pieces to get the width you need. Locate the glueline toward the bottom so that it will be hidden when the bedding is in place.

After milling the plank to size, trace the profile at the top of the headboard using a half template made from ¼-in.-thick plywood. Cut the headboard pattern on the bandsaw and smooth the sawmarks with a spokeshave. Lightly handplane the ends of the headboard until they slip easily into the mortises in the posts.

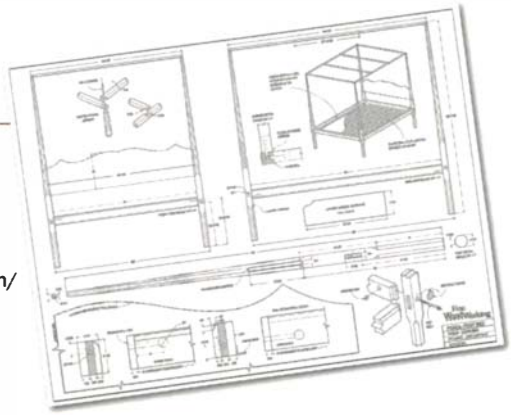
Once all the parts have been fitted, disassemble the bed to add final details such as the decorative ogee profile in the top of each rail, and build the mattress support.

Add the hardware and tester frame, then apply the finish

When it comes to supporting a mattress in the bed frame, you have a few options depending on the size of the bed (for more information, see *FWW* #175, p. 39). I used 1-in. angle iron and wooden slats (see drawing, p. 35) spaced about ½ in. apart. I ordered the angle iron predrilled 12 in. on center and attached it to the rails with #10 screws.

Fine WoodWorking.com

Visit our Web site for a video tour of Bird's four-poster bed. A full-size (36 in. by 48 in.) downloadable plan is available at www.FineWoodworking.com/4poster. You can tile the plan on a home printer, or take it to a copy shop for a full-size printout.



A tester frame adds to the period look. In colonial times, the framework supported heavy drapery to shield against the winter cold. In southern climates, the frame was covered with netting to keep out insects. The framework is half-lapped at each corner and held in position at the top of each post with a small wood dowel.

With all the components fabricated and fitted, it's time to sand and apply a finish. The bed should need only a light sanding with P240-grit paper. To make the figure of the maple pop and to give the bed an antique appearance without waiting 100 years, use the finish I described in "An Antique Finish for Tiger Maple" (*FWW* #180, pp. 74-77). The process involves using dye to bring out the figure, brushing on tung oil to add luster, sealing the wood with a 1-lb. cut of amber shellac, and then adding a glaze to accentuate the details. These four easy steps will impart a rich, amber color to the piece. And as you drift to sleep in the finished bed, you just might dream that you're living in the 18th century. □

Lonnie Bird, contributing editor, teaches woodworking at his school near Knoxville, Tenn.

Check the fit. *Slide the bolt through the post and into the rail, then place the nut on the end and tighten it down. If you don't have a bed-bolt wrench, you can use a scratch awl or screwdriver to stabilize the nut.*

The Clearest of Finishes

Several products will preserve the natural color of wood or paint

BY PETER GEDRYS

The yellow or amber cast of most "clear" finishes often enhances the final appearance of a finished piece. However, sometimes you want a clear coat to be just that, as clear as possible with minimal alteration to the color of the project. You may want to preserve the just-planed look of maple or pine, or to keep the distinctive appearance of wood that has been bleached or pickled. If you have found the perfect blue for a built-in bookcase, you don't want a coat of varnish with a typical yellow cast reminding you that blue plus yellow equals green.

The earliest demand for very clear topcoats came from artists who didn't want their works viewed through a yellow film. They used clear resins such as mastic and sandarac dissolved in alcohol. Modern chemists have greatly improved and expanded the choices. The three I've selected for their clarity are water-based finishes, clear shellac, and a solvent-based lacquer. Each has pros and cons, but the first question to consider is the degree of protection you expect. Does the finish have to resist heat and abrasion? Will it get physical abuse or is it purely decorative? Think about your finishing skills and the tools available to you—all three finishes can be sprayed, but the shellac and lacquer should be sprayed in an explosion-proof booth.

Peter Gedrys is a professional finisher and restorer who lives in East Haddam, Conn.

An oil-based, yellowing finish would have ruined the look of this bleached ash tabletop.

Water-based finishes are very clear

An oddity a generation ago, water-based finishes are widely available today. Spurred by environmental laws, most major coatings manufacturers now offer some type of water-based finish, and some specialize in them. But amateur woodworkers have been slow to accept these finishes. One reason is their complete lack of color; many woodworkers are used to the finish warming the wood's appearance. The application of water-based finish also requires a slight change in technique from the methods used to brush on oil-based finishes. However, if you want a totally clear finish, it is worth learning how to apply a water-based coating.

Just like solvent-based finishes, some water-based finishes are designed to be brushed, others to be sprayed. Make sure you have the right kind. There is no substitute for reading the directions. You can apply a water-based finish with a good synthetic-bristle brush (natural bristles absorb the water and go limp), a disposable foam brush, or my choice for large surfaces, a paint pad. The secret is to lay down an even coat of finish straight off the applicator; do not go back and rework the surface. Water-based finishes start to get tacky far more quickly than oil-based ones, and if you try to rebrush them, your learning curve will get very steep.

A technique that works well with pads is to pour some finish onto a paper or plastic plate and charge the pad by dipping it in the finish. Then, lightly touch it on another plate lined with a couple of paper towels. As the towels become saturated, just lay the pad on this second plate to recharge it. Practice your technique on scrap before tackling your project.

Don't be put off by the milky, bluish cast when you first apply these products. They will become clear as they dry. As with any finish, thin coats are best. Lightly sand between coats with P220- or P320-grit paper and remove the dust. Never use steel wool between coats, because the minute fibers left behind will rust, and the only way to fix that is to sand the surface and start over.

A family of finishes. *Types of water-based finishes include acrylic, polyurethane, varnish, and shellac. Among the clearest of finishes, they can be sprayed or applied with paint pads, foam brushes, or brushes with artificial bristles. Advantages include fast drying time, minimal odor, and easy cleanup with water.*

Padding wide areas. *A paint pad works well when applying a water-based finish to a large area. Charge the pad on a plate containing the finish, and then remove the excess by touching it on another plate lined with paper towels.*

A choice of brushes. *When applying a water-based finish to narrow surfaces, use either a foam brush or an artist's brush with man-made bristles.*

Shellac is easy to apply

Shellac is familiar but not the clearest of finishes. *Clear, or blonde shellac, which is actually pale yellow in color, will have a minimal impact on the color of the wood if only a thin coating is applied. Shellac can be applied with fine-haired brushes dedicated to this type of finish, or padded on with a French-polishing rubber.*

To achieve its pale yellow color (not the water-white of water-based finishes), clear shellac is bleached rigorously. This robs it of some of its natural hardness, but it makes a fine finish for objects not subject to heavy use.

Shellac can be sprayed, padded, or brushed. Most woodworkers find it easier to apply shellac by brush or pad than they do water-based finishes. With all three methods you'll probably need to thin the shellac. Zinsser's clear shellac comes as a 3-lb. cut. To get a brushing consistency, reduce it to a 1½-lb. cut by mixing four parts of shellac to three parts of denatured alcohol. After you've used shellac for a while, you'll find that you do less measuring and develop a feel for the cut by observing the viscosity of the liquid. Just keep in mind that two thin coats generally are better than one thick coat.

For large surfaces, a flat brush with very fine synthetic bristles such as Taklon works nicely. However, on smaller or shaped pieces, nothing beats a good round mop brush. They can be obtained in a variety of bristle types, sizes, and price ranges. I have a squirrel-hair mop that I've used for years. The unique quality of these brushes, besides laying down a very precise coat, is their memory; I rinse the brush in alcohol and shape the bristles into whatever shape I'm working on. If the project is mostly flat, I'll simply flatten the bristles out and let them dry. If I'm using the brush for moldings and such, I'll shape it into a point.

You can use the same brush for different grades of shellac, but don't use it for other types of finish. You don't have to clean a dedicated shellac brush after use; simply let the brush harden. The next time you need it, place the brush in alcohol for a few minutes and you're ready to go.

To apply a thin coat of shellac just to seal the wood, use a French-polishing pad made of a cheesecloth core wrapped in a piece of thin fabric such as linen, muslin, or a well-worn cotton sheet. To charge the pad, open it and apply a bit of finish to the cheesecloth. The shellac will cover the wood quickly and will leave no sags or runs.

Thinning a finish. *The ideal brushing consistency for shellac is about a 1½-lb. cut. If you are using Zinsser's clear shellac, dilute it with denatured alcohol in a separate container.*

A dedicated brush. *You can use a variety of brushes to apply shellac, either flat or round, natural or artificial bristles, but you should use them for shellac only.*

Pad on a seal coat. *If you just want to seal the wood, use a French-polishing pad to apply a thin coat with no risk of drips or runs.*

Photos, except where noted: Mark Schofield; opening page and product shots: Justin Miller

Lacquer is durable

Lacquer became popular in the first quarter of the 20th century because it embodied the same fast-drying properties as shellac yet was less susceptible to damage from heat and alcohol. Over the years, chemists have come up with a variety of lacquers. The most common brushing lacquer is nitrocellulose, but like super-blonde shellac, the clearest stili have a pale-yellow cast, and they get yellower as they age. To get a truly water-white finish, you need to use a cellulose acetate butyrate (CAB) lacquer. Also sold as CAB acrylic lacquers, they must be sprayed.

Good ventilation is a must when using lacquer. Its extreme flammability requires It to be sprayed in an explosion-proof booth. If you're not set up to spray lacquer, there are a variety of aerosols available. While they won't produce the same quality of finish as a commercial lacquer, they can be used successfully on small projects. Use a light touch when applying them.

Despite these drawbacks, nothing beats sprayed lacquer for a clear finish on a surface subject to wear and tear.

Sprayed lacquer provides a tough, non-yellowing finish. *Most brushing lacquers are nitrocellulose and have a slight yellow cast that will increase with age. The clearest lacquer, CAB acrylic, must be sprayed.*

Thin before spraying. *It is a good idea to thin most finishes before spraying the first coat so that it flows more easily onto the wood. CAB acrylic lacquer must be sprayed, but it provides a tough, non-yellowing clear coat suitable for tabletops or kitchen cabinets.*

TOOL TEST

10-in. Cabinet Saws

Most haven't changed much in a generation, but a few are breaking new ground for safety and convenience

BY ROLAND JOHNSON

Finally, safer saws

Three saws relatively new to the market—Laguna TS-10, Powermatic PM2000, and SawStop 31230—have put safety on the front burner. That's not a bad idea when you consider that in 2001, the tablesaw was the source of 38,000 visits to U.S. hospital emergency rooms, according to the Consumer Product Safety Commission.

Riving knife reduces the chance of kickback. *A riving knife, found on the Laguna TS-10, Powermatic PM2000, and SawStop 31230, helps prevent the workpiece from pivoting onto the rear of the sawblade during a cut.*

Photos, except where noted: Tom Begnal; this page (top) Rodney Diaz

Generally speaking, 10-in. cabinet saws have much in common. But, given a closer look, notable differences begin to show. A few saws offer improved safety features; for example, three now have riving knives, a big improvement over traditional splitters. Some manufacturers are improving convenience, with features such as easy-access switches and one built-in mobile base. In addition, there are big price differences, from a low of about $975 to a high of almost $3,300.

To find out if any of the saws stand out from the bunch, I looked at 13 popular models side by side in the *Fine Woodworking* shop. For testing consistency, I reviewed left-tilt models. The Laguna was an exception, because it is available only as a right-tilt model. All of the saws are 3-hp, 220v models.

Safety is getting its due

A 10-in. tablesaw spins sharp, hard teeth at around 120 miles per hour. Used properly, it can make all sorts of useful cuts safely. Used improperly, it can cut through skin and bone in an instant or shoot a cutoff at you like it was fired from a cannon. So it was encouraging to see safety getting its due on some machines.

SawStop senses skin, stops blade instantly—The SawStop saw features a remarkable safety device, a brake that stops a spinning blade within 3 to 5 milliseconds when the blade touches skin. At the same time, the entire arbor and blade drop below the tabletop to further reduce the risk of injury. The brake works so quickly that an errant finger pushed into the blade would end up with only a shallow nick rather than a deep cut or an amputation.

When the safety device fires, it ruins the brake and the blade. A replacement brake cartridge costs about $80. But the cost of a cartridge and blade is a whole lot less than that of a hand surgeon and hospital stay. Or, even worse, the loss of a finger.

A riving knife is important—Talking to people who have had tablesaw injuries, I've learned that most of them were hurt by kickback, not body contact with a spinning blade. Kickback generally

SawStop blade brake. *This ingenious device on the SawStop stops a spinning sawblade the instant the blade is touched. Instead of a trip to the hospital, the user ends up with only a shallow cut.*

Kneeable switch. *In an emergency, the jumbo-size switch on the Powermatic PM2000 can be easily reached with a knee. The green-glowing center lets you know that the saw is powered up.*

Tabletop flatness. *To make sure the tabletops were acceptably flat, Johnson used a testing-quality straightedge and feeler gauges to check them.*

Fence deflection. *With the rip fences locked, Johnson applied force to the end of the fences and measured deflection.*

Measuring up close

Johnson used a collection of measuring tools to check the accuracy of tabletops, miter slots, arbors, and fences.

Blade/miter slot parallelism. *A 10-in.-dia. flat plate and dial indicator were used to find out if the sawblade is parallel to the miter-gauge slot when the blade is at 90° (shown) and 45°. Misalignment can be corrected.*

Arbor runout. *An arbor that wobbles will cause vibration and rougher cuts, so Johnson looked under the hood to check each one.*

occurs when the workpiece makes contact with the teeth at the back of the blade—the ones just coming up from under the table. Under certain conditions, those back teeth can grab the workpiece and fire it back at the operator's body at high velocity.

The riving knife is one of the best tablesaw safety features, because it greatly reduces the likelihood of kickback. Unlike the splitter found with most blade-guard systems, a riving knife is curved for close location to the blade's teeth and remains in close proximity throughout the blade's range of travel. With a riving knife, the workpiece is much less likely to bind on the back of the blade or to make solid contact with the rear teeth. A short riving knife (no taller than the blade), allows the saw to be used for blind cuts such as rabbeting or grooving with the knife in place. The manufacturers of the Laguna TS-10, Powermatic PM2000, and SawStop saws deserve kudos for including riving knife/blade guard assemblies. A short riving knife is included with the SawStop and is optional with the PM2000.

Still, riving knives must be removed for some operations, so they should go on and off easily. Powermatic and SawStop use locking handles to secure the knife. It took seconds to reach through the throat-plate opening, rotate the handle, and free the knife. Laguna relies on a socket-head screw, so it wasn't quite as quick and easy.

Better blade guards—A blade guard is important because it provides a physical barrier between your fingers and the blade. The Laguna, Powermatic PM2000, and SawStop have guards that are well-designed because they work with riving knives and can

MODEL	BLADE-MITER SLOT PARALLELISM AT 90°/45°	ARBOR-FLANGE RUNOUT	FENCE DEFLECTION
BRIDGEWOOD BW10LTS	0.002 in. / 0.010 in.	0.0005 in.	0.008 in.
DELTA 36-L31X	0.002 in. / 0.015 in.	0.0030 in.	0.004 in.
GENERAL 650-T50 M2	0.003 in. / 0.003 in.	0.0005 in.	0.011 in.
GENERAL INTL. 50-260 M1	0.002 in. /0.008 in.	0.0005 in.	0.008 in.
GRIZZLY G1023SL	0.011 in. / 0.017 in.	0.0010 in.	0.003 in.
JET JTAS-10XL	0.001 in. / 0.001 in.	0.0005 in.	0.004 in.
LAGUNA TS-10	0.000 in. / 0.000 in.	0.0003 in.	0.006 in.
POWERMATIC 66	0.025 in. / 0.025 in.	0.0010 in.	0.006 in.
POWERMATIC PM2000	0.001 in. / 0.009 in.	0.0005 in.	0.006 in.
OLIVER 4015	0.009 in. / 0.013 in.	0.0005 in.	0.003 in.
SAWSTOP 31230	0.001 in. / 0.009 in.	0.0005 in.	0.002 in.
SHOP FOX W1677	0.014 in. / 0.016 in.	0.0010 in.	0.003 in.
WOODTEK 130-364	0.002 in. / 0.015 in.	0.0005 in.	0.011 in.

be removed relatively quickly. The other saws require that you remove a few bolts with a wrench before the guard will come out.

Switches should be easy to shut off—All of these saws have large, easy-to-reach switches. But occasionally I want to shut off the saw and must hold onto the workpiece with both hands. That's when it's helpful (and safer) to have a button I can hit with my knee. All these saws, except for the Jet, Woodtek, and Powermatic 66, can be shut off with a well-aimed knee. The Powermatic PM2000 and SawStop switches were especially easy to reach.

Testing flatness, alignment, and runout

A number of factors affect the quality of a tablesaw. A few can be measured with the right tools. In particular, it's relatively easy to check a saw for tabletop flatness, whether the blade is parallel to the miter slot, and runout at the arbor shaft and arbor flange. A misaligned slot can be corrected by readjusting the table, but the other areas are difficult to address.

All the tabletops measured satisfactorily flat. When it comes to blade/miter-slot parallelism, I'd adjust the alignment on any saw that's out of parallel by 0.005 in. or more at either the 90° or 45° blade settings. Adjustment entails shifting or shimming the table a bit (for my guide to tuning up a saw, see "Tablesaw Tune-up," *FWW* #179, pp. 46-53). For arbor-flange runout and arbor-shaft runout, the numbers should be no more than 0.001 in. and 0.002 in. The Delta was the only saw that came up short on arbor-flange (0.003 in.) and arbor-shaft runout (0.005 in.).

All of these saws have Biesemeyer-style fences, which are sturdy and slide across the table with relative ease. The locking mechanisms worked effectively. Most of the fences needed routine tweaking to get them parallel to the blade.

I was curious to see if the fences, once locked, deflected when I applied force to the back end. After all, when ripping, especially large and heavy stock, the fence must withstand a certain amount of sideways force. I applied 6 lb. of sideways force to the back edge of each fence, then I measured the deflection. All of the fences proved sturdy, with the SawStop showing the best result.

Plenty of power, across the board

Extra power is one of the main reasons to consider moving up to a cabinet saw. Granted, a contractor's saw with a sharp blade can rip 1¾-in.-thick oak—if you cut slowly. But a cabinet saw with a 3-hp motor lets you cut the same board at a much brisker pace.

To get a sense of how well a 3-hp motor can cut, I made ripping cuts using 6/4 hard maple and 6/4 white oak. To eliminate blade quality as a variable, I purchased three new, identical sawblades for the test to make sure that a sharp blade was always in play.

These machines had no trouble ripping the thick hardwood. They have plenty of power for just about any furniture-making cut.

Choosing favorites

Anyone looking to upgrade from a contractor's saw won't be disappointed with any of these big boys. All of them offer more

10-in. cabinet saws

POWERMATIC PM2000

AUTHOR'S BEST OVERALL CHOICE

Source: 800-274-6848
www.powermatic.com
Price: $2,100
Motor: 3 hp/13 amp
Comments: Easy-to-change riving knife; easy-to-reach switch; integrated casters (lowering them on our saw required a lot of effort; problem is being corrected on newer saws); extension table and legs included.

SAWSTOP 31230

AUTHOR'S BEST OVERALL CHOICE

Source: 866-729-7867
www.sawstop.com
Price: $3,270
Motor: 3 hp/12.8 amp
Comments: Easy-to-change riving knife; revolutionary blade brake; large paddle switch is easy to operate but slow to reset if motor stalls; blade cartridge must be switched for dado blades; extension table and legs optional.

GRIZZLY G1023SL

AUTHOR'S BEST VALUE CHOICE

Source: 800-523-4777
www.grizzly.com
Price: $975
Motor: 3 hp/18 amp
Comments: Lowest price; blade/miter slots out of parallel (90° and 45°) to the point of requiring adjustment.; extension table and legs optional.

BRIDGEWOOD BW10LTS

Source: 800-235-2100
www.wilkemachinery.com
Price: $1,450
Motor: 3 hp/12.8 amp
Comments: Slanted cabinet floor aids dust collection; tied for flattest table; extension table and legs optional.

GENERAL INTERNATIONAL 50-260 M1

Source: 819-472-1161
www.general.ca
Price: $1,700
Motor: 3 hp/12.7 amp
Comments: Blade/miter slot parallelism very good; switch is easy to shut off accidentally; storage for accessories in the saw cabinet; extension table and legs optional.

OLIVER 4015

Source: 800-929-4321
www.sunhillmachinery.com
Price: $1,785
Motor: 3 hp/18 amp
Comments: An old American-made name on a new Taiwan-made saw; digital readout for blade tilt; extension table and legs optional.

WOODTEK 130-364

Source: 800-645-9292
www.woodworker.com
Price: $1,200
Motor: 3 hp/18 amp
Comments: Arbor needs to be changed when switching between dado and regular blades; slanted cabinet floor aids dust collection.

DELTA 36-L31X

Source: 800-223-7278
www.deltawoodworking.com
Price: $1,900
Motor: 3 hp/12 amp
Comments: Tiny arbor nut is fussy to handle; highest arbor runout; switch is easy to shut off accidentally; extension table and legs included.

GENERAL 650-T50 M2

Source: 819-472-1161
www.general.ca
Price: $1,900
Motor: 3 hp/12.5 amp
Comments: American-made Baldor motor; lowest arbor runout; extension table and legs optional.

JET JTAS-10XL

Source: 800-274-6848
www.jettools.com
Price: $1,350
Motor: 3 hp/14.5 amp
Comments: Tied for flattest table; blade/miter slot parallelism very good; extension table and legs optional.

LAGUNA TS-10

Source: 800-332-4094
www.lagunatools.com
Price: $2,500
Motor: 3 hp/15 amp
Comments: Heaviest machine; extralarge throat plate; riving knife; American-made Baldor motor; best blade/miter slot parallelism; extension table and legs included.

POWERMATIC 66

Source: 800-274-6848
www.powermatic.com
Price: $2,250
Motor: 3 hp/15 amp
Comments: Blade/miter slots out of parallel (90° and 45°) to the point of requiring adjustment; extension table and legs included.

SHOP FOX W1677

Source: 800-840-8420
www.shopfoxtools.com
Price: $1,100
Motor: 3 hp/18 amp
Comments: Good switch; blade/miter slots out of parallel to the point of requiring adjustment; extension table and legs optional.

power, solid rip fences, and smoother controls. That said, the Laguna, Powermatic PM2000, and SawStop had extra appeal. Not surprisingly, they cost more. All have well-designed blade covers and riving knives for greatly improved safety and convenience.

The Laguna is the heaviest of the lot, tipping the scales at almost 1,000 lb. It has the third biggest tabletop (wings included) and it did above average in the measurement tests. However, its riving knife was fussier to remove and replace than the other two. A left-tilt model of the saw is not available.

In the end, two saws—the Powermatic PM2000 and the SawStop—stood alone at the top. As a result, I selected them both as best overall. The PM2000 saw had good scores in the blade parallelism and arbor-flange runout tests. Also, it has a riving knife, an easy-to-reach switch, and a good insert. The tabletop is the second largest in the test group. In addition, it's the only saw that includes retractable casters in the base, making it surprising easy to roll around the shop.

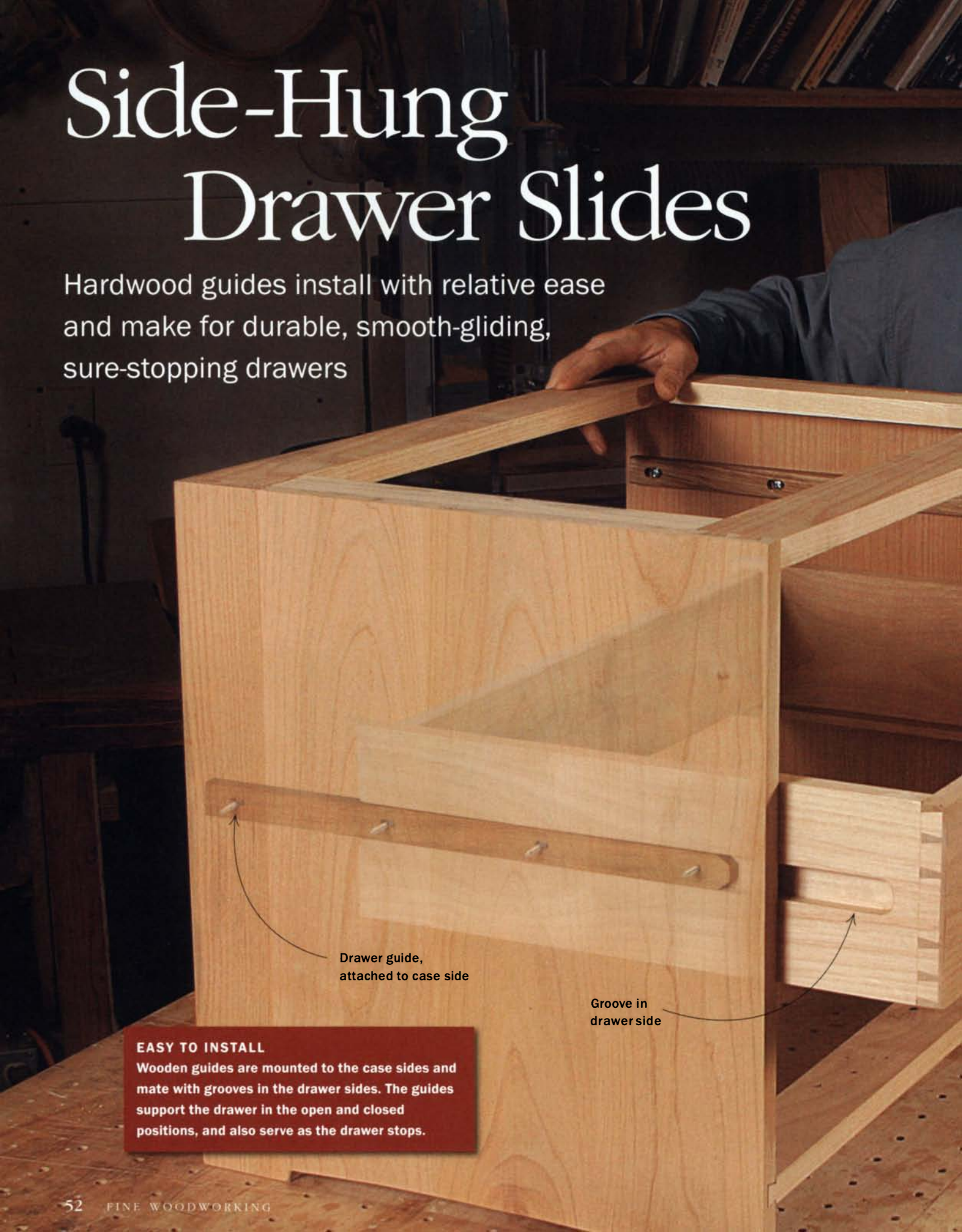
The SawStop scored well in the blade parallelism, arbor flange, and fence deflection tests. It has a riving knife, a convenient switch, and a good insert. No other blade guard was as easy to remove and replace. Its tabletop is the largest. Plus, it includes the revolutionary blade brake.

If your budget is tight, consider the Grizzly G1023SL saw. It is solid and accurate, and does everything a 3-hp, 10-in. cabinet saw is supposed to do, but at a bargain-basement price. It is my choice as the best value among all the saws. □

Roland Johnson is a contributing editor.

Side-Hung Drawer Slides

Hardwood guides install with relative ease and make for durable, smooth-gliding, sure-stopping drawers



EASY TO INSTALL

Wooden guides are mounted to the case sides and mate with grooves in the drawer sides. The guides support the drawer in the open and closed positions, and also serve as the drawer stops.

BY MARK EDMUNDSON

Over the years I've constructed all sorts of drawer systems, from traditional drawer pockets consisting of rails, kickers, and runners, to elaborate center-hung guides. But nothing beats the simplicity and adjustability of side-hung guides. With this system, wooden guides are mounted to the case sides or table aprons and mate with grooves in the drawer sides. The guides support the drawer as it is opened and closed, and they also serve as the kickers (to prevent tipping) and drawer stops.

You will find side-hung drawers on everything from utility cabinets to elegant chests of drawers to tables—and for good reason. Without the need for the rails of a traditional drawer pocket, side-hung guides allow you to design a bank of drawers with a clean, uninterrupted façade. They also allow for deeper drawer boxes.

Most important, however, is the straightforward installation. Side-hung guides make it easy to achieve perfectly fitting drawers in a chest or table, and will provide smooth-gliding service for many years.

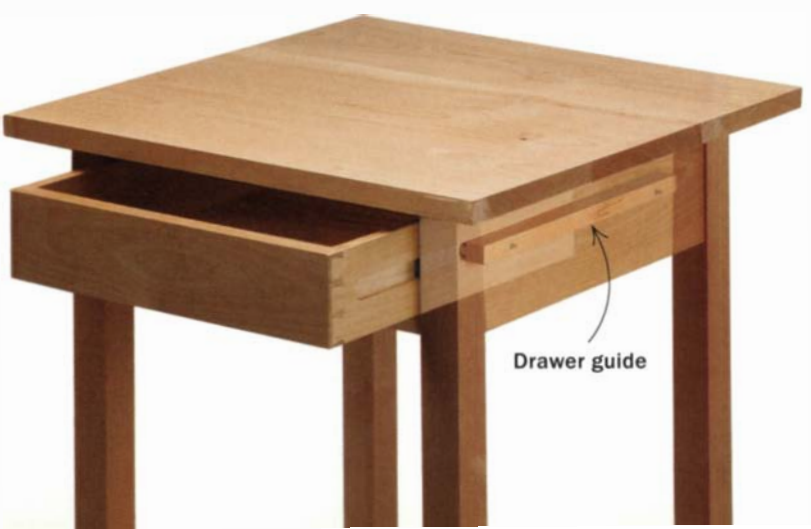
Side-hung guides simplify a chest of drawers

Fitting drawers is an exercise in trial and error. Too tight a fit, and the drawer will jam when the weather is moist; too sloppy a fit, and the drawer will bind and slide roughly in the opening. Using side-hung guides does not exempt you from building a cabinet with a straight and smooth drawer pocket, but it does simplify the process of hanging a bank of drawers.

Make the guides as thick as possible—When sizing the guides for a chest of drawers, consider how much weight the drawers will carry. In general, drawers that carry a lot of weight need beefier guides. A rule of thumb is to make the guides about ¾ in. to 1 in. wide and as thick as possible without compromising drawer strength. Also, because of the abuse the guides must endure, make them of a hard-wearing wood, such as teak or ash. Teak is ideal because its oily nature makes for smooth-gliding action.

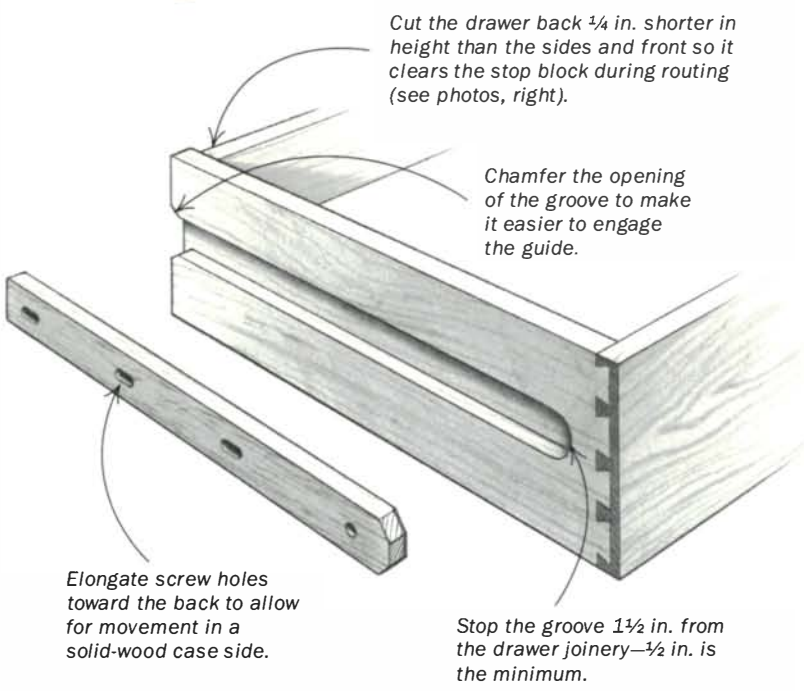
Side-hung guides have a couple of key requirements when it comes to the drawer construction. First, the sides must be thick enough to allow for the grooves that mate with the guides. Generally,

No web frame required. *Side-hung guides simplify table construction because they eliminate the need for rails and kickers to support the drawer. In tables, the guides must be a bit wider than they are thick so they can clear the inside of the legs.*



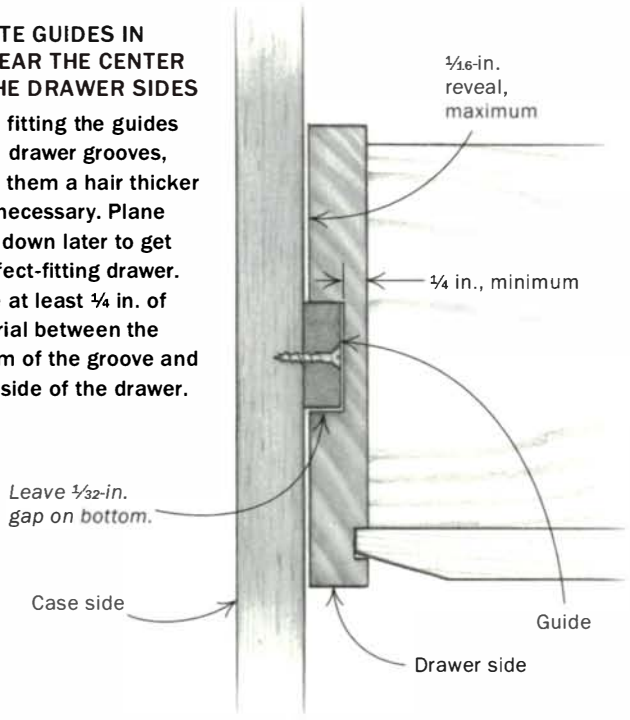
Cut the grooves first

Installing a bank of drawers that ride on side-hung guides is simplicity itself. Build the case and drawers, cut grooves in the drawer sides to house the guides, and mill up the guides. Then install the guides in the case, one pair at a time, using a plywood spacer for accuracy (see pp. 56-57).



LOCATE GUIDES IN OR NEAR THE CENTER OF THE DRAWER SIDES

When fitting the guides to the drawer grooves, make them a hair thicker than necessary. Plane them down later to get a perfect-fitting drawer. Leave at least ¼ in. of material between the bottom of the groove and the inside of the drawer.



Take light cuts and hold the drawer firmly. *A ½-in.-thick MDF strip clamped to the tabletop (above) prevents the drawer from jumping away from the fence. The stop block clears the lower-cut drawer back but hits the front (right).*

Photos: Thomas McKenna; drawings: Michael Gellatly

for strength there should be at least ¼ in. of wood remaining between the bottom of the groove and the inside of the drawer. Also, cutting the drawer back about ¼ in. shorter in height than the sides and the front allows you to plow the grooves in both sides with only one stop setup.

Cut matching stopped grooves in the drawer sides—To make things go smoothly when building a bank of drawers, create a story stick out of scrapwood that shows all of the drawer heights, the reveal between each drawer, and the guide/groove locations. If all the drawers are the same size, you can use the same router setups for all the cuts. For drawers of different heights, you'll have to adjust the fence and stop, as needed.

Start by transferring the groove location from the story stick to each drawer side. Mark the top and bottom of the groove as well as the depth (the thickness of the guide). If the drawers are all the same size, you don't need to transfer this location over to every drawer.

Next, chuck a straight bit in the router. Ideally, you should use a bit with the same diameter as the width of the groove. If that's not possible, set up the fence to cut one side of the groove. After cutting to depth, readjust the fence in or out to plow the rest of the waste.

To ensure the same length groove and stopping point for the drawer, I devised a stop-block setup that works for the cuts on both sides of the drawer (see photos, facing page). I typically stop the groove 1½ in. from the front of the drawer. There's no hard-and-fast rule here, but to avoid compromising the joinery at the drawer front, you should clear it by at least ½ in.

The stop can be made from scrap about ½ in. thick and wide enough to be clamped to the router-table fence. To determine the length of the block, measure the distance from the front edge of the drawer to the stopping point of the groove. Subtract the thickness of the drawer front, multiply that number by two, then add the diameter of the bit. For example, if you are using a ¾-in.-dia. bit and want the groove to stop 1½ in. from the edge of a drawer front that's ¾ in. thick, make the stop block 2¼ in. long.

Mark the center of the stop block, align it with the center of the router bit, and clamp it in place. To keep the drawer from wandering

Then mill the guides to fit

Begin by planing the guides a hair thicker than the depth of the groove before cutting them to width and length. Check their fit in the drawer grooves. Leaving the guides slightly proud of the sides will allow you to plane them down later to get a perfect-fitting drawer.

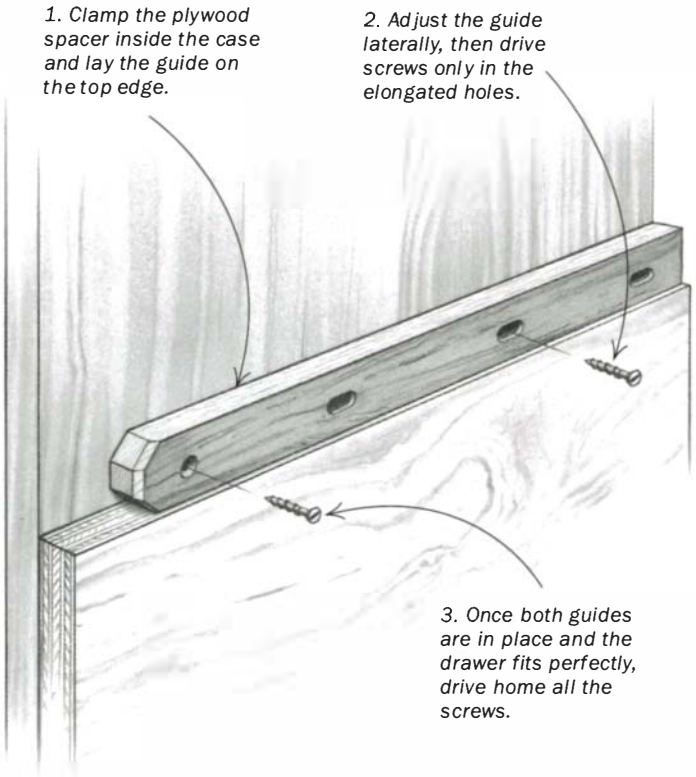
Tight, but not too tight. *The guides should ride in the grooves smoothly with very little slop top and bottom.*

Smooth the edges and chamfer the tips. *Sand lightly and chamfer the tips of the guides to make installation easier.*

Drill pilot holes for the screws. *In solid-wood construction, be sure to elongate the holes toward the back to allow for wood movement in the case sides. For safest practice, clamp the workpiece so that it won't lift up.*

A spacer makes installation easy

A ½-in.-thick plywood spacer ensures that pairs of guides align perfectly. For accuracy, mark the front edge of the spacer near the bottom and keep that edge toward the front for each pair of guides. Work from the top down.



Clamp the spacer to one side. *Place the guide on the spacer and use a square to set it back the correct distance from the case front (to set the square, measure from the drawer front to the groove).*

away from the fence, create a channel for it by adding a long strip of plywood or medium-density fiberboard (MDF) clamped to the router table. Leave about 1/32 in. of clearance between the strip and the drawer so the drawer slides smoothly without jamming.

Now you're ready to rout. For a smooth finish, take light passes, gradually raising the bit to final height. The stop block will clear the drawer back but will hit the front. Don't ram the stop block and knock it out of alignment; allow the drawer front to just kiss the block. Cut one side, flip the drawer, then cut the other side, running the same reference surface against the fence. One of these cuts will be a climb cut, which will want to pull the workpiece into the bit. A light cut and the channel will help with control.

Smooth grooves mean smooth drawer action, so clean up rough spots along the edges, lightly sand all surfaces, and ease the edges with fine sandpaper. To make it easier for the drawer to engage the guides, use a chisel to chamfer the back of each groove.

After the grooves have been routed in the drawer sides, check them against the story stick to see that nothing has changed and then mill up the guides and fit them to the grooves.

Use a spacer to help with alignment and installation— The story stick will tell you where to install the guides, but it won't help you keep pairs level front to back and parallel to one another. To help with that, I make a spacer out of ½-in.-thick plywood, cut to a length that's just shy of the case opening. To use the spacer, first transfer the location of the bottom of the top guides from the story stick to the spacer. Then rip the spacer to that width on the tablesaw.

Slide the spacer into the carcase opening, clamp it against one side, and mark the front of the spacer. Place the guide on top of the spacer in its correct location, then screw it in place through the elongated holes only. Now clamp the spacer to the other side of the cabinet, keeping the front edge toward the front of the carcase. Install the opposite guide and test-fit the top drawer. If the drawer stops too far in or too far out of the case opening, you can easily loosen the screws in the guides and slide them in or out to correct the problem. When the drawer fits perfectly, drive home the rest of the screws in the guides.

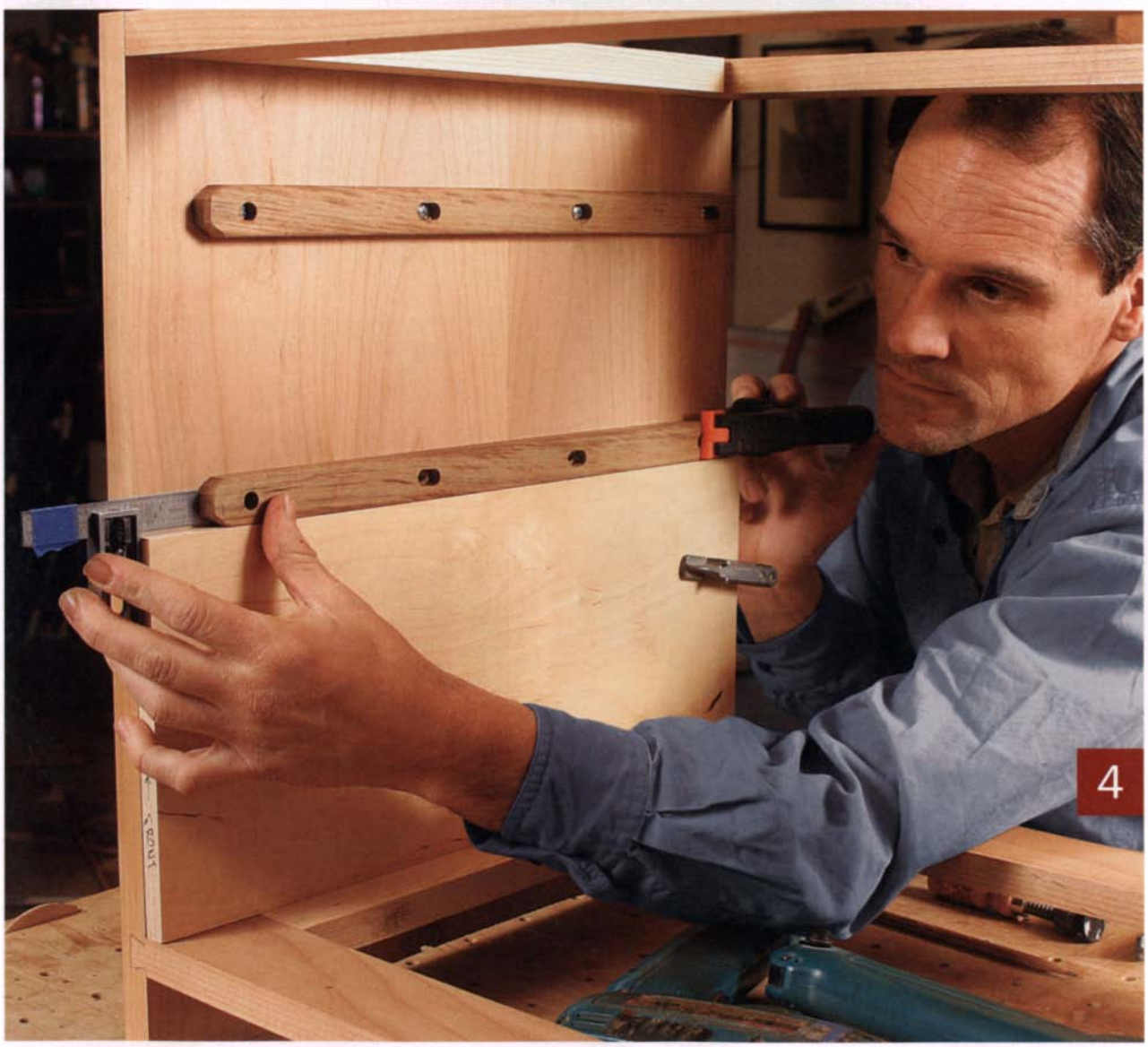
Rip the spacer to width so that it reaches the bottom of the next set of guides, and follow the same procedure. Work your way down the cabinet until all the guides are installed.

Table-mounted guides have a different setup

In tables, side-hung guides share many of the same design principles as those used in a chest of drawers, but the anatomy and

Screw the guide in place. *Drive screws only in the elongated holes for now. This makes it easy to adjust the guide in or out later when you're fitting the drawer. Slide the spacer to the other side of the case and repeat.*

Test the fit as you go. *If the reveal is not right, remove the drawer, loosen the screws, and slide the guides forward or backward as needed. If the fit is too tight, carefully plane or sand the guides.*



Rip and repeat. *After the top drawer has been fitted, repeat the installation process for the drawers below. Cut the spacer to the proper width, install the guides, and test-fit the drawer.*

Side-hung drawers in a table

construction of table-mounted guides are a bit different. When incorporated into a table, side-hung guides typically are a bit wider than they are thick so that they can clear the inside of the legs. To add strength and to make registering and aligning the guides easier, I house the guides in shallow grooves in the table aprons. I also attach the guides with glue and screws (see drawing, left).

Cut and fit the guides before cutting the drawer grooves— When installing side-hung guides in a table, first build the drawer and fit it to the opening. Next, cut and fit the guides and chamfer the tips where they will engage the grooves in the drawer sides. Install the guides, but don't glue or screw them in place yet.

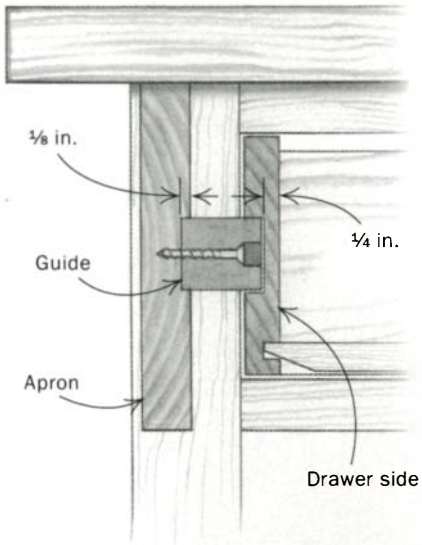
Because you are cutting the grooves in the drawer sides to fit the guides, it's important that the router-table settings be spot-on. To set the fence the correct distance from the bit, measure from the bottom of the top rail to the top of the guide. For the stop-block setting, measure from the front of the leg to the tip of the guide (for more on setting up the stop block, see p. 54). Test the setup on a scrap piece the same width and thickness as your drawer sides. Once you have perfected the settings, go ahead and rout the grooves in the drawer sides.

After cleaning up the grooves, test the fit of the drawer. If the fit is too tight, remove the guides and plane them to height or width as needed. One important thing to keep in mind: If you need to plane down the height of the guide, be sure that you do not remove material from the area that engages the groove in the table apron; doing so could ruin the fit of guide to groove. When you have the drawer running true and smoothly, glue and screw the guides in place. □

Mark Edmundson is a furniture maker in Sandpoint, Idaho.

MAKE GUIDES WIDER TO REACH PAST LEGS

Side-hung guides in a table eliminate the need to build a web frame, so there are fewer parts to mill up and fit. The guides typically are wider than they are thick so that they can clear the inside of the legs. The guide should project ¼ in. beyond the inside of the leg.



Long-lasting connection. *In a table, the guides are wider to reach past the legs. They can be glued and screwed and even set into grooves in the aprons.*

Smooth-gliding drawers in no time. *If the fit is too tight, simply remove the guides and plane or sand them down, but do not touch the area that engages the groove in the table apron.*

An Exercise in Design

Given a common inspiration, three furniture makers create a diversity of designs

BY MARK SCHOFIELD

Inspirational arch. *The authors designed arched-leg tables based on this concrete bridge in Connecticut.*

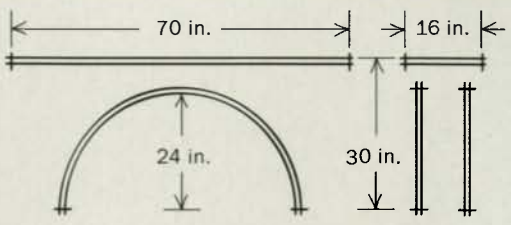
I'm sure I'm not the only woodworker who has embarked on a project without first working out all the details. After seeing the graceful arches of a bridge spanning Connecticut's Housatonic River, I recently rushed into building an arched-leg table (see photo, p. 63).

I did a quick sketch of the table, built a bending form, and steam-bent some ash arches. The first surprise was how springy the thin arches were; clearly they would need some kind of brace to stop them from widening and the table from getting progressively lower. As I was driving to work, I wondered: How would Garrett Hack make such a table? How would Jere Osgood tackle this design?

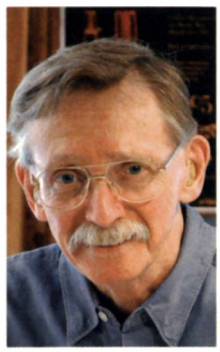
The readers of *Fine Woodworking* often ask for more design articles, but it is a hard subject to pin down. Asking great furniture designers how they develop their ideas is rather like asking Mozart how he came up with a tune—it's not easily described. To solve my own design dilemma and to share with readers how original designs are created, I decided to give three other woodworkers, each with a reputation for original design, a photo of the bridge for inspiration and basic parameters to see what they would create.

THE BASIC DIMENSIONS

The height, width, and length of the table were specified, as was the height of the arches. Two arches were required to serve as a base.



Don't let construction worries constrain your designs



BY JERE OSGOOD

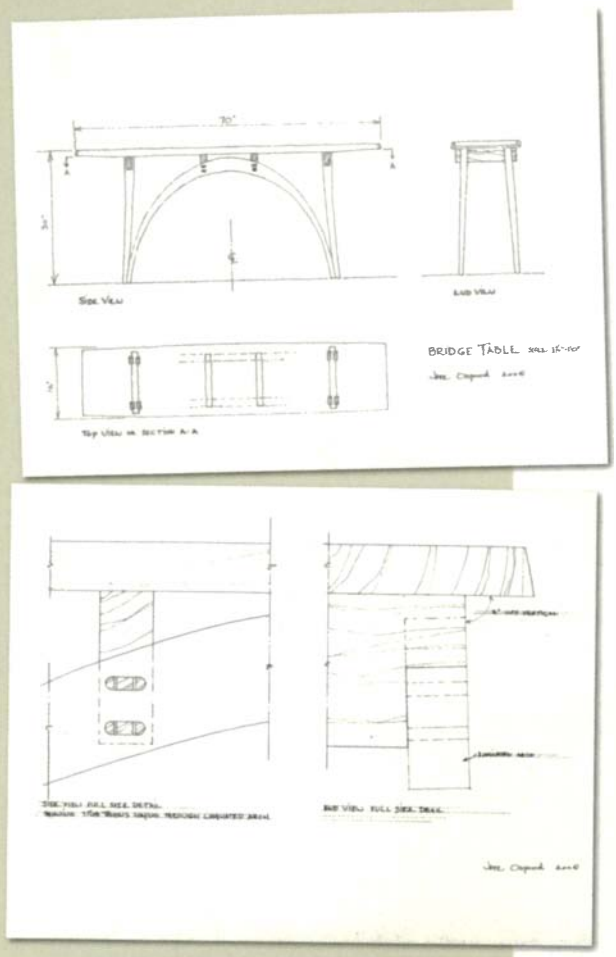
I wasn't surprised when the proposal arrived with its single photograph. It is one of the ways I work. I try to stay alert to interesting forms and to note them in my sketchbook. Great forms can and should be carried over to furniture; in this case I was inspired by the bridge's arches.

Generally I work out the engineering and joinery after a design is under way: I feel we should design first and then find the techniques to carry it out. Despite its simple appearance, this table involves fairly advanced woodworking from the tapered lamination arches to the angled stub tenons. I believe it is worth the effort; many pieces wouldn't be made if we had to stick to easy, straightforward joinery.

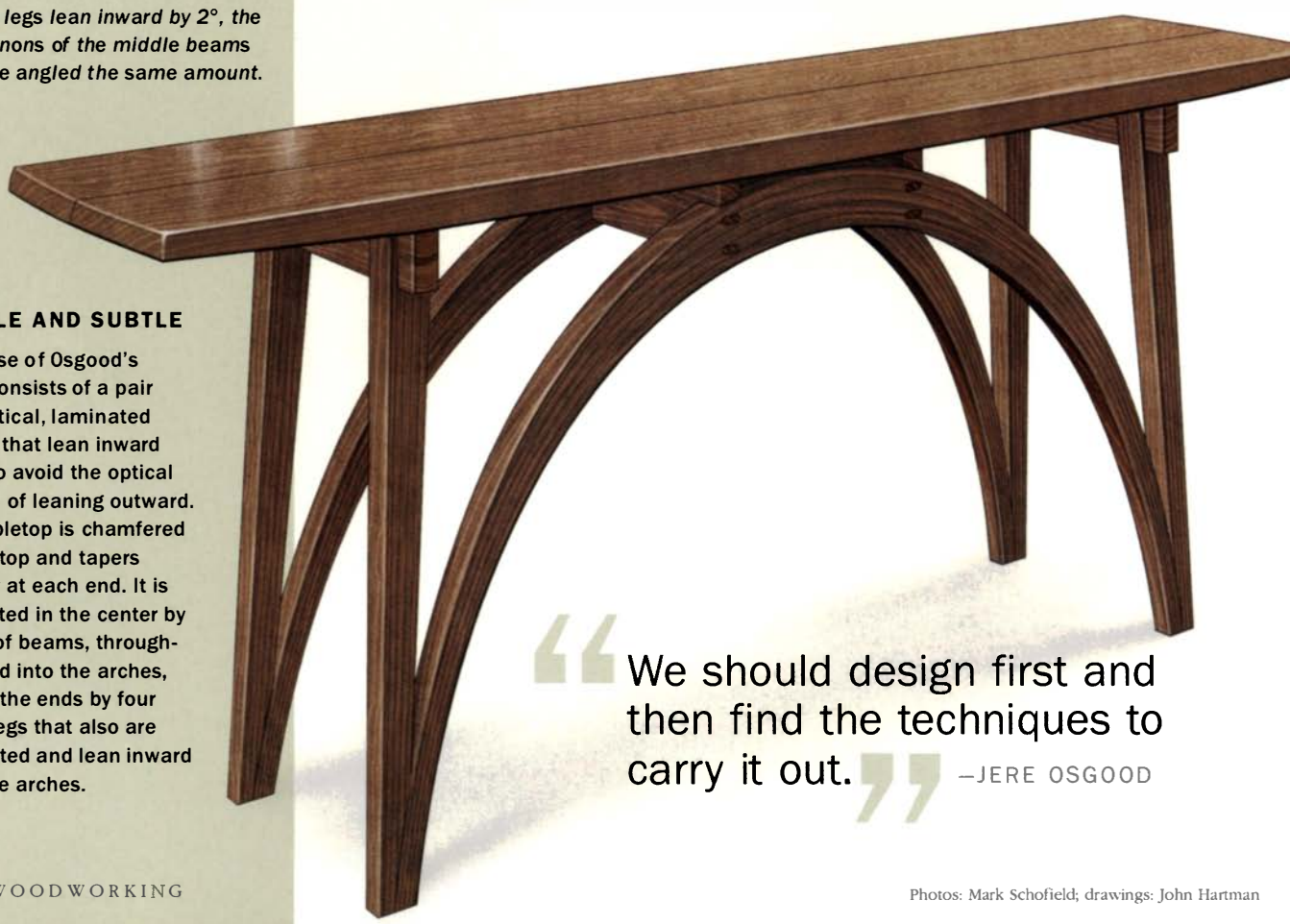
I used tapered laminations for the arches because they create a stiffer arch, less liable to spread under load. The outer legs are needed only to support the ends of the tabletop. They could be made from solid wood, but I would laminate them to harmonize with the arches. I designed the two arches to lean inward by 2° each. If they were vertical, at first glance they would appear to be splayed outward at the top. It is subtle, but I've seen tables designed both ways, and the more complicated joinery with the inward-leaning arches and legs is worth the effort.

I always do a full-size drawing; it helps me discover and tackle difficult areas such as the joint between the middle beams and the arches. Even though this table has no traditional apron, I kept the top of the end legs straight for about 4 in. to emphasize the introduction of the taper.

Jere Osgood is a member of the New Hampshire Furniture Masters Association.



Full-size drawings simplify complicated joints. *Because the arched legs lean inward by 2°, the stub tenons of the middle beams must be angled the same amount.*



SIMPLE AND SUBTLE

The base of Osgood's table consists of a pair of elliptical, laminated arches that lean inward by 2° to avoid the optical illusion of leaning outward. The tabletop is chamfered on the top and tapers slightly at each end. It is supported in the center by a pair of beams, through-tenoned into the arches, and at the ends by four outer legs that also are laminated and lean inward with the arches.

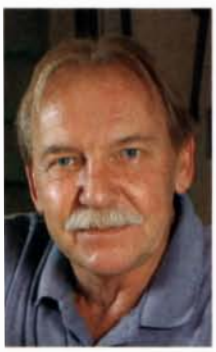
> "We should design first and then find the techniques to carry it out." —JERE OSGOOD

Photos: Mark Schofield; drawings: John Hartman

POWERFUL BUT POISED

The strong stance of the legs contrasts with the thin, floating top and shelf. On the shelf, the undercut edge, the downward sweeping ends of the stretchers, and the space between the shelf and the legs combine to make the panel appear to levitate.

Each design builds on the last one



BY WAYNE MARCOUX

When I got *Fine Woodworking's* letter, I thought, "They must be mind readers." I had just visited a gallery where I exhibit and noticed the perfect spot to display a long, narrow sofa or hall table. Not only did the arched-leg table's dimensions fit perfectly, but the design fortuitously built on some of my previous creations.

I started sketching, thinking back to my earlier work: I had built a curved-leg table where the front legs were set closer together than those at the back, with a rectangular top and a half-moon shelf (see top photo, right). The table sold, but the design had an abstract look to it with the top and shelf in conflict. On the next table I tried for a more symmetrical look, with the aprons and stretchers crossing diagonally and a convex shelf complementing the concave edges of the top (see bottom photo, right). This produced a more graceful form that looked correct from any angle.

However, when I saw the idea of having the legs as two complete arches, I knew that was the missing element. I drew up an initial design using tapered laminations for stiffness, but strictly observing the set dimensions. On the final plans, I diverged. The difference between the overall height of the table and the 26-in. outside radius of the arched legs meant having a 3-in. apron. I preferred the more dynamic look of the top supported by the legs, so I lowered the height and had the top rest directly on the crown of the crossing legs. For extra support I added wings that extend 13 in. from the crown along the top of each leg. Viewed in perspective, the form has a very animalistic stance.

The tabletop is 1 in. thick with a 20° bevel cut on the underside while the top is still rectangular. The concave edges are cut through the slope, making the top appear thicker in the center than at the ends. With the long cantilever off the saddle, this gives the top a light and lofty look.

The shelf ends are similar to those of the tabletop, beveled and then profiled, but the sides are profiled and then beveled, making the front edge appear only ¼ in. thick.

Fine WoodWorking.com

Visit our Web site to view photos of Marcoux's table, winner of the prize for "Best in Wood" at the League of New Hampshire Craftsmen's annual juried exhibition.

Wayne Marcoux is a furniture maker in Manchester, N.H.

Good, better, best. *Marcoux's curved-leg table designs have progressed from one where the legs are spaced in pairs (top photo), to one where the legs are aligned but are not complete arcs (lower photo), to the design for this article (top illustration).*

Both bridges and tables must carry a load

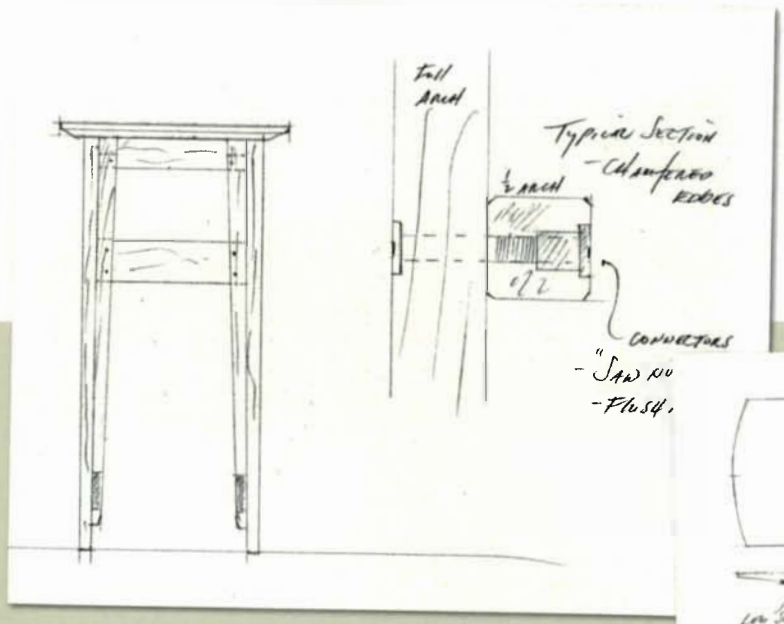
BY GARRETT HACK

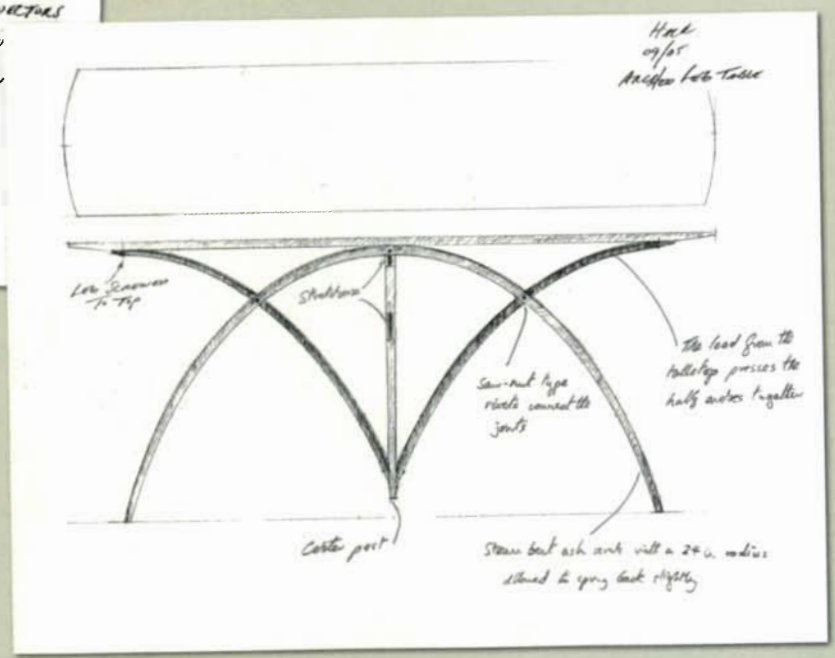
Given this challenge, my thoughts turned to the couple of covered bridges in our small Vermont town and how their simple, yet very strong, arched trusses work so well after almost 200 years. I also immediately saw the differences between engineering a bridge and a table: The major one is that while a bridge's arches are braced by the banks of the river, the arches on a table will spread when subjected to any downward pressure. One solution is to make the arch heavier, but that would negate some of the design's elegance. A second question is how to make a rigid connection to the tabletop if it joins only the apex of the arch.

My solution for each side of the table was to add half-arches to the full arches, marrying them with vertical posts so that they reinforce each other yet everything remains light in cross section. The half-arches strengthen the single arches, making them less apt to spread under load, and the load on the top is distributed along a number of points. To counteract racking forces across the width of the table, two stretchers

GRACEFUL YET GROUNDED

Inspired by the strength, grace, and longevity of his local covered bridges in Vermont, Hack created a radical design where opposing forces keep the table together and support the top.





Hack's design uses two arches made from steam-bent ash. *To control the springback, a central post and two half-arches are employed on each side of the table. The arches taper from 1 in. by 1 in. at the top to ⅝ in. by ⅝ in. at the foot. The arches, half-arches, and posts are connected with flat-head nuts and bolts, similar to those found on saw handles.*

> "I would use ash, which bends extremely well into smooth curves." —GARRETT HACK

spaced well apart connect the vertical posts. In my initial sketch the two posts touched the floor, giving the table six feet, but in my final design the post is cut back slightly so that the table rests solely on the four points of the main arches.

Steam-bending is my method of choice to form the arches, using a single elliptical form. Minor variations in the arches using this method would not be noticeable. I would use ash, which bends extremely well into smooth curves. The wood should be cut to nearly its final dimension, then planed and steam-bent. After a few days of drying, the parts will be ready for joinery.

The joinery follows the bridge analogy: Simple flathead nuts and bolts connect the main arches to the half-arches and each post and allow some flexing, yet don't diminish the strength of any member as mortises might. The absence of glue would allow the table to be leveled on its four feet before the bolts are snugged up.

Garrett Hack is a contributing editor.

One editor's creation

Already committed to steam-bent arches, I couldn't use the laminated designs created by Osgood or Marcoux. I needed to brace the arches, but I also wanted to keep them uncluttered. For this reason I rejected wooden stretchers as too bulky, and opted for steel wire. John White, *Fine Woodworking*'s resourceful shop manager, solved the problem of joinery by passing the wire through threaded brass inserts. The two arches, now resembling bows, were stiff and strong.

Because the steam-bent arches are under tension along their upper surfaces and under compression on the lower edges, I kept the mortises for the crosspieces thin and located them in the center of the arches. A third arch was cut to provide flying supports for the ends of the tabletop.

I gave all four sides of the tabletop a convex curve, and then beveled the underside with a panel-raising bit on a router table. I bleached the whole table using two-part bleach, but when dry-assembled it appeared too monotone, so I dyed the crosspieces and wing supports black.

I mostly build period furniture, and once in a while it's liberating to put aside the past and improvise.

—Mark Schofield is a senior editor.

High-tension table. *On Schofield's table, the arches are held in shape by picture-frame wire strung across the base.*

Sharpen with Sandpaper

Produce razor-sharp chisels and plane blades in less time, with less mess

BY BRENT BEACH

For years, no matter what method I used, my sharpening efforts were a disappointment. Then I tried high-quality sandpaper as the sharpening medium, used with an angle jig. To my surprise and delight, the process proved to be remarkably quick, easy, and effective. Indeed, it now takes less than two minutes on average to sharpen a dull plane blade or bench chisel with a perfect bevel angle every time.

Sandpaper sharpening has been around for a long time. As the name suggests, it uses sandpaper as the sharpening medium, rather than traditional oilstones or waterstones. The paper is glued temporarily to a flat surface, such as the top of a tablesaw or jointer, or more commonly of late, a piece of glass.

I now use a commercially available jig for most of my honing, but for a long time my jig was shopmade (check it out on my Web site: www3.telus.net/BrentBeach). I still use the shopmade jig when I want to add a shallow back-bevel to the flat side of a plane blade. The commercial jig will produce a back bevel, but it's limited to an angle that's not to my taste.

After switching to sandpaper sharpening, I experimented until I found the technique that worked best. I now use high-quality sandpaper that has a remarkably consistent grit size and an adhesive backing that secures it solidly to the glass. That way, as I sharpen, the paper doesn't push up in front of the cutting edge and change the sharpening angle. And I add three microbevels, which gets me through the three successive grits of sandpaper more quickly.

Start with three pieces of glass

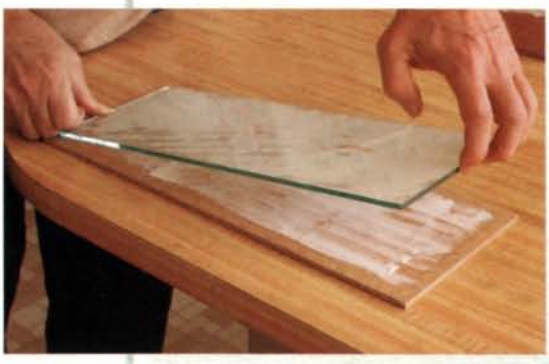
The sandpaper must be mounted to a flat surface. I use standard window glass. It's inexpensive, available at any glass shop, and more than flat enough. Because my sharpening procedure requires three different sandpaper grits, I use three pieces of glass, each measuring 5mm thick by 6 in. wide by 16 in. long. A glass shop will cut them to size for you. For safety's sake, take a few minutes when you get them home to smooth the sharp edges with sandpaper.

To strengthen and protect the glass, glue it to a backer board. I use ¼-in.-thick hardboard (Masonite), but plywood also works. I use a glue called Weldbond (www.monstermosaics.com; 888-236-4001), but I suspect that any glue that bonds wood and glass will work. Apply a thin coat of glue to each mating surface, then place the glass on the backer. A few pieces of masking tape prevent the glass from sliding, and a stack of books on top holds it down.

Use high-quality sandpaper—The most important part of my system is high-quality adhesive-backed sandpaper. I use microfinishing sheet abrasives made by 3M (www.toolsforworkingwood.com; 800-426-4613). Compared to regular sandpaper, the grits on this 3M product are more

Sandpaper needs a flat surface

To ensure a flat bevel, the sandpaper must be mounted to a flat surface. A piece of window glass serves that need more than adequately.



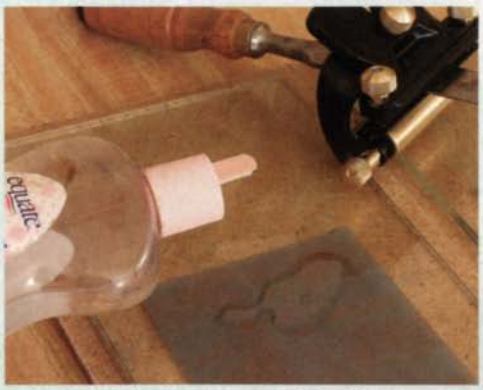
Strengthen the glass with a backer board. *The glass becomes less fragile when glued to a piece of hardboard.*

Peel away the plastic backing on the sandpaper. *Although the paper is self-adhesive, apply a thin coat of soapy water to the glass. This will make it easier to position the paper.*

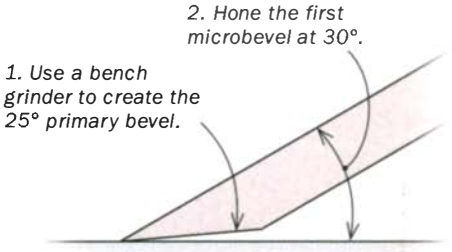
Roll out the bubbles. *Air bubbles trapped under the paper can cause it to rip when sharpening. Use a roller of some sort to push the bubbles out to the edge.*

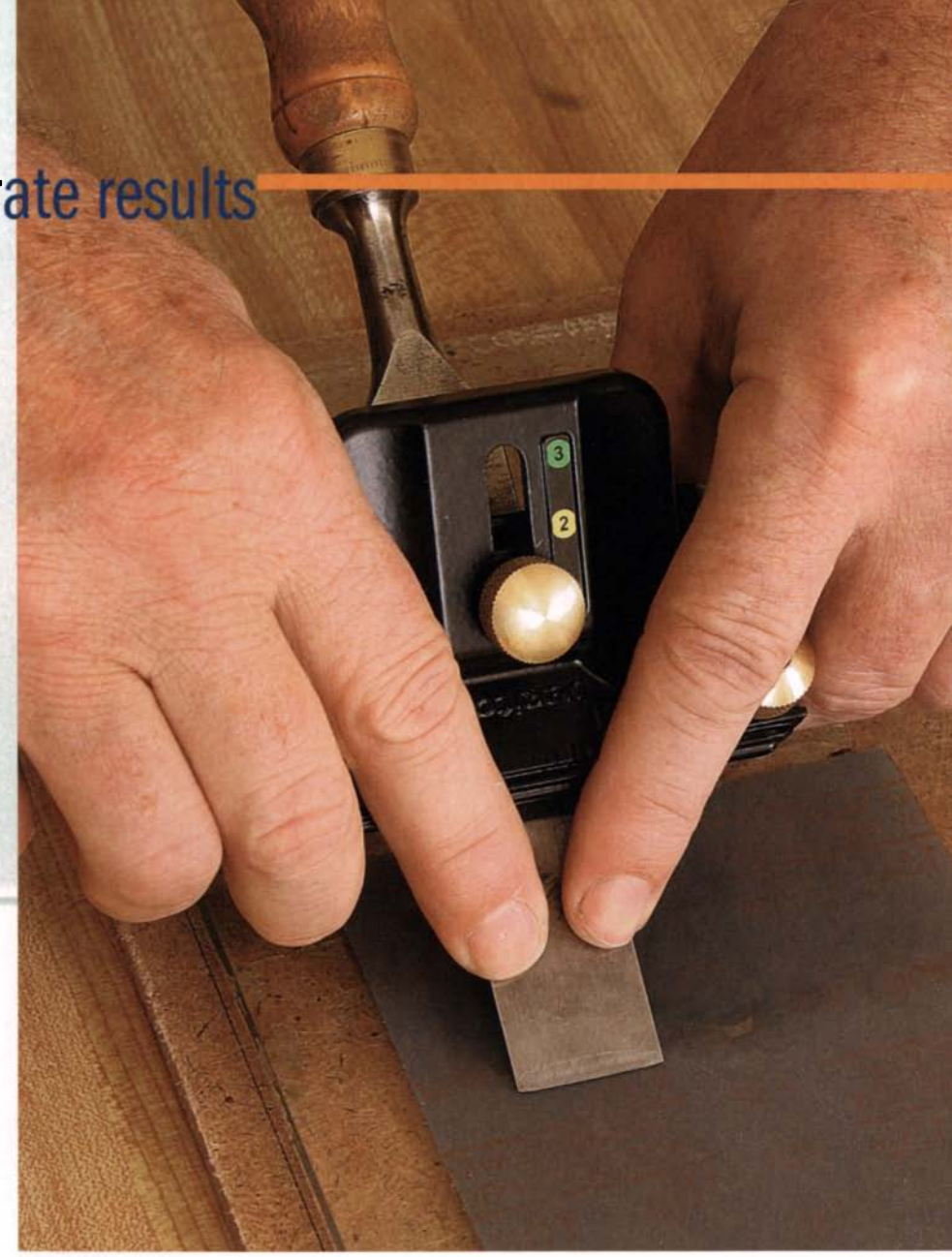
Use a honing guide for fast, accurate results

Speed up the sharpening process by raising the blade angle after each grit. This reduces the amount of steel removed at each step.



Start with 15-micron paper. *Add a little baby oil or mineral oil to help float away the steel filings. Set the jig at 30° and roll it back and forth, keeping the wheel off the sandpaper. It takes a minute or less to establish the first microbevel.*





uniform in size. That means you are less likely to get unwanted deeper scratches from an occasional oversized grit in your paper. Plus, because the sandpaper mounts firmly on glass, the abrasive stays flat. I use three grits—15 micron, 5 micron, and 0.3 micron—one for each piece of glass.

It's important to apply the paper carefully. Any dirt or air bubble can leave a bump, and even a tiny bump can nick the edge of a tool or catch an edge during sharpening and tear the paper. Before adding the paper, wash the glass with soap and water to remove odd pieces of dirt or sawdust.

Cut the sheet abrasive in half lengthwise and remove the backing paper. Wash your hands with just a little soap on them (not too wet) and rub your hand on the glass to dampen the surface. If you tilt the glass and water runs off, it is too wet. Add the paper carefully to avoid trapping air bubbles between the glass and the paper. Place one end of the paper on one end of the glass, lowering the paper until you reach the other end. The soapy water will prevent the adhesive backing from adhering immediately, so you can slide the paper around until it's centered. The water will dry through the paper in short order. No matter how small they might be, roll or push out any air bubbles.

A jig ensures perfect microbevels—Because I use microbevels, I must hold the cutting edge at a consistent angle every time. I've long been partial to my shopmade jig, but of late, I've also learned to like the Veritas Mk.II jig (part No. 05M09.01; $48.50; www.leevalley.com; 800-871-8158). The Mk.II accepts most plane blades and bench chisels, and allows me to establish three microbevels quickly.

Before you start honing, grind a fresh 25° primary bevel on the blade. When grinding, make sure the edge ends up square to the chisel or blade. After the edge is ground, set the Mk.II to 30° and mount the blade or chisel. Make sure the knob on the eccentric roller is in the 12 o'clock position. Then, put a little baby oil or mineral oil on the 15-micron abrasive. As you sharpen, the steel that's removed will end up as tiny filings. You'll want enough oil to float the filings out of the abrasive so that the blade can push

Photos, except where noted: Tom Begnal; facing page (bottom right) and drawings: Michael Pekovich

Easy adjustment. *A quarter turn of the knob on this Veritas jig lets you add 1° to the initial angle of the microbevel; another quarter turn adds 1° more.*

Continue through the grits. *With the jig set to 31°, Beach hones the second microbevel on the 5-micron paper. He then raises the angle to 32° for the final passes on the 0.3-micron paper.*

Trim the paper as it wears

When a section of paper finally wears out, simply peel up the worn section and cut it off with scissors. Any residue from the adhesive backing can be removed from the glass using baby oil or mineral oil and a soft cloth.

them along the sheet for a natural cleaning action. When you're finished, you can clean up the excess oil with a paper towel.

To start, rest the edge of the blade in the oil and pull back first (this prevents paper rips if there is a hidden bump or bubble at the edge), then forward and backward a few times with light pressure. Keep the roller of the jig off the sandpaper. Check the bevel after no more than a couple dozen strokes. You should see a new bevel forming at the edge. Typically, it need be only about one-tenth the width of the 25° primary bevel. Total actual sharpening time at the 15-micron grit shouldn't be more than a minute.

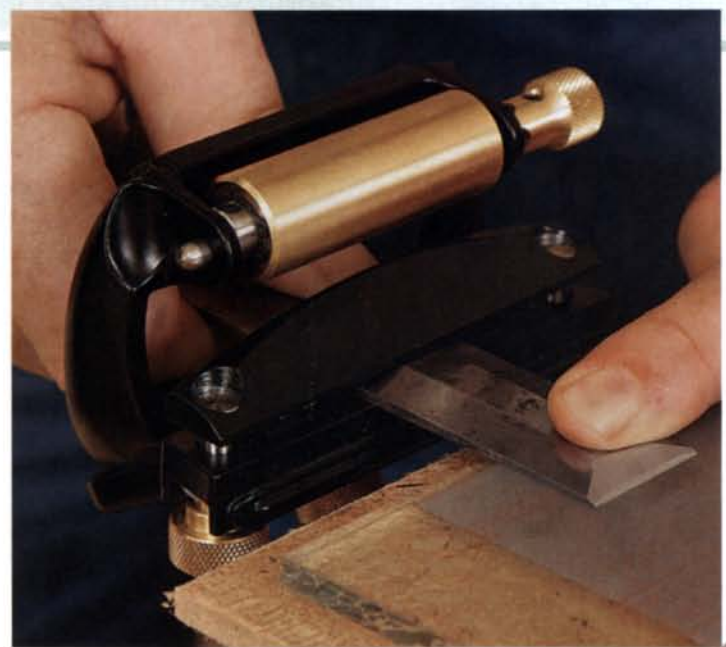
Now, change the angle of the jig from 30° to approximately 31°. That's done simply by turning the knob on the jig's eccentric roller to the 3 o'clock position. Repeat the honing steps with the 5-micron grit. I normally spend no more than 30 seconds at that grit.

Finally, change the angle of the jig from 31° to approximately 32° by turning the eccentric roller knob to about the 6 o'clock position. Repeat the honing process with the 0.3-micron grit. You should need only a dozen or so strokes to add this final microbevel.

At this point, you will have a burr on the back of the blade or chisel. To remove the burr, flip the jig and hold the back side of the blade or chisel flat against the 0.3-micron paper. Slide the blade back and forth a few times until the burr breaks free.

That's it. The edge will be razor sharp and ready to go to work. When it begins to dull, place it back in the jig and rehone it, always working through all three grits. If your jig is already set up, you can complete a rehoning in less than two minutes. □

Brent Beach lives in Victoria, British Columbia, Canada.



Remove the burr on the back. *To remove the burr that forms on the back of the bevel edge, the final step is to place the back of the chisel on the 0.3-micron paper and slide it back and forth until the burr breaks off.*

Instant edge. *In less than two minutes, Beach hones an edge to 0.3 microns. As a means of comparison, an 8,000-grit Japanese waterstone equates to 1.3 microns.*

Build a Fireplace Mantel

An easy installation begins with a flat foundation

BY MARIO RODRIGUEZ

A fireplace without a mantel looks naked and lacks character. Adding a mantel gives the fireplace an elegant frame, which becomes the room's focal point. This frame can be as simple as two brackets supporting a shelf or a floor-to-ceiling extravaganza dripping with carved gargoyles and yards of molding.

Whatever the style, I've found that the secret to a solid, easy installation is the foundation—sections of ¾-in. plywood joined to surround the fireplace opening. The foundation gives you something firm to anchor to the fireplace masonry, and it serves as a flat, plumb base on which to fasten the decorative elements.

The foundation can be screwed, nailed, bolted, or glued to the existing fireplace; trim will cover the fasteners. You can make and finish individual elements in the shop, then assemble everything at the fireplace, using the trim carpenter's technique of scribing to fit the mantel snugly against the wall and floor.

Survey the site, and design to fit

Before you start cutting, carefully measure the existing fireplace. Plan your design so that the wood will be at least 6 in. away from the fireplace opening (many building codes specify this distance; check with your building department). The mantel shelf is typically 54 in. from the floor, but the overall size of the mantel, fireplace, ceiling height, and such will influence your design and affect the size (this one is 53 in. tall).

This mantel is a modern adaptation of classical elements. Plinth blocks support pilasters (pieces resembling flattened columns) that support a wide horizontal piece known as the frieze board. Separating those elements are thin moldings made with a router from solid walnut. Atop the frieze board is a wide cornice molding that supports the mantel shelf and creates a smooth transition from vertical to horizontal.

Fine WoodWorking.com

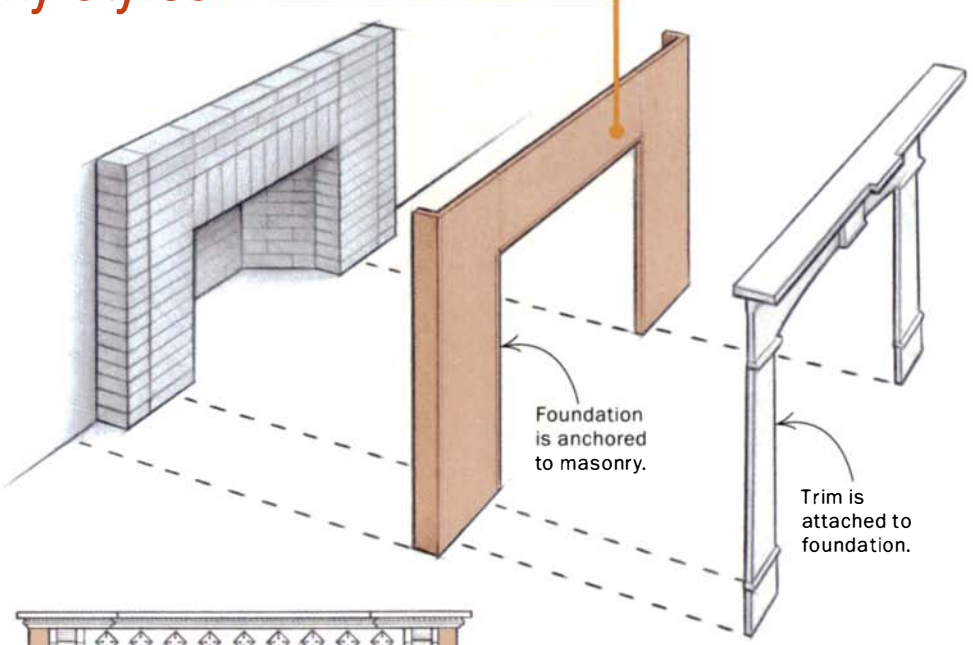
Visit our Web site to see a slide show of other mantel designs.

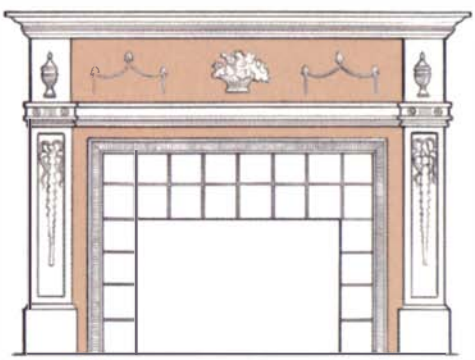
Cut the components in the shop

Once you've settled on a design, you're ready to cut plywood for the foundation, mantel shelf, and returns (narrow pieces of plywood that wrap around the sides of the fireplace to hide the masonry edges). Not only is it faster and more cost-effective to use plywood than to edge-glue solid lumber, but the plywood also minimizes seasonal wood movement. For this mantel, I used walnut-veneer plywood. Shopmade molding and

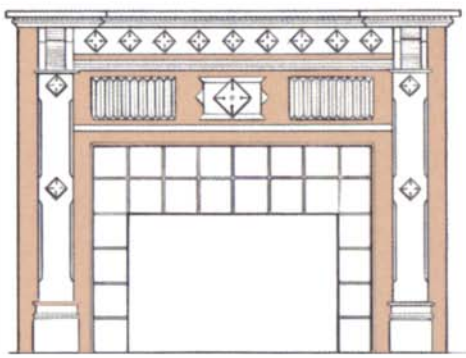
One foundation, many styles

A few pieces of plywood, joined with biscuits and glue, create a versatile canvas for a multitude of mantel designs. It all depends on the trim you attach. The illustrations here show a few possibilities. The trim can be flat with simple moldings, like the classical style of the mantel built for this article. Thick pilasters and elaborate cornice moldings denote a Georgian style. A profusion of applied moldings yields a Victorian look. A wide mantel shelf and simple trim recall the Arts and Crafts style.

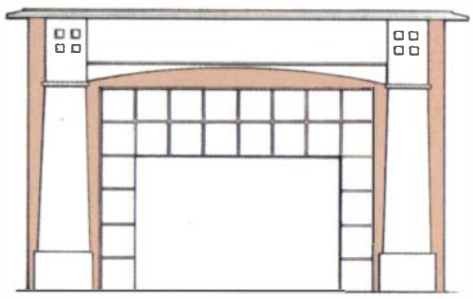




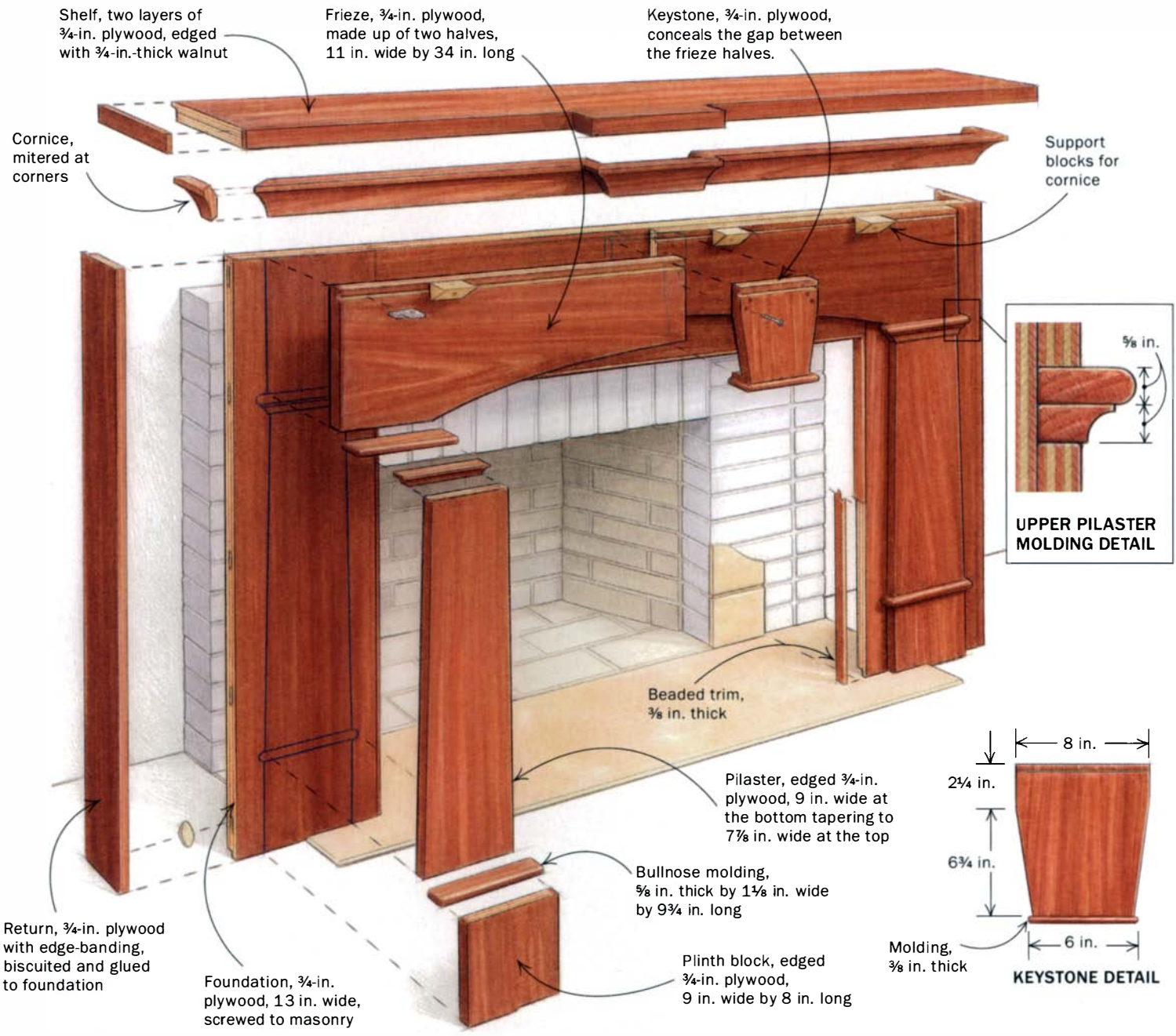
GEORGIAN



VICTORIAN

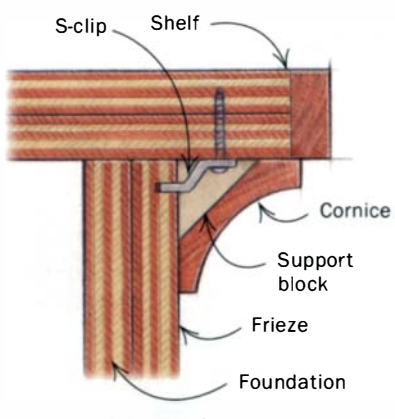


ARTS AND CRAFTS

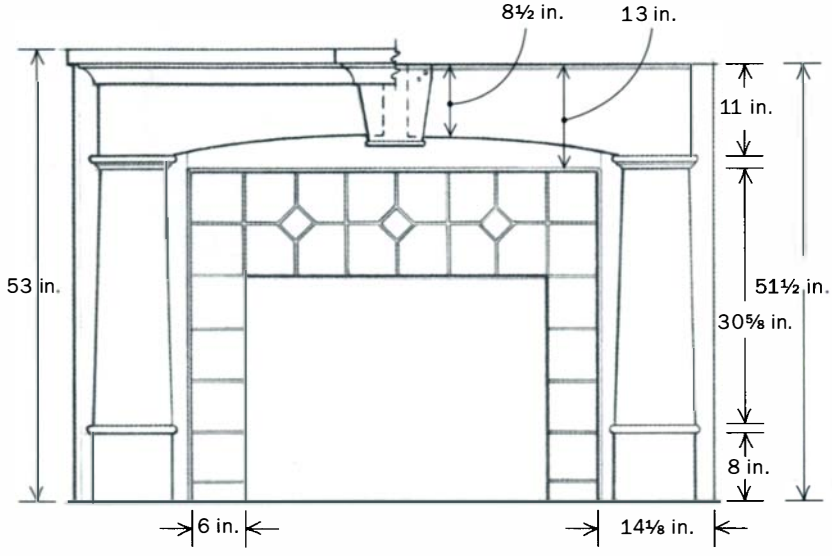


WALNUT MANTEL

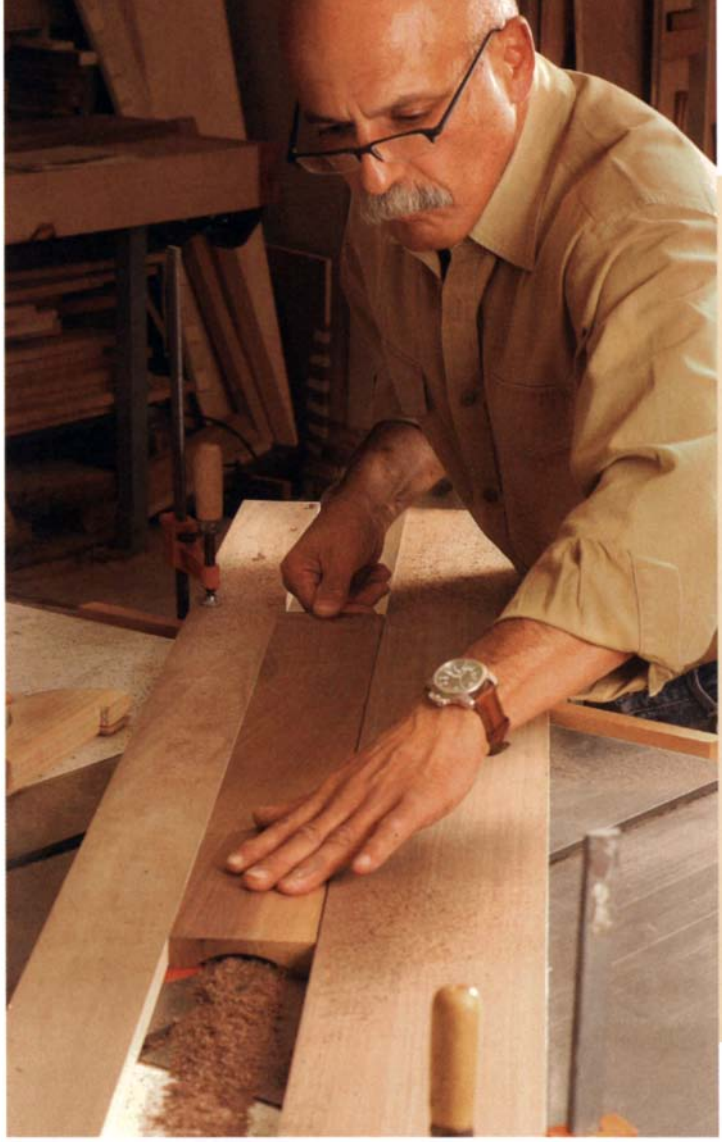
The mantel consists of trim and a shelf attached to a plywood foundation. The size of the firebox and the desired setback will determine the overall dimensions of your mantel.



SHELF DETAIL



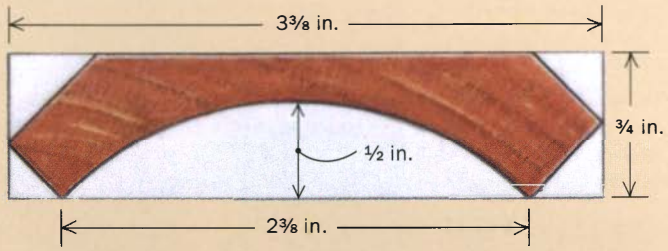
Photos, except where noted: Michael Pekovich; facing page: Andy Engel; drawings: Bob La Pointe



Make the parts in the shop

CUTTING A COVE ON THE TABLESAW

Moving a board across the sawblade at an angle produces a cove cut (left). Take multiple passes, raising the blade no more than 1/16 in. after each pass until you reach the final height. Use a push stick to guide the stock as you get closer to the blade.



ACTUAL SIZE

Scrape and sand. *The tablesaw will leave plenty of blade marks in the cove. Use a curved scraper and sandpaper to smooth it out.*

edging hide the exposed edges. Use the tablesaw to cut rabbets ½ in. deep by ¼ in. wide on the inside back edges of the returns and the vertical foundation pieces. Those edges will be scribed to fit against the wall and floor; relieving them with the rabbets makes trimming easier. Cut plinths and pilasters from ¾-in. plywood and glue ⅛-in. solid banding over the exposed edges. Cut the vertical foundation pieces and returns long, to allow for scribing.

For a mantel like this, with individual elements of ¾-in.-thick stock, you can make small moldings from solid stock, routing the profile on the face and end grain and screwing them in place on top of other trim pieces. If your design features thicker elements, you'll want to miter the moldings around the corners.

For the mantel shelf, rip two pieces of plywood and laminate them together with the best sides outward. I added a piece of walnut to cover the keystone, and milled more walnut for the front edging, attaching it with biscuits and glue. I cut a deep rabbet in the back edge of the shelf, leaving a ¼-in. by ¼-in. projection for scribing.

Tricks for cutting curves and coves

You don't need a roomy shop or a big workbench to lay out the curve on the frieze board. Instead, use a length of thin wood (1¼ in. by ¼ in. works) and a piece of string. Notch the ends of this batten and secure the string in one notch. Pull the string tight,

Do an initial dry-fit. *Lay out the pieces in the shop to check their fit and proportions. This is also the time to cut and partially assemble mitered moldings, such as the cornice, and prefinish the components.*

Scribe and attach the foundation

FIT THE FOUNDATION TO THE FLOOR

Position the foundation. *Fit the three foundation pieces together and secure them temporarily with a 1x4 batten on the rear. Lift the foundation into place against the masonry and center it on the fireplace opening.*

Notch the feet. *Mark the foundation base and notch it as needed to fit the hearthstone or scribe it to match the slope of the floor.*

like a bowstring, to shape the batten. Stop pulling when you get an arc that you like, and knot the string in the notch. Use the arched batten to trace the curve on the plywood. I bandsawed the curve from scrap plywood that I used as a template to guide a router for the final cut. But you could cut the curve directly on the plywood you're using for the mantel.

I cut the frieze in two and left a space between the pieces so that I could fine-tune their position. The keystone covers the gap. I ran the frieze boards through the tablesaw to cut a ½-in.-deep slot near the top to accept S-clips that secure the mantel shelf.

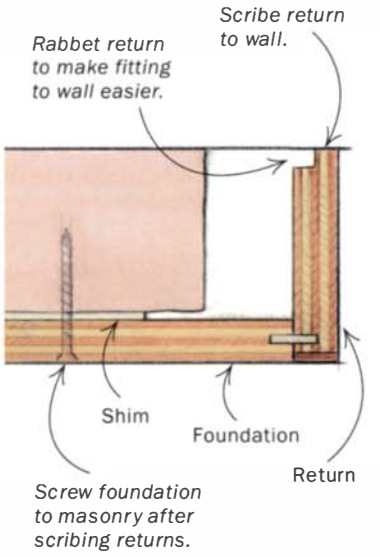
The cornice molding is a 2⅜-in. cove, cut on the tablesaw. (This is a practical way to make large crown moldings in a home workshop.) Cutting the cove involves slowly pushing the workpiece at an angle across the sawblade several times, raising the blade no more than 1/16 in. after each pass. Use a fresh, sharp combination blade. Trace the profile on the end of the workpiece and use trial and error on scrapwood to find the right angle. (For more on this technique, see "Cutting Coves on the Tablesaw," *FWW* #168, pp. 68-73.)

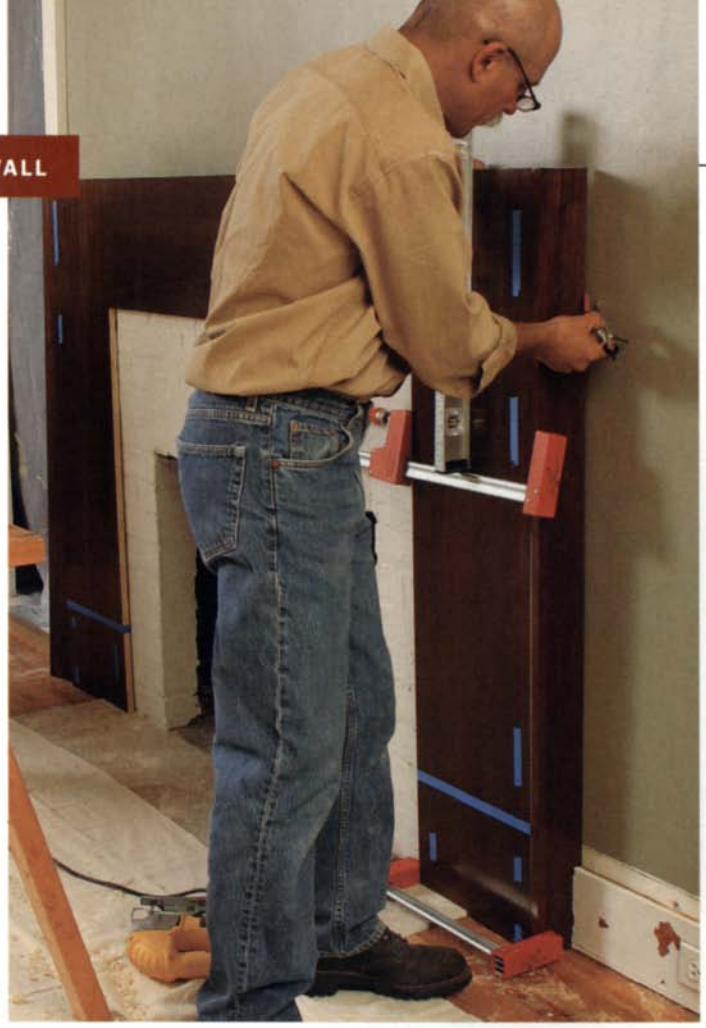
Once I had the desired profile, I removed the blade marks with a sharp curved cabinet scraper and P220-grit

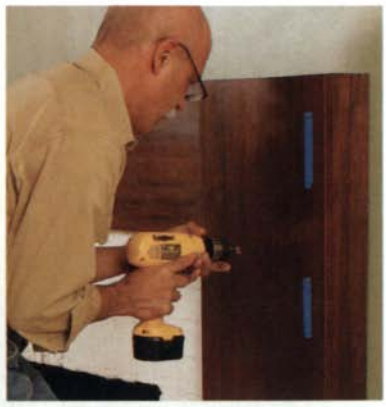
Use tape to locate the trim. *Lay out all the trim pieces on the foundation, working from the top down (left). Use strips of tape to mark the edges of the trim. Plinth blocks, which rest on the floor, must be trimmed to match the profile of the foundation (above).*

FIT THE RETURNS TO THE WALL

Scribe the returns. *Clamp a return board to the foundation. Check everything for level, then use a compass to trace the undulations of the wall onto the return. Trim to the scribed line so that the return fits snugly.*







Anchor the foundation. *Use a masonry bit to drill through the foundation and into the masonry (above). Then screw in a masonry anchor. Before driving the anchors in all the way, add shims where needed to compensate for irregularities in the masonry (below).*

sandpaper (see photo, p. 71). Then I clamped the frieze board, keystone, and mantel shelf to the foundation and mitered the cornice to fit. I also scribed the position of the keystone on the frieze boards so that I could position it properly in the end.

I prefinished all of the components with yellow water-based dye, followed by cherry dye to bring out the color and grain, and three coats of shellac.

Do final assembly at the fireplace

Assembling the mantel on site is the best approach for built-ins like this. It's easy to tote the individual pieces to the fireplace. And it's easier to scribe pieces to fit before everything has been glued and screwed together.

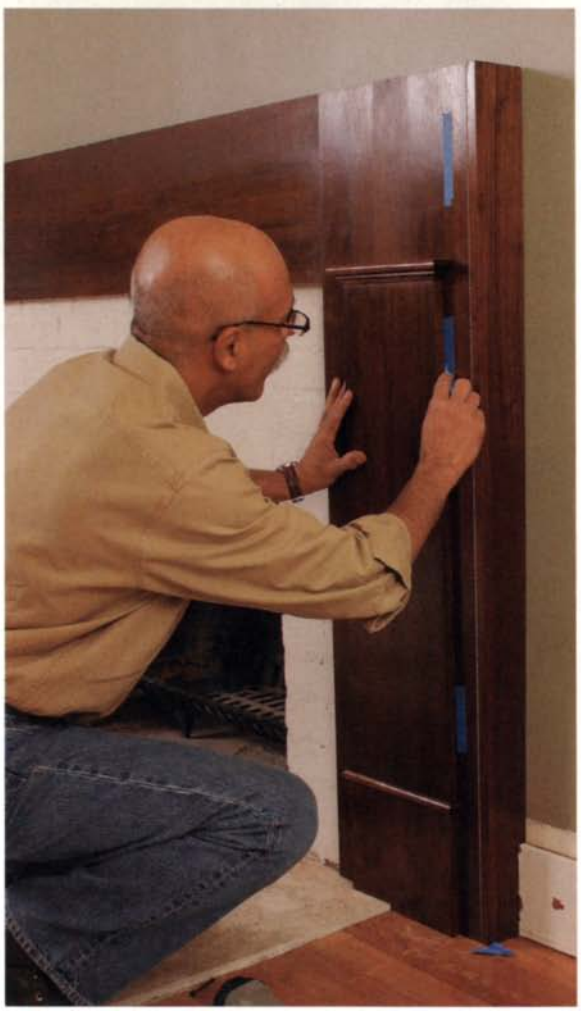
First, dry-fit the foundation. Put the pieces good side down, snug them together, and screw on a 1x4 batten to hold them. Next comes a series of trial fits, where you'll scribe pieces and trim them to a gap-free fit against walls and floor. Hoist the foundation into position against the fireplace masonry. Measure to be sure it's centered on the fireplace opening, and use a level to see if it's plumb when you push it firmly against the masonry. You may have to use shims or attach furring to the fireplace with masonry screws (use the Tapcons described on p. 74) to keep the foundation plumb.

Notch and/or trim the bottom of the foundation to fit over irregularities in the hearth and floor. Check the fit and keep trimming until the wood is flush against the floor. Double-check that the foundation is level and plumb. Next, remove the batten from the foundation. Use biscuits and yellow glue to join the pieces, and reattach the batten temporarily to hold them until the glue sets.

Now it's time to lay out the trim. Put the foundation on the floor (or on sawhorses), finished side up. Starting at the top, align the frieze board and keystone with the top of the foundation and center the frieze left to right. Then position the pilaster pieces below the frieze and the plinths below the pilasters. Use blue painter's tape to mark the edges of those pieces so that you can get them in the proper position when the foundation is anchored in place.

Because the foundation is scribed to fit at the floor, the plinths will overhang the foundation. Scribe and cut the plinths to match the foundation. Fit the returns to the foundation and scribe them where they meet the floor and wall. Start by clamping the returns in place at the sides of the foundation, checking that everything's plumb and level. Then take a compass and set it to match the widest gap between the return and the floor. Holding the point of the compass

Attach trim from the bottom up



Begin at the bottom when tacking on trim. *Whether you use a pneumatic nailer or a hammer, keep nails close to the edges to make them inconspicuous (above). Align each trim piece with the tape guides as you nail it in place (right). The large trim pieces cover the masonry screws that anchor the foundation in place. When you position the frieze (far right), be sure it's flush with the top of the foundation before nailing it in place.*

against the floor and the pencil on the return, draw the compass across the board to mark the floor's profile on the wood. Cut away the waste with a jigsaw, and use a plane and chisel to pare to the scribed line. Do the same where the return abuts the wall.

Attach the returns to the foundation with biscuits and glue. Then you're ready to anchor the foundation in place. I use 3⁄16-in. by 2¼-in. Tapcon concrete anchors. These blue screws bite right into the masonry. Drill a pilot hole with a Tapcon masonry bit, sized to match the screws (the ones I chose mate with a 5⁄32-in. by 3½-in. bit). A 14.4v or 18v cordless drill has enough oomph to drill the hole and drive the screws.

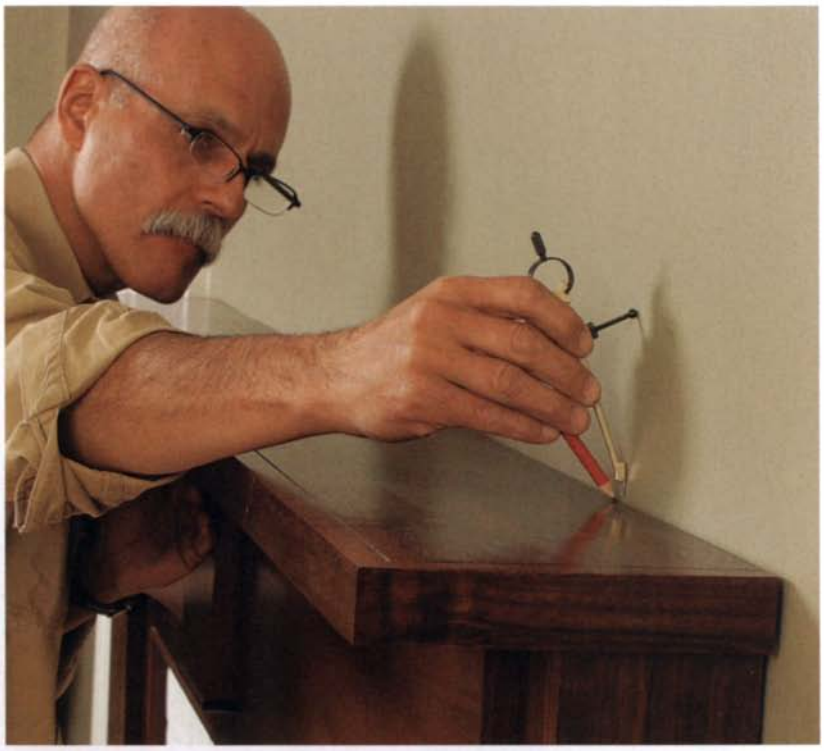
Lift the foundation into position, be sure it's centered and level, and then drill two pilot holes on each side as deep as the bit will travel. Be sure the holes will be covered by the frieze or pilasters, and countersink each hole in the foundation. Drive the screws. Tap in shims under the attachment points to compensate for low spots in the masonry before you drive in the screws all

the way. Working up from floor level, align the plinths with the blue tape and nail them in place. I use an 18-ga. pneumatic brad nailer, but you can hammer in 4d or 6d finish nails instead. Repeat with the pilasters, the frieze and keystone, the returns, and so on. Cover the exposed plywood edges surrounding the fireplace opening with molding cut from ⅜-in.-thick solid stock, mitered to fit, and nailed in place. This molding also hides gaps between the foundation and brickwork. Set the mantel shelf in place. Scribe and trim it to fit against the wall, then anchor it using table clips.

The cornice molding goes on last. Begin at the center, tacking the molding in place around the keystone, then the pieces that extend to the left and right. Set the nails and fill the nail holes. To accentuate the trim elements, I brushed on a very dark glaze, then wiped off the excess. □

Mario Rodriguez is the author of Building Fireplace Mantels, *(The Taunton Press, 2002).*

Add the shelf and cornice



More scribing and fitting. *Rest the mantel shelf on the foundation, then scribe the rear edge (above) and cut it to fit against the wall. Once you have a snug fit, screw in S-shaped clips to anchor the shelf securely (left). Attach triangular blocks cut from scrap to help support the cornice molding (below left). The molding is the finishing touch.*

Hold Carvings Securely

A plywood base and simple accessories lock down a variety of pieces in perfect position

BY FREDERICK WILBUR

For the aspiring wood-carver and professional alike, a carving station is an uncomplicated way to hold a workpiece steady as you carve. The use of a large board with various ways to grip the work is nothing new, but this smaller version is easy to make and extremely versatile. You need only a piece of smooth and dense plywood, 14 in. by 28 in., and scraps of plywood and hardwood.

Different sides of the board adapt to different tasks. One side has fences and various filler strips that hold irregularly shaped workpieces in place with the help of a pair of wedges or cams. The flat side can hold a flat-backed blank screwed in place through the plywood. Mark the length and width centerlines in pencil on the flat side because they will come in handy for

WEDGES WORK WONDERS

Using opposing wedges as clamps is a technique familiar to many woodworkers. In an application such as the one shown here (right), cut the wedges from stock thicker than the ¾-in. fence material to facilitate removal.

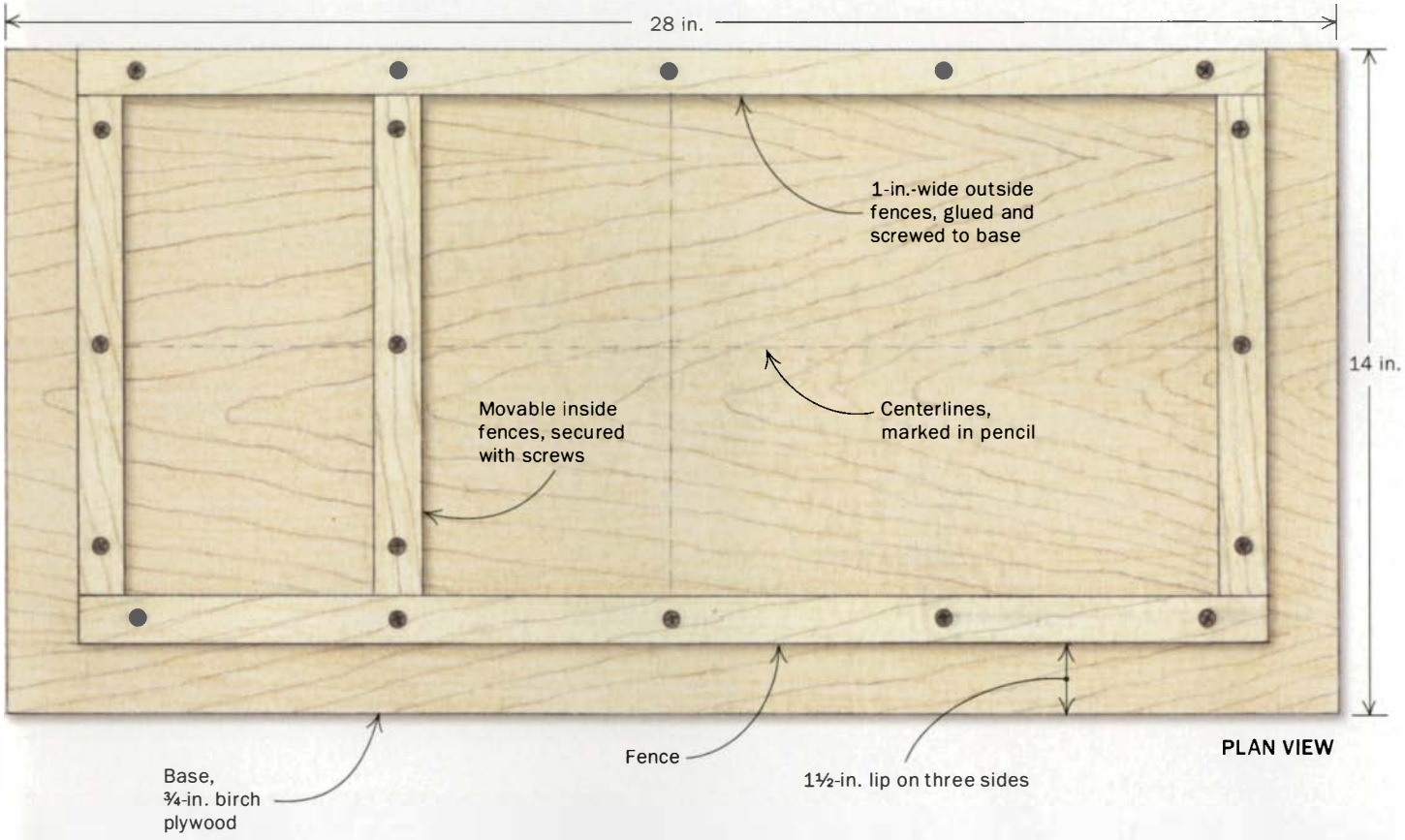
Photos: William Duckworth; drawings: Kelly J. Dunton

A PORTABLE CARVING STATION

The simplicity of this carving station, made from scraps of plywood and lumber, belies its versatility. With a variety of wedges, cam clamps, and standard shop clamps, you can use the carving station to secure a workpiece of any shape to a bench or table.

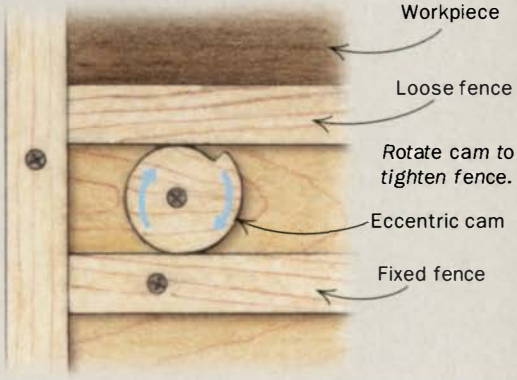
Fine WoodWorking.com

Visit our Web site to watch an audio slide show on using Wilbur's jig.



ECCENTRIC CAM CLAMPS ARE QUICK AND STURDY

Wilbur secures an irregularly shaped corbel by screwing a movable fence to the base. Against that fence two cam clamps rotate, pushing against another, loose fence that presses against a scrap from the bandsawn corbel. He adds a cushion of foam rubber to prevent marring the workpiece.



TWO WAYS TO HOLD MOLDINGS

A fence set back from the edge of the base leaves a perfect space to support long pieces of molding, which Wilbur clamps in place using scraps of wood cut to the shape of the molding and cushioned with foam rubber padding (right). Shorter, mitered pieces can be locked in place with mitered cleats that are screwed or clamped to the base (above).

locating screws and aligning blanks. Also, for work that has symmetrically curved silhouettes, you can draw a system of grid lines on the plywood.

On the side that has four fences screwed and glued to it, place three of the fences set in from the edges by 1½ in. or so. Set the fourth fence flush with the edge of the plywood base. The longer inset fence provides a long edge that is perfect for holding pieces of molding in place, and the flanges created on the shorter sides allow you to secure the carving station to a bench or table.

Many wood-carvers who do detailed work prefer to carve on a slanted surface so that they can see the workpiece clearly without having to lean over. I made an angled easel that fits snugly into the fence side of the carving station. The ends are two 30°/60° right triangles made of ¾-in. plywood, connected by two rectangular pieces that overlap the triangles. The triangles are located to fit between the short fences on the base. I also notched out the ends to fit over the two long fences. □

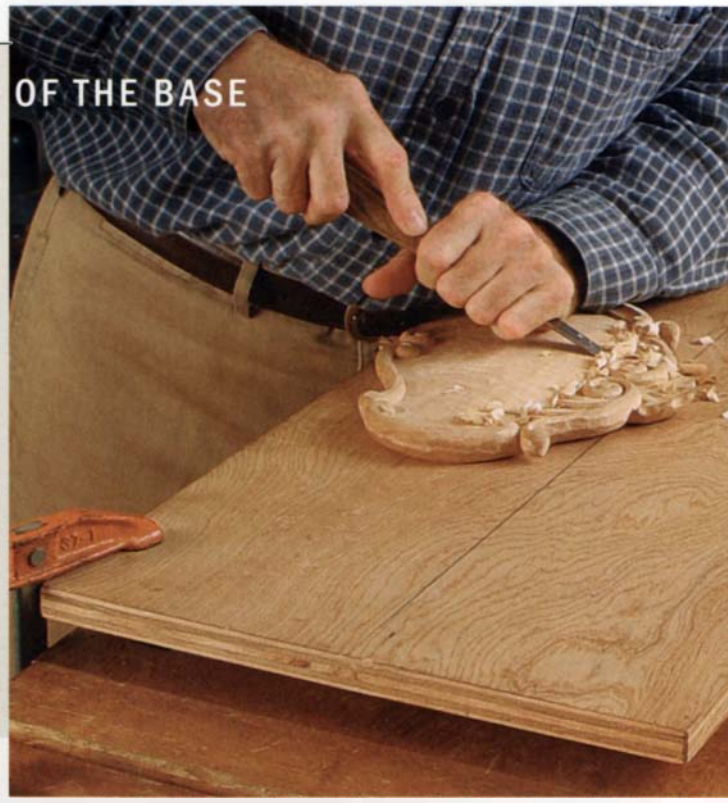
SMALL ROSETTES NEED SOME EXTRA CARE

To hold really small workpieces such as these rosettes firmly in place as he carves them, Wilbur drills shallow holes in a scrap of plywood. A piece of double-faced tape on the back of each rosette keeps it from slipping around in its hole.

Frederick Wilbur is a professional wood-carver in Lovingston, Va. Material for this article was excerpted from his book, Carving Classical Styles in Wood *(GMC Publications, 2004).*

USE BOTH SIDES OF THE BASE

When carving blanks with flat backs, screw the blank to the base of the carving station (above) to hold it in place. Take care to locate screws where they will not damage carving tools (right).



A DROP-IN EASEL FOR MORE COMFORT

An angled easel places workpieces at a more comfortable height and angle. The four bottom corners are notched to fit within the fences on the base (above), and the easel is held in place by its own weight. Lips on the top outside edges allow for clamps to hold some workpieces in place (right); others can be secured with screws from behind.

readers gallery

MARTIN J. MILKOVITS
Mason, N.H.

In building this reproduction William and Mary tall chest (20 in. deep by 42 in. wide by 66 in. tall), Milkovits discovered new uses for his outdoor grill. Not knowing how to shape the applied beading on the lower case, Milkovits employed an "act of sheer desperation." He soaked the beads in water, clamped them to forms, then baked them in his grill for a few hours. "It ruined the pads on the clamps, but it worked," he said. The carcase is walnut, with maple burl veneer on the drawer fronts and lower case front. The legs and stretchers are ebonized maple. Milkovits finished the case sides and top with Minwax Antique Oil and wax. For contrast, he used shellac on the drawer fronts and legs.

ANDREW PITTS
Heathsville, Va.

Every time bad weather brings down a tree on his property, Pitts fires up his WoodMizer LT15 sawmill and gets busy cutting the logs into lumber for use in his furniture. This simple entry table (15 in. deep by 24 in. wide by 30 in. tall) is one of many examples built from that lumber. For the carcase, Pitts selected prime pieces of cherry, quartersawn red oak, and white oak, and he carved the walnut pulls from a log in his firewood pile. The finish is shellac.

Attention Toolmakers

Do you make your own tools for woodworking? We want to showcase your shopmade wares in our annual *Tools & Shops* issue. We'd also like to include photos of restored vintage hand tools and machinery. Send entry forms (available at www.FineWoodworking.com) and photos (unaltered digital images, prints with negatives, or slides) to Readers Gallery, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwgallery@taunton.com. The deadline for submissions is July 31.

JOHN BULLAR
Cheshire, England

Bullar has made several versions of this concertina case, often to replace worn-out cases for antique instruments. This version (8 in. deep by 8 in. wide by 10 in. tall) is made of American black walnut, London plane, and African ebony, with a leather strap and lining. The finish is water-resistant acrylic.

KENNETH FREDERICK
Kansas City, Kan.

The need to house audio equipment was all the inspiration Frederick needed to build this cabinet of highly figured maple and quartersawn and plainsawn ash. The maple, which is curly, wormy, and spalted, was a special find, purchased from a lumber dealer in Pennsylvania who had two boards stashed away for 18 years. The pulls were carved out of ebony. The cabinet is 20 in. deep by 24 in. wide by 48 in. tall and is finished with varnish and wax.

PHOTO: BUD SIMPSON

BRUCE MILLER
Chippewa Falls, Wis.

Built as a college graduation gift for his daughter, Miller's tansu buffet can be configured into a number of shapes—horizontal, vertical, and stepped—so it can fit a number of settings. Made of bubinga and black walnut, the pieces feature custom-made traditional Japanese tansu hardware (www.misugidesigns.com). In horizontal mode, the piece is 16 in. deep by 58 in. wide by 38 in. tall. The finish is polyurethane.

DAVID HURWITZ
Randolph, Vt.

©2005 David Hurwitz

Hurwitz's wine cabinet has a sinuous exterior that belies the square gridwork inside. The cabinet stands 16 in. deep by 48 in. wide by 35 in. tall and is made of solid cherry and cherry-veneered bending plywood. The waves in the cabinet front were carved using a combination of hand tools and an angle grinder. To avoid interrupting the waves, Hurwitz carved a small notch behind the door just below the top to serve as the pull. The carcase and legs are finished with Watco Danish Oil, and the finish on the top is J.E. Moser's water-based polyurethane. PHOTO: TOM MILLS

FRANK B. RHODES JR.
Chestertown, Md.

This painted chest (21 in. deep by 42 in. wide by 52 in. tall) is a reproduction of a rare Mahantongo Valley chest of drawers, ca. 1835-1840. To re-create the elaborate motifs on the drawer fronts and case sides, Rhodes traced the details from the original and transferred them to this chest. He then hand-painted each one, without the aid of stencils, reproducing as closely as possible the colors that appear on the original. The building and painting took more than 600 hours. The wood is poplar, the turned pulls are cherry, and the paints are oil-based. The topcoat is satin varnish.
PHOTO: JOHN H. ANSLEY

TIM BICKERT
Hudson Heights, Que., Canada

This mahogany chaise bench was inspired by the furniture forms of Charles and Ray Eames and Hans J. Wegner, pioneers of the modern furniture age. Bickert created the gentle S-curve of the bench by laminating individual strips. The bench is a marvel of simple engineering: When you lie on it flat, the bench rests solidly on two points, but it gradually reclines as you pull up your legs. You can also rock in it while reclined. Lightweight (14 lb.) and narrow (17 in. wide by 78 in. long by 24 in. tall), the bench is finished with oil varnish and orange wax.

KEN WIRTZ
Marshall, Mich.

Wirtz's corner cabinet was inspired by 18th-century examples he spied in Wallace Nutting's expansive volume *Furniture Treasury* (MacMillan, 1954). The pine cabinet, which stands 23 in. deep by 56 in. wide by 85 in. tall, is painted. Wirtz first applied a mustard base coat, then used both combing and rag-rolling techniques to achieve different decorative effects on the sage-green interior and brown exterior. The 27 panes of glass in the door and sides were salvaged from old windows.

BILL COYLE
Summit, N.J.

You might say that Coyle spent three decades designing this tall case clock. A furniture maker for more than 30 years, Coyle had been studying and collecting 18th- and 19th-century American clocks and drew on that knowledge to make this piece as a wedding gift for his daughter. Influenced mostly by the work of Aaron Willard, Coyle's clock (9¾ in. deep by 19 in. wide by 92 in. tall) is made of curly maple, with secondary woods of poplar and pine. The movement and dial are from S. LaRose Inc. (www.slarose.com), and the finish is water-soluble dye stain, hand-rubbed polyurethane, and wax.

CHRIS DAVIDSON
Boulder, Colo.

While attending the furniture-making program at the College of the Redwoods in Fort Bragg, Calif., Davidson wanted to build something that would interact with people. This drum-shaped table (12¾ in. dia. by 34¾ in. tall) has a 10-lb., 1-in.-thick aluminum top that spins on a heavy-duty axle and bearing assembly. Davidson says people are fascinated by the table, often gathering around it at exhibits just for the chance to give it a whirl. The legs are made of African mahogany, and the coopered portion is assembled from 12 book-matched pieces of American sycamore. The finish is shellac.

PHOTO: SETH JANOFSKY

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Time-tested method for turning wooden boxes

BY RICHARD RAFFAN

Even after 35 years as a professional wood turner, I never tire of making lidded boxes, perhaps because the round, small containers still offer infinite design challenges.

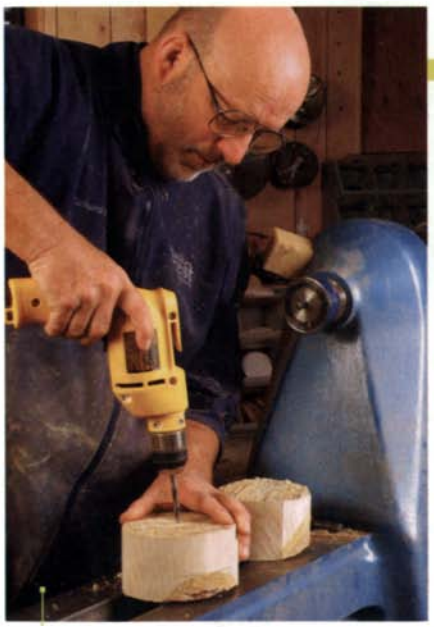
I find inspiration for boxes everywhere I look, in natural and man-made things. This box is very architectural, a walled structure topped by a roof, or lid, with an overhanging lip and a cupola for a knobby handle. However, boxes can be almost any shape and size, from highly decorated to remarkably simple. The walls can be monumentally thick or ultrathin. And it is not mandatory that the internal form reflect the exterior shape.

No matter what design I pursue, I always follow the same procedures to ensure that the finished piece is visually balanced and of high quality. I turn the box first, then refine the lid in relation to it. This project requires mounting the workpieces in a chuck several times, in several orientations.

I rely on a self-centering four-jaw chuck with dovetail jaws. The jaws fit into shallow grooves that I cut in the wood. The grooves allow me to pop the turning off and on the lathe as

Turn the bottom

Mount the blank for the box on a screw-center chuck. Turn the blank to a straight cylinder and then finish the base. Make a recess with angled sides for the four-jaw dovetail chuck to grip later. Finally, sand and apply a finish to the base surface only.



1 Drill a center hole in the workpiece. *Use a drill bit of a slightly smaller diameter than the screw projecting from the chuck.*

2 Mount the turning blank on the lathe. *A plywood spacer prevents the center screw from driving too deep into the workpiece.*

3 Begin at the bottom. *After smoothing the blank into a cylinder, cut a 3/32-in.-deep recess in the base. It not only looks nice, it gives the chuck a place to grip.*

4 Finish off the base. *Add a few details with a shallow gouge, then sand and finish.*

Photos: Matt Berger; drawings: Rodney Diaz

many times as necessary, and they also hide the minimal marks left by the serrated jaws.

Start with the box

The lidded box is a faceplate project, with the grain at 90° to the lathe axis. I often cut a pair of blanks for the box and lid from the same 2-in.-thick seasoned block of wood.

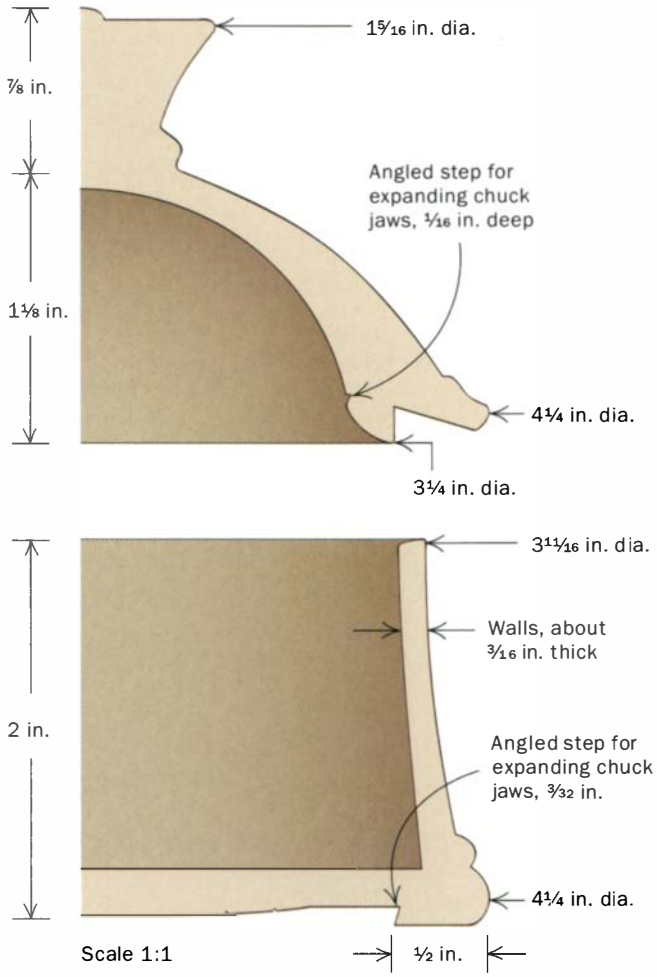
Mount the box on the lathe (see photos, p. 86), true the blank, and square the base to the side. Then turn the base to completion. It needs a foot around the perimeter and a slightly recessed center so that the final box will sit only on the foot. The best tool for cutting the recess is a small scraper with the face and left edge sharpened.

I like to add some decoration to the base. In this case, I rolled two beads with a shallow gouge (see photo, p. 86). Then I sanded the base and added a coat of finish.

Next, remove the center-screw chuck from the lathe and replace it with the four-jaw chuck. Mount the box on the chuck, and finish turning its profile. I prefer a ⅜-in. shallow

LIDDED-BOX CROSS SECTION

The box and the lid are the same diameter (and height), but the walls of the box taper inward, allowing the lid to overhang. The knob is decorative but also provides plenty of room to grip. The lid should be just undersize, compared to the box, so that it can spin freely and won't stick if the wood expands.



Shape and hollow the box

Mount the box on the four-jaw chuck and tighten it by expanding the jaws inside the angled recess. Then turn the box to completion.

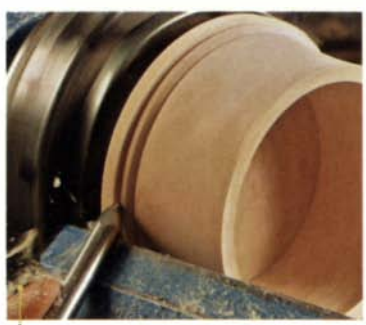
1 *Switch to a self-centering chuck.* *Remove the box from the screw-center chuck, flip it over, and let the four-jaw chuck hold it.*

2 *Drill a depth hole.* *The center hole lets you know when you've hollowed the box to the correct depth. Leave the base at least ⅜ in. thick.*

3 *Turn the outside.* *Taper the walls to a smaller diameter at the rim so that the lid can hang over the box.*

4 *Hollow the inside.* *Remove most of the waste, cutting from rim to center with a gouge. Keep the walls a consistent thickness.*

5 *Square off the inside corner.* *A roundnose scraper with its edge sharpened to a corner will cut a sharp transition where base and wall meet.*



6 *Roll two beads at the base.* *These decorative elements will complement the overhanging lip on the lid.*

7 *Sand and finish on the lathe.* *Sand with up to P320-grit abrasives, then apply a coat of finish before removing the box from the lathe.*

gouge with a long fingernail grind for working the exterior and turning two beads on the outside, at the base. If you have a problem getting a clean cut on the end grain with the gouge, try shear scraping by holding a roundnose scraper at about 45° to the tool rest. A successful shear scrape will produce thin shavings, as opposed to the dust produced by a standard scraping cut.

With the profile completed, hollow the box (see photos, p. 88). Plan the depth of the box so that the base will be at least ⅜ in. thick, and then mark the depth by driving a ¼-in. drill bit into the center of the workpiece while the lathe is on. I attached a handle to one of my drill bits so that I can use it like a turning tool with the tool rest. But if you have a drill chuck for the tailstock, you can use that.

With the outside turned and the center hole drilled, hollow the inside using a ⅜-in. deep-fluted bowl gouge, cutting from the rim to the center. When the interior is nearly finished, switch to a ¾-in. square-end scraper with a slight radius to make a nice, sharp corner where the wall meets the base. To limit tearout on the end grain, which makes up nearly 75% of the wall, go very slowly as you make the final cut. If you can't cut cleanly with a scraper, use the ⅜-in. shallow gouge with the bevel rubbing against the wall of the box and the flute pointing to the base. Finally, sand and finish the box, inside and out.

Make the lid to fit loosely

Unlike the box, which is shaped and then hollowed, the lid is hollowed and then shaped. Use the self-centering chuck to hold the wood (see photos, below). On a turned box of this size, it's unwise to have a tight-fitting lid. Because of the direction of the grain, seasonal wood movement can cause the lid to expand and become jammed in the box. I make the lid so it's just loose enough to spin on the box. The overhanging lip on the lid also helps disguise any movement or distortion that does occur.

Remove the lid from the chuck as needed to see how it looks on the box and to gauge the thickness of the walls. When you're satisfied with the shape, sand and apply a finish. □

Make the lid to fit

Mount a blank on the lathe with a center-screw chuck and rough out the outside so that it can be fitted to the four-jaw chuck. Then turn the underside of the lid, checking the fit of the lip with the finished box. Finally, remount the lid and turn the exterior.

❶ ***Mount the second blank on a center-screw chuck.*** *Turn a round tenon on the end and rough-cut the exterior profile.*

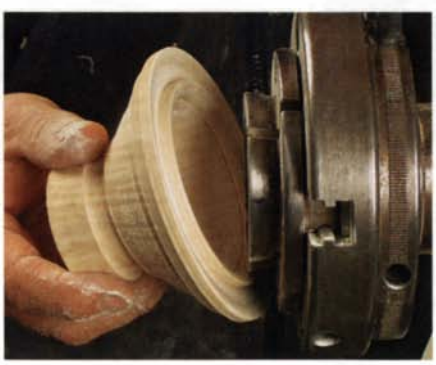
❷ ***Measure the box opening with dividers.*** *Transfer the inner diameter of the box to the lid, which is flipped and remounted.*

❸ ***Use the dividers to scribe the diameter.*** *Dig the left point of the dividers into the work as it is spinning, then see if the right point lines up with the scribed line.*

❹ ***Turn the lip to the scribed line.*** *Check the fit as you work. The lid should fit loosely because the wood will shrink and expand.*

❺ ***Hollow the top.*** *With the lip sized, use a gouge to hollow out the inside of the lid.*

❻ ***Cut a step for the chuck jaws.*** *Similar to the base, cut an angled step on the inside of the lip for the expanding chuck jaws to grab before removing the lid and remounting it. Apply a finish to the inside surface.*



❼ ***Complete the top.*** *Trim the lid and finish off the knob. Then sand and finish.*

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Q&A

Tuning a spokeshave

Q: I recently purchased a 151-style spokeshave, and I am having trouble getting a chatter-free cut. I've sharpened the blade, but I am now thinking the shave needs a complete tune-up. Can you explain the process?

—ALLAN ANDERSON, Phoenix, Ariz.

A: TO CAPITALIZE ON YOUR SPOKESHAVE'S FULL POTENTIAL, it must be razor sharp and tuned properly.

There are basically two types of spokeshaves: Some have their blades bedded bevel side up and feature low cutting angles of between 20° and 35°. These shaves typically have wooden bodies and require little tuning. Other shaves, like the 151 you mention, have their blades bedded with the bevel down, have cutting angles of around 45°, and often have metal bodies. These shaves are similar to handplanes and require a bit more attention.

Many shaves have roughly machined soles that make them drag. Take a minute to smooth and flatten the sole with sandpaper on a flat surface. While you're working the sole, check that the blade edge is parallel to the front of the sole so the shave's mouth is uniform. If things aren't right, file the mouth straight with a mill file.

Next, use a fine mill file to flatten and smooth any rough spots on the bed (where the blade seats). To prevent shavings from jamming in the shave's throat, you need to work the lever cap a bit. Begin by flattening the bottom of the cap on sandpaper on a flat surface. The top edge should be smooth. Eliminate flat spots or burrs using a mill file, then lightly hand-sand with P220-grit paper.

Now, sharpen the blade the same way you would a bench-plane iron. It also couldn't hurt to replace the stock blade with a thicker, high-quality aftermarket blade (www.hocktools.com).

Finally, reassemble the shave, wax the sole, and oil any threaded adjusters. Now you should be ready to put the shave to use, without chatter.

—Chris Gochnour, woodworking instructor and furniture maker

Flatten the sole. *Smooth any coarse scratches with sandpaper on a flat surface. Start with P120-grit paper and work up to P320-grit paper.*

Smooth and flatten the bed and lever cap. *A blade that doesn't seat properly on the bed will cause chatter. Use a fine mill file to remove rough spots (left). To ensure perfect contact between the blade and lever cap, rub the bottom of the cap over sandpaper attached to a flat, smooth surface (above).*

Lubricate moving parts. *Apply wax to the sole and household oil to the threaded adjusters.*

Photos: Thomas McKenna

Is low-density MDF strong enough for shop cabinets?

Q: I'm building a series of storage cabinets for my shop. Some (24 in. deep by 30 in. wide by 30 in. tall) will roll on casters and some (10 in. deep by 48 in. wide by 48 in. tall) will be wall-hung. Is low-density MDF strong enough for these applications?

—BUD LESTE,
Tucson, Ariz.

A: MEDIUM-DENSITY FIBERBOARD (MDF) is a fine choice for constructing woodshop cabinets and shelving. And the lighter-weight (lower-density) material now offered will work just fine for tool-storage cabinets on casters. For wall-hung cabinets, a 48-in. span on the shelves is too much for any ¾-in.-thick MDF (or even plywood for that matter). For a cabinet that wide, I'd add a center divider to stiffen it up.

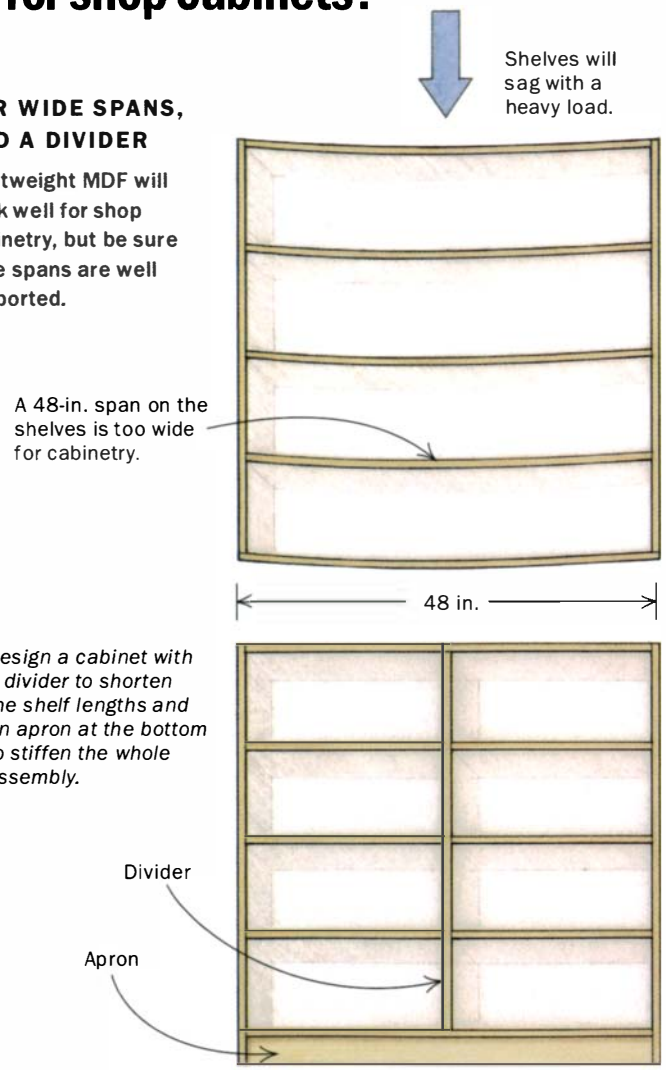
For a sturdy case, you can add a thick edging to the front of the shelves, or you can install a center divider using a dado, a tongue-and-groove joint (for an example, see *FWW* #170, p. 79), a butt joint, or biscuits.

There is a Web site (www.pbmdf.com/buyerguide/tbshelving1.htm) that covers the engineering specs on using MDF for shelving applications.

—William Duckworth, contributing editor

FOR WIDE SPANS, ADD A DIVIDER

Lightweight MDF will work well for shop cabinetry, but be sure wide spans are well supported.



Design a cabinet with a divider to shorten the shelf lengths and an apron at the bottom to stiffen the whole assembly.

The effects of ammonia fuming on ebony

Q: I plan to fume a quartersawn white oak chair with ammonia to impart a brown color to the wood. I'm using ebony to pin the mortise-and-tenon joints. Will the fuming affect the color of the ebony?

—ROSS NEWMAN,
Langley, B.C., Canada

A: AMMONIA COLORS WOOD by reacting with the tannic acid present in species such as oak and walnut. Ebony contains very little tannic acid, so it should remain unchanged by the ammonia treatment.

—Chris A. Minick, consulting editor

***Ebony doesn't react to ammonia.** The ebony in this oak table didn't change color after it was fumed with ammonia.*

Drawings: Vince Babak

Crossbanding

VENEERED BORDER ENHANCES MANY KINDS OF FURNITURE

BY JEFF HEADLEY

Crossbanding refers to wood, usually veneer, that is inserted flush with an underlying workpiece with its grain running predominantly across it. If you look out for crossbanding, you'll be amazed at the many examples you'll find. Commonly used on Federal-style furniture, it defines the outer edges of tables large and small, drawer fronts, or in this case, the headboard of a bed.

Designed to enhance a piece of furniture, crossbanding gives different degrees of embellishment depending on the type of wood chosen. Light or dark, straight-grained or figured, the effect can be as subtle or as fancy as you desire.

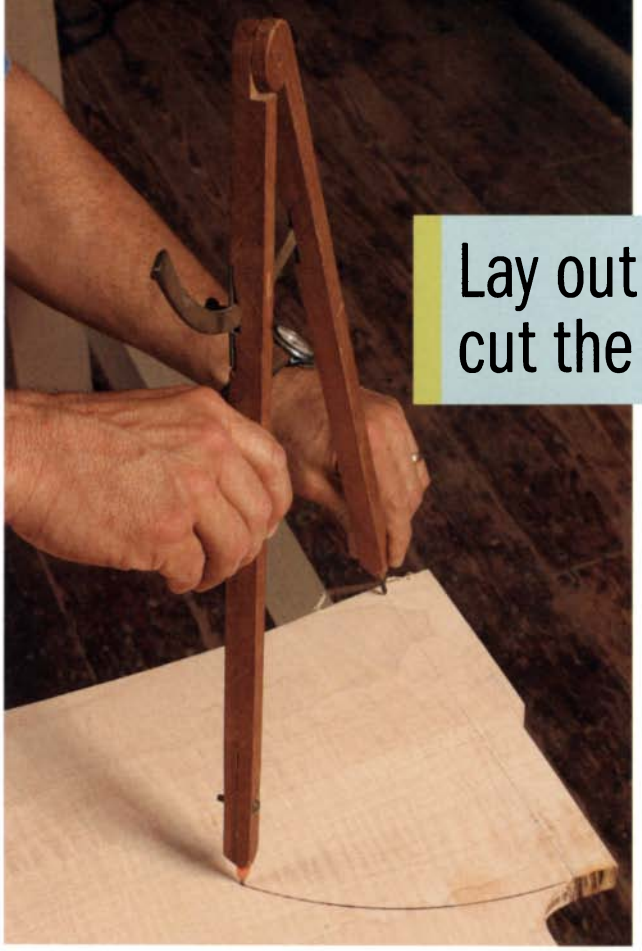
Work first on the arcs at each end of the headboard

On this headboard, the crossbanding and stringing define the visible top edge only, not the sides and bottom that will be hidden under bedding. The crossbanding extends right to the edge, unlike surfaces exposed to wear and tear such as tabletops, where the crossbanding ends ⅛ in. inside the edge.

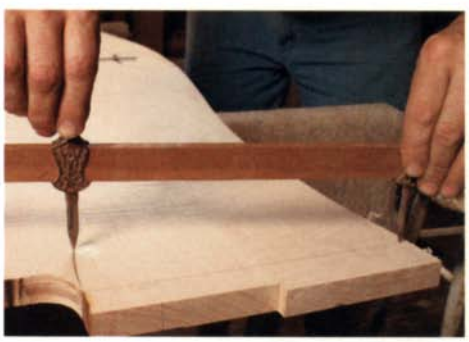
The width of the band will vary based on the area being banded---drawer-front banding may be as narrow as ½ in. The banding for this headboard is 1⅝ in. wide. I used a compass and trammel points to lay out and scribe the arcs of crossbanding,

When the color of the crossbanding contrasts with the rest of the piece, a combination of dark and light stringing makes an elegant transition.

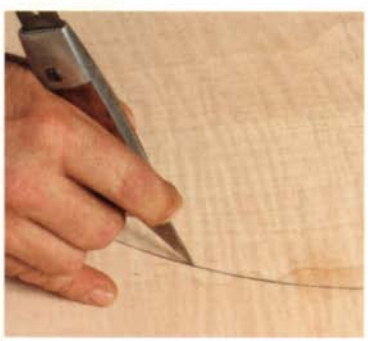
Lay out and cut the recess



Avoid cutting the headboard to its final shape. *This allows you to locate the center-point of the arc on what will become waste wood. Use a compass to draw the arc connecting the tenon to the top of the headboard.*



Scribe the line. *A pair of trammel points allows you to bear down and create a shallow cut along the compass line.*



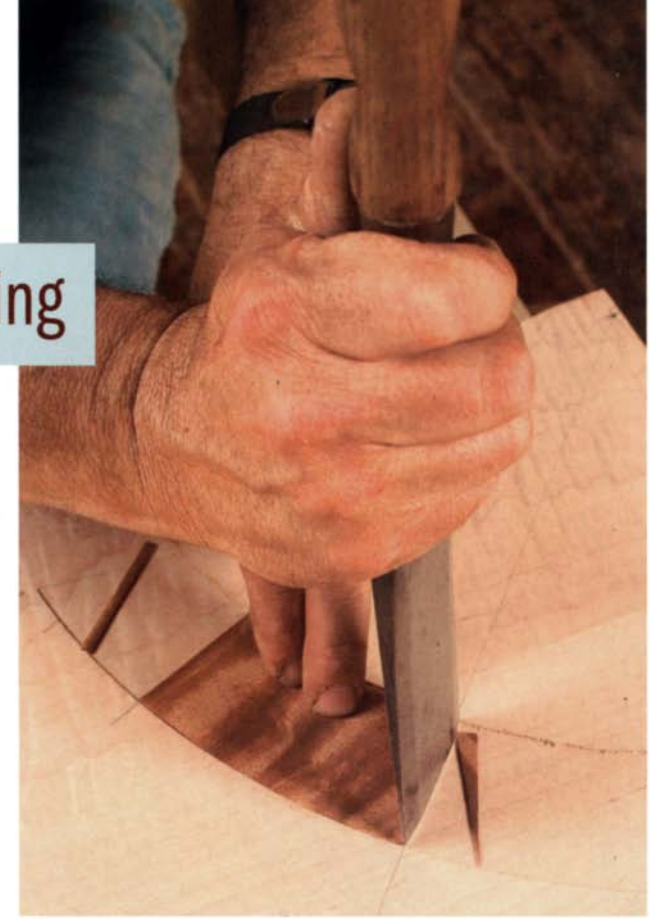
Deepen the cut. *Guided by the trammel-point cut, define the shoulders of the recess with a stiff-bladed knife.*

Pivot a router. *Mount a router fitted with a straight bit on a piece of plywood and insert a nail into the same hole used by the compass. Swing the router around the nail and excavate the recess. Set the depth to leave the veneer slightly proud of the surrounding wood.*

Photos, except where noted: Mark Schofield; this page (bottom left): Jeff Headley

Inlay the crossbanding

Fit the crossbanding. *Use the compass, trammel points, and knife to mark and cut the crossbanding to fit the recess.*



Cut the veneer to length. *Use the lines on the workpiece that divide the arc into quarters as a guide for cutting each section of crossbanding to length.*

locating the center of the arc on what would become waste wood (see photos, p. 96).

If you need to locate the pin on a section that will become part of the finished surface, such as when crossbanding the corners of a dining-room table, mark where the pin should go, and then tape a double thickness of veneer to the surface for the pin to engage.

The most efficient way to remove the waste from the recess is to use a router attached to a jig. To find the centerpoint on which to pivot the jig, record the distance between the two trammel points. Measure from the extreme outside edge of the router bit and mark the plywood jig at that distance. Drive a nail ⅛ in. through the plywood and engage the nail in the hole used for the trammel. If the bit aligns with the outer edge of the arc, go ahead and rout away the waste. Because the crossbanding reaches the edge of the headboard, you can freehand the router along the inner edge of the arc, straying into the waste area. On a dining-room table, you'd have to relocate the nail and use the jig to carefully cut the inner shoulder, too. To create room for the double thickness of veneer taped to the table, chisel a recess on the underside of the jig.

Crossbanding on curves is applied in short sections. This method allows you to create symmetrical "slices of the pie" moving out from the center of the arc; it also keeps the grain of the crossbanding more perpendicular to the sides of the recess, and it wastes less veneer. I divided the arc into quarters, marking the divisions on both sides of the recess to aid installing the veneer.

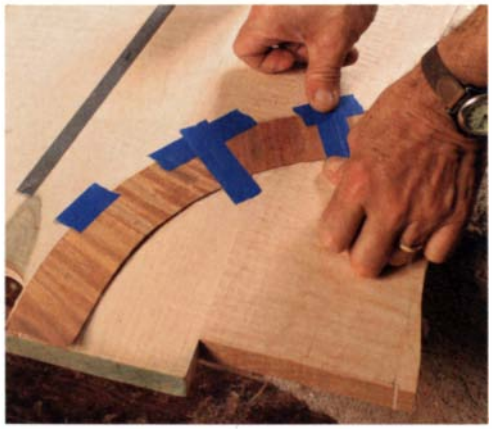
Cut the veneer in place

The best veneers for crossbanding are those with prominent stripes. Not only is this pattern more dramatic, it makes it easier to conceal the joints between sections of crossbanding. Good choices include crotch or ribbon-striped veneer.

Using consecutive pieces of flitch-cut veneer, I laid the first two pieces on either side of the centerline to see how the light would affect the grain to get the best effect.

With the first piece laid over the recess, repeat the compass, trammel, knife sequence used to create the recess. Scribe the line with the trammel, and cut the veneer with the stiff-bladed knife. Try to keep the knife vertical to avoid creating an angled cut. Lay the veneer in the recess and repeat the steps to cut the inner arc. Using the lines dividing the arc into quarters, mark the ends of the veneer and cut it to length with a wide chisel or a knife. Because stringing will be inserted between the veneer and the solid wood, the joint doesn't have to be perfect.

Take the first piece of crossbanding and use it as a template for the three other pieces that make



Glue the crossbanding. *Because of its long open time, Headley uses white glue to secure the crossbanding. Tape across and in between the joints reduces the chances of the veneer slipping when clamps are applied.*

Inlay the stringing

Two ways to cut a channel for the stringing. *Rout the channel using the same pivot point used for the crossbanding (left). Or use a cutting gauge guided by the edge of the headboard to cut away a 1/16-in. strip of veneer (center), and clean out the waste with a chisel (right).*

up the arc. When all the pieces have been cut and fit, number the pieces and their corresponding locations.

Brush both surfaces with a thin layer of Elmer's white glue. It has a longer open time than hide glue and it doesn't stain like yellow glue. Avoid applying so much glue that it will squeeze out around the edges and come up through the pores of the grain. Lay plastic over the veneer, place a caul on the plastic, and apply even clamping pressure to avoid sliding the veneer.

The top of the headboard is cut differently

Because of its serpentine shape, the top of the headboard can't be cut with a trammel. After cutting and smoothing the profile, set a cutting gauge at 1⅝ in. and cut a line that follows the shape of the top. Deepen the line with a knife, and then rout away most of the waste, cleaning up close to the line with a chisel. The easiest way to cut the crossbanding to size is to lay it in place on the recess, mark the location of the edge of the headboard on the underside, and then draw a parallel line about 1¾ in. from the first line. This allows the crossbanding to overhang the edge of the headboard slightly.

Apply the stringing and clean up

After about an hour and a half, remove the clamps and the tape, making sure to pull off the tape across the grain to avoid tearout. Scrape away any excess glue and use a chisel to slice away the veneer that overhangs the top of the headboard.

Now it is time to insert the stringing. The recess around the arcs can be cut with the router, resetting the location of the pivot nail to take account of the smaller bit. On the serpentine section, set a cutting gauge so that it cuts away veneer and not primary wood. Peel up the still slightly soft strip of veneer using a 1/16-in.-wide chisel. After the glue sets up it would be much harder to remove the very narrow strip of veneer.

Insert the stringing. *Dry-fit the stringing around the arc, holding it in place with tape. Miter the corner near the top of the headboard. Then glue in the stringing.*

Dry-fit the stringing, mitering the joint between the arc and the top section. Glue in the stringing and reapply the plastic, cauls, and clamps for a few more hours. The next day, bandsaw away the waste outside the arcs, scrape any uneven surfaces, and then sand the whole surface, being careful not to sand through the veneer on the outside edges. □

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12 quick tips

BY TERI MASASCHI

Every shop has a container for odd nuts, bolts, and washers that are not needed immediately but will handle an emergency one day. These finishing tips fall into the same category: They're a grab-bag of solutions I've found over the years with no common theme. I hope one or two will come in handy when you hit a snag.

Warm up a water-based finish

Water-based coatings are convenient but add no color to wood. If that is a problem, warm up the look by first applying a thin coat of dewaxed shellac tinted with a concentrated dye such as Wizard Tints or TransTints. A few drops of honey amber or medium walnut work wonders. When dry, scuff with P320-grit sandpaper, remove the dust, and apply the water-based topcoat.

Size furry wood before you sand it

When sanding woods such as mahogany, certain areas will have "fur" that refuses to sand off. Just like the nap of corduroy, sand one way and it flattens; sand the other direction and it stands up. Mix one part glue size to four or five parts water and coat the entire surface, not just the problem area. Let it dry overnight and then sand the surface smooth. The glue size will stiffen the wood fibers so sanding can shear them off.

Color epoxy filler to match the wood

Using two-part epoxy is a great way to fill holes, cracks, and knots and add strength as well. But because dried epoxy won't accept stain, it must be colored when mixed, to match the finished appearance of the wood. Universal tinting colorants blend in easily.

Photos: Mark Schofield

4

Get greater stain absorption on tight-grained woods

It is hard to get some boards to accept much stain. One trick is to lightly spray the wood with water, allow it to dry, and dewhisker the raised grain with a gray abrasive pad or P220-grit sandpaper. The wood will be more receptive to any kind of stain, and the raised-grain problem will be solved as well.

5

Substitute rubbing oils

It's Sunday afternoon and you are all set to start rubbing out your finish with pumice and rottenstone. You suddenly discover that you are out of paraffin oil. Rather than drive around looking for it, simply borrow junior's baby oil. It's the same stuff but it smells prettier. Mineral oil is also an acceptable substitute.

6

No-clog spraying

When you're spraying a water-based finish, the coating tends to dry too quickly on the air cap. It is a nuisance to stop and clean the encrusted cap in the middle of a big job. A thin application of Vaseline on the horns of the cap will make it easy to pop off any crust of finish with a fingernail.

7

Spray a flawless coat of lacquer

Here's a way to achieve a flawless finish right off the spray gun. Spray the last coat of satin lacquer as pristinely as possible. Let it dry just enough to lightly scuff off nibs or debris. Then fill the gun with one part lacquer and five parts lacquer thinner. Mist the surface just enough to melt it slightly and blend the scuff marks away. It will dry quickly, leaving a beautiful surface.

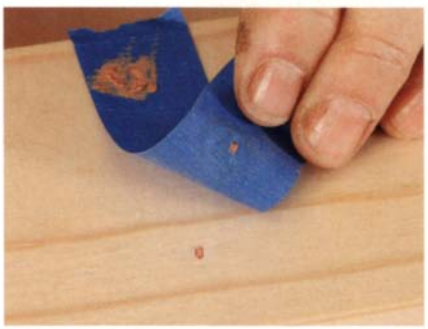
8

Coax dyes into open-grained wood

It is difficult to coax water-based dyes deep into open-pored woods such as oak or ash. A drop or two of soap detergent will relax the tension of the dye, making it more willing to sink into the pores.

9 Fill the hole and not the grain

When filling nail holes, it's hard to avoid getting putty into the grain around the hole that shows later when you apply stain or finish. If you are hand nailing, stick a piece of blue masking tape over the finish nail head, and then set the nail right through the tape. If you are using an air nailer, apply a small piece of tape wherever a nail is needed and shoot through the tape. Apply the putty with the tape in place, and when it dries, remove the tape to reveal a clean, filled hole.



10 Try vanilla for a pleasant smell

Oil-based and solvent-based finishing materials can have a noxious smell. Add a few drops of vanilla extract to make these products more bearable. Please note that this does not make them harmless; you still must have good ventilation and use a respirator when spraying.

11 Keep finish out of the rim

How often have you had the rim of a can fill with liquid? Unless you clean up the mess before it hardens, the lid will not fit properly, speeding the deterioration of the contents. Take an awl and punch a few drainage holes through the lowest part of the rim. These holes will not cause evaporation because the lid will seal nicely above them.

12 A rubdown with a brown bag

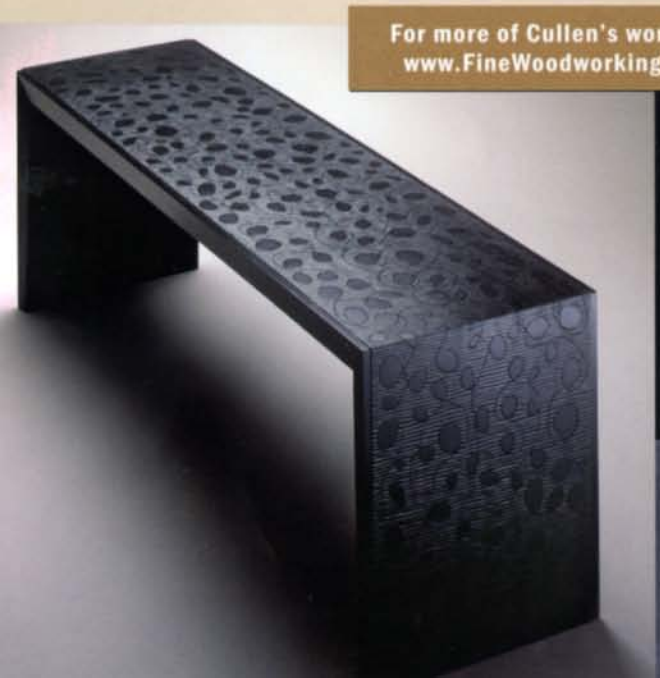
Wood turners have long known about "denibbing" a spindle with brown paper. This technique also can be used on flat surfaces where you want to rub out the topcoat to a satin or semigloss sheen.

Perfectly Irregular

Michael Cullen studied woodworking in the 1980s under David Powell, an English furniture maker obsessed with exacting craftsmanship. Cullen, of Petaluma, Calif., has gone on to make many technically challenging pieces, but over the past decade he's been exploring a far looser way of working. Eschewing the elaborate veneering and impeccable surfaces of his earlier days, he's working in solid wood and simple forms, patterning his pieces with vibrant carvings that range from the whimsical to the primitive. Cullen embraces irregularity in the carvings, working from freehand layout lines or none at all. He often contrasts his allover carvings with carcases, frames, or trim untouched by the gouge. He usually carves in mahogany and then applies milk paint—three or four coats in various shades, some wiped off with a rag—to achieve variegated colors and an impression of age right out of the shop.

—Jonathan Binzen

For more of Cullen's work, visit our Web site at www.FineWoodworking.com/MichaelCullen.



Photos, top row and bottom right: John McDonald; bottom left: Don