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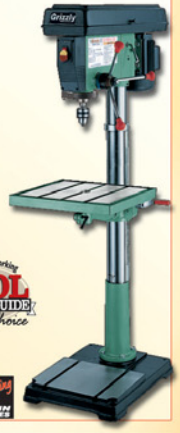

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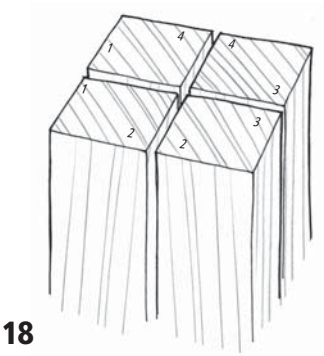

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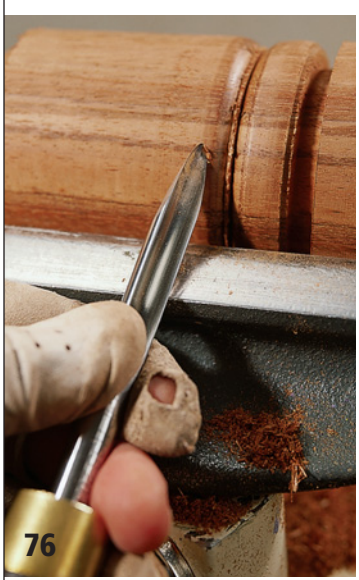
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We went to great lengths to ensure our version of this famous Shaker timepiece had the look and feel of the original.

Cover photo by Al Parrish

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SAFETY NOTE

Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand. Safety First!

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Lost the Fever? Let Me Turn Up the Heat

Do you find yourself heading to the shop less? Are you spending more time puttering in the shop than actually building projects? Have you not finished a project in weeks, maybe months?

Like a fire, every passion tends to burn down over time – even woodworking. That's when it's necessary to recharge your batteries. The question is: How do you re-ignite your passion for woodworking?

The answer varies from one person to the next. I found myself in this situation a couple of years ago. After more than 20 years I was finally burned out. Completing a huge project (a new gingerbread porch for my 1870s-era Victorian home) put me over the edge. I needed more than a rest, I needed a change.

My 100 percent lathe-turned stool for the shop.

However, finding the right project or reading an inspirational book wasn't enough of a cure in this case. I needed a big fix. But what?

I actually found two solutions, and both had interesting advantages: They were two things I always wanted to do but never pursued, and both would remind me of the challenges that beginners face in the craft. I decided to make an acoustical guitar and learn how to turn on a lathe. Both were highly rewarding and took me far enough away from my usual woodworking to get refreshed without forsaking the shop.

When building the guitar, even from a kit as I did, my woodworking skills could take me only so far. I found myself frequently challenged and often full of doubt about whether I was getting each step right.

Learning how to turn was a similar test. I found myself poring over instruction books, trying to fathom various techniques for cutting using different turning tools. I was unsure and confused about the right tools to buy.

These were important lessons because they made me all the more aware of just how important clearly written instructions and "to-the-point" tool-buying advice can be.

These projects also rekindled my woodworking passion and brought back the rewarding feeling of time spent in the shop. Being challenged and learning something new was invigorating. The guitar is one of the projects I'm most proud of in my 25 years of woodworking. And you should see me bound up the basement stairs with a newly turned bowl ready to show it off to my family.

I found that exploring a new area of woodworking can be a tonic. I'm chomping at the bit on new cabinet projects for the house. Yes, I think I'm in love again.

New Turning Column

This newfound enthusiasm for turning opened my eyes to a world that has been growing for years. After hearing from thousands of readers, we know that many of you own a lathe (and some aren't using them), so we're adding a turning column that will appear in every issue starting with this one. Professional turner Judy Ditmer has written books and taught classes across North America for more than 20 years.

"Next to the joy of turning itself," she says, "my favorite thing is to help someone experience that pleasure."

Welcome aboard, Judy! **PW**

Steve Shanesy

Steve Shanesy
Editor & Publisher

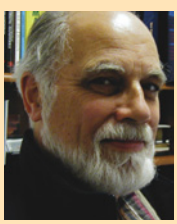
CONTRIBUTORS

JOHN WILSON

Because his father's woodshop had no electric power tools, John was permitted to use every tool in the shop, peaking his interest in woodworking (and hand tools) early. Since then he has worked as a carpenter, anthropology professor, community college woodworking instructor, Shaker boxmaker and most recently a writer. Today, John teaches on the road and at the Home Shop, a woodshop and production facility in Charlotte, Mich., that he founded to produce supplies for the oval box trade. An environmentalist (he built his own solar-powered home and shop), John always makes the most of the materials at hand. His "Canoe Paddle" on page 32 is an example of this. However, John notes that his love for paddle-making and boatbuilding far outweigh his love of the water.

GRAHAM BLACKBURN

What might surprise you about Graham is not only how much he likes traditional hand tools, but also how much he relies on power tools and machinery. For more than 40 years, Graham has built furniture, houses and a reputation as an expert on hand tools – more than a dozen of his books have taught thousands about the efficiencies of handwork. But when Graham needs to surface or rip lumber, he turns on the machines. "I couldn't possibly build furniture without power tools," he says, "but my use of hand tools increases the vocabulary of the things I can do." See page 60 to find out why woodworkers should have a few handsaws in their shops.



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Imitation Not Always True to the Original

Finn Proud that Aalto's Trolley Inspires Woodworkers Worldwide

John Hutchinson wrote an educational article about utilizing CAD ("Building a Drawing," April 2004). I was tremendously delighted to notice that the example was Alvar Aalto's Tea Trolley 900, made by Artek Furniture here in my hometown of Turku, Finland.

There is an element of magic in most classic Aalto pieces, how the form and function simply flow together. They are beautiful and lightweight, yet they are often extremely durable and good for use in a kindergarten classroom or a hospital. The forms are Spartan, but never harsh. This is achieved by skilled detail work and advanced craftsmanship in manufacturing. The article's drawings are an illustrative example of how easily one can, benevolently, lose some essential details – touch and feel – trying to recreate something without touching the original. The drawings suggest spline joinery and flat-sided wheels. Aalto and Artek Furniture are famous for developing new birch-laminating and steam-bending techniques.

In Aalto pieces, the wood and details bend like clouds – there are no hard contrasts or spline seams that would eventually fail. Also, the wheels are curved out just a tad, maybe ½" or so. The pieces are a real pleasure to look at and touch. (*For more information, go online to artek.fi.*)

The bottom line: Take inspiration from great pieces and proudly make your own craft with your own style. But if you're reproducing a masterpiece, take great effort to get the significant details right. John, thanks for the great CAD tutorial article for the rest of us!

Visa Huuskonen
Turku, Finland

Relatively Simple Equation Helps Table-makers Find Bevel Angle

In a recent issue ("Letters," April 2004) you answered Bob Pfohler's question on developing the bevel angle (5½°) for the legs on the "Shaker Drop-leaf Table" (December 2003) by saying it was trial and error. This seemed a little imprecise to my draftsman's sensibilities, so I developed a formula for the corner-to-corner bevel angle on a square leg with equal side angles. It is:

$$\text{TAN}^{-1}\left(\frac{\text{TAN} \times W \times 2}{\sqrt{W^2 + W^2}}\right)$$

where "TAN" is the tangent of the leg's side bevel (in this case, 4°) and "W" is the width of the square leg (2½").

First, determine the tangent of the side bevel angle using your calculator. The tangent of a 4° angle is 0.069926812, or 0.07. Then plug this and the width of the leg into the formula. This gives you 0.099. Where you used the "TAN" key on your scientific calculator to get the tangent of the 4° angle, now use the "TAN^{-1}" key applied to this number to get your corner-to-corner bevel angle. This gives you 5.65°, so you were close!

Stephen C. Allen
Abbeville, Georgia

Editor's Note: If you don't have a scientific calculator and want to check this out for yourself, you can find a calculator online at math.com/students/calculators/source/scientific.htm.

Premium Tools are Pricey for Good Reason – They're Worth the Effort

In response to a letter from February 2004 asking why hand planes are so pricey, I'd like to respond. I'm retired and I like to collect desirable woodworking tools – anything from Stanley and some others that I feel are really worth the effort to hunt for.

Years ago, a carpenter told me he went to the store and bought a new jack plane and it "warn't no good." Strange, I thought, how a new tool fresh from the factory could be no good. So I asked him to let me have it overnight so I could see what was the matter with it. The first thing I did told me the whole story. I put a straightedge on the sole and it was high on both ends. I have since found that Stanley never made a flat bottom true and square.

Gray iron is a terrible material to true up other than by hand. However, a new kid on the block (Lie-Nielsen Toolworks; 800-327-2520 or lie-nielsen.com) has chosen a material that is superior and tough – ductile iron – and they spend a good amount on old-fashioned know-how and good American labor. They make every other tool manufacturer run for cover. These are good-looking tools that work very well in the hands of people who know how to use tools and they literally sell themselves.

All you have to do is just go to a good street fair or antique show and price an old Stanley 164 and see what they are asking. If you buy it, you still won't have the quality of a Lie-Nielsen 164 that costs about $225. Or go to a power tool show and watch as I have from the background as Lie-Nielsen sells just as much as the power-tool operators do.

Harry Harrington
Auburn, California

Case Miters Can be Made from Plywood with Some Simple Tips

I really enjoyed author Bill Hylton's article "The Case for Case Miters" ("Power-tool Joinery," February 2004) – particularly the lock-miter section. I have a template that I made a number of years ago after I finally got a good joint to work.

continued on page 12

WRITE TO US

Popular Woodworking welcomes letters from readers with comments about the magazine or about woodworking in general. We try to respond to all correspondence. Published letters may be edited for length or style. All letters become the property of *Popular Woodworking*. To send your letter:

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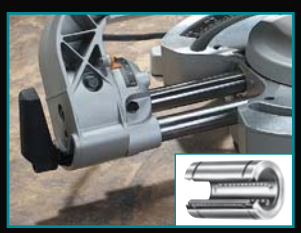

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Letters

continued from page 10

Since then, I have lived in fear of losing or damaging my priceless jig. However, if this is a joint that readers are going to try on plywood, which Bill seems to be doing, there are a couple of things I am sure he knows but doesn't mention.

First is that on the vertical cut, the bit is cutting the veneer face and will cause chipping at any speed. Making the cut gradually is tedious and doesn't seem to help much. I solved this problem by making a heavy score line with a straightedge and a utility knife at the top of the cut.

The other problem that I found is that the spline created in the vertical cut is very easy to break during assembly, particularly on some of the larger pieces that might need some additional encouragement to fit. Before applying any pressure to move the end that's out of line into position, be sure the part of the joint that has been fit is clamped in position. Otherwise the least amount of pressure is likely to snap the spline.

Jon Noel
Helena, Montana

Bill Hylton responds: Regarding the problem you mentioned about the splintering and chipping of the face veneers, the only place I can envision a knife-cut being made is at the inside edge of the miter, which would be at the inside corner of the assembled joint. You'd have the same problem at the same spot on the cuts made with the work flat on the tabletop.

I think a zero-clearance support around the bit would be quite beneficial. I didn't have the space to broach this topic in the column, but in the accompanying photos, I show a hardboard auxiliary tabletop providing a zero-clearance opening for the bit in the table.

And I have the movable fence facings of the router table's fences closed in on the bit. I did this with the router running, so the bit cut its profile into the ends of the facings. You can see that I was cutting birch plywood and it didn't have splintering that I recall.

Where's the Book to Help with QuickCAD? It's Hidden, but it's There

In reference to your "CAD for Woodworkers" article (June 2003), I purchased the QuickCAD program as described in your very good article. I'm having some trouble in using the program due in part to my lack of understanding of the "not-too-informational" book that came with the program.

I pulled up the designs that were included in the article, as well as those on your web site, to see what you had done. Do you know of an aftermarket book that would be of help with this program?

Don Nicholas
Lakewood, Washington

Author John Hutchinson responds: You already have the only book on QuickCAD, but you don't know it. It's contained in the CD-ROM with the software. To keep prices down, most of the software manufacturers are going with these kinds of CD-ROM "books." The entire thing prints out to almost 400 pages, and it contains everything you could ever want to know about QuickCAD. Put the CD-ROM in your computer and the path to the book should become evident – now that you know it's there.

There are Plenty of Options Available When Finishing Cherry

I have recently started making my first piece of furniture – the Stickley Side Table (June 2000). I decided on this piece as a gift for my parents, who have new cherry Stickley furniture in their house.

I noticed that you finished this white oak table with a reddish aniline dye, then applied one coat of boiled linseed oil and wiped on a thin coat of warm brown glaze. What would you recommend I use to finish this table, considering it's cherry?

David Hussung
Louisville, Kentucky

Editor's Note: Cherry is a beautiful option for Arts & Crafts furniture. It's my opinion, and the opinion of many woodworkers, that cherry requires no additional coloring. Properly selected and matched cherry that shows no sap will age and darken to a beautiful, warm color. This actually happens very quickly, especially when the wood is exposed to sunlight. My suggestion is to complete the piece and allow it to get some sun. Try and move the piece to balance the light it's exposed to. After a couple of days, a coat of boiled linseed oil will bring out more depth and color. Your finish coat can be a traditional wax, shellac or even a coat of lacquer. The table will continue to darken and gain beauty. **PW**

– David Thiel, senior editor

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What are the Rules For Placing Hinges?

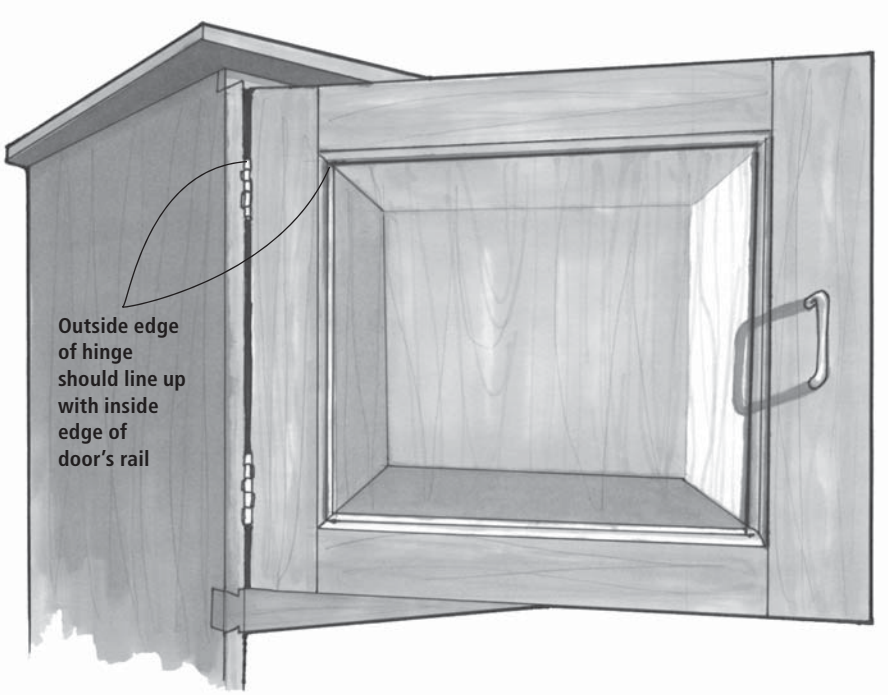

Illustration by Hayes Shanesy

Where on the Door's Stile Should Each Hinge Go?

Is there any set rule to tell me how far from the top and bottom on a door to place a hinge? I'm thinking of replacing the doors on my kitchen cabinets but am unsure about how far up or down from the top and bottom to mount the hinges.

Ed Williams
Elkhorn, Wisconsin

Though this is somewhat a matter of taste, I think you get a more-balanced look when the barrel of the butt hinge lines up with the interior edge of the top and bottom rail. This rule may not work with all doors, however. Doors with wide or narrow rails might not look right with the hinges installed in line with them. Ultimately, let your eye be your guide.

The rules change if you are going to use European hinges, sometimes called cup hinges. According to the manufacturers, you need to keep the hinges near the ends of the door – no more than 3" from the end of the door to the centerpoint of the hinge's cup.

— Christopher Schwarz, executive editor

continued on page 16

WRITE TO US

Every day we get questions from readers on all subjects about their woodworking. Some are letters; many are e-mail messages. We are more than happy to share our woodworking experience with you by answering your questions or adding some clarity to whatever aspect of the craft you are unsure about. In addition to the hundreds we answer privately every month, we want to share the best questions here with readers.

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- 1½ HP, 110V, single-phase motor
- Precision ground cast iron tables
- Sanding belt size: 6" x 48"
- Disc size: 12"
- Quick change belt release
- Sanding belt speed: 878 FPM
- Disc speed: 1725 RPM
- Approx. shipping weight: 178 lbs.

MORTISING MACHINE

W1671

We designed this machine for mortising ease. The super heavy-duty fence & hold down eliminates unwanted wood movement and "sticking chisels". Unique swiveling base allows easy off the bench operations while the extra height and depth capacity allows the use of much larger stock. Features like a 22" long solid steel quick-positioning handle, 8-tool holder, easy two-door chuck access, large base and twin hardened and ground columns insure perfect mortises every time.

- ¾ HP, 3450 RPM motor
- Adjustable depth stop rod
- Mortises lumber to 8¾" thick
- Jacobs taper #2 spindle
- Double support columns
- ½" JT #2 chuck
- Approx. shipping weight: 90 lbs.

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2 HP, 10" CONTRACTOR TYPE SAW

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W1714

This machine is ready to rip with heavy-duty cast iron extension wings and the new Shop Fox® Aluma-Classic™ Fence. A sturdy base, cast iron miter gauge with adjustable quick stops, & a rail mounted magnetic switch are some standard features that make this saw irresistible to contractors & home shop woodworkers alike. Weighing in at 292 lbs., this saw will provide operating stability for better cutting accuracy.

- 2 HP, 110V/220V, single-phase motor
- Precision ground cast iron table with T-slots
- Table size: 39⅝" x 27" (with cast iron extension wings)
- Max. depth of cut: 3⅛"
- Ripping capacity: 28"
- Arbor speed: 4250 RPM
- Approx. shipping weight: 310 lbs.

10" LEFT TILT TABLE SAW

With a left tilting blade and nearly 450 lbs. of vibration dampening mass, this saw will definitely take center stage in any shop We've included 2 large cast iron wings, a jumbo miter gauge with patented adjustment feature, and a powerful 3 or 5 HP motor with triple drive belt system. The Shop Fox® Classic Fence with a 26" rip capacity provides a compact and sturdy means for dependable and accurate ripping.
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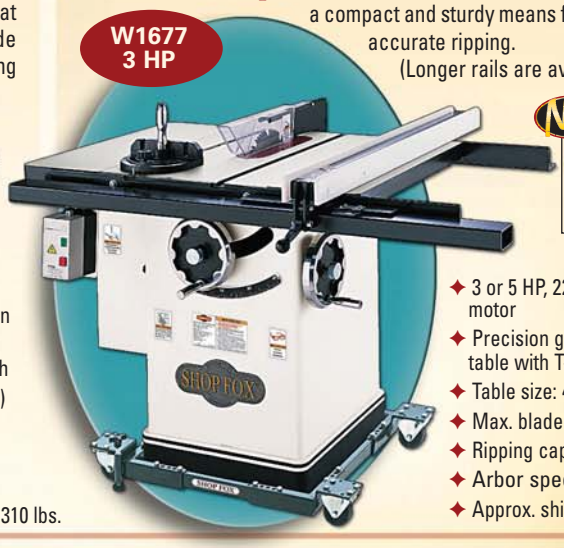
W1677
3 HP



New

W1711
SHOP FOX®
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with 5 HP Motor

- 3 or 5 HP, 220V, single-phase motor
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- Arbor speed: 4250 RPM
- Approx. shipping weight: 552 lbs.

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Q & A

continued from page 14

What Should I Do if I Glued a Solid-wood Back Into a Rabbet?

I'm just completing two Shaker wall clocks of Isaac Youngs' 1840 design, following various plans. I opted to make solid-wood backs and door panels for my clocks. I allowed for wood movement on the back piece and also left the door panel floating.

However, I misinterpreted one of the comments in the plans that said to screw the back simply with two screws at top and two at the bottom, and nail the sides. The plans said to put a small dab of glue at the center so the wood will move equally in both directions. Somehow I interpreted this to mean in the sides, not the top and bottom. So I placed a small dab of glue in the center of the side rabbets. Do you think this will affect the case when the clock is subjected to a Midwest summer?

David Rata
Iowa City, Iowa

Chances are that the small dab of glue will fail when the panel expands and contracts with the first big change in humidity. Then the panel will be free to expand and contract with the seasonal changes. The worse-case scenario is that the wood will splinter a bit where the glue is, which might be visible from the inside of the case.

— Christopher Schwarz, executive editor

What are the Tricks to Making A Door Panel That Remains Flat?

Can you tell me how to make a door panel nice and flat? Do you glue up the panel and then thickness it? Or do you thickness the pieces and then glue them up?

I use all rough lumber, so warping and twisting are constant problems for me. I doubt I could get a nice flat panel with ½" stock.

Joe Ott
Lakewood, Ohio

There are a number of strategies that have worked remarkably well for me:

• I allow my wood to acclimate to my shop's humidity for two weeks before building.

• I don't surface the wood to make the panel until the day I'm ready to glue up the door. That is, the rails and stiles for the door are all ready and the joinery is cut.

• When I surface the panel stock I remove the same amount of wood from both faces. I do this by planing one face and then the other, switching faces after each pass. This helps equalize the release of tension in the wood.

• I then glue up the panel stock and assemble the door as quickly as possible.

— Christopher Schwarz, executive editor

What Finish is Good for a Workbench?

I just finished building my dream workbench. The top is 2¼"-thick oak sawn from planks, each piece turned 90° and then glued up. In effect, it's a quartersawn top.

Still, I worry about warping or cupping. I wonder if I should apply some sort of top coat as a sealer against humidity.

Bill Jordan
Andalusia, Alabama

Benches do need a finish. Most people use an oil/varnish blend such as Watco. It's not really much of a film finish, so it doesn't crack when you pound on it. The oil in the finish helps repel water in glue that occasionally drips on your bench. And the finish is easily and quickly renewable every six months or so. Finish the top and underside of the benchtop.

— Christopher Schwarz, executive editor

Can I Use My Planer to Get All My Parts to the Correct Width?

My question has to do with the final dimensioning of wood. After milling the oak for some rails down to ⅝" thick, I ripped them to width on the table saw. I have noticed that when I cut multiple pieces of identical stock, sometimes I get saw marks on the edge, or the wood might have a slight variance in width when laying all the pieces on their edges.

My solution was to joint one edge and then run them all on that edge through my thickness planer.

This provided me with perfectly identical rail stock. I wonder if this is considered "wrong" to do. Should I get perfect rip cuts on my table saw, or is it acceptable to achieve my final width by using a planer?

Rick Schuster
Pittsburgh, Pennsylvania

What you've done is perfectly acceptable. In fact, that's why planers can accommodate 6" stock. Just be sure to take off stock from both edges to minimize warping as tension is released. **PW**

— Christopher Schwarz, executive editor

Compiled by Paul Anthony
Illustrations by Matt Bantly

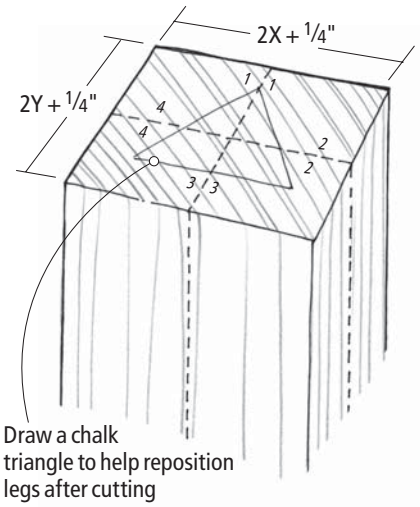
Bookmatching Legs With A Simple Swap and Twist

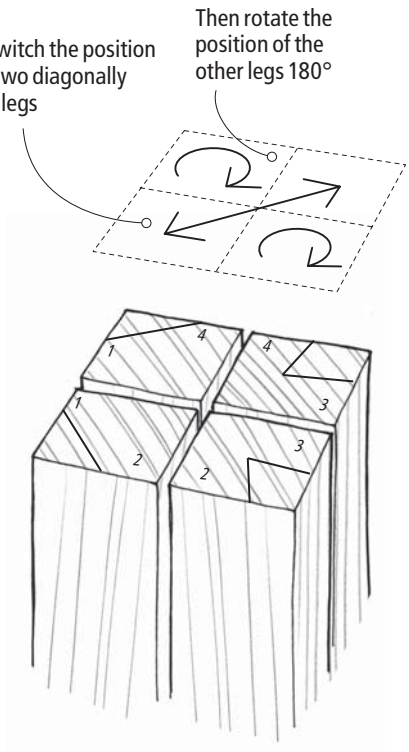
THE WINNER:

Whenever I make a piece of furniture with four identically shaped legs, I arrange them to display bookmatched grain when viewed from any side of the piece.

To accomplish this, I begin with a piece of stock that is the length of the legs and square in section. In thickness and width, the stock should equal twice that of a single leg, plus 1/4" for milling. For best symmetry and harmony, use a piece where the growth rings run diagonally across the end of the piece, which results in consistent bastard grain on every face of each leg. Scrawl a triangle in chalk on one end of the stock, then rip the piece into quarters to make four individual leg blanks.

Using the triangle as a reference, reconstitute the original piece of stock and label the matched faces on the ends of the leg blanks as shown in the drawing. Next, rearrange the individual leg blanks to display the bookmatched faces on the outsides. This is done by switching the position of two diagonally placed legs and rotating the other legs 180°, as shown. If you maintain this relationship of the legs in the piece of furniture, the grain on each pair of legs will be a mirror image when viewed from any side of the piece.





Geoffrey Noden
Trenton, New Jersey

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Cincinnati, OH 45236

A Quick Way to Rout Curved Corners

When shaping the corners of tabletops or shelves, I find that I can do the work quickly and accurately on a router table using a plywood template and a flush-trim router bit. The fences on the template allow for quick, clamp-free registration against the workpiece.

Using 1/2"-thick hardwood plywood, cut your pattern to the desired shape using a jigsaw or band saw. If necessary, smooth the profile with a file or a power sander. Attach two fences as shown below, making sure to keep them back from each end of the curve by a couple of inches so they don't impede the travel of the bit.

To shape the corners of your workpiece, first use the template to trace the curve onto the workpiece, then cut to within 1/8" of the line using a jigsaw or band saw. Install a flush-trim bit with a shank-mounted bearing and adjust the height of the bit so the bearing contacts the template. Holding the workpiece firmly against the template fences, trim the corner to shape, making sure to move the workpiece against the rotation of the bit.

Bill Mitchell
Riegelsville, Pennsylvania

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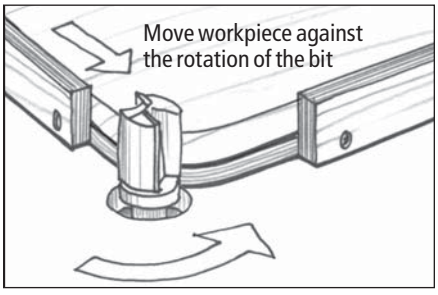
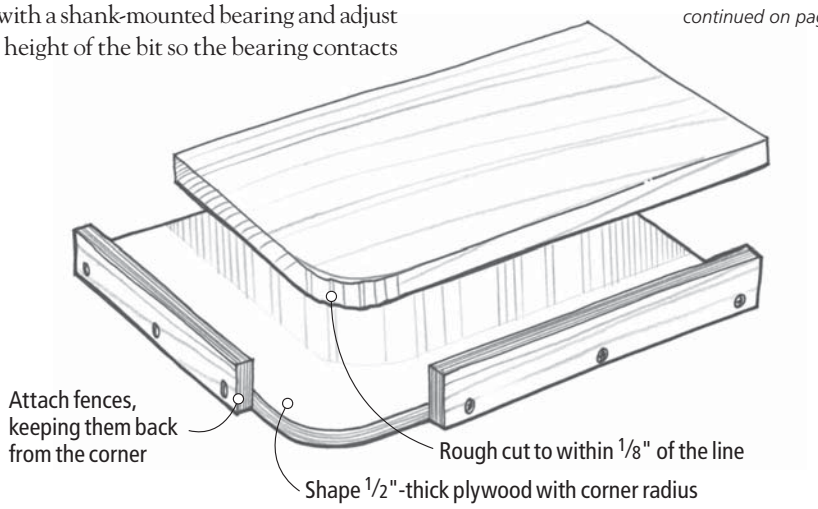


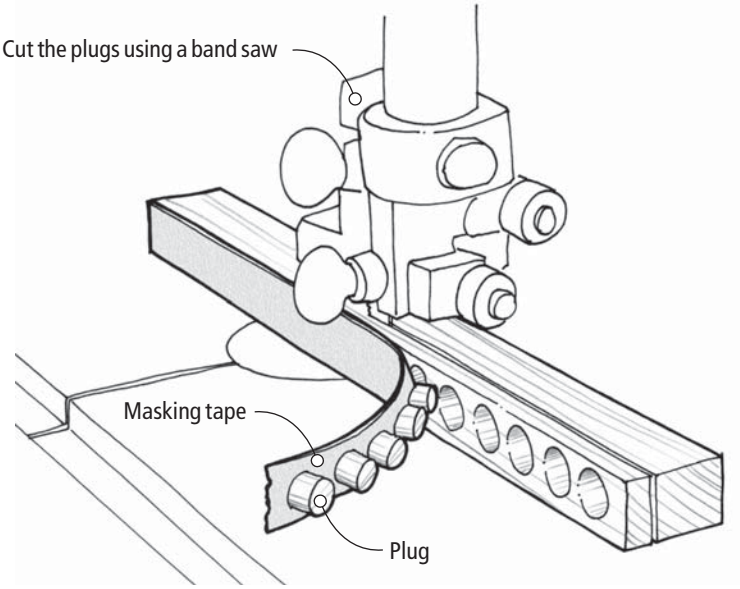


continued from page 19

Preventing Flyaway Plugs

After drilling into the edge of a board using a plug cutter, the plugs must be cut free of the board. Although this can be done on the table saw, it typically results in plugs shooting across the shop like wayward bullets. A better approach is to use the band saw, with its slower, downward-thrusting blade. Even so, it's hard to corral the plugs as they're cut free of the board. To keep the freed plugs from flying off, I affix a piece of masking tape across the edge of the board before sawing the plugs free. If you press the tape down hard on the plugs, you'll end up with a strip of tape holding a line of neatly sawn plugs after the cut.

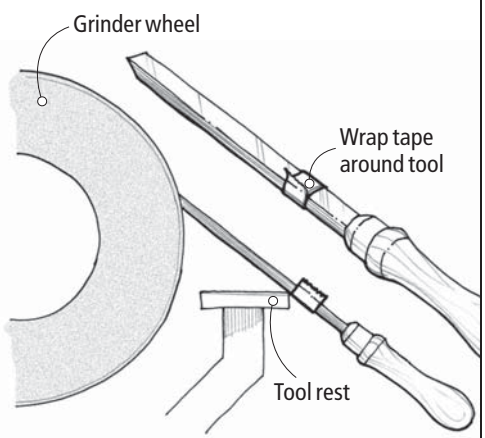
David Huntley
Madison, Wisconsin



Maintaining a Grind Angle

When sharpening a chisel, it's often necessary to remove it from the grinder rest to quench it in water or to inspect the bevel. Unfortunately, it can be difficult to find the same angle again once you've moved the chisel. The solution is to use tape as a reference. Once you've established the proper angle of the blade against the stone and the rest, wrap masking tape or electrician's tape on the blade where it meets the tool rest. That way, you can easily return the chisel back to its previous position.

Wallace Spicington
Birmingham, England



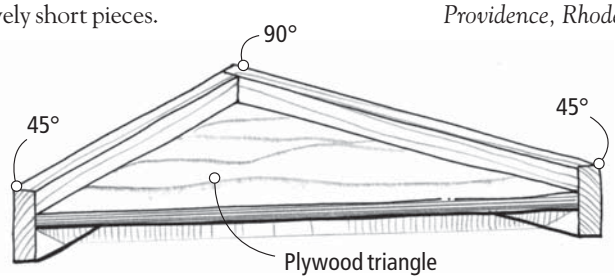
Add a Mitering Jig to Your Crosscut Sled

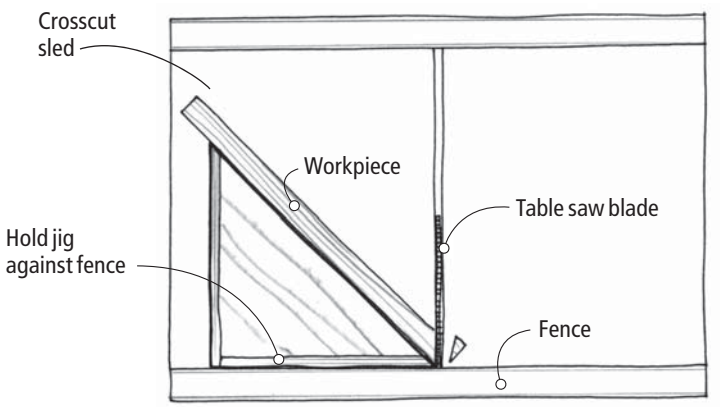
Because of the poor machining, small fence-bearing surface and sloppy fit of my stock table saw miter gauge, I don't use it for crosscutting or mitering. Instead, I made a dedicated crosscut sled for my saw a long time ago, and it works great.

Recently, I had to make a bunch of small picture frames. I didn't have time to build a miter sled for the job, and I realized that I could adapt my standard crosscut sled to miter these relatively short pieces.

So I built a simple mitering jig to use in conjunction with the sled. The jig is simply an accurately cut plywood triangle with two wooden strips attached to the 90° edges to serve as finger grips. To use the jig, I hold the appropriate strip against my sled fence with the workpiece held against the long edge of the jig. To cut the opposing miter, I just flip the jig to the opposite side of the blade.

James Browne
Providence, Rhode Island





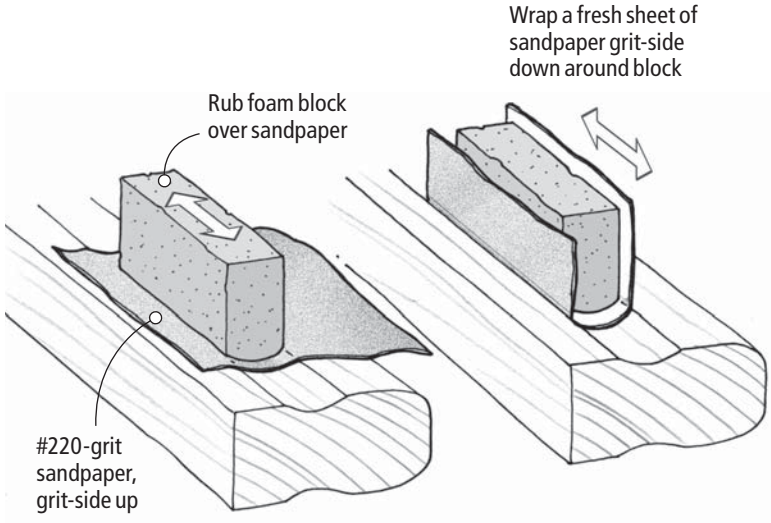
Custom Sanding Blocks for Any Moulding

Hand-sanding curved surfaces on mouldings, handrails and other work is difficult to do efficiently, and it can be brutal on the fingers. I've learned that using a mirror-image sanding block makes all the difference. To make a sanding block that you can shape to suit your needs, begin with a thick piece of rigid foam insulation (available at home-supply stores) or Styrofoam you saved from the packing material around your latest piece of stereo equipment. The block should be as thick or wide as the section you want to sand.

To shape the block, first lay a piece of #220-grit sandpaper grit-side up against the surface to be sanded. Then rub the sanding block against the paper in a straight line until it conforms to the shape of the surface, as shown at right. After that, simply wrap a fresh sheet of sandpaper around the sanding block to sand your workpiece, this time grit-side down. It's amazing how much more efficient and comfortable this is than if you use your fingers as a backer.

Linda Denny
Houston, Texas

continued on page 22



continued from page 21

Faster Plane Sole Flattening

For good performance, the sole of a hand plane must be reasonably flat. The typical approach is to rub the plane on an abrasive-covered piece of plate glass that is reliably flat. (When rubbing, always ensure that the plane is in working tension, with the blade installed and retracted.)

One approach is to attach wet/dry silicon carbide paper to the glass using spray adhesive. An alternate method is to sprinkle the glass with lapping powder. The problem with using abrasive paper is that it loses its initial sharpness rather quickly and must be replaced frequently for aggressive cutting. On the other hand, lapping powder (available from Lee Valley Tools, 800-871-8158 or leevalley.com) can easily be replenished, but it will eventually wear a hollow in the glass, thwarting your flat reference surface.

I've found that the best approach is to combine the two techniques. I begin by using #100-grit paper, lubricating it with water as I rub the sole on it. As the abrasive loses its bite, I simply add #80- or #90-grit lapping powder to it as necessary, along with a bit more water. The result? An aggressive cutting surface that doesn't hollow out in use.

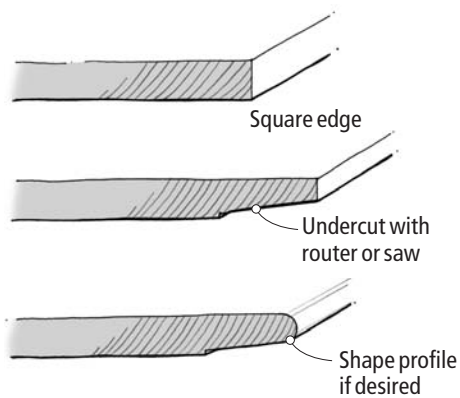
Paul Anthony
Popular Woodworking *contibutor*

Lighten the Look Of Tabletops

There are times when a tabletop needs to be thick and substantial, such as a trestle tabletop that lacks a supporting apron. However, a thick top can adversely affect the proportions of the table, making it look clumsy and top-heavy. A simple fix is to thin the underside of the edges. When viewed from above, this makes the top appear a lot less thick.

Thinning the edges can be done with a panel-raising bit in a router table. Because you're removing a fair amount of wood, take several light passes, removing no more than 1/8" at a time. If available, use a variable-speed router run at a slow speed. Alternatively, you can bevel the edges on a table saw, feeding the top on edge against a tall auxiliary rip fence, then clean up the cuts by hand planing or sanding.

William English
Avon, New York

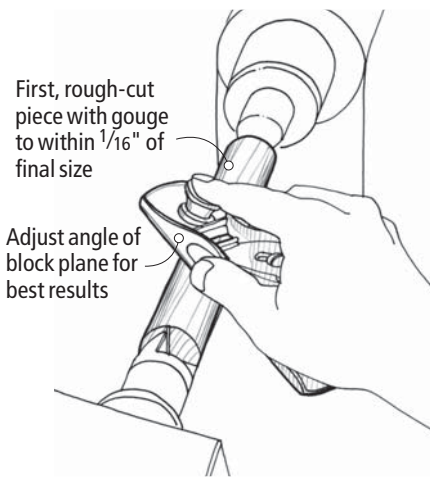


Planing a Cylinder On a Lathe

Because of its straight sides, turning a cylinder on the lathe can be more challenging than turning a complicated shape. A block plane can come in handy for the final smoothing and straightening of the cylinder. After rough-turning the blank with a roughing gouge, I use a finish gouge to turn the cylinder to within 1/16" of its final diameter. Then I set a block plane for a fine cut and hold it diagonally against the spinning workpiece as I plane along its length to smooth it.

Play with the angle of the plane as you work. The more parallel the plane is to the work, the straighter the results will be, but the more difficult the cut is. A more perpendicular approach will yield an easier cut, but it's one that might not be as straight.

Charles Brightson
Worchester, Massachusetts



Spray Your Screws For Easier Driving

I recently did a stint assembling Adirondack chairs with galvanized screws. To make the screws insert more easily, I dumped them into a coffee can and sprayed them with aerosol furniture polish, shaking the can while spraying to coat the screws thoroughly. Once the polish dried on the screws, they drove in smoothly and quickly with less effort. No problems with screw heads snapping off, and my drill batteries last much longer. **PW**

Steven Zawalick
San Luis Obispo, California

Lie-Nielsen Chisels: Best in the Western World

Woodworkers are of two minds when it comes to buying chisels – some would consider $250 for a set of five to be outrageously expensive; others have spent a lot more than that to buy one Japanese chisel.

No matter which camp you're in, the new Lie-Nielsen chisels are tools to be reckoned with. They are based on the classic Stanley 750 socket chisels (circa 1930-1969) with some important differences.

The Lie-Nielsens are cryogenically treated A2 steel with American hornbeam handles. Without a doubt, these are the most balanced and finely finished chisels I have ever used. The handle pattern makes them ideal for both paring and light chopping, a rare quality in the chisel world.

The bevels on the edges are perfectly ground close to the faces, making them perfect for cleaning out the waste between dovetails without dinging the joints' tails.

Of course, most woodworkers want to know how durable the edges are. So I spent three days testing the Lie-Nielsens against new Western chisels from Ashley Iles ($25 – all prices are for one chisel), Barr ($80), Marples ($11) and Sorby ($33). Among Japanese chisels, I tested Matsumura blue-steels ($50), a dovetail chisel from Nishiki ($63) and a "presentation" chisel from Nishiki ($161). I also tested a vintage 750 and an early Buck Brothers.

After much chopping and paring, the only chisels as durable as the Lie-Nielsens were the more expensive and more uncomfortable Barr and Nishiki dovetail chisels. All three stayed sharp through tremendous abuse.

The Lie-Nielsens are being sold as a set of the five basic widths. Other sizes will be added shortly, as will mortising chisels.

For woodworkers who want to buy one set of chisels in their lifetime and be done with it, look no further. — *Christopher Schwarz*

For more information, circle #155 on Free Information Card.

SPECIFICATIONS

Lie-Nielsen Bevel-edge Chisels
Street price: $250 for a set of five
Sizes in set: 1/8", 1/4", 3/8", 1/2", 3/4"
Length: 9 1/8"
Performance: ●●●●●
Price range: $$$
Lie-Nielsen Toolworks: 800-327-2520
or lie-nielsen.com

Grizzly's Tricked-out Contractor Saw is a Real Bargain

Usually when you're shopping for a "bargain" contractor saw, you end up sacrificing features such as cast-iron wings, a quality rip fence and a motor with real guts. Grizzly feels your pain, and the company has designed the G0444Z to make everything better.

For about half of the typical cost of a premium contractor saw, you get two solid cast-iron wings, a front-locking T-style rip fence and a 2-horsepower motor.

Add to this beefy cast-iron handles, a miter gauge with an adjustble-width bar that you can actually trust to make a square crosscut and an oversized "on/off" switch that's conveniently located and easy to find.

Grizzly also included a 4" dust hood panel at the bottom of the saw for easy connection to your dust collector. Another nice addition is a quality throat insert (and a second insert for use with dado stack sets). And you can store your tools, miter gauge or fence right on the saw with some nice hanging hooks.

There are some sacrifices, though. The saw is shipped without a blade, and while this upsets us, we think it's better than sending a substandard blade. The guard, while of good quality, is lacking an easy-on/easy-off mechanism that would make it convenient to use. (Other saws we've seen are similarly lacking.)

In testing, we noted that even with the height wheel locked in place, we were able to raise and lower the blade with some effort. This gave us concern about the arbor's height changing during a tough cut. But after cutting a 5/8" x 5/8" dado in white oak with a dull dado stack, we put that worry to rest – the arbor stayed put.

While that was an extreme test, we also made some test cuts with a general purpose blade (a good blade, which is a good use of the money you saved on the saw) and were pleased with the results. Ripping a 2"-thick white oak board, for example, didn't cause the motor to pause at all.

So don't sacrifice performance for economy: Take a good long look at Grizzly's newest (and best) contractor saw. — *David Thiel*

For more information, circle #156 on Free Information Card.

SPECIFICATIONS

Grizzly G0444Z Contractor Saw
Street price: $525 (plus shipping)
Motor: 2hp, wired for 220V
Rip capacity: 30"
Fence: Shop Fox, T-style
Weight: 298 lbs.
Performance: ●●●●◐
Price range: $$
Grizzly Industrial: 800-523-4777
or grizzly.com

ProTop Gets an Upgrade

We've always been big fans of Bench Dog's ProTop router table, and with some recent upgrades we like it even more.

First, the cabinet is now made of a high-density plywood rather than laminate-covered fiberboard. This adds a great deal of strength and material stability to the case.

The cabinet rests on rubber feet to keep the unit from moving during operation. And if you want to mount the table permanently, the feet are hollow and allow access to the threaded T-nuts for easy attachment.

Then there's the top. Bench Dog moved the location of the bit closer to the front edge for more stability when using a miter gauge. A new second set of fence attachment slots allow you to turn the fence around and use the larger rear surface of the table for routing large panels, which is a plus.

Last but not least, the support system for the insert plate is now a pair of steel brackets, adding strength to protect against the table warping and adding a more solid mounting point for the eight height-adjustment screws. All this, and the new version costs only a few dollars more. Good Dog! *— DT*

For more information, circle #157 on Free Information Card.

SPECIFICATIONS

Bench Dog ProTop
Street price: $240
Size: Top - 16" x 24"; inside - 15" high
Weight: 46 lbs.
Performance: ●●●●○
Price range: $$$$
Bench Dog: 800-786-8902
or benchdog.com

TopSaver Takes Care of Rust – and Your Machines

Getting rust off your machines is half the battle. Keeping it off is the other, and Empire Manufacturing's TopSaver tackles both. It's a combination rust remover-lubricant-sealant-conditioner for all your metal surfaces.

The TopSaver System comes with one 8-ounce bottle of fluid, one set of disposable gloves, two abrasive pads (coarse and ultra-fine) and four cotton towels – everything you need to protect your machines.

To test this product, we took a rusted and encrusted table-saw wing outside (good ventilation is needed with this product), sprayed a liberal amount of fluid onto the wing and rubbed it in with the abrasive pads as per the instructions. This turned the entire wing brown, but after wiping the surface clean and drying it, all the rust had been removed. There was still some evidence of tarnishing and discoloration, which we attributed to the long period of time we waited before cleaning the damaged wing.

Next, we wanted to see how well TopSaver would prevent rust. We left the wing outside for a few days in early April – after 48 hours, it was holding up nicely; after 72 hours, well, we got a little rain, so the rust reappeared. But another quick cleaning with TopSaver and the piece was back to its old self.

— Michael A. Rabkin

For more information, circle #158 on Free Information Card.

SPECIFICATIONS

Empire TopSaver System
Street price: $20 for 8 oz. system pack; $15 for a refill 8 oz. bottle; $90 for a gallon
Performance: ●●●●○
Price range: $$$
Empire: 866-700-LUBE (5823)
or empiremfg.com

NEW TITEBOND III GLUE

The new Titebond III is supposed to be waterproof, not just water-resistant like the great Titebond II. To test this, we exposed a panel made using the new glue to the rigors of water, heat and steam in a dishwasher. For comparison, we also made panels using interior-grade Elmer's Carpenter Wood Glue and Gorilla Glue brand polyurethane glue.

The results were impressive. As expected, the Elmer's glue joints failed during the first dishwashing cycle. The boards glued using Titebond III and Gorilla Glue were as sound as before the test, if a bit waterlogged. After five more cycles in the dishwasher, neither the Titebond III nor the Gorilla showed any signs of giving up at the glue line.

Titebond III offers higher bond strength (4,000 pounds per square inch), longer open time (10 minutes) and lower working temperature (47°) than Titebond or Titebond II. The glue sands easily without softening, cleans up with water, passes the glue industry's test for water-proof glues and is approved by the FDA for indirect food contact. *— Steve Shanesy*

Street price: $14 for a quart
Performance: ●●●●●
Price range: $$
Titebond: 800-877-4583 or titebond.com

For information, circle #159 on Free Information Card.

TOOL RATINGS

Performance is rated on a one-to-five scale. You won't see a low rating ("one" or "two") because we don't publicize inferior tools. "Five" indicates the leader in the category. Five dollar signs indicates highest price in the category; three indicates an average price. If you have tool questions, call me at 513-531-2690 ext. 1255, or send me an e-mail at david.thiel@fwpubs.com.

— David Thiel, senior editor

Lock Joint Holds Drawers Tight

A good substitute for traditional methods, this joint is strong and easy to make.

A couple of hundred years ago, most drawers were assembled with hand-cut dovetail joints – half-blinds up front, through dovetails at the back.

But it's the 21st century now. Many of us don't have time to hand-cut dovetails. We want something that can be cut fast, assembles quickly and, of course, will stay strong.

The drawer-lock joint is just the ticket. It has an interlock that holds the front and back to the sides and it resists the main stresses administered to a drawer – tension, compression and racking. The finished drawer might not have the pizazz of one assembled with dovetails, but it goes together a whole lot faster.

Photos by the author

Two ways to cut a drawer-lock joint: The joint at top was made using a drawer-lock bit; the one at bottom was made using a miniature glue-joint bit. Both are strong and quick to make.

The Best Bit to Use

While the routed drawer-lock joint can be produced with two kinds of bits, I am going to focus on the more familiar one, which I call the drawer-lock bit.

This bit is about 1¾" in diameter with a low body (about ½" high). Each cutting edge has a protruding tab to cut a single dado.

The other bit you can use is a miniature glue-joint bit. It's smaller in diameter (about 1") and the body is taller, about ¾". It's designed to produce a routed glue joint on thin stock. While the joint produced is stronger, thanks to the extra shoulder it produces, and it can also cut a glue joint on solid-wood stock, I prefer the drawer-lock bit. It's easier to set up and will cut all the joinery you need to make a drawer, including the groove you need to hold the bottom in place.

Two bits will cut a drawer-lock joint. The miniature glue-joint bit (left) is less flexible on stock thickness but produces a joint with more interlock. The drawer-lock bit (right) is more flexible in terms of the thickness of wood it works with. It cuts joints for both bottoms and corners.

Neither bit has a pilot bearing, so you must do the work on a router table using a fence. Because the bits are small, you can use either in a low-powered router run at full speed.

Both bits work the same way. One height setting is used for all cuts. The fence is used in one position for the fronts and backs, and in a slightly different position for the sides.

by Bill Hylton

Bill is the author of several books about furniture construction and router operations. When he isn't writing about woodworking, he's doing it in his home shop in Kempton, Pa.

Setting Up the Drawer-lock Bit

Start by setting the bit about ⅜" to 7/16" above the tabletop. As you slide the fence into position, either adjust its facings for zero clearance or apply a strip of ⅛"-thick hardboard to it (put the hardboard in place with the bit running so it cuts through, creating your zero-clearance opening).

Adjust the fence so it's tangent to the bit's small cutting diameter – just the tab should protrude from the fence.

Make cuts in the edges of two pieces of your stock, turn one over and fit the two together. While the pieces won't be flush, the interlock should be nice and tight (as shown in the photo at the top of page 28).

If the fit is too loose, raise the bit to tighten the joint. If the fit is too tight, lower the bit. After each adjustment, make additional test cuts to check the fit.

The only subsequent alteration you'll need during setup is to shift the fence back when

you cut the fronts and backs to expose more of the bit. Use a piece of the side stock as a gauge. Hold it on end against the fence and move the fence until the protruding tab is flush with the exposed face of the stock.

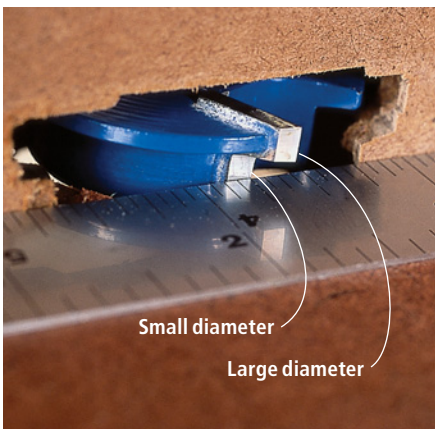
It's easy to move back and forth between cutting sides and cutting fronts or backs. Check out the series of photos below to see how I make these cuts.

Cutting the Joinery

Before cutting the joinery for your drawer parts, mill your stock to the final thicknesses and lengths. To determine how long to cut the pieces, especially the sides, make sample cuts in scraps of the working stock.

The thickness of your stock will have an impact on this. If you're using 1/2" stock, for example, the sides generally will be about 1/8" shorter than the desired drawer length (front to back). Figure out what it's going to be before crosscutting the parts and routing the joinery. A workable routine is this:

- Rout the sides. To cut a side, stand it on end with the inside face against the fence and slide it past the bit. Cut one end, then the other. I've never found a tall fence to be necessary, nor do I bother with featherboards. If you're more comfortable with these accessories, feel free to use them.
- Rout the fronts and backs. First, adjust the fence position. The workpiece will rest flat on the tabletop with its end butted against the fence. A square scrap used as a back-up block helps keep the work moving squarely and smoothly along the fence.



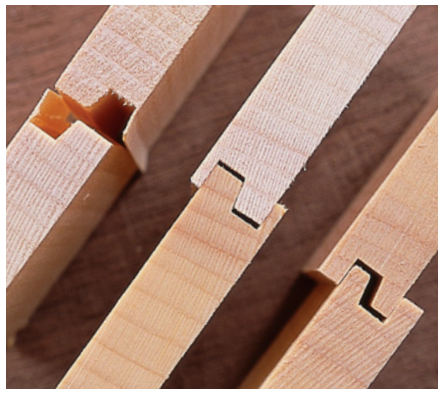
To rout the sides, set the fence tangent to the small diameter of the bit, leaving just the tab protruding. Check the setting with a rule.

If you're using a miniature glue-joint bit, tweak the fit by adjusting the height of the bit. The point where the front meets the side must be tight.

Bear in mind here that the thickness of your stock doesn't impact the joints' fit. You can mix 3/4"-thick fronts with 1/2"-thick backs, routing all with the same setup.

- Rip the parts to their final widths.
- Rout the groove for the bottom. Return the fence to the place used to cut the sides. Position the inside face of each part against the fence and cut from end to end with the drawer-lock bit just as it is set. This groove won't be visible after assembly.
- Mill the bottom so it fits the groove. Keep the bit and fence setting as they are. The 1/4" bottom should be face-down on the tabletop as you cut this rabbet.

Stand a side on end, braced against the fence, and feed it past the bit. The zero-clearance tabletop and fence surfaces minimize tear-out and prevent catches in the work's movement.

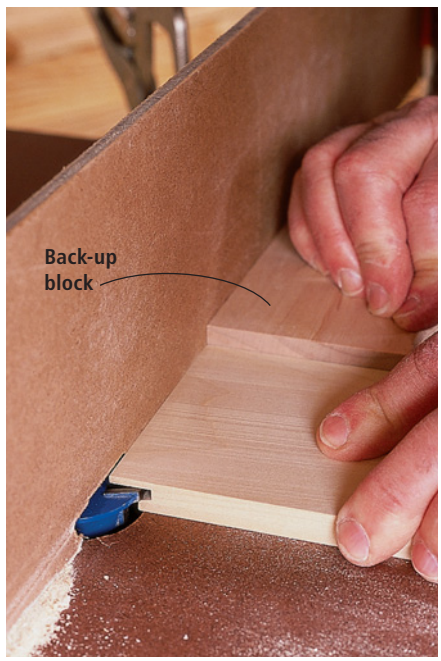


Test cuts, made with the stock flat on your tabletop, help you zero in on the correct height setting of the drawer-lock bit. If the samples won't mesh (top), the bit must be lowered. If they are gappy (bottom), the bit must be raised. When the setting is right (center), the joint closes tight.

Putting it All Together

Assembly is pretty straightforward. After doing a dry fit, apply glue to the joints and put the parts together. I glue a plywood bottom into place, regardless of the stock used for the sides, front and back.

In keeping with the "make 'em fast" mindset, I've taken to shooting two or three brads into each joint. Glue holds the parts together,



Lay a drawer front or back flat on the tabletop, its end butted against the fence, then feed it past the bit. A back-up block minimizes tear-out and helps keep the workpiece square to the fence.

With the drawer bottom face-down on the tabletop, rout all four edges. The rabbet will fit the bottom to the grooves cut for it in the fronts, sides and backs using the same bit.

but the brads eliminate the need to clamp up each drawer, saving a lot of time.

To do this, first join a side to the front. Then set the bottom into its grooves and add the back. Next, drop the second side into place. Check for square, shoot brads into the two remaining corners and your drawer is assembled and ready for fitting.

If you don't have a pneumatic brad nailer, you can use masking tape to "clamp" small drawers. But if you're making larger drawers, you ought to use parallel-jaw clamps or bar clamps. Just apply pressure from side to side; front-to-back clamping is unnecessary.

In the end, when the drawer is fitted to the case, shellacked and loaded up with whatever you've decided to store there, it'll perform as well as the ones you devoted hours crafting with dovetails. And the proof is in the performance, right? **PW**

The drawer-lock joint works on inset drawers with integral fronts (shown here) as well as on drawers with lipped false fronts.

Veritas Low-Angle Smoother

A well-made, versatile plane that's a great value.

Photo by Al Parrish

When Stanley manufactured the No. 164 low-angle smoothing plane from 1926 to 1943, it was intended mostly for working on end grain, butcher blocks and the like.

These planes didn't sell too well, so you might wonder why modern planemaker Veritas decided to introduce its own version in 2002. The truth of the matter is that the Veritas Low-Angle Smooth Plane is much better made than the vintage Stanley. The body castings are thicker, the blade is beefier and the blade-adjustment mechanism is simpler to operate and more versatile. On top of that, modern woodworkers have learned how to customize these tools easily to make them ideal for any smoothing task.

Unlike in a bench plane, the iron in a low-angle smoothing plane sits in the body with the cutting bevel facing up, similar to a block plane. With the iron factory-ground at 25°, the tool is ideal for planing end grain, trimming miters and smoothing face grain that's straight. Boards with tricky grain are a problem in this stock configuration, but if you simply grind the bevel of the iron to 38° or steeper, you can create a higher cutting angle that makes this tool ideal for smoothing the trickiest face grain out there.

In fact, you can make this tool do the work of several planes by purchasing a few replacement irons ($21.50 each from the manufacturer), grinding different cutting angles on them and swapping them out when your work demands it. (Lee Valley Tools now offers replacement irons for this tool ground at 38° so you don't have to do it yourself.)

ABOUT OUR ENDURANCE TESTS Every tool featured in our Endurance Test column has survived at least two years of heavy use in our shop here at *Popular Woodworking*.

Once I started experimenting with different grinding angles 20 months ago, the Veritas Low-Angle Smooth Plane became one of my favorite tools.

The plane's body is made using indestructible ductile iron, so the plane will survive a fall to a concrete floor. The sidewalls are ground square to the sole of the tool, which makes the plane ideal to use with a shooting board to trim the end grain of parts.

The rosewood handles are quite comfortable to hold for long periods of time. I especially like the fact that your fingers aren't jammed in behind a big frog assembly, as they are with a standard bench plane.

Another big plus with this tool is that the mouth of the plane can easily be closed up tight thanks to an adjustable toe piece similar to what you find on a block plane. You simply turn the front knob to loosen the toe piece, move it where you want it and turn the knob back to lock your setting. My only quibble with this system is it's almost too easy to move the toe. In the last couple of years I've had it slide back unexpectedly and strike my freshly sharpened iron. Officials with Veritas say they have a solution in the works for the next generation of this tool.

SPECIFICATIONS

Veritas Low-Angle Smooth Plane

Street price: $159

Nice features: Well-constructed hand plane can be configured for a variety of uses. An excellent value among premium planes.

Recommended modifications: I wish the toe piece didn't move so freely. The tapered sides of the iron make it difficult to sharpen in some honing guides.

Lee Valley Tools: 800-871-8158 or leevalley.com

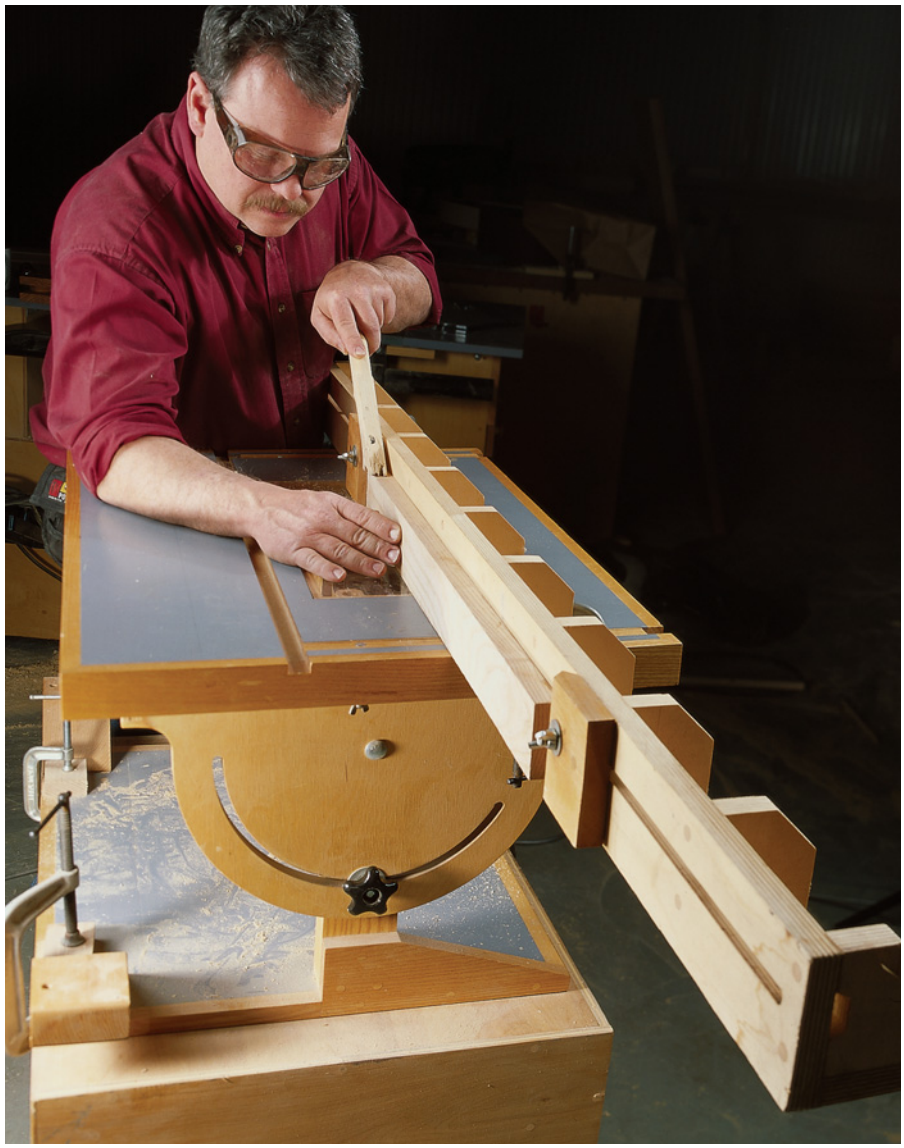
My only other gripe with the plane is that the sides of the A2 iron aren't parallel – they taper so the iron is narrower at the back. This makes it difficult (and sometimes impossible) to secure it in common side-clamp honing guides. The sides have to be tapered to allow you to laterally adjust the iron to get a perfectly square cut.

Those minor quibbles aside, the Veritas Low-Angle Smooth Plane is an impressive tool, and one I frequently recommend to woodworkers who are getting started in exploring hand planes. You'll be hard-pressed to find a better all-around premium hand plane for the price. **PW**

— Christopher Schwarz, executive editor

Stopped Cuts Made Easy

This extra-long mortising fence helps you cut "blind" joints in your work.



Photos by Al Parrish

Routing stopped or "blind" cuts is much easier when you build a fence with adjustable stops.

Cabinets and furniture often have "blind" joints – dados, grooves or rabbets that are stopped at one end so you can't see the joint on the outside of the case. Sometimes these joints are "double-blind," meaning they are stopped at both ends. A mortise is a perfect example of a double-blind dado or groove.

The key to cutting a blind joint accurately is to stop the cut precisely at the right point. To make a double-blind joint, you also must start the cut precisely.

That's where a mortising fence comes in handy. This is a long fence that can be clamped to your table saw, router table, drill press or mortiser. It has two stops – one to start the cut and the other to stop it.

Making the Fence

There are just five kinds of parts to the fence – the base, the face, the braces to hold the face square to the base, the stops and the dowel pins to keep the stops aligned.

The face is slotted and the braces are notched for the carriage bolts that hold the stops in place. Rather than rout this slot in a single board, I instead made the face from two pieces of wood, glued together with ⅜" x ¾" x 1" spacers between them at the ends.

To make the fence as true as possible, I jointed the face square to the base after it was assembled. I made the face, base and braces from cabinet-grade plywood. Then I glued the pieces together, using no nails or screws. I made sure to let the glue cure for 24 hours before I trued the assembled fence's face by passing it over the jointer. (I recommend you make your fence's face from hardwood, which is easier on your jointer's knives.)

The stops are beveled on the business ends, which keeps sawdust from building up between the work and the stop, interfering with the accuracy of the cut. Bevel the end of the stops so they come to a point. Each stop gets two ⅜"-diameter holes – one hole for the alignment pin and one hole for a bolt to hold the stop in place during use.

by Nick Engler

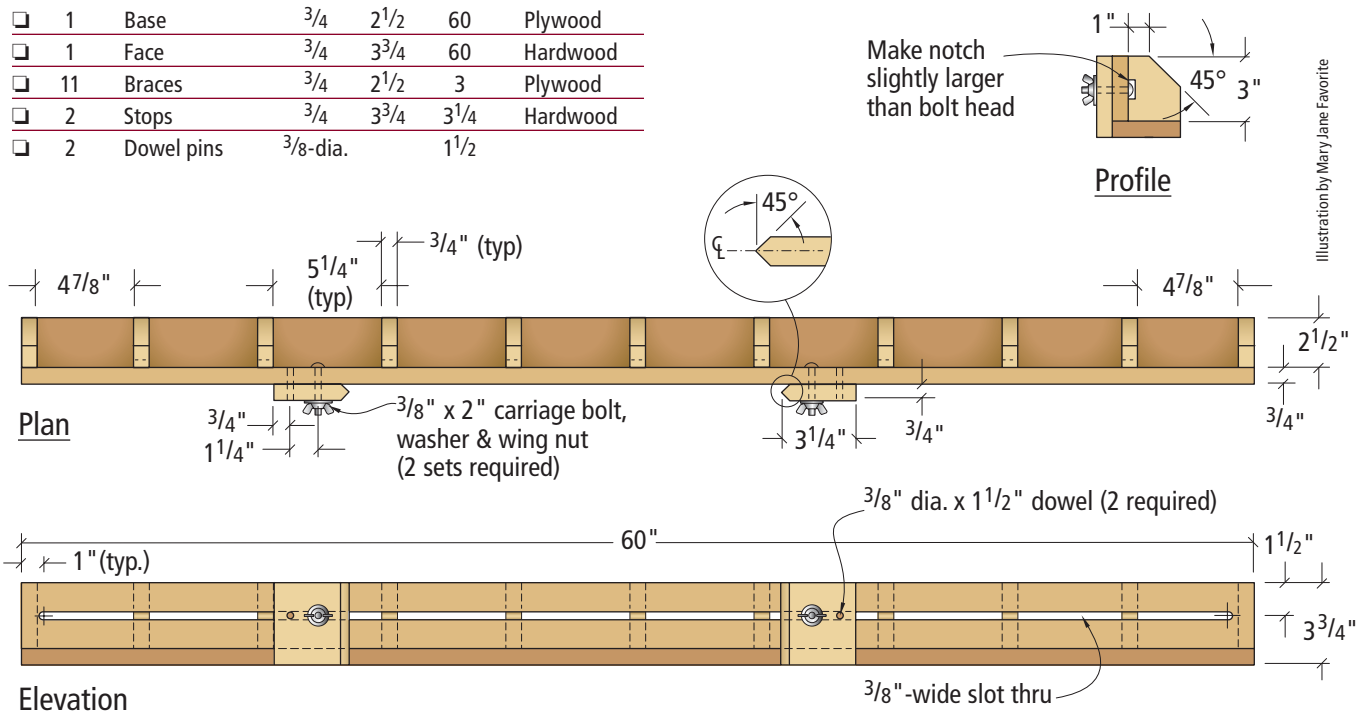
Nick, author of more than 50 books on woodworking, has built and flown a replica of the 1903 Wright Flyer, the first true airplane. He is now working on the 1905 version.

Using the Fence

How you use the fence depends upon the joint you're cutting and the tool you're cutting it with. If the joint is blind on one end, remove one stop and set the other to halt the work when the cutter reaches the desired location. I usually set up my fence so the cutter stops a hair short, then I finish the cut with a chisel. Because blind joints typically have squared ends and most cutters leave a curved end, you have chisel work to do anyway.

EXTRA-LONG MORTISING FENCE

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	1	Base	3/4	2 1/2	60	Plywood
❑	1	Face	3/4	3 3/4	60	Hardwood
❑	11	Braces	3/4	2 1/2	3	Plywood
❑	2	Stops	3/4	3 3/4	3 1/4	Hardwood
❑	2	Dowel pins	3/8-dia.		1 1/2	

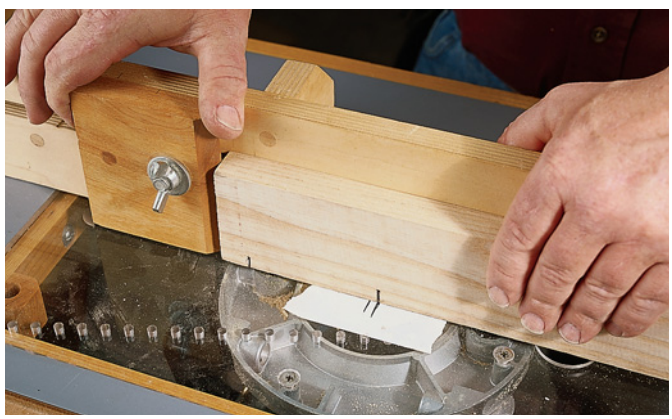


To make a mortise or a double-blind joint, use the second stop to start the cut at the desired location. Place the end of the work against the stop and slowly lower the work on the cutter. To avoid kickbacks and add accuracy, cut the joint in several passes.

Because router bits and dado blades cut the underside of the wood, you can't see the cut as it progresses. To compensate for this, mark the cutting diameter of the bit on the table as shown in the photo below.

Transfer the layout lines that mark the joint's blind ends to a surface on the board that will be visible when you make the cut. This surface must be adjacent to the indicator lines on the table. To monitor the progress of the cut, watch the layout lines on the wood as they move between the indicator lines. **PW**

To rout a mortise or a similar double-blind joint, put a piece of masking tape on your router table just in front of the spot where the work will pass over the bit. Using a small square, mark the diameter of the bit on the tape. The line to the left (as you face the fence) is your starting point; the line to the right is the stopping point.



Using the square again, transfer the layout lines that indicate the ends of the mortise to the surface of the wood. Lower the router bit below the table surface and align the starting end of the mortise with the starting point on the tape. Slide the right stop against the end of the work and tighten the wing nut that secures it to the fence. Slide the work so the other end of the mortise aligns with the stopping point on the tape and set the left stop. Raise the router bit and make the cut, sliding the wood between the stops.

Canoe Paddle

A single length of framing lumber will help you hone your skills with a spokeshave, a drawknife and a block plane.

It was a bright summer's day in 1993 at historic Strawberry Banke in Portsmouth, N.H. My wife, Sally, and I were unexpectedly in town and noticed a craft show and demonstrations on the green. The area is famous for such crafts as coopering and building Windsor chairs and wooden boats. I've always been fascinated to watch skilled demonstrators, and this demonstration by boatbuilder Geoff Burke would not be a disappointment.

Burke captivated onlookers while he made a canoe paddle. Here was a familiar object being made with a few hand tools. The material was a straight-grained 2x6 plank of spruce commonly used for residential framing. The time it took him to carve the paddle: less than one hour.

Everyone appreciated the efficiency with which the job was accomplished (not that reducing the blade thickness with a drawknife is easy – it's not). But the key is choosing the right tool for each step of the project, knowing how to put the right tool to use and having an eye for proportion to guide it.

by John Wilson

John first canoed in upstate New York as a Boy Scout. He has taught woodworking and boatbuilding at Lansing Community College in Michigan and the WoodenBoat School in Maine. Currently he operates the Home Shop in Charlotte, Mich., where he teaches woodworking classes and sells Shaker box supplies.

Photos by Al Parrish

But you should be forewarned. A paddle is sculpture in a traditional form and requires a practiced eye for proportion. This is something we're all born with to a degree, and we can develop it with practice. The exact ratio of "birth-given" and "practice-acquired" is a mystery. I have observed a wide range of accomplishment among my boatbuilding students when assigned this task. Most of my students made a functional paddle; few were able to make a graceful one their first time.

Today, paddle blanks stand in a corner of my shop, some cut out, some waiting as a piece of spruce framing. There are a few that are shaped, ready to be sanded and varnished. And there is Burke's demonstration paddle, signed and dated to remind me of that summer day when I was blown away by the accomplishment of tools in the hand of a craftsman with an eye to make something of utility and grace.

HOME SHOP CLASSES

To learn more about paddles and the tools shown here, check out John Wilson's classes at the Home Shop. It is located at 406 E. Broadway, Charlotte, MI 48813. Call 517-543-5326 (8:30 a.m. to 5 p.m. EST). For a class schedule, visit ShakerOvalBox.com.

The following one-day tool and paddle events are a good value at $90, which includes materials and lunch.

- Wood Block Plane Making
  Jan. 15, 2005
- Tool Sharpening
  Jan. 29, 2005
- Spokeshave Making
  Feb. 12, 2005
- Make Your Own Paddle
  March 19, 2005

John also is offering a Wood Block Plane Making class March 12, 2005, in Syracuse, N.Y. Contact John for more information.

Choosing the Right Wood

The best wood for paddles will be stiff, strong and lightweight. Maple or ash are fine for structure, but they are a bit heavy for long use on the water. Spruce is lighter and easier to shape. Sitka spruce is acclaimed, and rightly so, for being strong and light. But the effort required to secure that species is quite unnecessary.

There is a classification of construction framing called SPF, which stands for spruce-pine-fir (in this case "hem fir" or "western hemlock"). All three species designated for this class will work in paddle-making. Black spruce is most prevalent, and perhaps the best of the three. Pine has more flex, while hemlock is a little more difficult to work with hand tools.

The wide availability of residential framing stock at a reasonable price is one of the attractive aspects of this project. What is essential is straightness of grain, followed by clear lengths free of knots. Spruce is bedeviled by small knots, and an occasional pin knot will not significantly affect the paddle. I use a drop of cyanoacrylate glue (such as Hot Stuff) to seal small imperfections.

While you need only a 2x6 plank that is 6' long, you are unlikely to find the best lumber in small sizes of framing stock. The longer (16' to 24') and the wider (10" or 12") the stick, the better luck you will have getting your clear paddle blank. I believe this is because the mills use the better grade of logs for the longest lengths, resulting in some portion of a long joist (in a house) being clear. Buy the long length, cut your paddle blanks from the best portion and use the rest of the wood for some future project.

Layout involves transferring the dimensions from the plans. The centerline with cross lines indicate the major points. Connect the straight lines, then sketch in the curved transitions.

Ten Steps to Making a Paddle

Briefly, here is how the process works: Plane the plank to 1¼" thickness. Trace and cut the silhouette. Block plane and spokeshave all the sides smooth.

Draw lines around the edges to define the center of the paddle and its thicknesses. Thin the paddle's blade using a drawknife and a plane. Shape the handle using a hand saw, drawknife, chisel and plane.

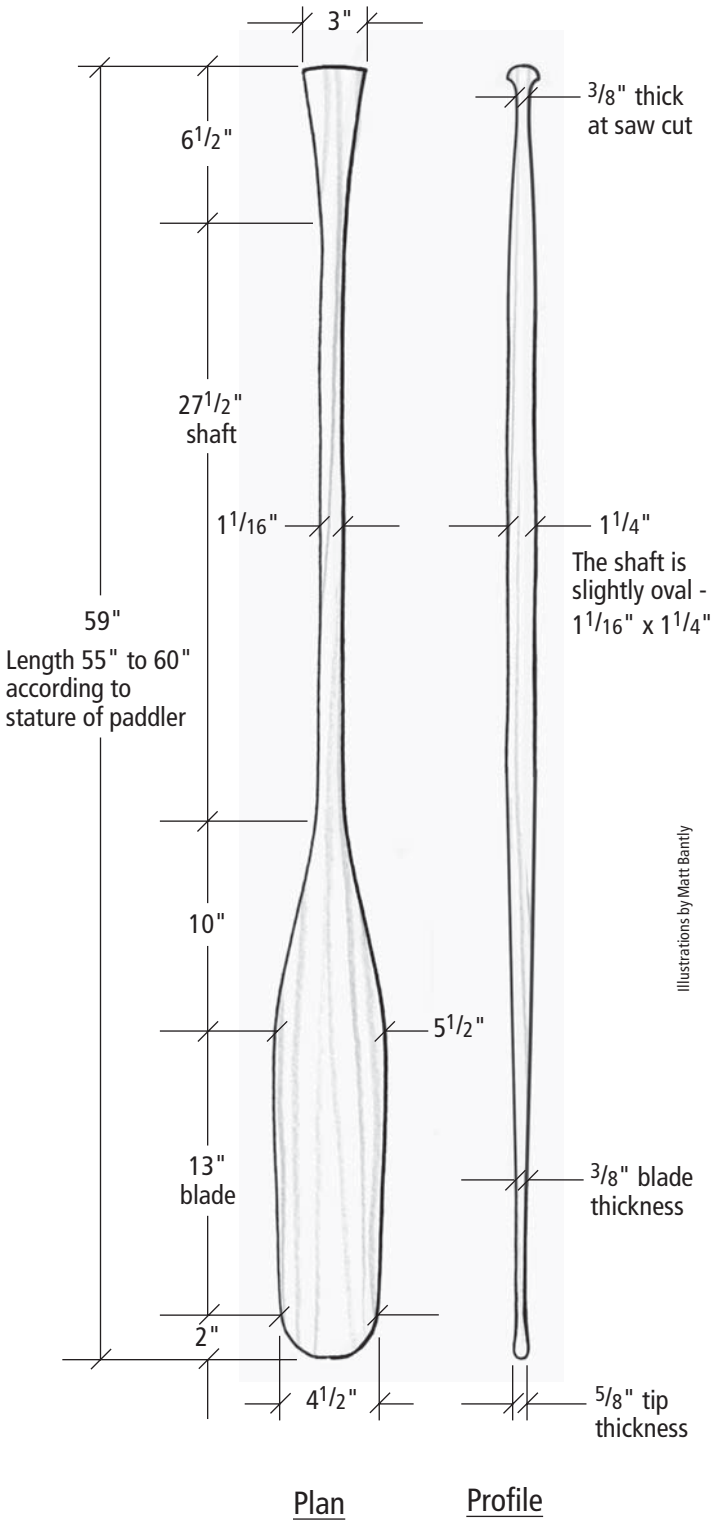
Round the shaft by first making it an octagon. Transition the shaft to the blade and handle with a spokeshave. Smooth the paddle, with a wood rasp and sandpaper. And finally, varnish the paddle leaving the grip unfinished.

Creating a Paddle Blank

Plane your plank to 1¼" thick. Then draw the silhouette of your paddle. It's easiest to trace around an existing paddle, making adjustments in shaft length to fit the intended paddler's height. Paddle length is a personal matter – generally, the paddle should be about chin height.

To follow the plans given at right, start by making a centerline the length of the plank. Next, mark off both ends of the paddle. Mark where the blade and shaft meet, the start of the handle, and the saw kerf on the grip. (See the photo above for details.) Now mark half-widths (use the widths given on the drawing divided in

After planing the plank to 1 1/4" thick, band saw the paddle blank to shape.



half) on either side of the centerline for the blade at its narrower and wider parts, the shaft and the grip. Then connect your marks to outline the paddle. Use a straightedge for the main lines and sketch in the curved parts.

Cut out the paddle blank on the band saw as shown above. Use a block plane to smooth and fair the edges. Check your work by holding the paddle at arm's length to see if you have a fair outline.

Spokeshave-friendly Project

You will need a spokeshave to smooth the hollows. There will be several places where this traditional tool comes in handy, mostly at transitions from one shape to another. These transitions can be troublesome. You could use a variety of rasps and sanders, but the traditional spokeshave is the tool of choice.

According to some historical accounts, the spokeshave got its name from its use in transitioning wheel spokes from the square hub end to the round section. You will find this tool indispensable for making the transition from the handle to the shaft and from the shaft to the blade.

It is worth your time to buy an effective spokeshave (see "Three Traditional Hand Tools Plus One Hand Skill" on page 39). Because of the absence of wooden wheels these days, a good spokeshave is

Smooth all the paddle's edges with a block plane. If any lines don't look fair to you, planing can make them so.

Using your pencil held as shown, trace a centerline on all edges.

hard to find. Therefore, they've fallen into disuse – many craftsmen have become frustrated having used bad ones.

You will need a spokeshave with a slight curve to the sole, not a flat one. Some of the best ones are the traditional wood-handled types with a blade flat to the sole, sometimes called razor-type spokeshaves. Another useful spokeshave has a concave sole, which makes it ideal for rounding the shaft of the paddle.

Defining the Paddle's Shape

It is important that the shaft be rounded last because as long as it remains square, you can capture it in the bench vise as you shape both ends of your paddle.

When the silhouette is fair and smooth, trace a centerline on the edge of the blank all around your paddle. Next, trace lines on the edge to show the 3/8" blade thickness, the octagonal edges of the shaft and the location and depth of the cut for the saw kerf at the grip. The profile view on page 35 gives you these lines.

The photo below left shows me tracing a centerline using the woodworker's method – a pencil held effectively between the fingers. If you haven't done this before, give it some practice. It is a great time-saving tip that shows off your skill as a craftsman. See page 40 for more details.

Thin the blade to 3/8" using the drawknife to rough it out and plane it smooth. Burke leaves the tip of the blade about 5/8" thick,

Use a drawknife to rough the blade to thickness. Bevel the edges first as shown, then take down the center. It may be tough using this tool, so try to hold it the way the photo shows. This should ease the struggle a bit.

Use the bench plane to smooth the blade to its final 3/8" thickness. The pencil lines on the edge should give you guidance in this step.

The point of the blade is left thicker (5/8") to reinforce the point where splits are possible.

Saw down to a point on the handle, leaving 3/8" for the grip.

The drawknife removes waste as you approach the saw kerf at the handle.

Chisel a hollow approaching the saw kerf. Beware that two cut lines like this can be difficult to blend smoothly. Before cutting too far, expect to clean it up with a rasp and sandpaper.

which is something that I like. This strengthens the end, which is vulnerable to being cracked.

Shape the handle by first sawing a kerf across the paddle 1½" from the end to a depth that leaves ⅜" in the center. Then drawknife away the wood for 5" along the shaft to meet your cut line. Chisel the handle to meet the cut line. I like to chisel a hollowed cut for a good finger grip.

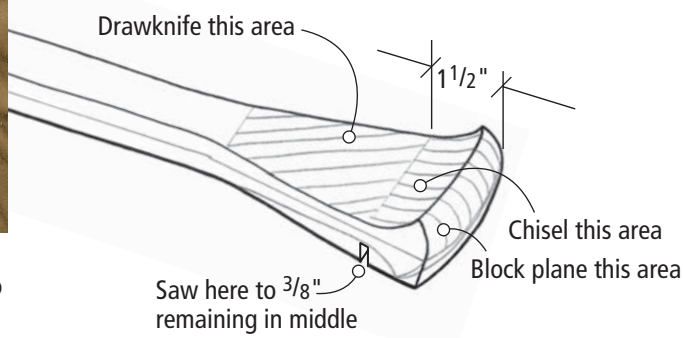
Round the end with a block plane and use a wood rasp (a toothed file) for finishing touches as shown in the drawing below.

The shaft is made slightly oval using a bench plane to first reduce it to an octagon. This will keep it uniform when planing the smaller edges smooth with a block plane and a curved spokeshave.

Use the spokeshave to shape the transition from the shaft to the blade. This versatile tool works equally well pulling or pushing so you can follow the change in grain direction.

Sanding and varnishing completes the paddle. Traditionally, a canoe paddle's handle is left unfinished to give you a better grip on the wood.

I have spent many enjoyable days paddling a canoe with a traditional paddle such as this. Making paddles for your children appropriate to their height is especially meaningful for a parent introducing offspring to the water. **PW**



A block plane will round over a comfortable end. The profile shows well here.

The shaft is planed into an octagon following guide lines.

The block plane will quickly smooth all the edges into a $1^{1}/_{16}$" x $1^{1}/_{4}$" oval, as I'm doing here.

The spokeshave (I'm using a wooden one here) is used to smooth the transition between blade, shaft and handle. It works pulling or pushing to follow the direction of the grain.

A spokeshave with a concave sole, such as this one from Veritas, excels at rounding the shaft of the paddle.

3 TRADITIONAL HAND TOOLS PLUS 1 HAND SKILL

Tools solve problems in wood. Hand tools bought just to collect do not serve you well. But tools bought when you need them will serve many projects to come. Don't hesitate to buy a good hand tool suitable to the task. The tools mentioned here actually stand a chance of being useful in the hands of some future woodworker a century from now.

Drawknife

I owned a drawknife for years without ever putting it to use. There were only two instances when I observed it being used in the hands of a professional. One was in a boat shop where planks along the sheer (the top of the sides where it meets the deck) were being finished off in the gentle curve that makes the profile of the hull. The other was watching Geoff Burke make a paddle that fine summer day. I have since learned that there are several styles and blade treatments for this tool.

Drawknives are made in a variety of sizes for a variety of tasks. The largest drawknife is used for peeling bark from logs. Carvers' drawknives are small. The one shown in this article is referred to as a carpenter's drawknife, and is 12" long with a 7"-wide blade.

As is so often true, the critical point of this tool is the sharpness and angle of the blade. Hogging off rough chunks of wood is not light work. Check the angle of sharpening before use. The tools often are made with an angle of 25° to 30°, which is steeper than necessary and will make heavy going of your work. A finer pitch of 15° to 20° will serve well in the straight-grained softwood of a paddle.

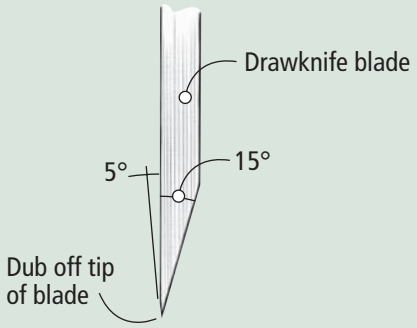
Drawknives are used bevel up for straight cuts. Turned over they will follow contours for shaping. Leonard Lee, in his book "The Complete Guide to Sharpening" (Taunton Press), points to an alternative:

"If you put a 15° basic bevel on a drawknife and dub [a slight bevel on the flat side] from 2° to 5° off the face of the knife, you will find that it is much more maneuverable." (See the drawing of a modified drawknife at right.)

Old drawknives of good quality can still be found at a considerable savings, and they can give you great satisfaction for having rescued a very useful tool.

For a new drawknife contact Ray Larsen, author of "Tool Making for Woodworkers" (Cambium Press). He has been forging quality tools for more than 30 years. Call 781-826-8931 or visit windsorchairresources.com.

continued on page 40



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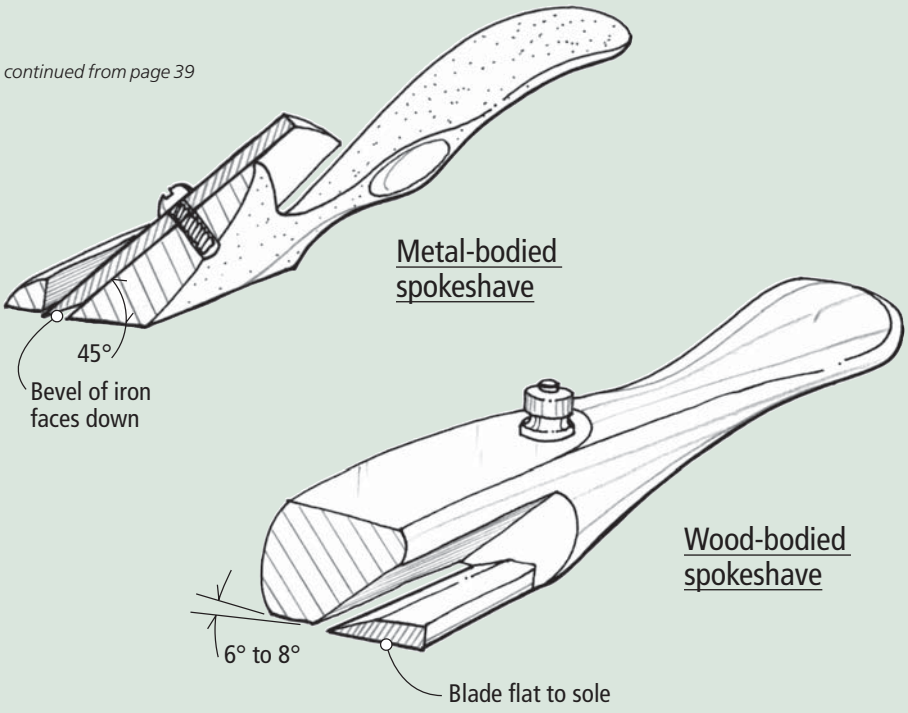


Spokeshave

This is a short-soled plane used for smoothing hollows that typically appear when transitioning from one shape to another.

Modern versions of the spokeshave have a metal body holding the blade at an angle to the sole similar to a plane. They come with a flat sole like a conventional plane for flat work or outside curves, with a convex curved sole for shaving inside curves, or with a concave sole. Two high-quality versions of this concave-soled tool should be available from Veritas (Lee Valley Tools, 800-871-8158 or leevalley.com) and Lie-Nielsen Toolworks (800-327-2520 or lie-nielsen.com) by the time you read this.

The traditional spokeshave had a wood body and the blade lying flat to the sole. They are sometimes called razor-type shaves, identifying the shape of the blade, which looks like a traditional straight razor. The change in blade angle makes the modern version less effective for many cutting operations. The flat position of the razor-type blade makes it easy to work with.

The traditional wood-bodied shaves have a 6° to 8° bevel in the sole ahead of the cutting edge. This allows for making hollows, while the blade slices into the wood at no angle at all. (Check out the "Tool Reviews" link at popwood.com or see the April 2004 issue of *Popular Woodworking* for a review of metal-bodied spokeshaves, and the November 2003 issue for information about traditional wood-bodied razor-type spokeshaves.)

Following are sources for spokeshaves:

• Dave Wachnicki (603-356-8712 or ncworkshops.com) has been making shaves for chairmakers in the traditional design.

• Glen Livingstone (508-669-5245 or woodjoytools.com) makes small, medium and large shaves. The largest is especially favored by boatbuilders.

• Leonard Lee of Lee Valley Tools not only wrote a great book on sharpening, he has pioneered a new generation of spokeshaves under the Veritas label, including metal-bodied shaves with flat, curved and concave soles.

• High-quality metal shaves also are available from Lie-Nielsen Toolworks.

Block Plane

For years, a block plane was a familiar tool tucked into my nail apron as a trim carpenter. It was used for almost any planing job, not just the smoothing of end grain that tradition has made its appointed task. To this day, I will reach for a block plane more often than a bench plane to smooth wood.

Fortunately, a good version of this plane, the Stanley No. 60 1/2, is readily available. You will find this version in most tool catalogs and may even find it in the hardware section of a home-supply store.

Be aware that there are two versions of the block plane – a regular and a low-angle. The low-angle Stanley No. 60 1/2 is 1/4" narrower than the standard version. It is this low-angle, narrower block plane that fits my hand best.

In all these tools, their effectiveness depends on being sharp. That should be job one before beginning your paddle.

Finger Marking Gauge

To the list of these tools – drawknife, spokeshave and block plane – I have added a fourth "tool:" the finger marking gauge. This is simply a pencil in your hand.

I learned this skill from my father so early in my woodworking career that I thought everyone knew how to do it. That is, until I started teaching woodworking. I would use this technique for gauging a line along a board and find that my students would do a double-take to see where the straight line came from.

The photo below shows this better than a description could. The middle or ring finger serves as a stop to determine the width of the space to be drawn. To find the center of a board, as in the paddle blank, simply gauge a line from both sides approximately half the board's width. Seeing now how closely they meet in the center gives you an eye for the exact center to set the final holding position for your finger marking gauge. In applications where the space to the gauge line widens, you need to hold the pencil higher, using your ring finger instead of your middle finger as a stop.

– JW

While your forefinger and thumb grasp the pencil, your middle finger or ring finger acts as an edge stop to define the width of the line.

WOODWORKING ESSENTIALS

BY NICK ENGLER

CHAPTER 7

Advanced Techniques For the Router

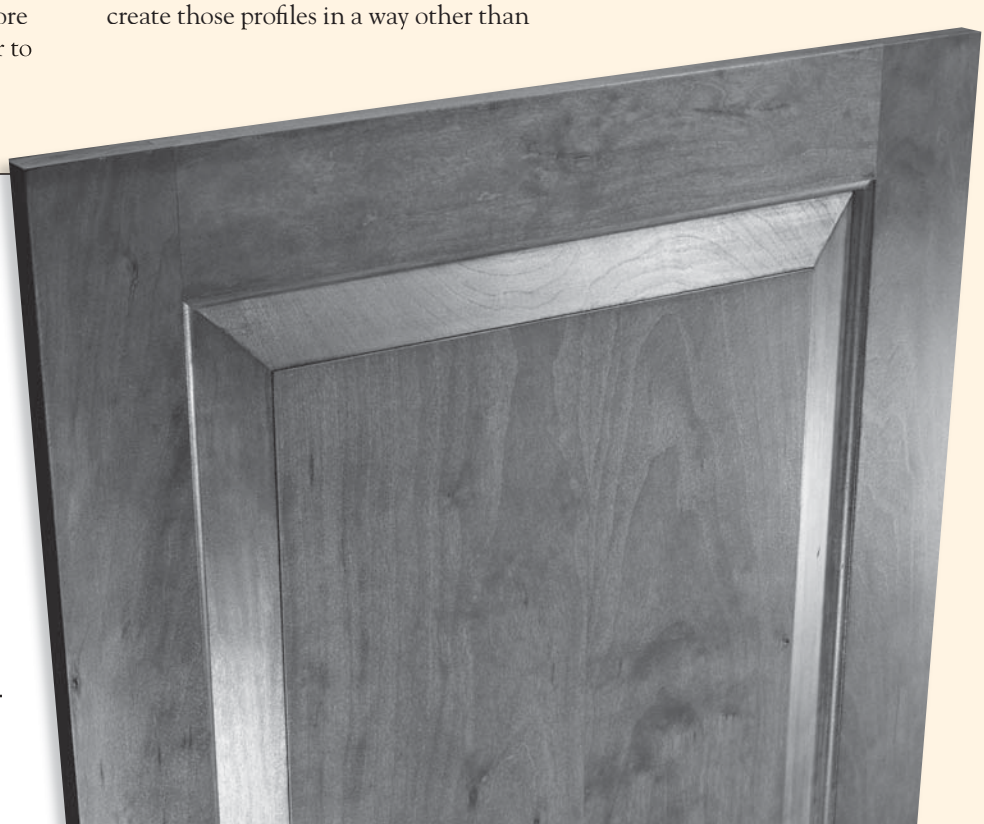
The router is an amazing tool that can mimic many of the other tools in your shop, including the table saw, the shaper, the jointer and even the planer. But it's also capable of amazingly delicate profile work, complicated joinery for any type of furniture you can imagine and shaping perfect circles and ovals. For the truly creative woodworker, the router is an excellent tool for making intricate inlay work normally performed by skilled hands alone.

Two things make these and other advanced router techniques possible: jigs and specialty bits. I've devoted more space than normal in this chapter to some of my favorite router jigs because of this. Spending the time to make one (or all) of these fixtures will open up a new world of opportunities for you. I'm sure you can quickly think of many other ways to use these jigs for your woodworking than just the techniques I've mentioned here.

The specialty bits are a different story. In many cases they can be expensive, such as with a rail-and-stile set for making raised-panel doors. Each set often creates only one style of door profile. But if you think about the effort involved to create those profiles in a way other than with a router, you'll quickly see the benefit to purchasing this pricey bit set.

There are other specialty bits that can create multiple profiles with a single bit, and I've listed some to consider in the "A Bit of Advice" section. These also will be able to adapt to your specific woodworking applications.

But please – feel free to try new ideas. If you combine the tilting router table shown with any of the specialty bits, you've made it easier to change the bits, and added a new dimension to your woodworking.



PRO TIP:

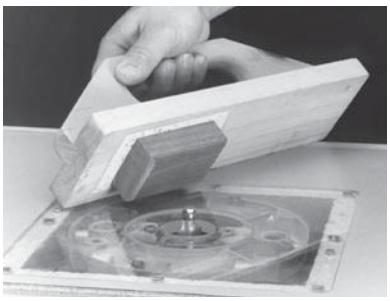
Rattle-free Doors

With a solid-wood raised-panel door such as the one shown here, it's important to leave a little room in the grooved frame to allow for panel expansion because of changes in humidity. That's smart, but the extra space can make the door rattle. By adding a strip of rubber tubing or weather-stripping foam in the groove prior to glue-up, the panel won't shift unnecessarily, but the tubing will compress, allowing the panel to expand.

TIPS & TRICKS

GREAT TRICK:

Use a Push Block When Routing Smaller Pieces



When cutting small pieces on a router table, be careful to keep your hands and fingers clear of the bit. You may wish to secure the stock to a push block or a large scrap with double-faced carpet tape to rout it safely.

PRO TIP:

Use Bearings to Get Perfect Fence Alignment

When setting up a bearing-guided bit in a router table during an operation that uses the fences, the bearing isn't a necessary part of the procedure, but it's still useful to help you set the fence. After adjusting the proper height of the bit for your cut, use a straightedge held against the bit's bearing to align the fences perfectly. In fact, if you don't align the fences correctly, the bearing can protrude past the fence faces, causing your work to ride away from the bit in the middle of your cut.

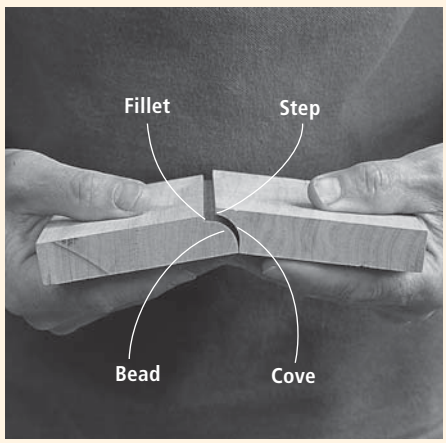
Rule Joint

A rule joint is not so much a joint as it is two decorated, mated edges between a tabletop and a drop leaf. Cut a bead and a fillet in the tabletop, then cut a matching step and cove in the drop leaf.

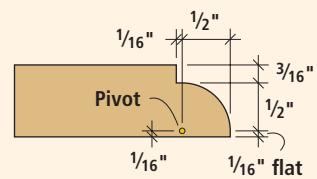
When the table is assembled, the bead will show when the leaf is down. When it's up, the joint will close and the surfaces will be flush.

The trick to making a rule joint is not as much in shaping the edges as it is in installing the drop-leaf hinges. Each hinge must be mortised into the wood so that its pin is at the center of the arc described by the mating cove and bead. Just fasten the long leaf of the hinge to the drop leaf, then fasten the short leaf to the tabletop and you're done.

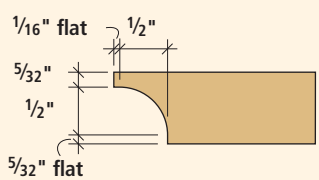
You can rout a rule joint using a simple cove bit. The bit height should leave a flat to match the mating profile's bead.



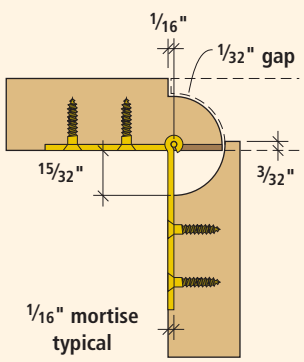
When both rule joint profiles are correct, the pieces should nest together with the top surfaces flush and a very small gap between the profiles.



Top detail



Drop-leaf detail



Hinge detail

Illustration by John Hutchinson

A great application for the rule joint is to install drop-leaf table hinges. You just need to make sure you think before you act. What seems normal – just placing the hinge barrel where the leaf and top meet, like a door to a stile – is totally wrong. Also, you need to make sure that you don't make the hinges flush with the underside surface. You need a bit of depth there. As with all hinges, the location of the pivot point is the ultimate concern. With the drop-leaf hinge, the pivot point (the center of the pin) must be centered on the radius of the matching profiles.

Rail-and-stile Joint

Rail-and-stile joints require two matched router bits and are normally used to join the shaped surfaces of frame members. Rout the sticking portion of the joint – the portion with the shape that you want to see – in the inside edges of the stiles and rails. Use a fence to guide the stock when routing straight edges, and rely on the pilot bearing only when routing contoured edges.

Rout the coped portion of the rail-and-stile joint in the ends of the rails only. Use a miter gauge to help feed the stock past the bit. To keep the board from chipping out as you finish the cut, back it up with a scrap piece.

This door shows a complex version of a rail-and-stile joint. The haunch fills the groove left by the bit. Also, the decorative moulding is mitered at the corner for a classy finish.

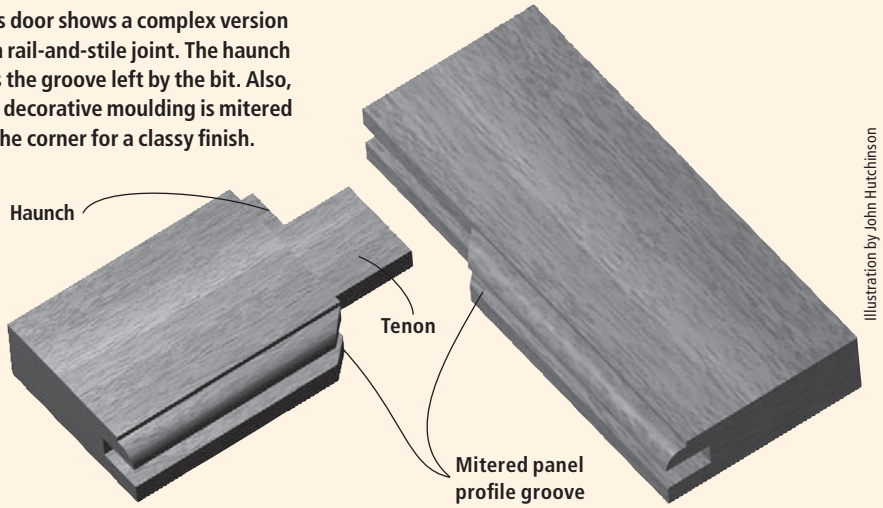
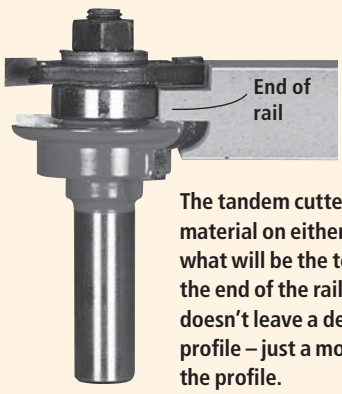
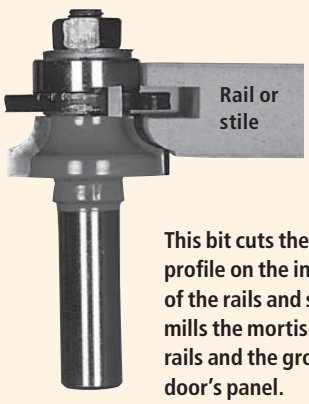


Illustration by John Hutchinson



The tandem cutters remove material on either side of what will be the tenon on the end of the rail. This bit doesn't leave a decorative profile – just a mortise for the profile.



This bit cuts the decorative profile on the inside edges of the rails and stiles, and mills the mortise for the rails and the groove for the door's panel.

Common Multiple-cut Mouldings

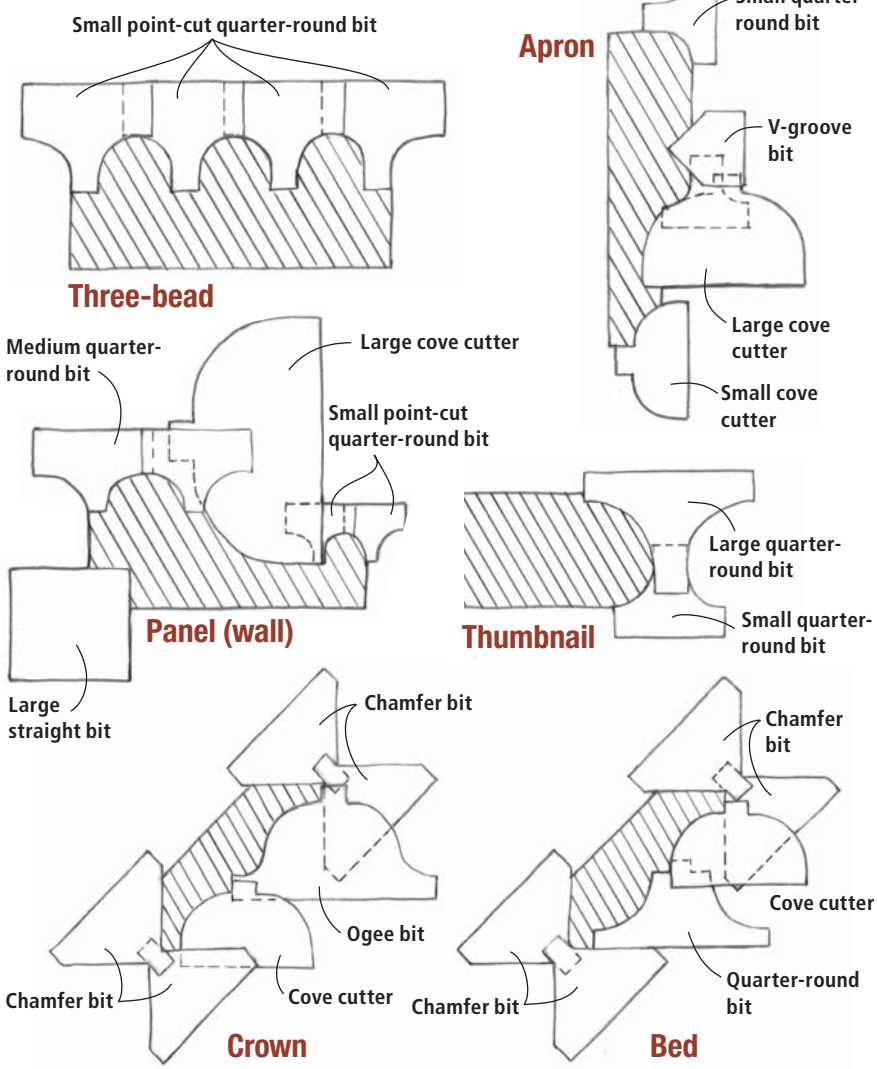
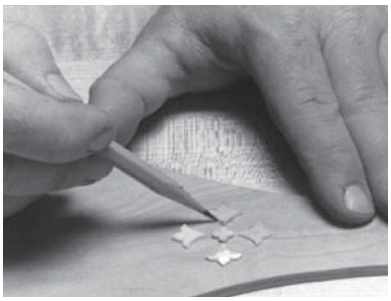


Illustration by Mary Jane Favorite

TIPS & TRICKS

INLAY TIP:

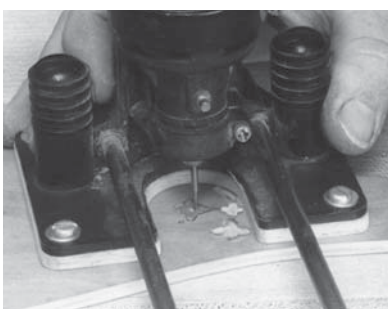
Small Inlay? Sticky Solution



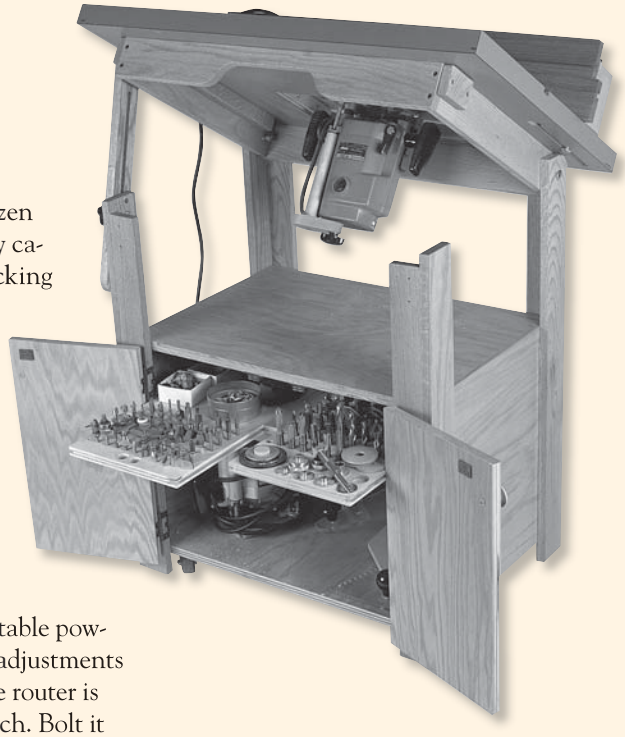
To inlay a shape, first trace the outline on the wood surface. This can be a difficult task, particularly if the design includes several small shapes. To keep wooden shapes from shifting as you trace around them, stick them to the surface with double-sided carpet tape. To keep hard, dense materials in place, glue them to the wood surface with white (polyvinyl resin) glue. The adhesive won't hold the inlays in place permanently, but it will secure them long enough to trace the outline.

INLAY TIP:

Precision in a Small Package



Rout the inlay recesses with a straight bit and a hand-held router. It's easier to work with small bits rather than large ones. Not only can you cut intricate details with small bits, but they also are easier to control. You may want to work with a small router rather than a large one, because small routers give you better visibility and are easier to control. However, even with a small bit and a small router you may find it difficult to rout a line freehand. For this reason, stop cutting just short of the outline and finish the job with carving tools.



Tilting Router Stand

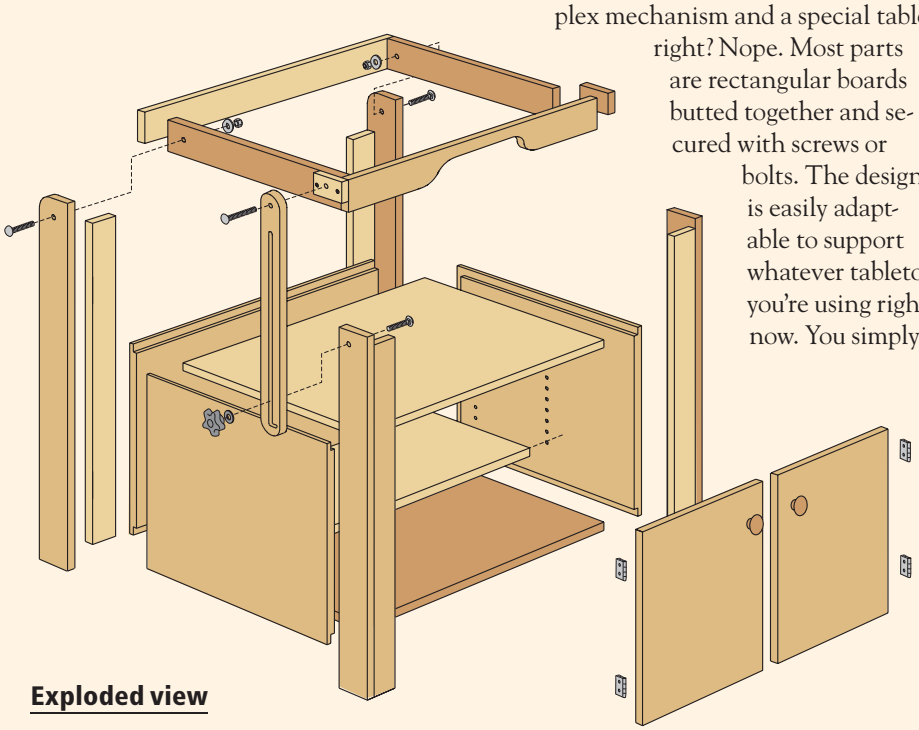
I've designed more than a dozen whiz-bang router tables in my career, each one supposedly packing a bigger bang than the last. But what finally dawned on me a few tables ago is this: What makes the fixture truly useful has less to do with the tabletop than the stand it rests on.

Whether you build or buy a router table, you're faced with the same dilemma. The router is designed to be a portable power tool. All the controls and adjustments are easily accessible when the router is resting upright on a workbench. Bolt it to the underside of a table to convert it to a stationary tool and suddenly it is a lot less cooperative. Many of us spend a lot of time on our knees in front of our router table, fumbling underneath to change bits and adjust the depth of cut. A woodworker I know calls this "praying to the router god."

Some woodworkers solve this problem by mounting the router to a plate that rests in a rabbet, then removing the plate when they need to get at the router. Unfortunately, the sides of the rabbet wear as you pop the plate in and out. As the plate becomes loose in its rabbet, new problems arise with safety and accuracy.

A tilting router stand makes the router easily accessible and lets you secure the router to the table. The table swings up like the lid of a chest, exposing the router and bringing it up to a comfortable working height. You can change bits and make adjustments to the tool while standing upright.

Of course, to get this amazing convenience you'd have to build a complex mechanism and a special table, right? Nope. Most parts are rectangular boards butted together and secured with screws or bolts. The design is easily adaptable to support whatever tabletop you're using right now. You simply



Exploded view

Illustrations by Mary Jane Favorite

need to change the width and depth of the stand to fit.

Begin with the frame under the table. It should be about 6" smaller side-to-side and 4" smaller front-to-back than your router table top. If the table has slots on it to mount the fence, make sure that the frame members won't cover these slots or interfere with the fence movement.

Also give some thought to how you will attach the table to the frame. I used two long cleats, one on each side. However, brackets, table clips and pocket screws work equally well.

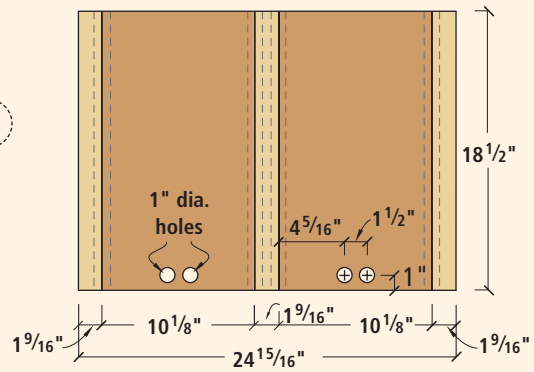
The legs should hold the table at countertop level (roughly 36"). My router table is part of a "work island" – the table saw, workbench and router table all are at the same level. So I cut the legs on my table a fraction of an inch longer than what the drawings show.

A plywood box is screwed to the legs below the table to brace the legs and provide storage for router accessories. There must be adequate room between the top of the box and the bottom of the router table to fit the router when the collet is fully retracted into the router base. I mounted simple plywood doors on the front legs to enclose the box and keep some of the sawdust out.

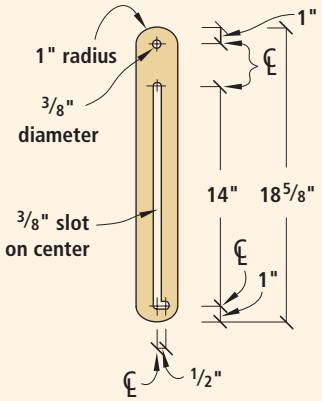
The most complex part in the table is the support arm. It has an L-slot – a long slot with a little hiccup at one end. I made the "hiccup" first, drilling a few overlapping holes to create a short slot. I routed a long slot perpendicular to the short one, then cleaned up the edges of the short slot with a file. When mounting the support arm to the stand, the short portion of the slot faces front.

To help organize all my router bits and collars, I mounted two sliding shelves to the fixed shelf inside the storage box. You don't need to buy expensive hardware to get the sliding action. Make narrow hardwood rails to guide the shelves, then cut matching grooves in the sliding shelves and fixed rails. Glue splines in the grooves in the rails, then glue the rails to a fixed shelf. Fit the sliding shelves to the splined guides, enlarging the grooves in the edges and sanding a little stock from the bottom faces so the shelves slide easily. Wax the grooves in the shelves to help them move smoothly. I drilled holes and mounted dowels in the sliding trays to help organize the bits and accessories and keep them in place. The shelves slide all the way out of the storage box so you can use them as a caddy or tray to carry the bits.

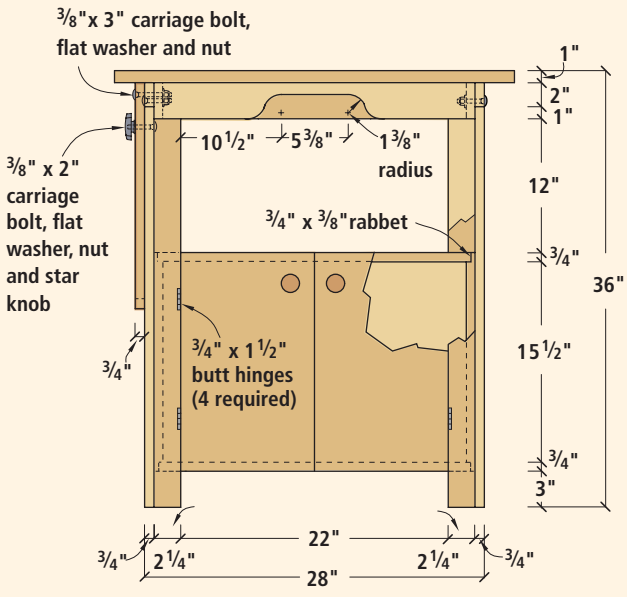
To raise the top of the router table, lift it all the way up and push down near the bottom of the support arm to slip the locking bolt into the short portion of the L-slot. Tighten the knob to make sure the top doesn't slam down unexpectedly.



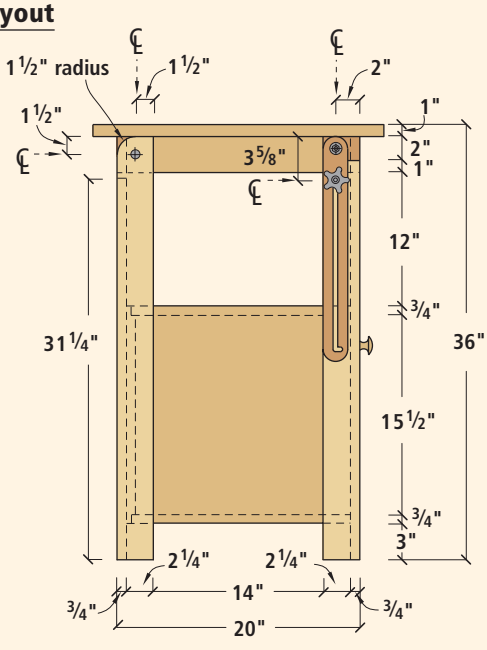
Plan of sliding shelves



Support arm layout



Elevation



Profile

TIPS & TRICKS

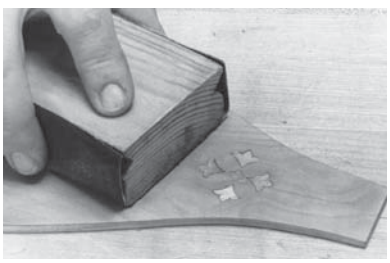
INLAY TIP:

Hand Tools for a Crisp Look

After using a power tool to do much of the inlay work, trim up to the line with carving chisels. Use gouges to cut the curved portions of the shape, and use a skew chisel to cut straight edges and corners. Then clean out the waste with dogleg chisels and a small router plane.

INLAY TIP:

Slow Sand to Smooth Finish

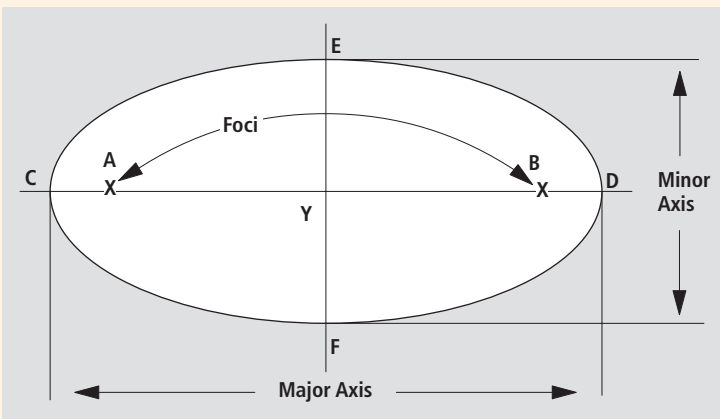


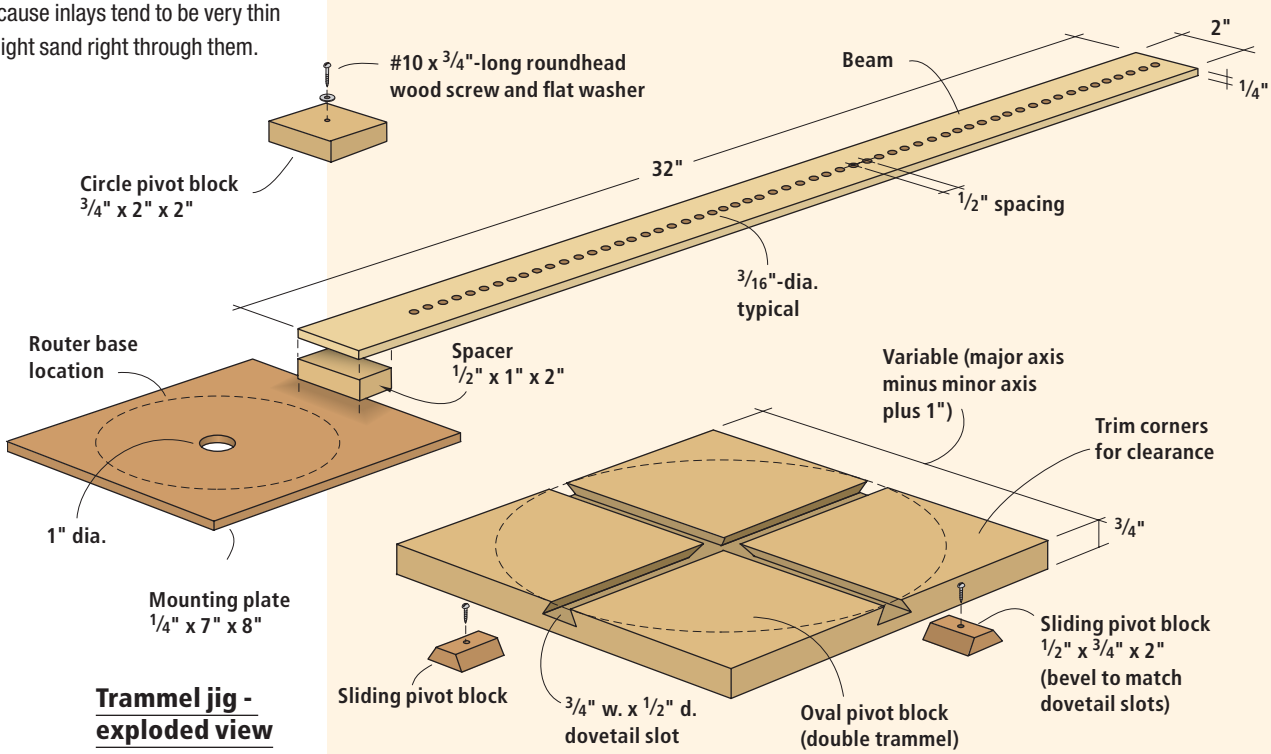
After gluing the inlays in, let the glue dry completely before you scrape away the excess. If the inlay is proud, hand-sand it flush with the surface. Don't use a power sander because inlays tend to be very thin and you might sand right through them.

Routing Ovals

While circles have a constant radius, ovals don't. The radius of an oval or an ellipse is greatest along the major axis (the length of the oval) and smallest along the minor axis (the width of the oval). Ovals also have two pivot points, each of which is called a focus. See the drawing below for more details.

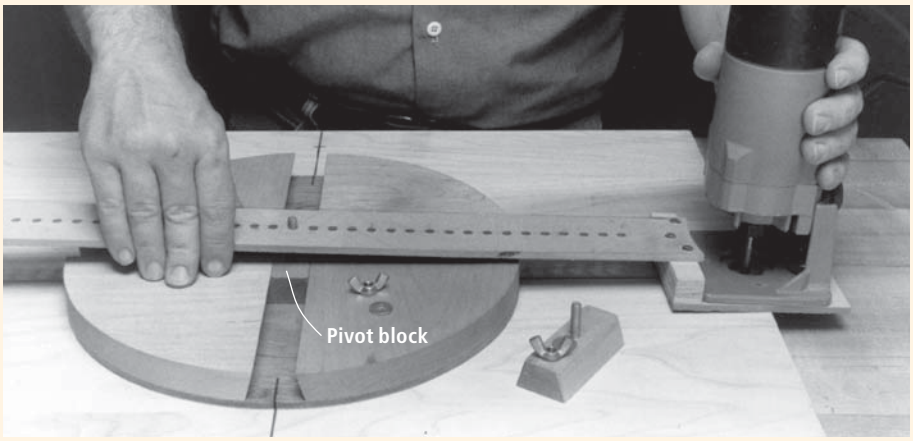
The technique for routing an oval relies on the same principle as routing a circle, but you must swing the router around both pivots or foci. To do this, make a double trammel – a beam compass with two moving pivots – on which to mount the router. This jig works in the same fashion as a folk toy you might have come across that has a crank handle that describes an ellipse as you turn it. By substituting a router for the handle, you can rout perfect ovals. **PW**



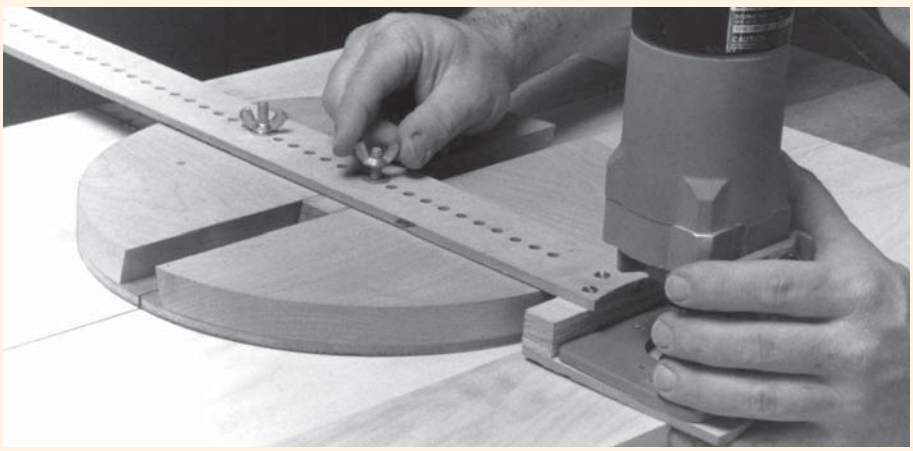


Trammel jig - exploded view

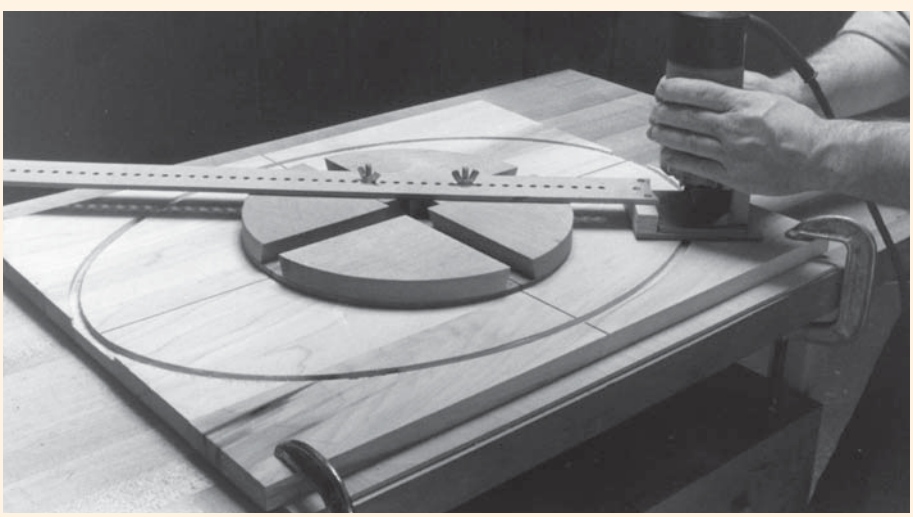
Illustrations by Mary Jane Favorite



Before you rout an oval with a double trammel, decide the length of the major and minor axes, then mark them on the workpiece. Center the double trammel pivot block over the point where the major and minor axes cross (Y), aligning one sliding pivot with the major axis and the other with the minor axis. Stick the pivot block to the workpiece with double-faced carpet tape. Mount the router on the beam, align it with the major axis and position the router so the bit is at one end of the axis. Center the minor pivot (the pivot that moves along the minor axis) over point Y and fasten the beam to it.



Swing the beam 90°, aligning it with the minor axis, and position the router so the bit is at the end of that axis. Center the major pivot over point Y and fasten the beam to it. The beam should now be fastened to both pivots. To check the setup, swing the router once around the pivots with the power off. The bit should pass over the ends of the major and minor axes.



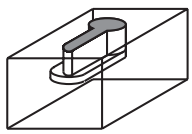
To cut the oval with this double-trammel jig, swing the router around the pivots, pulling gently outward. This slight tension will take any play out of the mechanical system as the pivots slide back and forth in their grooves. Make the cut in several passes.

A BIT OF ADVICE

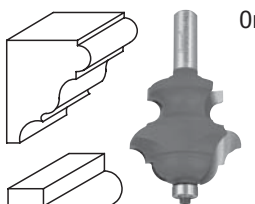
A router bit consists of a cylindrical shank (1/4" or 1/2" in diameter) and one or more flutes or cutting wings, usually comprised of a piece of carbide brazed to the metal body of the bit. Throughout this series we have provided a closer look at many of the common and specialized bits to use with your router. The bits shown here are great when using your router for some of the more advanced applications.

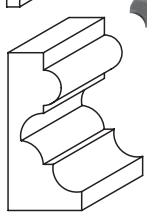
Keyhole Bit

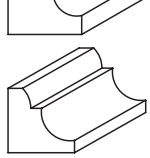
For hanging a project flush to the wall, a keyhole bit is the answer. It plunges into the wood, then plows a channel, perfectly sized to slip over a screw head.



Multi-profile Bit



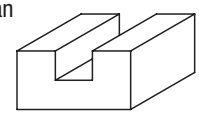




One bit does it all. By adjusting the height and the distance to the fence, this one bit cuts a variety of profiles. Mix and match the shapes. The options are limited only by your imagination and the jigs you can use.

Upspiral Bit

At first you may say this bit just plows grooves. Not true. The spiraling flutes of this bit also remove the waste from the groove, keeping the cut clean and keeping the bit from overheating and working harder than necessary.

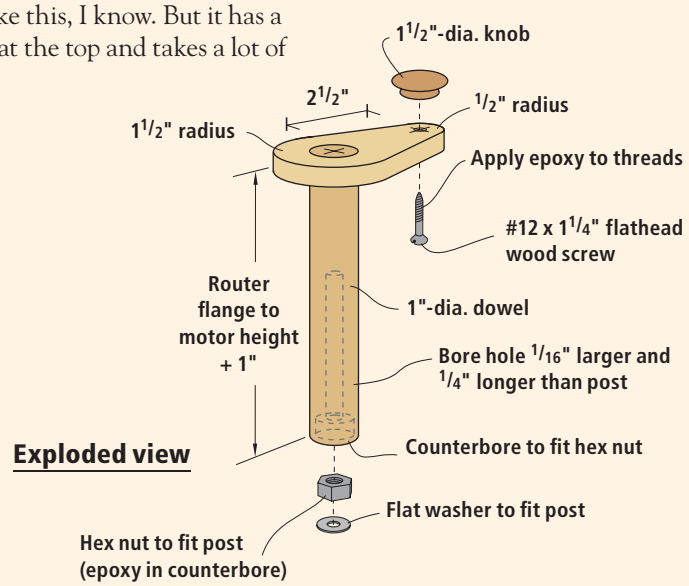


Router Crank

The crank fits most plunge-style routers and helps greatly when the tool is positioned upside-down in a router table, such as the tilting router table discussed earlier.

If you use a plunge router with your router table, this little gizmo takes all the frustration out of setting the depth of cut. Just thread it onto the post, then crank the router up and down as needed.

There's an accessory on the market very much like this, I know. But it has a simple knob at the top and takes a lot of wrist action to raise or lower the router. You'll find the crank action much faster and more comfortable. When used with the tilting router stand I built for my shop, it helps create a truly user-friendly stationary routing system.



Illustrations by Mary Jane Favorite

COMING NEXT ISSUE: FIRST CHAPTER OF A NEW SEVEN-PART SERIES!

ALL ABOUT THE TABLE SAW

Photo by Al Parrish

Sliding Dovetails

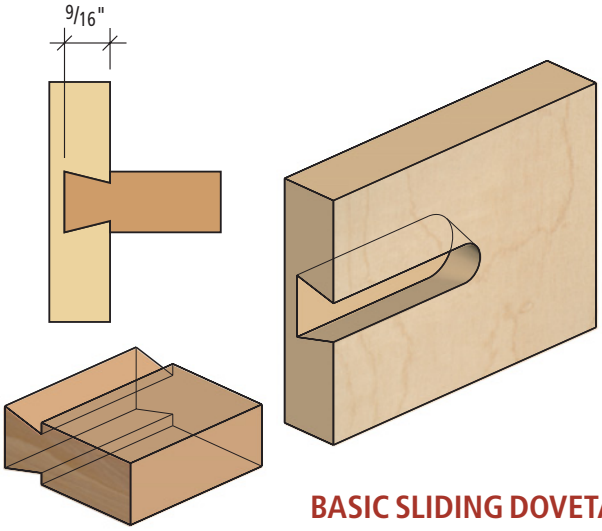
Two router bits with guides and a simple shop-made jig make three variations of this joint a snap.

One of the defining features of 17th- and 18th-century furniture is the dovetailed horizontal case divider. Case dividers are the rails that separate the drawers, or the door and drawer sections. Attaching these dividers to a case's sides using sliding dovetails is probably the strongest way possible to assemble a carcase.

However, reproducing this detail is daunting to many woodworkers. Not only is a sliding dovetail seen as complex joinery, but it can be made in different ways. The basic sliding dovetail, shouldered sliding dovetail and through sliding dovetail (shouldered or not) are just a few of the options.

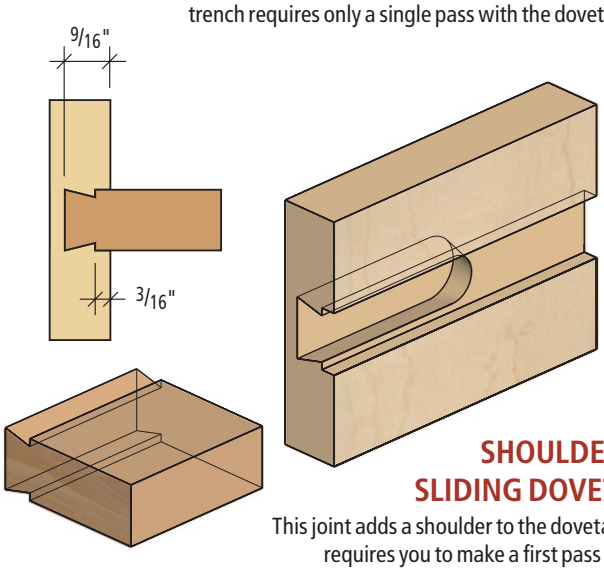
by Glen Huey

Glen builds custom furniture in Middletown, Ohio, for Malcolm L. Huey & Son, teaches woodworking and is a contributing editor for Popular Woodworking. *He also is the author of two books, "Building Fine Furniture" and "Fine Furniture for a Lifetime" (Popular Woodworking Books). See more of his work at hueyfurniture.com.*



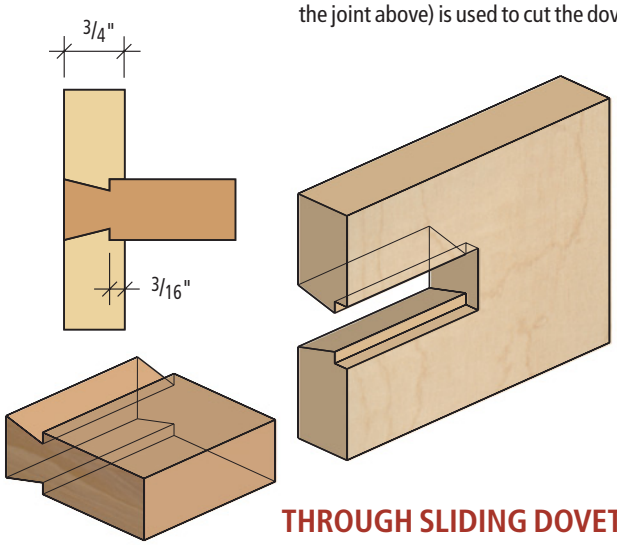
BASIC SLIDING DOVETAIL

The simplest option in sliding dovetails. The socket or trench requires only a single pass with the dovetail bit.



SHOULDERED SLIDING DOVETAIL

This joint adds a shoulder to the dovetail and requires you to make a first pass with a pattern-making straight bit. Then the dovetail bit (set at the same depth as on the joint above) is used to cut the dovetail.



THROUGH SLIDING DOVETAIL

A more complicated joint, this is made in three steps. First the straight bit forms the shoulder, then the dovetail bit shapes the divider pin. The final dovetail socket is hand cut to avoid tear-out.

Each type of sliding dovetail requires a different jig. I've used a variety of these jigs in my many years of building reproduction furniture. Some jigs capture the router base and are specific to a certain router bit. If you need to use more than one bit (to make a shouldered dovetail, for example) this can be a problem – unless you own two identical routers.

Other jigs are as large as the entire case side, making them hard to handle and store. But I've found a better way. Using a 3/4" top-bearing flush-trimming bit (often used for pattern routing), a 3/4" dovetail bit, a template guide with a 3/4" outside diameter and a shop-made straightedge, any of these joints can be made easily.

From Dado to Dovetail

To understand how this works, let's start with a simplified version of the joint: a dado. With a straightedge clamped across a cabinet side and a flush-trimming bit in your router, you can cut a dado for case dividers or web frames. Simply position the straightedge where you want your dado, set the depth of cut on your router and plow it out. The bearing on the bit follows your straightedge.

By using a dovetail bit with a template guide and this same setup, you can use the straightedge to make the basic sliding dovetail shown above left.

Use a template guide that has the same outside diameter as your dovetail bit to make measuring simple. Next, clamp your straightedge exactly where you want the sliding dovetail to go.

Set the proper depth for the bit, (9/16" in 3/4" material, for example) then rout the dovetail trench or socket in a little further than the width of the divider. The trench doesn't need to extend all the way across the side. But because the dovetail trench will have a rounded end, the trench must extend a little further so the square-shouldered tail on the divider will fit.

Two-step Shouldered Joints

A shouldered dovetail is ideal for casework that uses web frames, which support drawers. The straight shoulder, which supports the web frame, is cut just as you would cut a basic dado.

First align your straightedge as you did with the basic sliding dovetail. With a 3/4"-diameter flush-trimming bit in your router, plow out the dado to 3/16" deep. Next, take your router with a template guide and dovetail bit, set it to 9/16" deep (without moving the straightedge) and make the cut into the case side. The cut should be a bit longer than the width of your front divider.

Thanks to the template guide (and keeping the straightedge in one fixed location), the dovetail portion of this cut is centered in the dado automatically.

Through Sliding Dovetails

For an even fancier look, you can create through sliding dovetails. These joints allow the end of the case's divider to be seen on the outside of the case.

Start once again by plowing the dado as explained above. You could cut the socket portion of this joint with a router, but there's much less chance of tear-out if you cut the socket using a handsaw.

If you go with this hand-tool route, you should first cut the male portion of the joint (called the tail) on the end of your horizontal divider using the dovetail bit in your router table. The process is explained on the next page. Then use the tail to lay out the location of the socket on the case side.

Now you can saw out the socket. Orient the saw to match the two tail sides, then cut in from

the front edge the width of the divider. Finally, chisel out the waste between your saw cuts.

Don't Forget the Tails!

To make the mating joinery on the dividers (the tails), I use my router table. Use the same dovetail bit you used to cut the dovetail sockets to form the tails to ensure that the joint fits well. Set the fence to adjust the size of the tails, cutting on both sides of the divider. I like to sneak up on the final cut to ensure a snug fit.

Set the bit to cut at the appropriate height for each joint style. For the basic sliding dovetail, that height should be about two-thirds of the width of the case side. If you're making a shouldered dovetail, allow for the 3/16" shoulder depth in your layout.

The through dovetail is cut with the height of the tail equal to the thickness of the case side (if you are adding a shoulder, remember to allow for the shoulder).

Your through dovetail doesn't need to expose the whole width of the divider. For example, you can show only 3/4" on the sides if you like. After cutting the tails on both ends of the divider, use a saw to trim the end 3/4" back from the front of the divider on both sides. Then cut from the back of the divider right at the point where the tail begins from the divider to remove the unneeded tail section. Repeat this cut on both ends.

With the back portion of the tail removed, slide the divider into the dado in the case and mark, then cut, the matching socket.

Whatever Size You Need

While these techniques work great with the standard 3/4"-thick drawer dividers that are common today, they also work with other thicknesses of dividers by using different-sized template guides and bits. The guides are readily available in a wide variety of sizes, including 51/64" and 1" if you need thicker drawer dividers.

You should consider using sliding dovetails for any number of woodworking tasks. The possibilities are endless. **PW**

THE STEPS TO A SHOULDERED SLIDING DOVETAIL

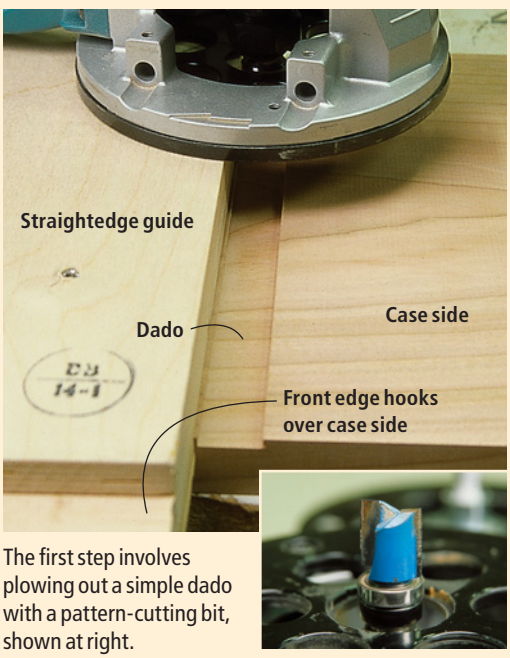
Making a shouldered sliding dovetail begins by cutting a dado in the case's side. This dado is easily made with a pattern-cutting bit and the right jig, which I call a straightedge guide.

The bed of my jig, shown below, is simply two pieces of plywood cut slightly longer than the width of the case side, then glued or screwed together face to face. (Depending on your router and bit, you might need only one thickness.) To complete the jig, screw a third block to the underside of the straightedge guide to hook it square against the front edge of the case side. The hook should be sized so you can clamp the jig in place without interfering with the base of the router. As you cut the dado, make sure you move the router in the correct direction (against the rotation of the bit) to keep it tight against the jig.

Next, install a template guide in your handheld router and the dovetail bit. I should mention one important detail: To use a template guide that is the same diameter as the pattern-cutting bit's bearing collar (in this case 3/4"), it will be necessary to attach the guide first, then insert the bit afterward. Because of the identical diameters, the router base can't be slipped over the bit with the template guide in place. The guide is the same diameter as the collar to allow the dovetail to run exactly down the center of the dado cut.

With the template guide in place and the depth set on the dovetail bit, you're ready to cut the dovetail socket, as shown below.

With the socket created, it's time to make the mating tail on the end of the drawer divider. Mount the dovetail bit in a router table and run both sides of your divider on end between the fence and bit. You will need to make a few test passes to get the perfect fit. Note that I'm using a push block behind the divider for safety and to stabilize the piece during the cut. *— GH*



The first step involves plowing out a simple dado with a pattern-cutting bit, shown at right.

Use a dovetail bit, shown at right, to make your shouldered dovetail socket.

You can easily rout the tail of the joint on your router table with the matching dovetail bit.

Isaac Youngs' Wall Clock

Modern CAD software restores the look of a 164-year-old Shaker design.

It's difficult to open a book about Shaker furniture or to page through a woodworking catalog without coming face to face with a clock similar to this one. It seems that nearly every woodworking magazine and catalog has published plans for a clock with Isaac Newton Youngs' name on it.

So what possessed us to do the same thing?

Well, the goal of this project was to create a version of Youngs' clock that looked very much like the classic original but was built with joinery that a beginner would be comfortable with.

As I began drawing up our plans, I made an interesting discovery. Other plans for this clock that I consulted didn't look exactly like the original 1840 wall clock at the Hancock Shaker Village in Pittsfield, Mass. Many of these other plans made slight alterations to the size of the clock's case or the visual weight of the doors' rails and stiles.

In a few instances, these changes looked good. In others, however, it seemed that the designer – in seeking to make the project easier to build – made the clock a little chunky or squat. So John Hutchinson, *Popular Woodworking*'s project illustrator, scanned in a photo of the original clock and scaled the parts using his computer-aided design software.

Suddenly the clock got a little taller, a little skinnier and the top door's stiles became narrower. After we "built" the project with CAD and compared it to the original, we knew we were on the right track.

Of course, we did make changes, but they are mostly invisible to the naked eye. To make the clock easy to build, the case is joined using rabbets and dados. The back piece is plywood, instead of solid wood. And the moulding on the top and bottom is a bead instead of a roundover. All the changes can easily be undone for those seeking Shaker purity.

Finding Rift-sawn Wood

Youngs built his original using mostly rift-sawn butternut. All of the grain in that clock is arrow-straight without any of the arching cathedrals that are common to this somewhat-uncommon wood.

To reproduce that look I sorted through a 4'-high stack of butternut at the lumberyard but came up empty-handed. Rift-sawn butternut, according to the guys at the lumberyard, is hard to come by. So I went with Plan B: rift-sawn red oak, which is plentiful and inexpensive.

Three things are important when choosing wood for this project: Pick boards where the grain is dead straight, the growth rings are close together and the grain is rift-sawn – not flat-sawn or quartersawn. Flat-sawn oak exhibits the cathedrals you see on every red oak kitchen cabinet in every suburban subdivi-

by Christopher Schwarz

Comments or questions? Contact Christopher at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

"You must not lose one moment of time, for you have none to spare."

— Mother Ann Lee, leader of the Shakers as they established their faith in America

Photo by Al Parrish

With the sacrificial fence in place, this setup will allow you to cut the rabbet in one pass. This eliminates the need for multiple saw setups and you don't need to stand your work on edge to make the cut.

sion. Quartersawn oak shows off the medullary rays of the wood as shiny bits of what we call "ray flake." (Ray flake isn't desirable on a Shaker piece.) Rift-sawn oak generally has tight grain lines but no cathedrals or ray flake.

How do you find rift-sawn wood? Some lumberyards sort the wood for you. But if they don't, you can pick out the rift-sawn stuff by looking at the end grain. In rift-sawn wood, the growth rings intersect the face of the board at an angle between 30° and 60°. If the angle is less than 30°, the board is flat-sawn. If it's more than 60°, the board is quartersawn. Look over a few boards with this in mind and the difference will be obvious.

I bought 50 board feet of 4/4 red oak for this project. While that's more than I needed, it ensured that I would be able to choose the wood for the rails, stiles and panel with extra care. (If you can't find rift-sawn oak, call Paxton Woodcrafters' Store at 800-325-9800; they can ship it to you via UPS at a fair price.)

As you joint and plane your wood to its final thickness, set aside the straightest, tightest-grained boards for the rails, stiles and panel. Not only will these "look right," they will be more stable and less likely to twist out of shape during machining.

SUPPLIES

Lee Valley Tools
800-871-8158 or leevalley.com

1 • 1/2" quartz movement #46K0115, $3.75

1 • pair of black clock hands #46K0303, 70 cents/pair

2 • pairs of no-mortise hinges #00H5123, $1.20/pair

1 • package of #5 x 5/8" screws, #01Z5305, $1.50/pkg. of 100

Rockler
800-279-4441 or rockler.com

1 • pair of oak Shaker knobs #88840, $2.09/pair

The Clock's Carcase

Here's how the basic skeleton of the clock goes together: The interior top and bottom pieces are secured in shallow rabbets in the side pieces. The 1/2"-thick divider that separates the doors rests in dados in the side pieces. The back fits in a rabbet cut in the sides. The exterior top and bottom are merely glued to the top and bottom of the assembled case.

It's a bit of a trick to cut notches in the divider so that its front edge runs the entire width of the case. And you'll employ that same trick to notch the exterior top piece around the half-round hanger piece. But it's simple stuff.

Once you've cut the parts for the carcase to the sizes shown in the cutting list, the first step is to cut the 1/4"-deep x 3/4"-wide rabbets on the ends of both side pieces. I like to perform this operation with a dado stack set in my table saw. As you can see in the photo at left, I've added a "sacrificial" wooden fence and a featherboard to my saw's rip fence. This setup allows me to cut right up against the rip fence without leaving a little waste piece on the end of the board. The featherboard keeps the work pressed to the saw's table.

To make the cut, place a side piece against the miter gauge with the end of the board touching the sacrificial fence. Move the work forward into the cut and keep firm downward pressure on the piece. Check your work with a dial caliper to make sure the height of the blades is correct. When you're satisfied, cut this rabbet on both ends of both side pieces.

To complete the joinery necessary on the side pieces, cut the 1/4"-deep x 1/2"-wide rabbets on the sides that will hold the back. To cut this joint, keep the height of your dado stack the same that you had for your first cut. But shift the rip fence so that you expose only 1/2" of the dado stack's cutters. Then cut the rabbets on the side with the parts run on edge as shown in the photo on page 56.

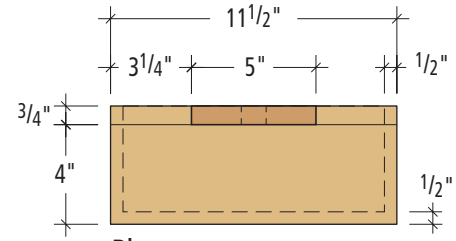
Finally, cut the 1/4"-deep x 1/2"-wide dado in the side pieces for the divider. Leave the height of the dado stack alone. In fact, lock the arbor of the saw in place. Then remove the dado stack and put enough chippers and wings on the arbor to make a 1/2"-wide cut. Also, remove the sacrificial fence from your rip fence.

Clamp a 1"-wide "standoff" block to your table saw's rip fence in the location shown in the photo

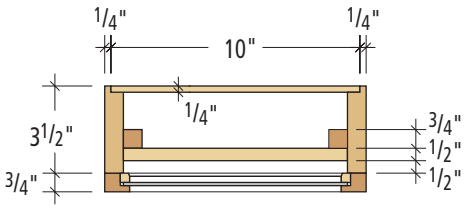
ISAAC YOUNGS' WALL CLOCK

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	COMMENTS
Carcase					
❑ 2	Sides	3/4	3 1/2	31 1/2	
❑ 2	Interior top & bottom	3/4	3 1/4	9 1/2	
❑ 1	Divider	1/2	4 1/2*	10 1/2	Notched
❑ 1	Back	1/2	10	31 1/2	
❑ 1	Hanger	3/4	5	3	
❑ 2	Exterior top & bottom	1/2	5**	11 1/2	
❑ 1	Dial	1/2	9	10 1/4	
❑ 2	Cleats	3/4	3/4	10 1/4	
Upper Door					
❑ 2	Rails	3/4	1 1/4	9 1/2	1/2" TBE
❑ 2	Stiles	3/4	1	11 1/2	Includes 1/4" horns
❑	Glazing moulding	3/8	1/2	48	
Lower Door					
❑ 2	Rails	3/4	1 1/4	9	1/2" TBE
❑ 2	Stiles	3/4	1 1/4	20 1/2	Includes 1/4" horns
❑ 1	Panel	1/2	8 3/4	18 3/8	

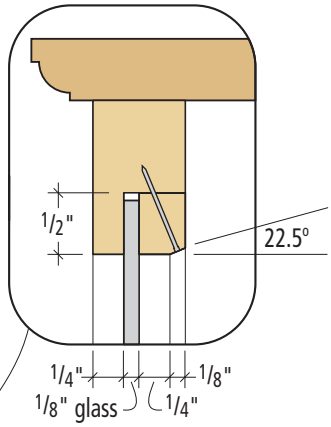
* Finished size after machining will be 4 1/4"; ** Finished size after machining will be 4 3/4"; TBE = tenons both ends



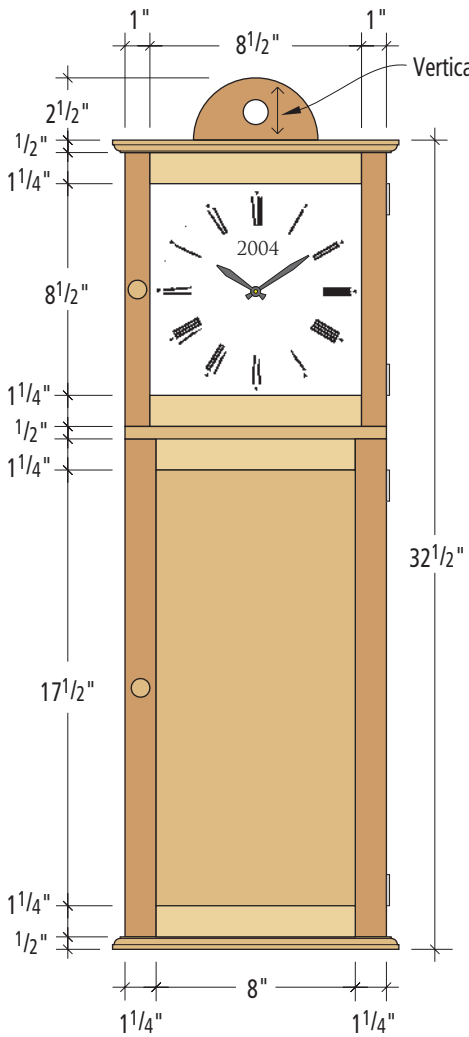
Plan



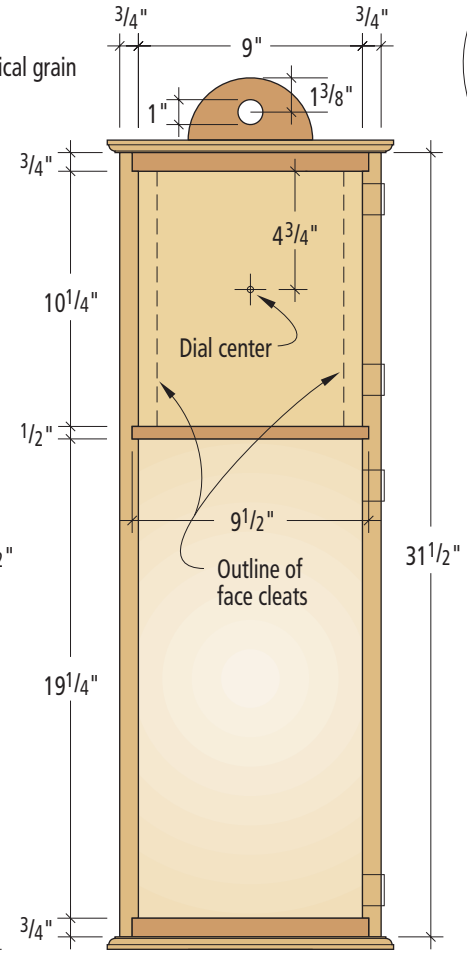
Plan section - top



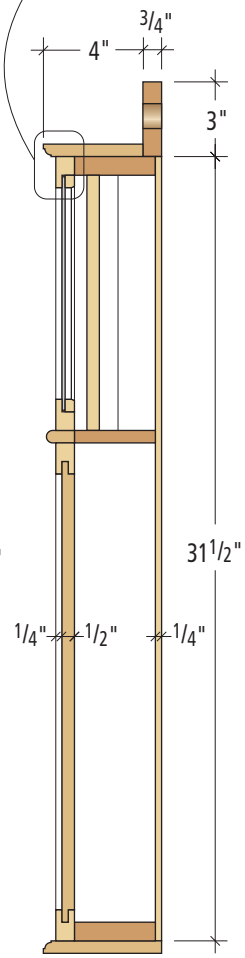
Detail - glazing stop w/brad



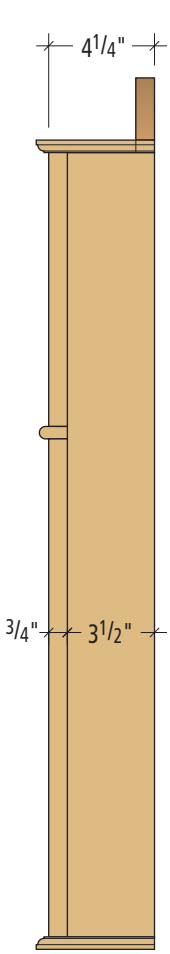
Elevation



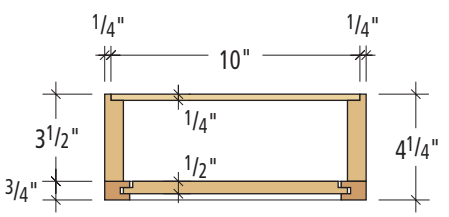
Elevation - doors removed



Profile section



Profile



Plan section - bottom

Don't change your saw's setup any more than you have to. By shifting the rip fence 1/4", you can make the rabbets that hold the back piece by running the sides on edge.

below. Set your rip fence at the 12" mark – this will put exactly 11" of space between your standoff block and the dado stack. That's right where you want the divider to be. Put a side piece against your miter gauge and against the standoff block. Cut the dado in the side piece and repeat the procedure for the other side. The joinery for your sides is now complete.

Tricky Notches

As you look at the cutting list for this project, you might notice that the divider is longer than the interior top and bottom pieces. It also runs the entire width of the clock's case and stands proud of the doors when they're closed. To make the divider do this, you need to notch the ends so they fit inside the dados and the front rounded-over edge then extends to the edges of the carcase.

This is actually easy. Here's the trick: First rout the 1/4"-radius roundover on a long edge of the divider, as shown in the drawing at right. Next, using your table saw, rip 1" of this detailed edge off of the divider. Crosscut the remaining piece to 9 1/2" long – the same length as the interior top and bottom pieces. Now glue the 1"-wide strip back to the divider.

If you do it this way you will have perfect notches on both ends and the grain will match all the way across the width of the board. (You'll use this same trick to notch the exterior top around the hanger piece.)

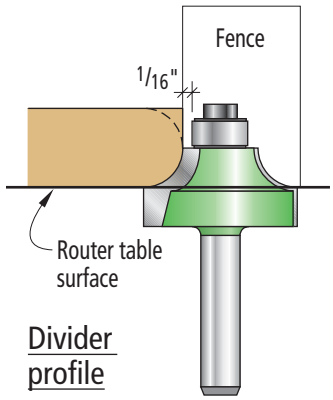
Before you assemble the carcase, plane or sand the interior surfaces so they are ready to finish. If you are using sandpaper, sand up to #220-grit. Then perform a dry run without glue to make sure you have the clamps you need and your joints close tightly.

When you're satisfied, spread a thin film of glue in the rabbets and dados and put the interior top, bottom and divider in place. Clamp the second side in place and ensure all the parts of the carcase are flush at front and back.

Compare the diagonal measurements of the clamped-up case to ensure it's square and wait for at least 30 minutes for the glue to dry. Then take the case out of the clamps and secure the joints with nails. (Tip: If you drive the nails in at slightly different angles, you'll wedge the parts together.)

Adding the Top and Bottom

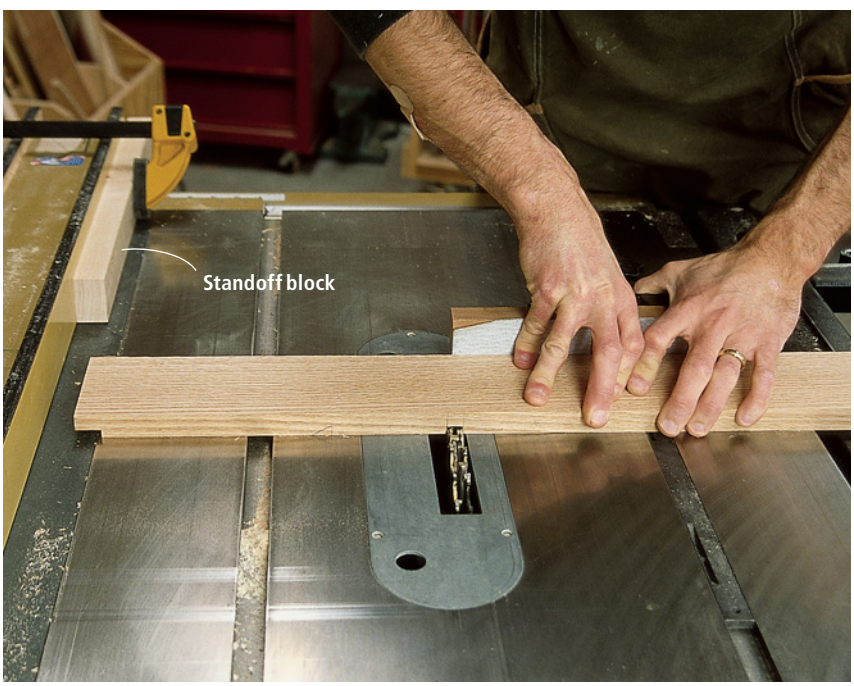
The exterior top and bottom pieces are merely glued to the completed carcase. But before you can do this, you need to do some machining to add the beaded detail on three edges and create a notch in the exterior top piece for the half-round hanger.

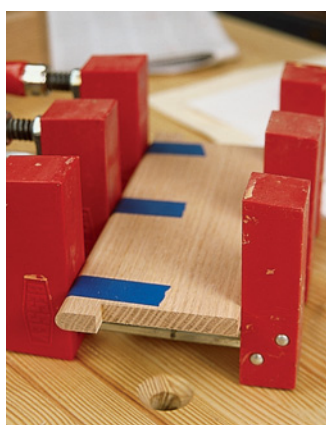


Begin by ripping a 3/4"-wide strip off the back edge of your exterior top piece. Take this narrow strip and crosscut 3 1/4" off each end. Now you can tape and glue these pieces back to the exterior top piece to create a notch in the center for the hanger.

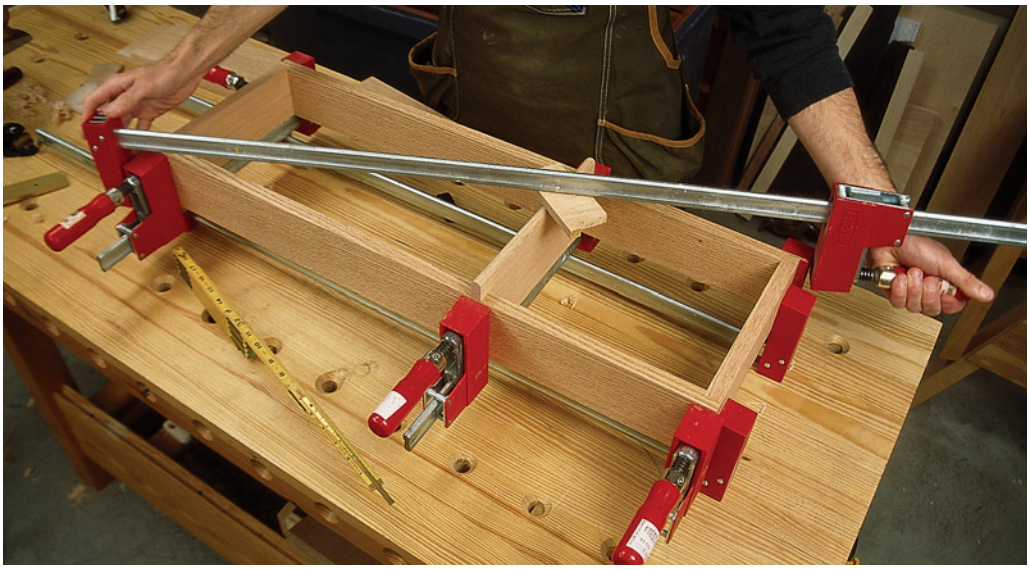
Next you can rout the beaded detail on the ends and front edge of the exterior top and bottom.

A standoff block clamped to the fence as shown allows you to use the rip fence and miter gauge in tandem and reduces the chance of a nasty kickback.

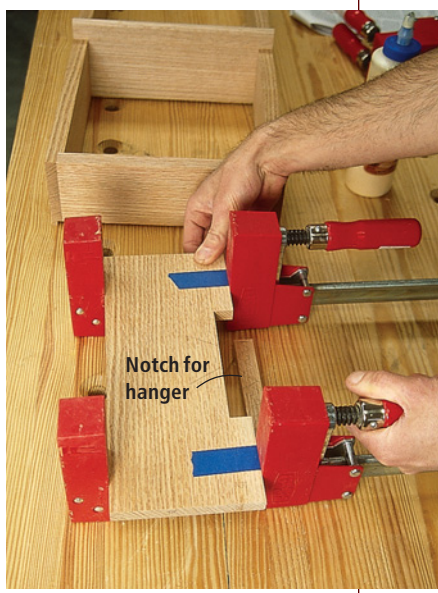




You could wait until the carcase is assembled to glue the detail back in place, but I find that you can get a tighter joint if you do this before the case is glued up. If your joint is smooth, you should be able to use painter's tape to position the detail to the remainder of the divider before clamping.



Using a folding rule – I like the ones where you can extend a 6"-long "finger" from the end – compare the diagonal measurements you make from corner to corner. If they're the same, your case is square. If not, place a clamp across the two corners that produced the longer measurement and apply a small amount of clamping pressure until the two measurements are identical.

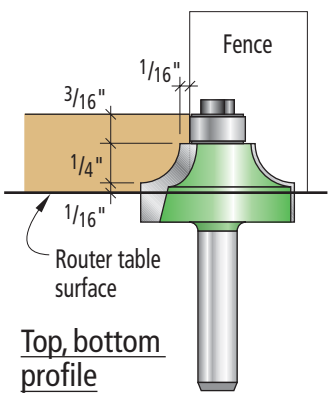


When you glue the strips onto the exterior top piece, tape them in place so they don't slide around as you add clamping pressure.

Use the illustration below to set up your router table. First rout the bead on the ends and use a backup block behind your work to control tear-out and add stability to this machining operation.

Once the ends are routed, cut the same detail on the front edge of both pieces. Before you attach these pieces, plane or sand the exterior of your carcase so it's ready for finishing.

With that done, you want to fit the exterior top and bottom pieces. These must fit tightly to the case, so it pays to clamp them in place without glue first. Note where any gaps are, then remove material with a block plane from any area that won't ever show to get the pieces to mate tightly.



Top, bottom profile

Don't rely on clamping pressure to close up gaps – you should be able to get a tight fit using hand pressure only.

I've found that the best way to attach each piece is to lay it on your bench, then spread a thin film of glue on the mating surface of the carcase and put the carcase in place. Before you clamp the two parts together, secure the pieces with a couple of nails.

Last Carcase Details

Cut the 5"-diameter half-round hanger to shape on your band saw and bore the 1" hole that's 1 3/8" from the top edge of the hanger. First glue it in place in the notch in the exterior top piece and secure it with screws through the back of the hanger.

To hold the dial in position, you need to nail in two 3/4" x 3/4" cleats in the top section of the case. When you position them, be sure to allow for the thickness of the dial (1/2" in this case), and the length of the stem of your clock's movement. Otherwise, the top door won't close.

Then cut the dial to fit the opening in the top and attach your movement to the rear. When you drill the hole for the stem of the movement, note that it is not in the center of the dial board. To center it in the upper door, you need to drill this hole 7/16" up from the centerpoint of the board.

I used a quartz movement to keep the clock simple and inexpensive. A mechanical movement with a pendulum is another option. If you choose this, be aware you'll have to cut a clearance hole for the pendulum in the divider.

You can download a file from our web site (click on "Magazine Extras") for the face of the clock if you want it to look like the one featured here. Otherwise, you can find 8" faces at a variety of supply houses or web sites.

Affix the paper face to the dial using a spray adhesive (I use 3M's Super 77 Multipurpose Spray Adhesive) and screw the dial to the cleats using four brass screws. Cut the plywood back to size, prepare it for finishing and screw it to the back of the case.

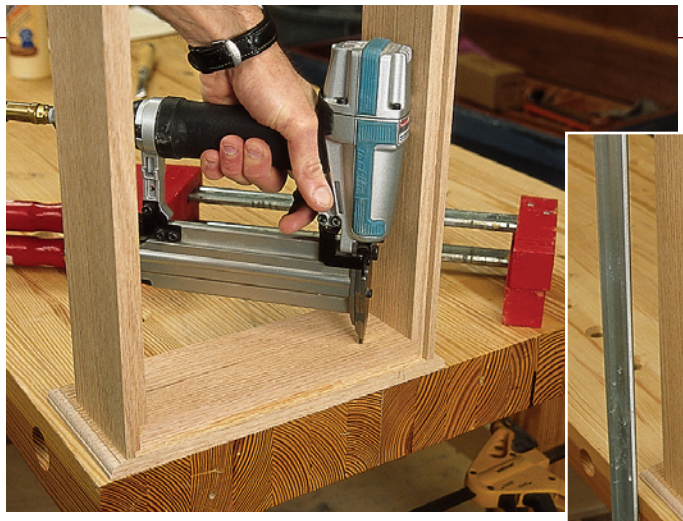
Building the Doors

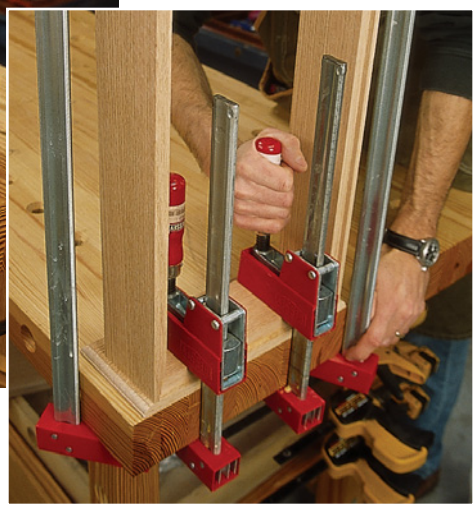
Because the stiles and rails of these doors are narrow, there are some useful tricks to machining and assembling them.

The first trick is to cut the rabbets for the top door on wider pieces, then rip the rails and stiles free from these wider boards. This makes cutting the rabbets a much safer operation.

Second, I like to cut all my rails and stiles 1/16" wider than called for in the cutting list. Then I like to cut my stiles 1/2" longer than the finished size of the door. All this creates a door that is slightly oversized for its opening so that I can then trim the door to be square and perfectly sized after it's glued up. It takes a bit more time, but it saves frustration when doing the final fitting.

Begin by working on the upper door. Set up a dado stack set and sacrificial fence for your table saw





Whenever you can, use your bench to assist your clamping. It helps spread your clamping pressure over a wider area. Here you can see how a couple of well-placed nails keep everything in line as I apply the clamps.

much like you did to cut the rabbets for the carcase. Set the height of the blade and the position of your rip fence to make a 1/2" x 1/2" cut. After confirming your setup is correct, cut this rabbet on the inside edge of the rails and stiles for the upper door.

Before you switch over to your rip blade to cut the rails and stiles free of their wider boards, it's a good idea to go ahead and cut the rabbet on the ends of the rails. These end rabbets create the lap joint that joins the rails and stiles together for the upper door (see the illustration at right). This lap joint, when properly executed, is satisfactory for a small door. To cut this joint on the ends of the rail pieces, leave the saw's rip fence as it is and lower the sawblade so it makes a 1/4"-deep cut. Then make the cuts on the ends of the rail boards.

Set these boards aside for a moment and get your rails and panel for your lower door. This saw setup is exactly what you need to cut the stub tenons on the ends of the rails for the lower door and the rabbet on the backside of the panel so it will fit in the door's groove. Cut this joint on both faces of your lower rails. Then cut this rabbet on all four edges of your panel stock.

Finally, install a rip blade in your table saw and rip the rails and stiles of the upper door free to their final width plus 1/16".

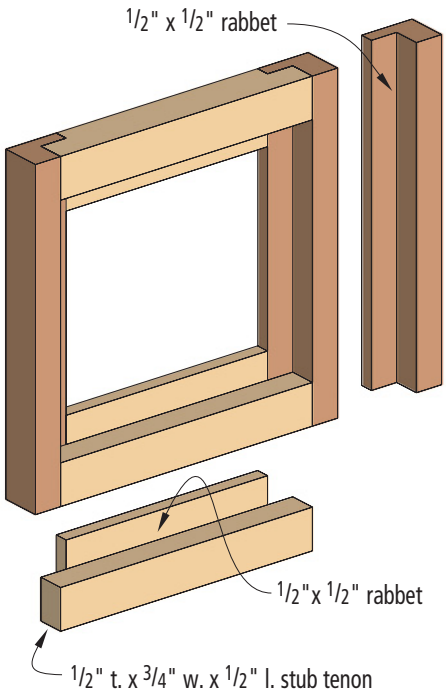
To complete the joinery on the lower door, you need to plow a 1/4"-wide x 1/2"-deep groove in the rails and stiles for the panel and for the stub tenons on the rails. Keep the rip blade in your saw and set the fence 1/4" away from the blade and set the height to 1/2". Now plow the groove in two passes. The first pass has one face of the board against the fence; the second pass has the other face against the fence. Cutting the groove in two passes ensures it will be centered on the edge.

Next, prepare all your door parts for finishing. Don't worry about cleaning up the outside edges of the rails and stiles because they'll be trimmed after assembly. Clamping the upper door is a bit trickier than most doors because of the lap joinery. First clamp the stiles against the rails like you would a traditional door. Don't forget to position the rails to accommodate the 1/4"-long horns on the ends and don't use a lot of clamping pressure. Clamp each of the joints with a bar clamp positioned like you would compress a sandwich, as shown below right.

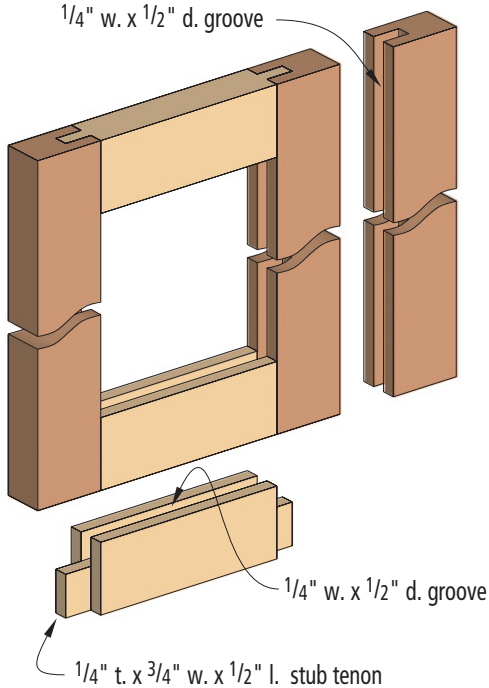
The lower door is easier to assemble. Paint glue in the grooves where the stub tenons will go (but not the panel), assemble the parts and clamp things up. Allow the glue to dry and remove the doors from the clamps.

Fitting and Fussing

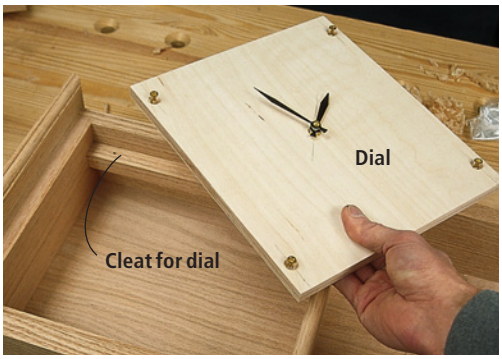
Now it's time for the detail work. Your goal is to trim the doors so they fit on the carcase with a 1/16"-wide gap between the doors and the carcase. This gap, called the "reveal," must be consistent. If it's not, other woodworkers will quickly notice.



Upper door joinery



Lower door joinery



Cringe if you want, but I like quartz movements. They're reliable, require little upkeep and are simple to install. I know this from installing and adjusting several mechanical movements in clocks over the years. Do whatever makes you happy on this point.

When working on narrow stock such as the door rails, it's safer to cut your joinery on a slightly wider board (this one is about 4" wide) and cut the part free when the joinery is complete.

Here's how I trim my doors, though there are many ways to do it: First true one stile on your jointer and rip the door to width, taking equal amounts of material from each stile. Then crosscut the door so it's just a hair longer than necessary. Finally, after installing the hinges, plane the top and bottom of the door to get that perfect 1/16"-wide reveal.

The hinges are a snap to install because they require no mortise. If you lack confidence when installing hardware, here's a simple trick you can use: Screw the hinges in place on the carcase. Mix up some five-minute epoxy and put a few dabs on the hinge leaf that attaches to the door. Position the door right where you want it, tape it to the carcase with painter's tape and allow the epoxy to set. Open the door and drive in the hinge screws for the door.

After your project is finished, install the 1/8"-thick glass. The most handsome way to do this is with glazing moulding that you machine yourself. This moulding is simply 3/8"-thick x 1/2"-wide moulding with a chamfer machined on it. Because you'll finish the project before installing the moulding, now is the time to machine and sand it.

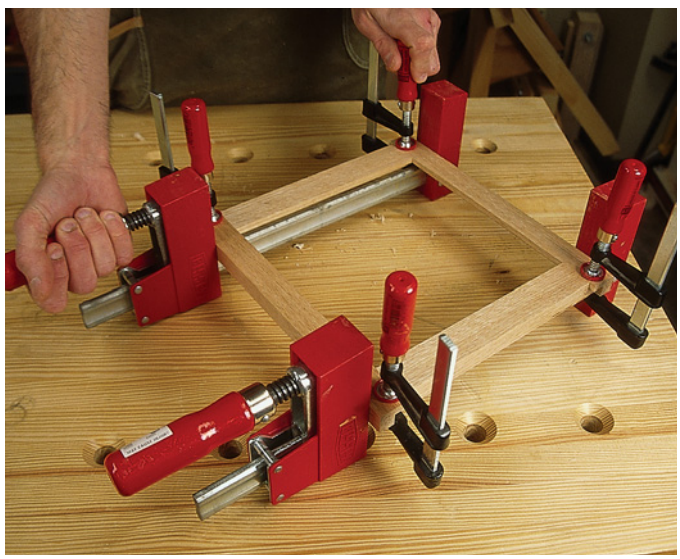
Install the Shaker knobs and the catches for the doors (I used a simple hook and screws), then disassemble the project for finishing. Break all the sharp edges with #120-grit sandpaper.

To give the piece an aged look, I chose to finish it with two coats of garnet shellac. Then I followed that up with two coats of a dull-sheen spray lacquer (shellac is very glossy). This finishing process mimics the look of the original clock quite well.

With the project finished, you can install the glass with a bead of silicone in the rabbet, then miter the glazing moulding and secure it with silicone and brads as shown in the construction drawing.

The original clock is hung on a traditional Shaker peg. You could build yourself a "peg board" and array it with a number of Shaker-like accessories. Another authentic option is to hang the clock on a single forged iron hook.

No matter how you hang it, whenever you check the time, you'll be reminded that it takes a little perseverence and (yes) time to get any project designed and built so it's just right. **PW**



You need to compress the joint vertically as well as join the pieces horizontally, so you need to clamp both simultaneously as shown.

A CLOSER LOOK AT ISAAC YOUNGS

The Shaker faith arrived in the United States from northern England in the late 18th century. One of the earliest communities existed in New Lebanon, N.Y., and it was there that Isaac Newton Youngs made a name for himself in the early 19th century.

Born in 1793, Youngs joined the Shakers when he was just 14 years old. While the Shakers didn't permit watches (they were deemed "an unnecessary indulgence"), they did value clocks to support punctuality. Many clocks were kept in dining areas and common rooms.

Youngs would grow to become one of the group's chief clockmakers, building more than 20 of these projects over the course of his lifetime. His clocks clearly illustrate the Shaker principles of simplicity, purity and utility. Many follow what has come to be known as the Shaker style – namely, they are straightforward, functional and modest.

Along with his clockwork, Youngs delved into another passion while at the community – music. He helped develop the guidelines of small letteral notation that included material on the importance of melody, rhythm and meter. He knew it was important to teach this system of notation, to provide examples for students to study and to encourage a uniform system for the entire community. Youngs died in 1866.

At its peak in the mid-19th century, there were about 6,000 Shakers living in the United States. But after a long, slow decline in membership throughout the late 19th and 20th centuries, there now exists only one active village, located in Maine.

— Michael A. Rabkin

The Case for HANDSAWS

Far from being quaint anachronisms or symbols of outdated and inefficient technology, handsaws are precision instruments that deserve a place in every contemporary workshop.

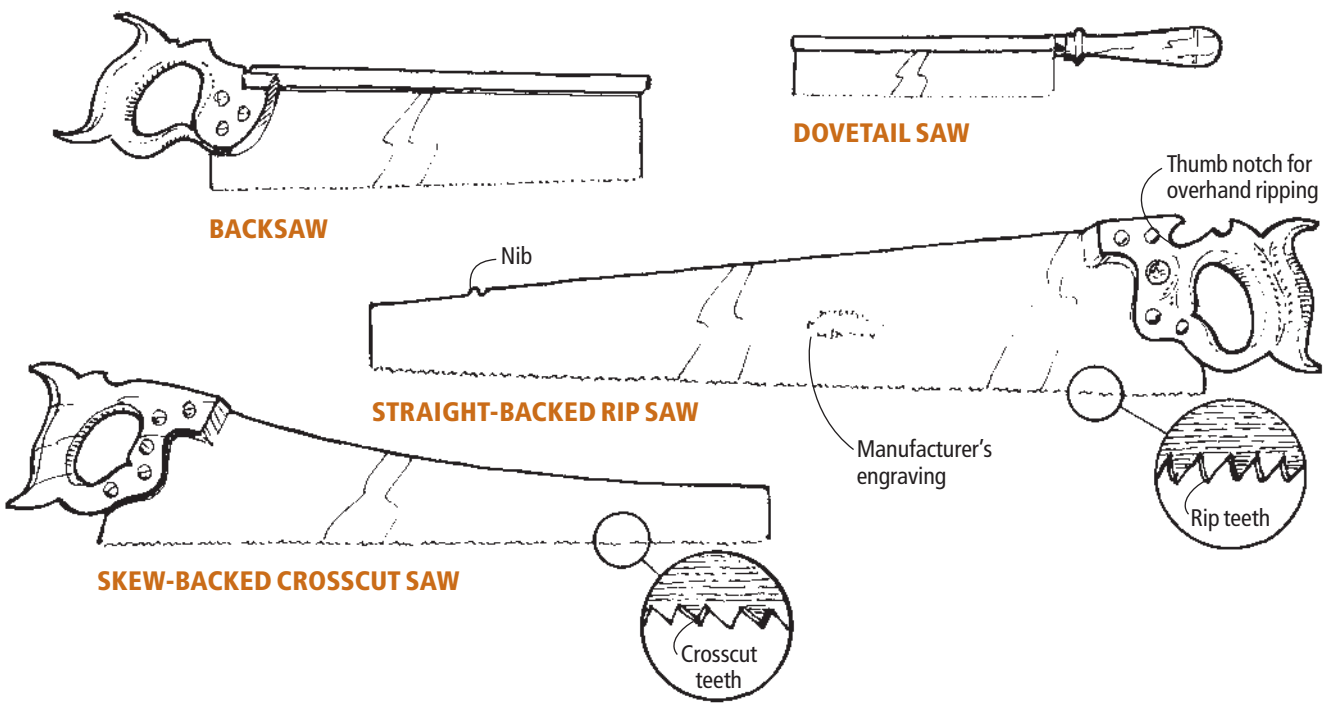
Why you should learn to sharpen and use these oft-neglected tools.

There are several reasons for such a claim, including safety, convenience and economy, but of ultimate importance for most woodworkers – whether professionals or hobbyists – is the fact that there are things you can do with handsaws that you can't do any other way. Including handsaws in your tool kit gives you more choices and can produce better woodworking.

The most common and most useful handsaws are a dovetail saw, a backsaw (also known as a tenon saw), a rip saw and a crosscut saw.

by Graham Blackburn

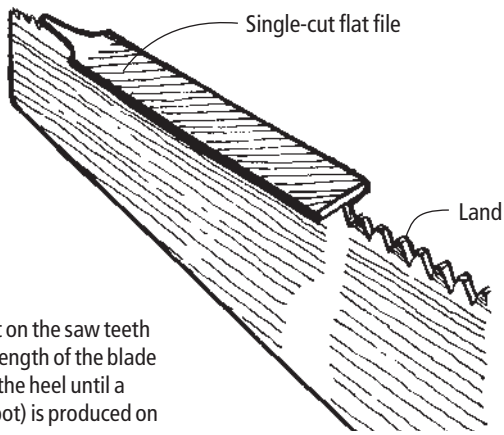
Graham is a furniture maker, author and illustrator. Look for his forthcoming book "Traditional Woodworking Techniques" (Blackburn Books) this summer. It will be available through blackburnbooks.com.



Illustrations by the author

Photo by Al Parrish

JOINTING



Hold the file flat on the saw teeth and pass it the length of the blade from the toe to the heel until a "land" (a flat spot) is produced on every tooth.

The dovetail saw is your secret weapon for perfect joinery.

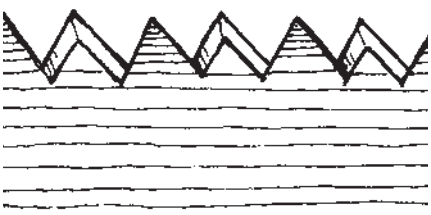
The backsaw is an all-purpose saw for safe cuts on small work–pieces – no one wants to push a small piece of wood (2" or less) through the table saw without all sorts of jigs and protection.

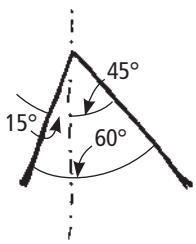
And crosscut and rip saws can be efficient alternatives to table saws and band saws when you don't want to change any of your carefully-set-up jigs, blades or fences for a single cut. Plus, it's often much easier to take the saw to the wood than vice versa.

Similar to all other tools, any handsaw must be properly tuned and skillfully used to be truly useful. But how can you tell a good handsaw from a bad one? How do you make sure it's in top condition? And what are the techniques to use it effortlessly and accurately in your shop?

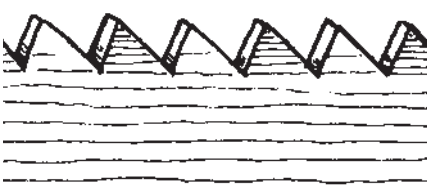
There is very little that is inherently difficult about handsaw use, yet the answers to these questions – for people raised on tools that must be plugged in before anything happens – have become virtual secrets. What was once common knowledge has been largely forgotten.

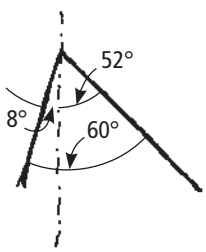
FILING CROSSCUT AND RIP TEETH





Crosscut teeth are filed with two bevels on alternate sides.





Rip teeth are filed straight across, producing a single bevel.

The Tune-up

The first requirement is a sharp and well-set tool. There are three components to tuning up a handsaw: jointing, filing and setting. And none of these tasks requires a time-consuming or costly trip to the old guy who sharpens saws on the other side of town.

• Jointing simply means running a flat file along the top of the saw's teeth. This ensures that all the teeth will be the same height (so they cut evenly) and provides a clear guide for the next step.

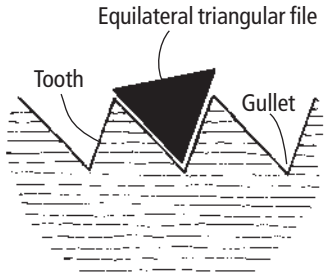
• Filing usually consists of no more than a couple of strokes with a triangular-shaped file placed between every tooth – in a particular manner and order. Three things make this process easy: understanding the particular shape of a given saw's teeth, using the right size file, and using a saw vise or an improvised wooden substitute.

Saws designed to cut along the grain, such as rip saws, dovetail saws and many backsaws, have teeth formed like a row of little chisels, as shown in the illustration at left. Saws used for cutting across the grain, such as crosscut saws, have teeth filed to look like a series of little knives.

The files used to sharpen Western saws (as opposed to Japanese-style saws) should be equilateral triangular files, because no matter how aggressive the rake of any given saw's teeth may be, the angles formed between the teeth and the angles formed by the teeth themselves are always 60°. The right-sized file is one that is small enough to fit into the gullet between two teeth and large enough to file the entire slope of a tooth.

When you file a saw, you need to clamp the saw in a saw vise (or between two pieces of wood held in a vise) so that the teeth of the tool are just visible above the vise. To position the file correctly, you need to pay attention to three things (which are shown in the illustration at right):

HOW A SAW FILE SHOULD FIT



First, hold the file perfectly horizontal.

Second, tilt the file so it fits down into the gullet and preserves the particular rake of the tooth. (This angle can be checked by dropping the file into a gullet at the extreme toe or heel of the blade where the teeth are unlikely to have been worn out of their original shape.)

Third, if you are filing a rip saw, hold the file perpendicular to the side of the blade. If you are filing crosscut teeth, angle the file back about 15°.

Now you are ready to file. If you abide by the following rules you'll never become confused when filing: Always start by clamping the saw so that the handle is to the right, then place the file to the left of the first tooth that is pointing towards you, at the toe of the saw. Hold the file as described above and take as many strokes as necessary to remove half the flat spot formed on the tip of the tooth when you jointed the saw. Remove the file and replace it to the left of the next tooth pointing towards you (this will involve skipping one gullet) and repeat the process until you reach the handle end. Then turn the saw around so the handle is to the left and place the file to the right of the first tooth

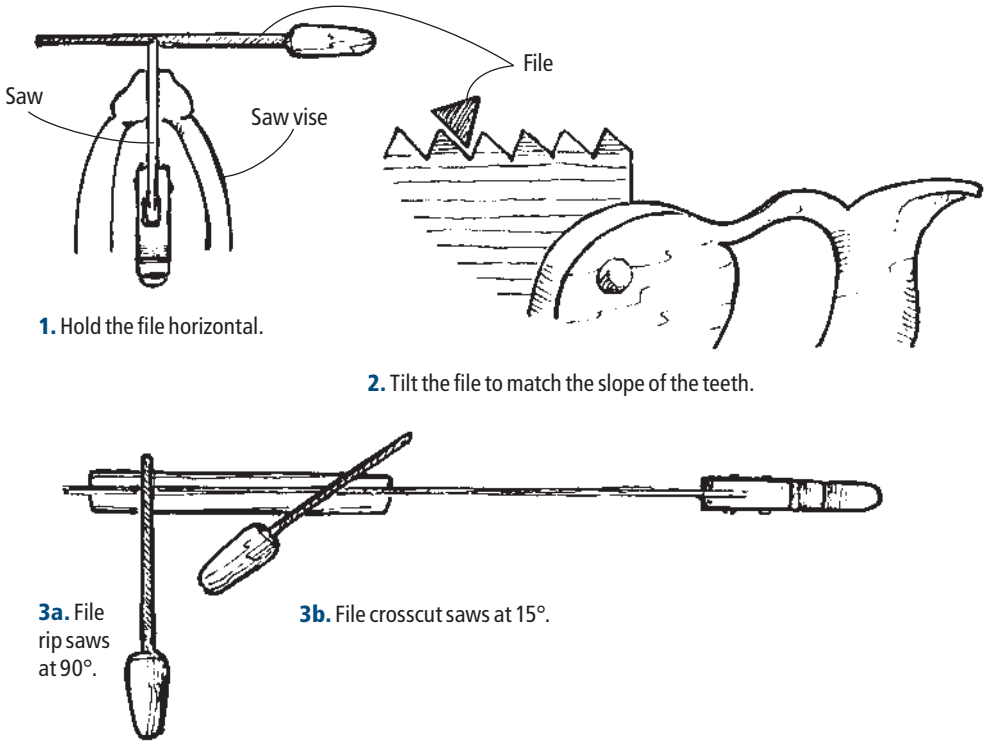
pointing towards you at the toe of the saw. File until the remainder of the flat spot is gone from the tip of the tooth, then move the file towards the handle, skipping every other gullet. The whole process should take no more than a couple of minutes.

• Setting, the last operation, involves bending alternate teeth sideways so they cut a kerf slightly wider than the thickness of the saw blade. With no set, the friction caused by sawing heats up the moisture in the wood, causing the wood to bind on the saw. The wetter or softer the wood, the greater the set needed.

The tool used to bend the teeth, called a sawset, is like a small hand-held vise. You place the sawset on a tooth, squeeze the handle and it bends the tooth.

Modern sawsets can be adjusted easily to bend any size tooth correctly. But however great the set, you should bend no more than half the height of the tooth – any more and the tooth may break off. This is not fatal, but like eating, the more teeth you have the easier the process. Small saws with many teeth, such as dovetail saws, which are used for relatively small cuts in dry wood, need very little set. Large rip saws need considerably more set.

FILING POSITIONS



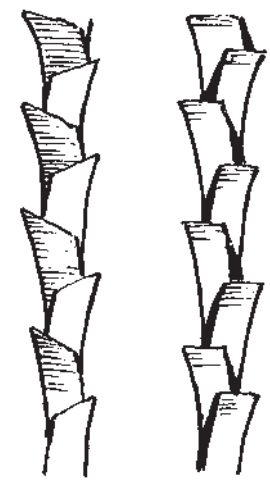
1. Hold the file horizontal.

2. Tilt the file to match the slope of the teeth.

3a. File rip saws at 90°.

3b. File crosscut saws at 15°.

TOOTH SET



Crosscut teeth Rip teeth

More important than the amount of set is the evenness of the job you do. If the teeth on one side of the saw are set out more than the other, they will cut faster and cause the saw to "lead" – a term used to describe the tendency of the saw to wander from the line you're trying to follow.

Sufficient and even set is therefore almost more important than actual sharpness. For this reason, set the teeth in the same way that you file the teeth: First set all the teeth that bend to one side, then turn the saw around and set the other teeth. This will tend to even out any differences.

If, after setting, the saw still leads, simply dress down the teeth on the side to which the saw is curving by running a flat file along the side of the teeth. Then check your saw to see if it still leads by making a test cut.

Quality Tips

Even cheap saws can be tuned so they perform well, but quality saws will have more comfortable handles, better balance and superior blades that will stay sharp longer. Clues to finding a superior saw, old or new, include:

• Nicely formed wooden handles (the more screws that hold the blade to the handle the better).

• A skewed back, rather than a straight back. This indicates a hollow-ground blade, which means the blade is thinner as you move further away from the teeth, thereby necessitating less set and a smaller kerf.

• Manufacturer's pride, which can be seen in items such as a brass back instead of a steel back on a backsaw, or fancier engraving (sometimes called the "etch") on the face of the blade.

The Basic Technique

Also essential for efficient handsaw use is learning correct technique. Even the best saw will prove disappointing if you don't understand how it should be used. A lot of this is common sense, but to avoid reinventing the wheel, you need to know the basics.

First, understand that handles are not designed to accommodate your entire hand. The idea is to insert only the lower three fingers of your hand into any saw with a closed handle; the index finger should be held alongside the handle, pointing forward.

Second, if you hold the saw like this while aligning yourself with the cut so that your eye is directly above the back of the blade, favoring neither side, you will take advantage of your natural ability to recognize verticality. Unless we are sick or drunk, most of us can tell more easily what is straight up and down than we can judge any other angle.

This basic positioning remains true whether you're sawing down an 8'-long oak board or making a

2" cut in a small workpiece held on your benchtop.

Next you need to know how to start a cut and what angle the saw teeth should be presented to the work. Whether you're using a small dovetail saw or a full-size, 26"-long rip saw with four teeth per inch, start the kerf by placing the saw on the work near the heel of the blade (the end nearest the handle) and drawing backwards for a few strokes. Resist the temptation to push until the kerf has been cut sufficiently deep for the saw not to jump out of it.

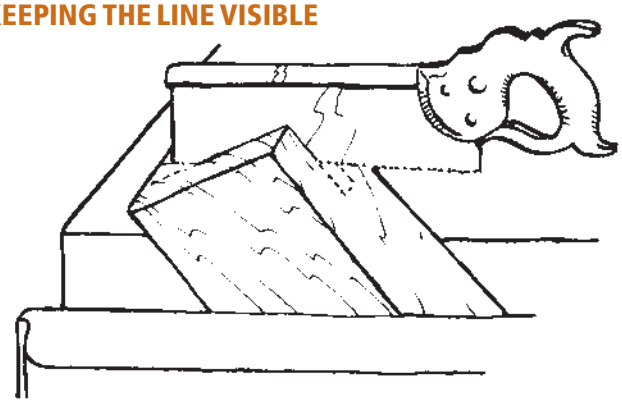
Guide the saw for these first few backwards strokes by holding the work near the blade so that the side of the blade rests against your extended thumb, as shown in the illustration below. It's very difficult to cut yourself as long as you're pulling the saw backwards, but when you start to push forward you must move your thumb.

The initial back cuts and the first few forward cuts should be made with the saw at a fairly low angle to the work, about 20° or so. Once the kerf is well established you'll work faster if you raise the angle. Especially long cuts may require you to insert a wedge or screwdriver into the kerf to prevent it from closing up and binding on the saw if the board has been cut from wood that has grown under compression. When using a dovetail saw or a backsaw, the situation may demand a more horizontal stroke, especially if the workpiece is small and you're using a holding device such as a bench hook.

Remember to use the whole length of the blade instead of short strokes. This is a more efficient use of the entire saw and will demand less effort. In any event, you shouldn't have to push the saw with a great deal of force – if the saw is properly sharpened and set it should be able to cut through the wood under its own weight – if held at a steep enough angle.

Also, always saw on the waste side of the layout line. This sounds obvious, but it implies that you position yourself and the workpiece so that you can always see the line you're attempting to saw on through the entire cut. It's easy to secure a piece of wood in the vise, align yourself carefully with the cut, then saw past the point where you can see the line.

KEEPING THE LINE VISIBLE



1. Tilt the workpiece so that the layout lines across the top and down the front side are visible.

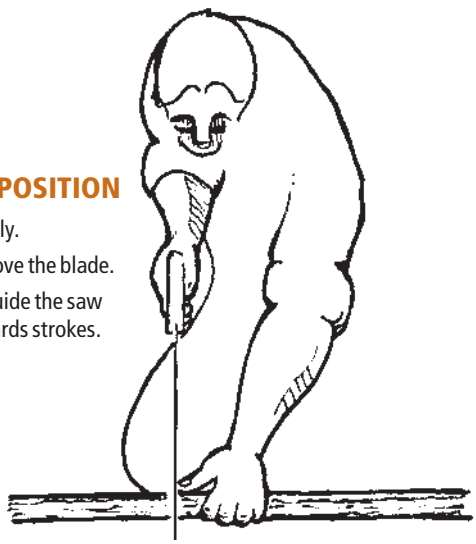
2. Then turn the workpiece around so the layout line on the back side is visible – the previous kerfs will guide the saw.

HAND AND EYE POSITION

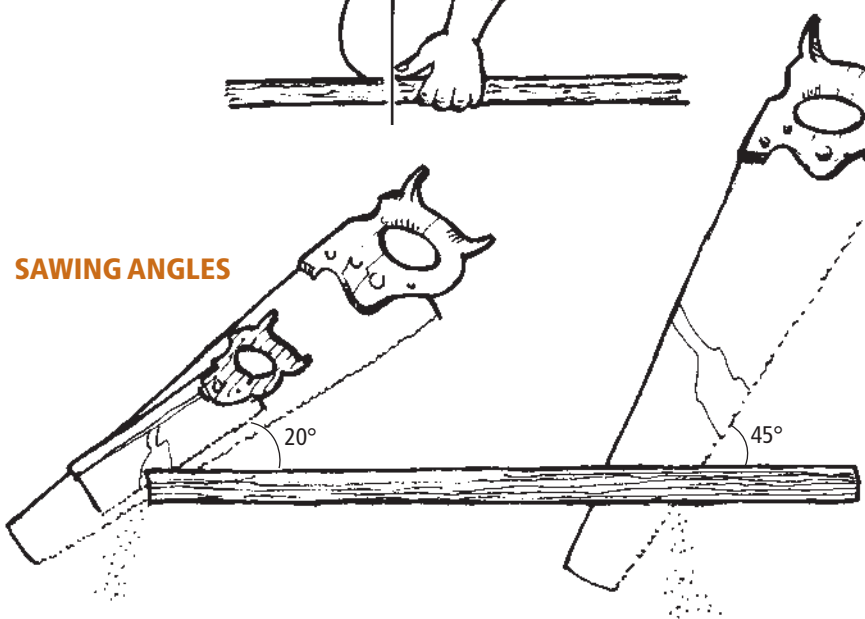
1. Hold the saw vertically.

2. Position your eye above the blade.

3. Use your thumb to guide the saw for the first few backwards strokes.



SAWING ANGLES



1. At start of cut the saw should be at a low angle.

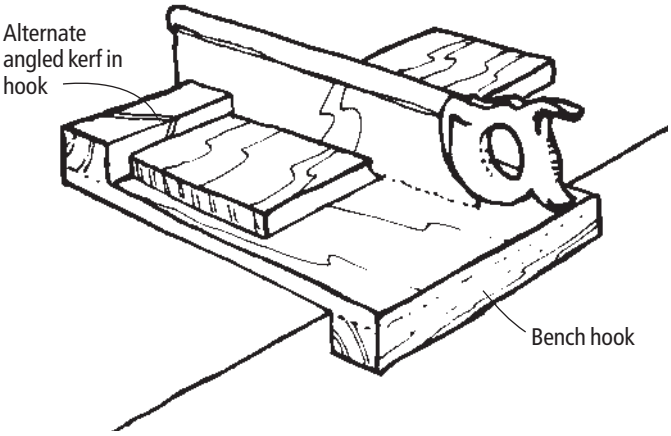
2. Increase the angle once the cut is established...

3. ... unless you're using a backsaw for joinery cuts.

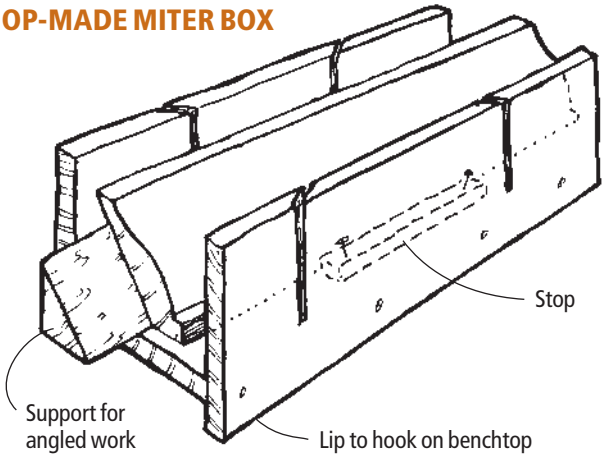
Guaranteeing Accuracy

In addition to the above techniques, remember that in traditional high-end woodworking, the use of hand tools is rarely synonymous with freehand hand-tool use. In the same way that you would be ill-advised to attempt

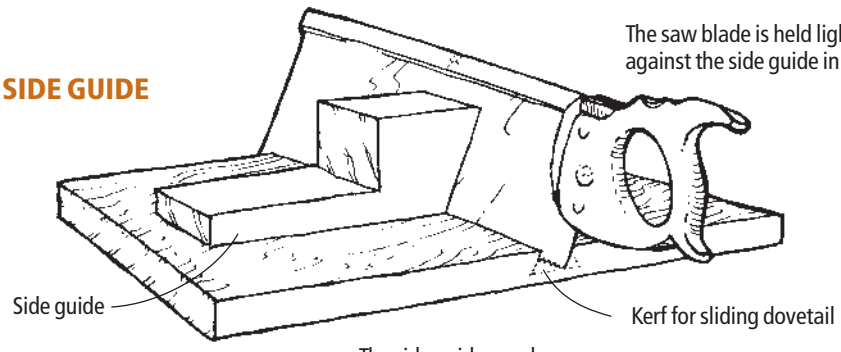
BENCH HOOK



SHOP-MADE MITER BOX



SIDE GUIDE



The side guide may be clamped to the workpiece.

to push something through your table saw without the aid of fences, miter gauges, hold-downs or sleds, it also is risky to use a handsaw without taking advantage of the shop-made jigs and guides that have been developed over the centuries to guarantee accuracy.

The most useful sawing aid for small workpieces is undoubtedly the bench hook. Easily made in a variety of sizes (sometimes in pairs), the bench hook functions as a third hand for holding a workpiece securely. Also, if the hooks are affixed and kerfed accurately, it works as an accurate miter block.

A metal miter box is useful but typically requires an especially large backsaw. You can use a dovetail saw or a regular backsaw with similar accuracy if you make your own wooden miter box, providing it has stops and wedges for complicated angled cuts.

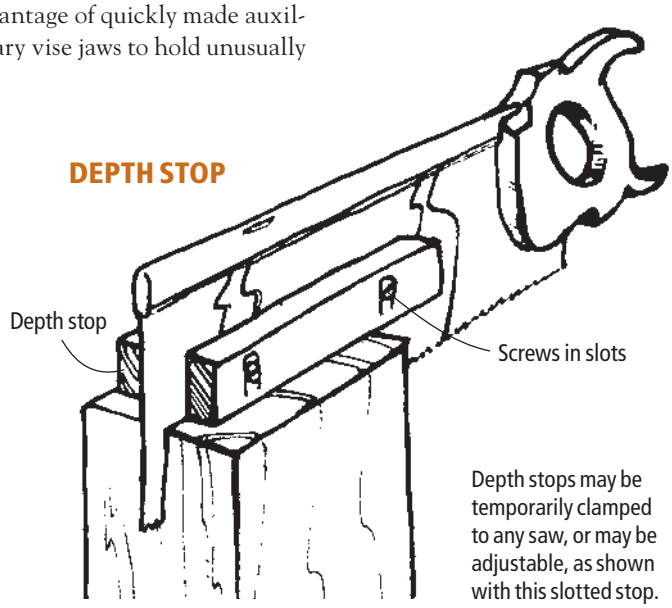
When using either of the above devices, how you position the work determines if you'll get tear-out on the workpiece. If you position the work so that the shaped part of the moulding faces you as you work, the tear-out will be on the backside of the cut and then hidden from view. This is called "sawing into the cut."

While bench hooks and miter boxes can quickly become standard equipment in many shops, there are numerous other jigs and guides that can be made easily as the specific need arises. A side guide, for example, can be cut with a face at any angle to provide a foolproof method for you to make wide, angled cuts.

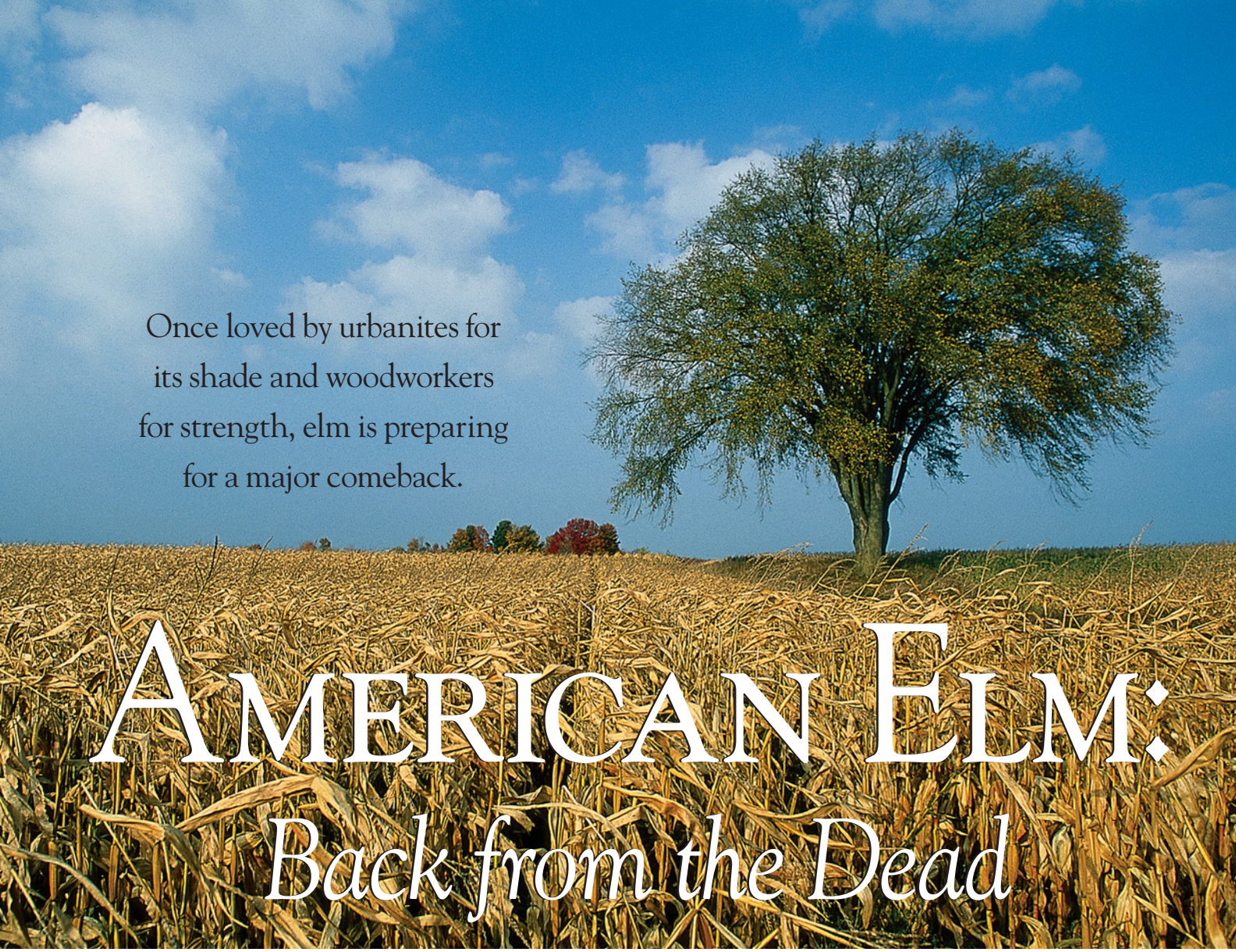
One of the easiest mistakes to make when using a handsaw is to saw deeper than intended. This kind of mistake can ruin tenon shoulders, dovetails, housed joints and many other cuts. Metal miter boxes usually are fitted with depth stops, but there is no reason not to clamp your own depth stop to the side of whatever saw you may be using, thereby guaranteeing a consistent depth of cut. You will frequently find old saws with a pair of holes bored through the blade – these once held screws that were used to attach a strip of wood that functioned as an adjustable depth stop.

Also, you should take advantage of quickly made auxiliary vise jaws to hold unusually shaped workpieces, such as round or curved sections, and remember whenever possible to position the workpiece so that the cut you make is vertical. **PW**

DEPTH STOP



Depth stops may be temporarily clamped to any saw, or may be adjustable, as shown with this slotted stop.



Once loved by urbanites for its shade and woodworkers for strength, elm is preparing for a major comeback.

American Elm: Back from the Dead

Photo copyright Cameron Davidson

Chairmaker Don Weber vigorously works at a piece of elm with an adze to form the beginnings of a chair. Hewing the seat's gentle slopes, which merge into the center pommel, is strenuous work, in part because of the nature of the act and in part because of the nature of the wood.

The chairmaker, partial to Welsh stick-style chairs, continues to shape the seat with an inshave, a spokeshave, a travisher and sandpaper before it is acceptable. Working with elm, a notoriously tenacious wood, is not an easy task.

Most woodworkers have never worked with elm because it's so tough. It's also not easy to find. In about 1930, a shipment of French veneer logs infested with a fungus spread by elm bark beetles arrived in the United States, decimating the population of the tree. This disease is now referred to as Dutch elm disease (commonly called DED).

Today, when building furniture that will experience a lot of physical stress, we often choose other tough woods that resist splitting, such as oak and ash. Elm has become a forgotten wood. But contrary to popular belief, elm exists. What's more, it's preparing for a major comeback, and not a moment too soon. Ash trees are in grave danger and elm may soon become our "tough" wood of choice again.

The Eminent Elm

Elm, a porous wood with noticeable rings, is similar in weight to white birch. Its interlocking grain makes

by Kara Gebhart

Comments or questions? Contact Kara at 513-531-2690 ext. 1348 or kara.gebhart@fwpubs.com.

it a tough wood that's difficult to split. Working with elm requires sharp hand tools and strong muscles. Elm has a light grayish-brown tint and an attractive herringbone grain pattern, which many say takes a finish beautifully.

Elm also has high elasticity and wears well. Because of this, elm has been used by humans throughout history. According to Elmcare.com, in North America the Iroquois used elm bark to make many useful items including canoes, ropes, utensils and roofing. In Japan, the Ainu used elm bark to make clothing. Romans tied grapevines to living elms.

In Britain, elm was a choice wood for the hubs of wagon wheels, barrels, tables and chairs. Shaker boxmaker John Wilson of Charlotte, Mich., has a canoe from the early 1900s with ribs made from red elm (different than American elm) in part because of red elm's light weight and ability to bend well.

Elms have woven their branches in and out of our history books, too. For example, in 1765, colonists hung effigies of Lord Butte and Andrew Oliver from Boston's Liberty Elm (perhaps the most famous American elm) in protest of the infamous Stamp Act.

Today, it's hard to travel through a town or a city in the United States without crossing an "Elm Street." Fast-growing, beautiful and tough enough to survive an urban setting with roots that rarely spoiled sidewalks, elms were planted one right next to another (a grave error) along city streets. Americans loved the way the tree's thick branches flared up and arched over our nation's concrete. Elm was considered America's shade tree.

But now only old movies and street signs remind us of what was once commonplace. Despite elms' toughness, a fungus killed an estimated 77 million of them.

Shipments of unpeeled veneer logs from Europe introduced two strains of Dutch elm disease to the United States. Dying American elms were first discovered in Cleveland in May 1930. By 1977, the disease, carried by the elm bark beetle (a relatively easy task because many elms were planted in rows) had spread throughout the United States, according to the U.S. Forest Service.

Streets once softly darkened by elms' thick branches became bright and bare. The arboreal disaster – a nightmare on almost every "Elm Street" – had an emotional effect one can compare only to the chestnut blight, a disease that virtually eliminated American chestnuts from our forests in the early 1900s.

Cloning the Survivors

Although millions of American elms died, hundreds of thousands still exist, says Denny Townsend, a research geneticist with the U.S. National Arboretum. Some are living because they haven't been exposed to the disease. Others have shown tolerance to it. The key to the trees' survival is finding ones that don't succumb to the disease and then cloning them.

A cloned tree is called a cultivar. To be cloned, an elm must show signs of tolerance.

Once a tolerant American elm is identified, the soft shoots (new growths on a plant) that appear between May and July are cut from the tree. The shoots are placed in a mist system to root. The roots are then dug up and planted in pots to grow. The genetic makeup of the cuttings are exactly the same as the tree they came from, Townsend says.

Thriving Cultivars

Today, several American elm cultivars are gaining popularity with names such as Liberty, Princeton, New Harmony and Valley Forge. (Think of these like you would different types of apples – Fuji, Gala and Granny Smith.)

Townsend introduced Valley Forge and New Harmony (named and released in 1995 and 1996, respectively) American elms. Valley Forge was discovered through inoculation (injecting lots of elms with the disease to see if any are tolerant). Townsend found New Harmony out in the wild, healthy and strong. Testing proved it, too, to be tolerant to Dutch elm disease.

Both cultivars now are being offered by nurseries such as The Botany Shop Garden Center in Joplin, Mo. Its owner, Mike Shade, has sold several thousand New Harmony and Valley Forge elms (he also sells Princeton elms). They have been planted in Washington, D.C.'s, national mall area and sent to Boston's famous Arnold Arboretum.

Photo by Al Parrish

Chairmaker Don Weber works on an American elm seat blank with a drawknife. Elm commonly is used in chairs because of its inherent strength.

The devastation of Dutch elm disease is apparent in these two pictures of Collingham Street in Detroit. The elms that gracefully lined the street during the summer of 1974 (left) had been removed by 1981 (below).

Photos courtesy of Jack H. Barger, U.S. Forest Service

Roger Holloway, a woodworker and owner of Riveredge Farms in Atlanta, sells Princeton elms. The Princeton elm was selected by a professional nurseryman in 1920 (before Dutch elm disease hit) for its appealing shape.

The nurseryman grafted this elm's cuttings onto American elm root stock, produced identical specimens, named it the Princeton elm and began selling cultivars in 1922, according to americanelm.com.

But in the 1930s, Dutch elm disease hit and production of elm cultivars halted. Years later, scientists discovered that the Princeton elm was tolerant to the disease.

Holloway now sells Princeton elms across the country, targeting urban sites, including Pennsylvania Avenue in Washington, D.C., where there are plans to plant 1,000 Princeton elms. Holloway estimates he has sold more than 20,000 trees.

William Monroe, a retired businessman who was instrumental in replanting hundreds of elms around Cincinnati, chose the Princeton elm as the cultivar of choice. None of the Princeton elms planted around the city has succumbed to Dutch elm disease, according to Larry Parker, a service area coordinator with the Cincinnati Park Board.

Since 1983, more than 250,000 Liberty elms have been planted in the United States, according to the Elm Research Institute. The institute has confirmed less than 100 cases of Dutch elm disease among the planted elms.

Deciding which elm cultivar is best is a matter of debate. Some say that while equal in tolerance, the Princeton elm has a more classic, vase-like look than Valley Forge and New Harmony. But others argue the exact opposite. Many say Liberty elms aren't as tolerant as the others to the disease.

The Future of Elm

As awareness of Dutch elm disease-tolerant American elms continues to grow, urban sites and historical monuments will continue to be revitalized with this once familiar and favored tree. And with time, these elms could eventually make their way into lumberyards and woodshops – especially if the emerald ash borer has anything to say about it.

The emerald ash borer, a beetle from Asia, was first discovered attacking ash trees in summer 2002. To date, areas of southern Michigan; Windsor, Canada; northwest Ohio and a nursery in Maryland all have reported diseased trees, says Steven Katovich a forest entomologist with the Forest Service. Already 6 million to 7 million ash trees have died in the six counties that surround Detroit. Some predict the beetles will be as devastating as Dutch elm disease and the chestnut blight.

Shade, the owner of The Botany Shop, predicts that if the ash borer spreads despite attempts to stop it, American elms could replace the thousands of ash trees that could die from the disease.

Several lumberyards have stopped carrying ash, not because of emerald ash borers but because

Photo courtesy of The Botany Shop (botanyshop.com)

About 5,000 Valley Forge elms are growing in The Botany Shop's propagation house in Joplin, Mo., during the winter season to increase production.

Photo courtesy of The Botany Shop (botanyshop.com)

Jim Slavicek, a plant geneticist with the U.S. Forest Service, stands next to a row of New Harmony elms at the U.S. Forest Service and U.S. National Arboretum research location in Delaware, Ohio.

of another group of beetles called powder post beetles. While emerald ash borers attack living trees, powder post beetles bore their way through wood products turning them into a powdery dust.

For woodworkers of the future, these two problems could mean a switch from ash to elm for projects that require tough woods.

Of course, elm isn't out of the woods yet. In Saskatchewan, Dutch elm disease is relatively new (it was first discovered attacking elms there in 1981). The Saskatchewan Dutch Elm Disease Association is fiercely fighting the disease by removing infected trees, promoting diversification and requiring woodworkers to obtain permits to use elm wood, says Sheri O'Shaughnessy, the association's executive director.

Then there's the Asian longhorned beetle, which was discovered attacking trees in 1996 in New York and in 1998 in Chicago. Although the beetle prefers maples, it also attacks horse chestnuts, willows and elms, says Dennis Haugen, an entomologist with the Forest Service.

The banded elm bark beetle was found last summer attacking elm trees in the western United States. It's too early to determine if Dutch elm disease-tolerant elms are tolerant to the banded elm bark beetle, too.

No one knows the effect these diseases ultimately will have on elm. But thousands of Dutch elm disease-tolerant elms have been planted and are thriving today.

How to Get it

Like the beautiful slab of bird's eye maple your neighbor got from a friend of a friend, the best way to buy American elm is to let it be known that you're looking and simply wait. None of the woodworkers interviewed for this article has worked with Liberty, Princeton, New Harmony or Valley Forge elms because the trees are too young. Most woodworkers patiently wait for wild American elms that survived Dutch elm disease to reach maturity and naturally fall.

Weber, the chairmaker who lives in Paint Lick, Ky., keeps his eyes open for fallen elms while driving in cities. But when working with street trees, Weber says you constantly have to watch out for wire, nails and staples.

Weber's latest batch of elm came from the Kentucky's governor's mansion. There, an elm had to be removed because of damage done during an ice storm.

Wilson, the boxmaker, buys red elm more frequently than American elm. Red elm isn't affected by Dutch elm disease so it's plentiful in Michigan. He says he also prefers red elm's nut-brown color to elm's light tan.

If you don't have the patience to wait for lightning to strike (literally), you can check your local lumberyard, but good luck. Most don't carry it. But, as Dutch elm disease-tolerant cultivars continue to grow and mature (and ash trees continue to fight for their lives), elms may once again become popular at the lumberyards and in the wood stacks – despite it being a challenge to work with.

Weber is fond of Raymond Tabor's book "Traditional Woodland Crafts" (Batsford). In it, Tabor writes, "Folklore characterizes elms as billowing timber trees whose wood is tough, resistant to the wedge, fit only for coffin boards. But use it young and green and you will find a lovely wood, versatile and easy to work with."

After finishing a set of elm seat blanks, Weber might not agree with the word "easy" in Tabor's passage. But, as the chairmaker shows off a large pile of American elm that was recently delivered to his shop, he points out its fine figure. Like most who frequently curse the wood while working it, Weber is quick to praise its strength and beauty.

Urbanites are already experiencing a renewed sense of appreciation for elms. And as our ash supply becomes questionable, it's just a matter of time before woodworkers embrace elms' virtues, too. **PW**

FOR MORE ELM INFORMATION:

- Riveredge Farms: americanelm.com
- The Botany Shop: botanyshop.com
- Elmcare.com
- Elm Research Institute: libertyelm.com
- Saskatchewan Dutch Elm Disease Association: sdeda.ca

Photo by Al Parrish

This Welsh-style Windsor chair built by chairmaker Don Weber features an elm seat.

Photo by Al Parrish

10" SLIDING

Compound Miter Saws

The modern answer to the radial-arm saw.

Miter saws have come a long way from being used primarily as a machine for chopping 2x4s on job sites. In fact, they've become so sophisticated and accurate that many woodworkers don't even consider using their table saw to cut a miter. And when it comes to straight crosscuts, 10" sliding compound miter saws have all but replaced the radial-arm saw.

But, like most toys in your shop, these advanced precision machines are pricey. So we decided to look at the available options to make sure your money is well-spent.

by David Thiel & Kara Gebhart

Comments or questions? Contact David at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com. Contact Kara at 513-531-2690 ext. 1348 or kara.gebhart@fwpubs.com.

Testing Parameters

For our test, we selected seven machines readily available on the market. Interestingly, DeWalt and Ridgid offer only 12" sliding compound models; therefore, they're not represented in this test.

Six of the seven machines cost between $420 and $550. That may seem like a wide spread, but the pricing actually is tighter than it appears. As for the seventh saw, well, it's an odd duck. You can buy it for less than $200 (only at Lowe's). It went in our shopping cart simply because we were so darn curious.

To determine the winners, we looked at how accurate and clean a cut the saw made, plus how easy it was to set up and adjust the machine.

But before we plugged any of the saws in, we checked all the fence and angle settings on each saw out of the box for initial accuracy. Many of the saws were out of square by one-tenth or two-tenths of a degree. Don't be so quick to roll your eyes. While this doesn't sound dramatic, it's enough to spoil the accuracy of a mitered frame where the error is multiplied times eight.

Next, we made a variety of cuts in ¾"-thick x 5½"-wide poplar boards. We tested the accuracy of straight 90° cuts as well as 45° left and 45° right miter cuts. We also tested compound bevel cuts at 45° in as many directions as possible (three of the models we tested bevel left and right).

When making the cuts, we used the blades that were shipped with each machine. All of them were alternate top bevel (ATB) crosscut blades ranging from 40 to 80 teeth. Many woodworkers opt to buy a less expensive saw and upgrade it with a nicer blade, so we also made cuts on each machine with a new Freud 60-tooth, thin-kerf, ATB blade.

Features of Note

Unlike all the other saws, the Bosch's bevel release is located up front. Although the bevel feature is used least often on most miter saws, it's nice to not have to look to the back of the saw for the locking knob that allows the saw to bevel.

As for the miter locks, all are located at the front of the machines (as they should be) and use some type of spring-loaded release to move between preset detents (automatic stopping points, traditionally located at 90°, 45° and 22½° – both to the left and right of 0°). How the table is stopped and locked at other locations varies with each saw and we've addressed that in the comments on the individual saws.

The slide lock/releases are more varied in their locations (frequently found back by the rail system) but all are accessible and function conveniently enough. Kudos to Makita for putting the slide lock/release up front with the rest of the controls.

While checking the saws' accuracy we noticed a difference worth commenting on. If the two halves of a fence are out of alignment, or if the entire fence isn't square to the blade, the type of fence can be critical. A cast, one-piece fence can only be tweaked as a single piece. Beware that if you try to adjust just one side, you can bend the casting out of alignment and you'll be fighting your fence forever.

All of the saws tested use a dual-rail, bearing-guiding slide system. Some slide more smoothly than others. The rails can be mounted either under the table or above the table behind the motor/blade assembly. Their location isn't critical to their performance, but it can impact the balance of the saw.

Our Verdict

The GMC saw did better than some of us expected, but we can't call it a good value. What we can recommend is a tie between the Bosch and the Makita. Both performed very well in the testing. The Bosch has more features, but it's also priced $70 more than the Makita. Both are excellent machines and will make your woodworking a pleasure.

Bosch 4410

Bosch:
877-267-2499
boschtools.com

The Bosch 4410 was a pleasure to use. This feature-laden machine (our notes while initially inspecting the saw spilled onto several pages) is the newest saw in our test and, honestly, has more features to offer than anything else we looked at.

The four-position handle with its ambidextrous safety switch gives you comfort and control during straight, miter and compound cuts. The bevel lock is positioned up front (with the standard miter lock) for convenience. The miter scale offers good readability.

The miter table moves smoothly. But before our praise becomes nauseating, we have to note that the miter detent settings were a bit sloppy, allowing a possible ½° of movement unless you locked your setting in place.

The good news about the detents is that there is an additional miter adjustment system that lets you fine-tune any detent setting, a unique useful feature.

The tools for adjusting the machine are stored onboard. And Bosch even added a cord wrap on the side, the only one in our test.

The extension tables are integral, nicely designed, easy to operate and include a built-in stop that works on the left or right side of the saw.

The fences are 4" high, have basic inch markings on the faces (nice) and can slide out of the way of the blade (a good thing to remember when making bevel cuts – don't ask). On close inspection, both fences had a .002" hollow at their centers, but were accurately aligned with each other.

The mechanism controlling your depth of cut is simple to adjust and even offers a quick bypass for faster adjustments. The throat plate adjusts to a 5/16"-wide opening, which is shy of a zero-clearance setting, but decent.

The motor is powerful and the blade supplied provided as smooth and effortless a cut as the thin-kerf Freud blade (which, in most cases, was much better than the stock blade with the other saws). Changing the blade was OK, but not the easiest in our test.

This saw's large footprint offers a stability not found in others. Combine that with the versatile handle orientation, dual-bevel capability, extended miter capacity beyond 45° and a nice blade and the Bosch 4410 earns one of our Editor's Choice awards.

Delta 36-240

Delta:
800-223-7278
deltawoodworking.com

At first glance, the table on this saw looks like it was designed to resemble the "Star Trek" Enterprise. While futuristic in appearance, it's not as cool. But we do have to admit that the support provided by the big table is appreciated. And as an added bonus, big rubber feet kept things from sliding around, so we didn't have to worry about permanently attaching the saw to a stand (though that's still usually a good idea).

The zero-clearance throat plate is a solid plastic insert. The factory made the initial cut and, in the process, cracked the insert. While this kind of insert (when not cracked) is good for zero clearance, you will make a mess of it when you make bevel cuts, rendering it quickly ineffective.

The saw's slide motion was a little resistant and the plunge spring was stiffer than we like. There were no extension tables and no apparent way to add extension bars. This was likely because this saw is designed for use with Delta's mobile stand. We felt the fence height was on the short side ($1\frac{3}{4}$" at the point where it was closest to the saw blade) but at the outside edges of the table the saw's plastic stand did add support up to 3"-high for the last 2".

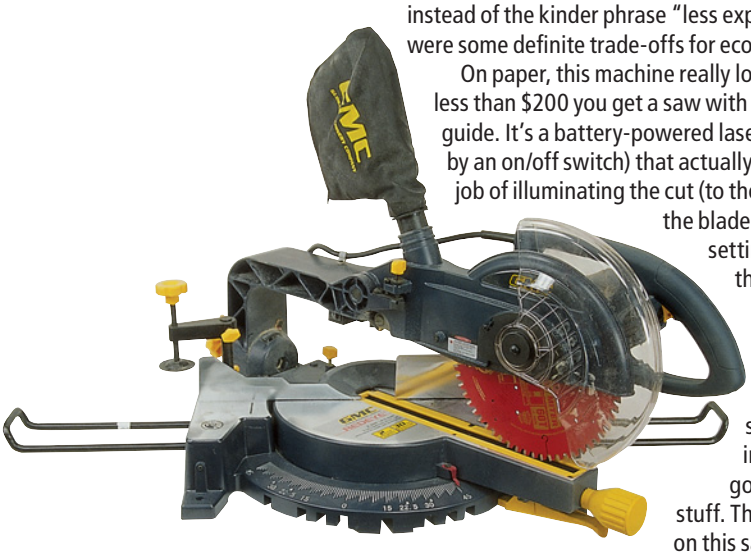
One feature that we really liked was the ability to lock the table in any miter location by merely releasing the up-front lever – pretty slick. Most of the saws tested required us to lock that setting in place with a separate handle. That said, we found the table too tight during operation, making it hard to easily stop at the detents. This may loosen up with time, but we found it pretty frustrating.

The depth of cut adjustment was difficult to figure out, but easy to use. The fences were square to the table and within accurate alignment to each other. All the tools you need for adjustments to the saw were stored on board.

The blade provided with the saw was a unique 39-tooth blade. We hope the broken-off tooth was just an anomaly. The quality of cut, although nice, was improved by adding the Freud blade.

All said, Delta priced this saw at $420. But we'd happily spend another $60 for a few small upgrades. A bonus Spock action figure might be fun.

GMC SMS250LSRUL



GMC:
866-307-0132
gmcompany.com

The price of the GMC saw ($220 less than its closest competitor) was too attractive to overlook. But it didn't take us long to discover why it's so cheap (note the word "cheap" instead of the kinder phrase "less expensive"). There were some definite trade-offs for economy.

On paper, this machine really looks great. For less than $200 you get a saw with (get this) a laser guide. It's a battery-powered laser (activated by an on/off switch) that actually does a decent job of illuminating the cut (to the left side of the blade kerf). If the setting isn't perfect, the laser can be adjusted from left to right.

At this point we started running into the too-good-to-be-true stuff. There is no brake on this saw; the only one lacking in the tested machines. Waiting for the blade to free-spin to a stop creates more opportunity for you to injure yourself and increases the time between cuts. The sliding and mitering table actions are not particularly smooth but they do function without too much resistance. While the saw wasn't tippy, it's lightweight (the lightest in the test and 5 pounds lighter than the next heaviest saw) and should be permanently attached to something.

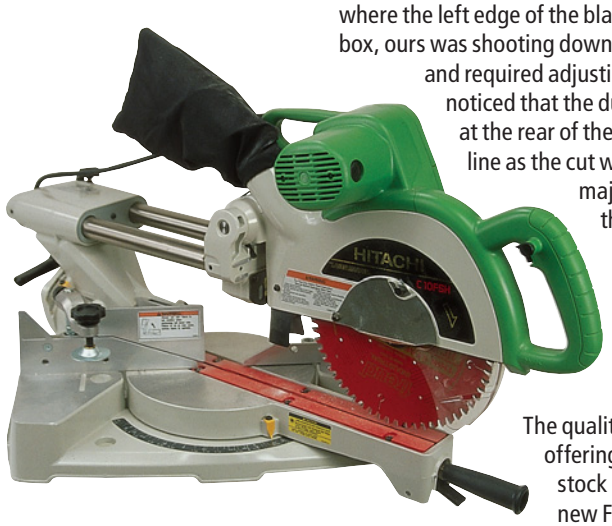
The locking mechanism (a screw-knob) for mitering in any location other than the standard preset detents is positioned at the rear of the table behind the fence. Functional, yes, but not very sophisticated or convenient. The throat plate is a solid plastic insert, but it's not a zero-clearance plate. It comes with a fixed $\frac{1}{2}$" opening, with no adjustment possible.

The miter scale is crude and the stock blade offered a poor cut. The machine's fences were adequate (though a little short) and of the difficult-to-adjust one-piece design. But they were within accuracy tolerances out of the box.

Overall this isn't a machine we can highly recommend, even at $200. But it is serviceable and – with a blade upgrade – would serve an infrequent user adequately, especially for carpentry jobs where accuracy is less critical. For example, if you plan to use a saw to build a deck and you'll never use that saw again, by all means check this one out.

But if you're attempting any type of fine woodworking or plan on using this saw on a daily (or even weekly) basis, we'd suggest looking past the price tag (and the laser) and buying one of the more premium saws recommended here.

Hitachi C10FSH



Hitachi:
800-829-4752
hitachi.com/hpt

If you just have to have a laser on your saw (if for no other reason than to impress your neighbors), check out the Hitachi. The laser runs off the saw's power (no battery to replace) and is designed to indicate where the left edge of the blade will cut. Out of the box, ours was shooting down the center of the kerf and required adjusting. Once adjusted, we noticed that the dust deflector mounted at the rear of the blade blocked the laser line as the cut was made. This isn't a major problem, but something to note and get accustomed to as you work with the saw.

The Hitachi has a powerful motor equipped with a soft-starting feature. The quality of cut was very good, offering as nice a cut with the stock blade as it did with the new Freud blade.

The table operation was smooth and solid (locking between preset angles with a front-locking mechanism), and the saw featured a precise and legible scale. It also has extended miter capacity to 47° to the left and 57° to the right.

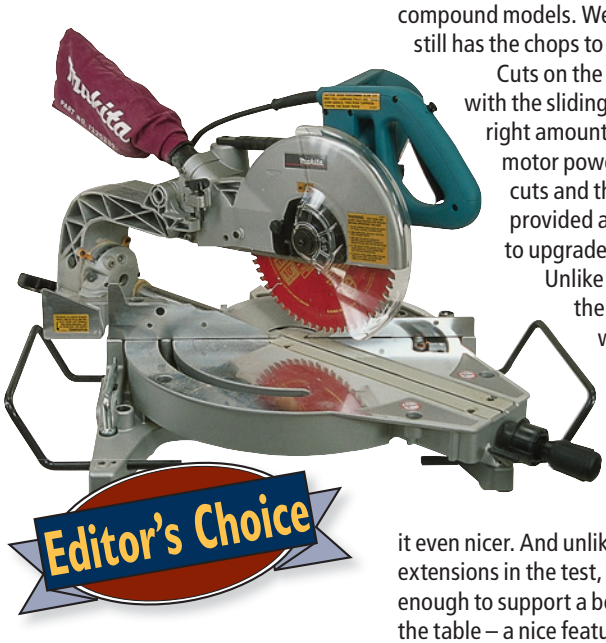
The Hitachi is one of three dual-bevel saws in the test, allowing more convenience in making compound miter cuts.

The table itself was the second smallest in the test with no extensions included. The saw has a very small footprint and you should definitely use the rear support bracket supplied with it to keep it from tipping backwards.

An adjustable throat plate (that can go all the way to zero) was very nice. The fences were of adequate height but were out of alignment with one another, which caused some rocking at the center of the cut. Unlike most of the saws in our test, the two fences were individually adjustable, so the alignment was easily correctable.

The Hitachi is a nice saw with good performance, good capacity and has enjoyed a good reputation with users for years. And now this machine has the added benefit of a laser guide. While we can recommend the Hitachi as a good saw, it was barely edged out for our Editor's Choice award by the Makita and Bosch units because they were less expensive or had more features aimed at woodworking.

Makita LS1013



Makita:
800-462-5482
makita.com

As one of the most popular sliding compound miter saws on the market, we were anxious to see how the venerable LS1013 stood up to the newest sliding compound models. We're happy to report the Makita still has the chops to do the job.

Cuts on the Makita were very smooth, with the sliding mechanism offering just the right amount of resistance. The 15-amp motor powered nicely through all the cuts and the included 64-tooth blade provided a superior cut. There's no need to upgrade this blade.

Unlike the other saws in this review, the Makita's slide mechanism lock was located at the front of the saw, which we found to be a very convenient feature.

The saw's large miter table offered ample support on its own. The extension supports just made it even nicer. And unlike some of the other "wire" extensions in the test, the extensions here are deep enough to support a board nearly the full depth of the table – a nice feature.

The miter scale on the table was mounted to the right (a less-standard location that's convenient when you're working on the left side of the saw) and was precise and easy to read. The miter capacity runs from 47° to the left and 52° to the right, offering more than the standard 45°. This allows you to fine tune your miters for out-of-square cabinets or walls.

A good-quality adjustable throat insert finishes out the table area, providing easy zero clearance for mitering and bevel cuts.

As with the Bosch and Hitachi, the Makita is a dual-bevel saw, allowing easier compound miter cuts without too much mental recalculation.

The fences were on the short side (1"-tall on the right) and of the one-piece design, but were square to the table and aligned accurately to each other. With the drop-down auxiliary fence in place at the left of the saw the height increases to 3", but it also threw out the squareness of the fence by $^{1}/_{32}$" and there was a bit of play to the taller fence.

While one of the older designs in our test, the Makita LS1013 still impresses us with its simplicity, accuracy and excellent performance. And we also discovered that if you purchase this miter saw before the end of the year, Makita will even throw in a free 14.4-volt cordless drill to say thanks.

That extra tool wasn't necessary to convince us to select the LS1013 an Editor's Choice award winner. While it isn't as feature-laden as the Bosch, we were happy to save $70 and still have a quality sliding miter saw that will handle any precision job.

Milwaukee 6497-6

Priced comfortably in the middle of the pack, the Milwaukee has some nice features, but also some frustrations that we didn't enjoy.

Like the Hitachi, the table and footprint of the saw are small. The machine is lightweight and required more assembly than many of the others tested. This proved especially frustrating when it came to making adjustments to correct common alignment problems. The Milwaukee is assembled with Torx screws throughout and there is no Torx driver provided. In fact, the manual tells you not to make the adjustments, but to take the saw to a service center instead. That questionable design choice will frustrate woodworkers who tweak their saws for precision crosscutting.

Out of the box, the depth adjustment was set so the blade didn't cut all the way through our test board. After some adjustments (using one of our wrenches) we were able to complete the cut.

Not all is awry, though. In operation we found the sliding mechanism smooth and the miter table adjustment solid. The scale was more difficult to read, but the miter range is impressive at 51° to the left and 59° to the right.

The fences are of useful height ($3\frac{1}{2}$" on the left and $2\frac{3}{8}$" on the right) and are of a two-piece design, making adjustment easier (if you have the proper tool). The flip-fence on the left side of the blade allows for quick adjustment between fences, offering tall, solid support for crown moulding cuts and an angled fence for bevel cuts.

We're sorry to say the quality of cut was merely average, even with the 80-tooth blade that was supplied with this saw. However, it can handle wider boards than any of its competitors, up to $3\frac{1}{2}$" thick and $12\frac{3}{8}$" wide.

The saw was shipped with a solid (though non-adjustable) throat plate that had not been cut through. Like the Delta, this will become quite sloppy with use. Even with a lifetime warranty, the Milwaukee finished in the middle of the pack, and that's not counting the adjustability difficulties.

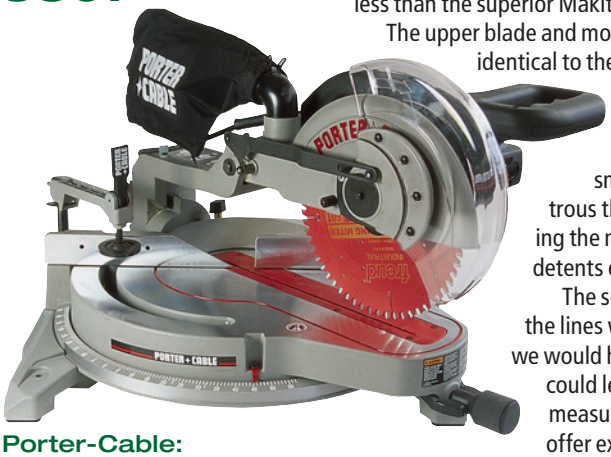
Milwaukee:
800-729-3878
milwaukeetool.com

10" SLIDING COMPOUND MITER SAWS

	BOSCH 4410	DELTA 36-240	GMC SMS250LSRUL	HITACHI C10FSH	MAKITA LS1013	MILWAUKEE 6497-6	PORTER-CABLE 3807
Price*	$550	$420	$199	$499	$480	$450	$465
Motor (amps)	15	15	14.5	12	13	15	15
Speed (rpm)	4,800	5,000	4,200	3,800	3,700	4,800	5,000
Brake	Yes	Yes	No	Yes	Yes	Yes	Yes
Safety switch	Yes	No	No	Yes	Yes	No	No
Handle orientation	Varies	Horizontal	Vertical	Vertical	Vertical	Vertical	Horizontal
Capacity (H" x W")	$3\frac{3}{4}$ x 12	$3\frac{5}{8}$ x $11\frac{1}{2}$	$3\frac{7}{8}$ x 12	$3\frac{17}{32}$ x 12	$3\frac{5}{8}$ x 12	$3\frac{1}{2}$ x $12\frac{3}{8}$	$3\frac{5}{8}$ x 12
Miter (L/R)	52°/60°	45°/45°	45°/45°	47°/57°	47°/57°	51°/59°	47°/57°
Bevel (L/R)	45°/45°	45°/–	45°/–	45°/45°	45°/45°	48°/3°	45°/–
90° accuracy	0.2°	0°	0.2°	0.2°	0.4°	0.1°	0°
45° miter accuracy (L/R)	0°/0.1°	0°/0.1°	0.4°/0.1°	0.2°0/.2°	0.1°/0.1°	0.1°/0.1°	0°/0.1°
45° bevel accuracy (L/R)	0°/1°	0.4°/–	1.5°/–	0.4°/0.1°	0°/0°	0.4°/–	1.5°/–
Max. length supported (")	$37\frac{1}{2}$	26	37	21	$33\frac{1}{4}$	32	$17\frac{3}{4}$
Blade (teeth/style)	72/ATB	40/ATB	40/ATB	40/ATB	64/ATB	80/ATB	40/ATB
Weight (lbs.)	55	51	38	43	46.5	55.5	57
dB at 2 feet	96	103	98	96	96	95	99
Warranty (mos.)	12	24	24	12	12	Lifetime	12

*All are Internet retail prices as of publication deadline.

Porter-Cable 3807



Porter-Cable:
800-321-9443
porter-cable.com

The Porter-Cable saw did OK in the testing and is all-in-all a decent machine. Unfortunately, it's only $15 less than the superior Makita.

The upper blade and motor assembly is nearly identical to the Delta, but the bases are significantly different. The Porter-Cable's miter table moves very smoothly, offers ambidextrous thumb releases for changing the miters and locks easily at detents or anywhere between.

The scale is easy to read, but the lines were a bit wider than we would have preferred. This could lead to user error when measuring a cut. The saw does offer extended miter capacity, reaching 47° to the left and 57° to the right.

The throat plate is a solid insert, leaving us no adjustment for zero-clearance and the added likelihood of more tear-out after a couple of bevel cuts.

The slide and beveling releases are at the rear of the machine (as with most saws in the tests). In use we felt the slide mechanism and plunge spring offered more resistance than necessary.

One oddity to note is that though the table platform appears large, there are no side extensions included (or available as accessories). As a result, the supported table width on this saw is the smallest in the test. The fences are a one-piece casting and short ($1\frac{3}{4}$" high), but were square and in accurate alignment with one another. If you need to adjust the fence, simply loosen four bolts and tap it into place.

In operation we found the quality of the cut on the Porter-Cable saw to be somewhat better than average, but we still found an improvement in the cut quality after switching to a new Freud blade.

Bottom line: It's a fine saw, but for a few bucks more you can get a much better machine. **PW**

MAKING YOUR MITER SAW BETTER

While we've spent some effort showing you the virtues or deficits of the sliding compound miter saw category, there are ways to make this machine even more useful in your shop.

Regardless of where you're using your saw, you will need to set it up at a reasonable working height. This may require you to build a miter saw stand such as the one we added to our shop. Shown below, this mobile stand (the free plans are available online at popwood.com by clicking on "Magazine Extras") offers 8' of board support and adjustable length stops to either side of the cut. These stops are something not found on most commercial miter saw stands.

If you build your own stand, make it mobile using casters so the stand and the saw can be brought to the work if necessary. Use casters that lock so that once the stand is in place it won't move while you're using the saw. The same advice applies if you're purchasing a manufactured stand. Stands should also allow you to adjust the extended table height to conveniently match the table height on your saw.

If you're not ready to buy or build a mobile stand but still want the benefit of improving the fence system (in capacity as well as repeatable accuracy), you can do it with an affordable aftermarket fence system.

We like the fence system shown below from Woodhaven (800-344-6657 or woodhaven.com). For about $100, the model 4502K easily adds a fence system that can be accurately aligned to your existing fence. Also included is a drop-down stop system that quickly adjusts and can be accurately set to make as many repeat cuts on a board as necessary. It's money well spent. *– DT*

It's Time to Turn

If your lathe sits idle in your shop, here's the best way to start using it.

Photos by Al Parrish

If you have ever turned or watched someone else turn, you know the process can be exciting. The shavings peel away and the piece takes shape as if by magic.

Although turning is one of the most straightforward ways of working wood, this seemingly simple process can be used to make a variety of things, far beyond the obvious staircase spindles, table legs and so on.

In the past 30 years, there has been an explosion of creativity in woodturning that once hardly could have been imagined. Exquisite bowls and vessels, sculptural pieces of every description and many works defying categorization are being made by people from every walk of life and of all ages.

Nevertheless, if you have ever turned on the lathe and put gouge to wood without a proper understanding of the process, the dramatic results may well have put you off lathe work entirely. In far too many shops, the lathe sits in a corner, abandoned after some disastrous event, perhaps forgotten or functioning as a somewhat expensive (and not very effective) storage table. In fact, I am told that roughly half of the readers of this magazine who have lathes don't regularly turn.

My most important goal for this column will be to change that statistic. In fact, my secret wish is to get everyone turning. I believe this could drastically improve the condition of the world. As a good friend of mine likes to say, "Manipulate wood, not people."

How to Be a Successful Turner

To succeed at the lathe, you need several things. Clearly, you must have a lathe, a few basic turning tools and the means to sharpen them. A band saw, while not absolutely necessary, is enormously helpful in preparing your wood for turning.

Second, you will need to have (or begin to acquire) an understanding of the underlying principles of turning: choosing appropriate material, properly mounting the workpiece on the lathe, sharpening, knowing which tools to use for various operations and learning how to use them correctly.

Third, you must practice. There's no shortcut and no substitute for practice and experience. But you need to be practicing the right way to do things. Teaching you proper techniques is what I hope to accomplish here.

Any art or craft when done by an experienced person looks easy; most are, of course, more difficult than they appear. My observation, based on having done many types of crafts (including painting, clay, woodworking and others), is that turning is at the far end of that spectrum. When done well it appears to be very easy, but in reality it's often much more difficult to learn than expected.

Much woodworking lends itself to being broken down into a series of simple steps. By doing so, it is possible, with patience and the right tools, to build some pretty impressive pieces right from the beginning. (This is not to say there aren't always a great many skills still to be learned. Obviously, it takes years to become truly expert at most things.)

Turning may look easy because of the

by Judy Ditmer

Judy, author of two turning books and many articles, has been turning since 1985. She teaches and demonstrates her skills throughout the United States and Canada.

simplicity of the basic process: A piece of wood spins and you cut it. For the most part, no intervening jigs, clamps or set-ups are necessary (though they occasionally may be used). The shavings pour off the piece and the object appears.

Alas, in turning as in life, simple doesn't equal easy. Lathe work can be tougher than it looks because to turn the simplest object, you must be doing many things at the same time, and all correctly. If you neglect even one, the result will be, if not a disaster, a ruined workpiece, or at least a much smaller one.

Learning a new skill that requires your body and mind to be doing several new things at once is difficult. We can really only learn one new thing at a time. The challenge is remembering that one thing while you learn the next and so on until you can remember enough to make a successful object. Now, you might learn one thing and then forget it as you learn another. That's OK. Simply recall what you've forgotten and try to incorporate both into your technique as you learn a third thing and a fourth.

The good news is that if you take the trouble to learn the "why" of each "how" (and to keep practicing), you should be able to put it all together. This is why it's so critical to understand the basic theories and principles

THE 3 MOST IMPORTANT PRINCIPLES

These essential principles will apply no matter what kind of turning you're doing.

• Always keep the bevel rubbing. This is the most-critical principle. The bevel is the part of the tool you grind to create the edge. It must be in contact with the workpiece at all times as you are cutting. (The primary exception to this rule is with scrapers, which are used in a very different way than cutting tools. More about these in a later column.)

Why? If you have had the unpleasant experience of a catch or kickback, it's because the bevel came off the workpiece. Rubbing the bevel, in combination with applying leverage with the tool handle, is what controls the depth of the cut. If the bevel comes off the workpiece, the edge immediately dives or digs into the wood, the wood pushes back, and the tool kicks back.

Trying to cut without the bevel rubbing is like trying to hand plane with just the plane blade. You need the rest of the plane because that is what controls the cut; it keeps the blade from plunging into the wood. This allows the blade to make the even, controlled cut you need.

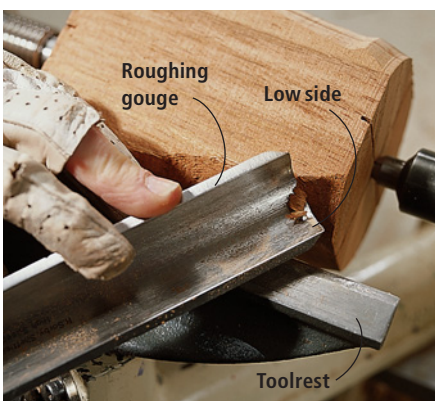
• Move the tool in the direction that the flute (the hollow or groove on the top of the gouge) is pointed and cut with the low side of the tool's edge.

This ensures that the considerable force being applied to the gouge by the spinning wood will hold the tool firmly against the toolrest, allowing you to control the cut. If you cut with the high side of the tool (the part of the edge that isn't supported directly below by the toolrest or is farthest away from the toolrest), the force will twist the tool, causing it to come off the bevel, dig in and kick back hard. There can be exceptions to this rule but if you're a beginner, stick to it. A high-side cut will always be grabby, which means it will force the tool into the wood.

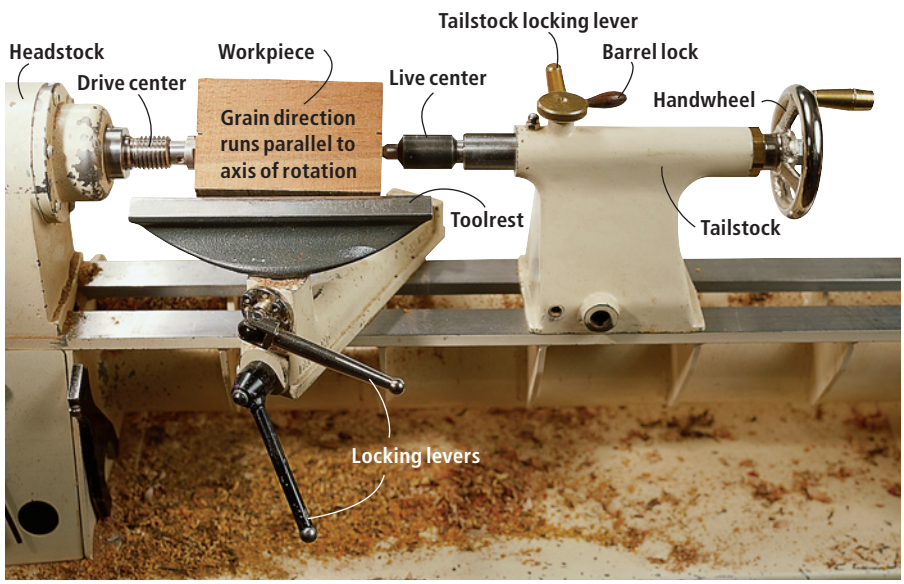
• As with all woodworking, cut with the grain. On spindle work (where the grain of the wood is parallel to the axis of rotation), cut from the larger to the smaller diameter. On faceplate work (where the grain runs perpendicular to the axis of rotation), cut from the smaller to the larger diameter on outside cuts (such as the exterior of a bowl) and from the larger to the smaller diameter on inside cuts (such as the interior of a bowl).

Basically, wood is a bundle of fibers. You cannot cut those fibers cleanly unless they are supported during the cut. As you slice through a particular bit of wood, the mass of wood behind and below it provides support so that you slice through the fibers, rather than bending, tearing or breaking them. —*JD*

PARTS OF A LATHE AND BASIC TOOL PLACEMENT



The tool I'm using above is called a roughing gouge (used only on spindles). The gouge is moving to the right and the cut is made with the low side of the tool. Note that the tool is held firmly against the toolrest and placed so that the part of the tool in contact with the wood is directly supported on the rest.



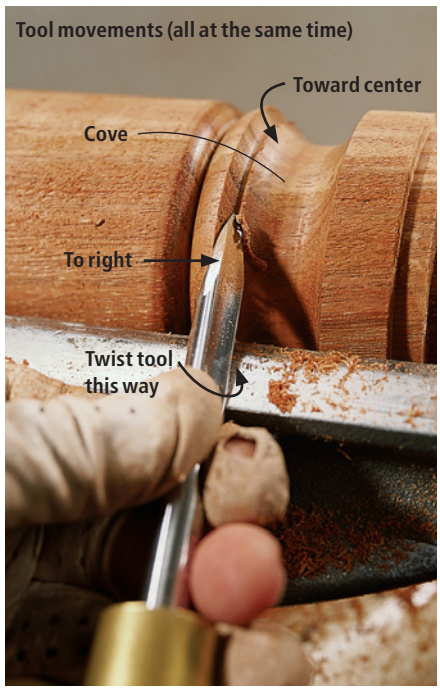
A turning blank is mounted on the lathe. In spindle turning, the grain of the wood runs parallel to the axis of rotation on the lathe bed.

of how the tools work; without this, all the practice in the world will be to no avail.

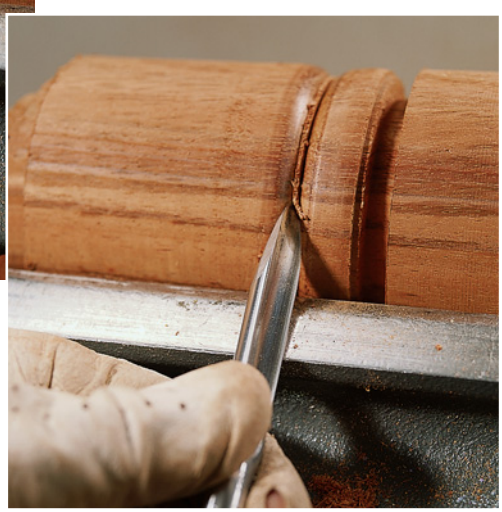
By the same token, understanding the theory doesn't mean that you will be able to put it to use at the lathe. You have to teach your muscles to enact the principles even if your brain has them down pat. It will be worth the effort. Few things are more satisfying than the feeling you get when the wood is spinning, the shavings are spouting and the object you're turning on the lathe is emerging right before your eyes. **PW**

3 BASIC CUTS

A PARTING CUT First make sure you're rubbing the bevel. To start the actual cut, raise the tool's handle as you push the tool's cutting edge into the wood and toward the center.



A COVE CUT Here I'm cutting a cove with a detail gouge. Work from either side toward the center of the cove. If you cut uphill (the other direction), the cut will be very rough and the tool will most likely dig in badly.



A BEAD CUT This small spindle gouge has been ground to look like a long fingernail for detail work. To cut a bead, use the part of the edge near, but not on, the tip of the tool. Keep the bevel rubbing and twist the tool clockwise as you push it to the right (top photo) and toward the center of the workpiece (right photo).

WHAT'S COMING IN FUTURE COLUMNS

I first picked up a gouge in 1985 and was immediately hooked on the lathe. I began turning full time in 1987. I make a wide variety of things on the lathe, including small production items such as tops, pens, boxes, ornaments and bottle stoppers, and larger items such as salad bowls and one-of-a-kind sculptural pieces. Next to the joy of turning itself, my favorite thing to do is to help someone else begin to experience that pleasure.

I will begin most columns with a particular project, and will address the "what," "how" and "why" of the principles and techniques involved. Pictured below are some of the projects we'll be learning to turn in future columns. *— JD*

Rosewood Studio

This Canadian school has its roots in the College of the Redwoods.

The photographic image of cabinetmaker and teacher James Krenov looks down from the door of Robert Van Norman's tool cabinet as he carefully pulls out the planes, spokeshaves and chisels he has fashioned to build chairs and cabinets of his own design.

Picking up the rear post of a chair from his bench, Van Norman matches the sole of a wooden compass plane to the inside radius of the dramatically curved piece of wood. What is immediately apparent by this simple act is that the plane has been made with as much care and skill as the post. Chip-carved into the stock of the plane are a series of small depressions on the sidewalls and on the top of the tool's toe. Though the carvings are indeed decorative, they also allow the user to grip the plane with remarkable force. The tool feels like an extension of the woodworker's arm.

"Toolmaking is an important part of what we do here at Rosewood Studio," says Van Norman, an instructor at the Almonte, Ontario, school. "We get into metalworking a little bit here – it helps the woodworking."

There's little doubt that Krenov, the former head of the fine woodworking program at the College of the Redwoods in Fort Bragg, Calif., would be pleased with the direction of this woodworking school outside Ottawa. Both Van Norman and the school's founder, Ted Brown, are graduates of the College of the Redwoods and have transplanted Krenov's approach to woodworking from the rugged landscape of Northern California to the windswept hills of eastern Ontario.

by Christopher Schwarz

Comments or questions? Contact Christopher at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

Machines Mix with Hand Tools

Rosewood is located in a cozy village at the back of a restored mill along the Mississippi River. The school caters to the woodworker who is looking for a weekend or week-long class, as well as to the more-serious individual who is considering making a living at the craft and is willing to devote 12 weeks to it.

continued on page 82

Wayne Duguay of Vancouver, British Columbia, works on his dovetailing skills at Rosewood Studio, a school that emphasizes both machine and hand skills.

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Glen-Drake Tool Works	*17*	108	glen-drake.com
Japan Woodworker	*81*	112	thejapanwoodworker.com
Lie-Nielsen Toolworks	*19*	117	lie-nielsen.com
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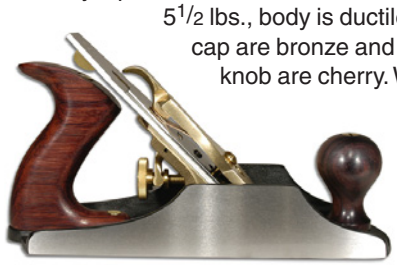
When you request information, you're automatically entered in our drawing to win a Lie-Nielsen 4 1/2 smoothing plane with the high-angle frog. This beauty is a Bed Rock style plane with a blade width of 2 3/8". Weight is 5 1/2 lbs., body is ductile iron, the frog and cap are bronze and the handle and knob are cherry. We'll select one lucky winner from the first 200 information requests received from this issue.



(See Advertiser Index or Product Index for circle numbers.)

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Laguna Tools	C4	115	lagunatools.com
Laserkerf	19	116	laserkerf.com
Legacy Woodworking	85	136	legacywoodworking.com
Leigh	6, 29	—	leighjigs.com
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Makita	11	118	makitatools.com
Manny's Woodworker's Place	84	138	manny'swoodbooks.com
Mesa Vista Design	85	139	grip-tite.com
Miller Dowel Co.	17	119	millerdowel.com
Newton Woods	84	—	walnutwood.net
Norwood Industries	84	140	norwoodindustries.com
Osborne Wood Products	81	120	osbornewood.com
Packard Woodworks	84	141	packardwoodworks.com
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Woodstock Int'l.	15	131	woodstockinternational.com
Woodworker's Choice	84	150	thewoodworkerschoice.com
Woodworker's Supply	16	132	woodworker.com

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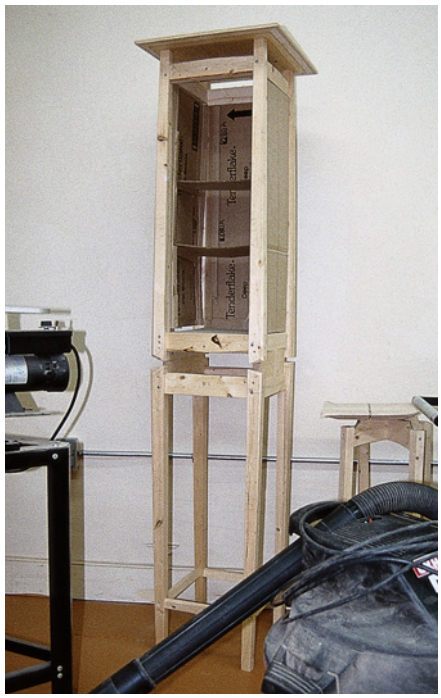
The high ceilings, huge windows and white walls of the bench room create an environment that is awash with natural light and peaceful. No machines are allowed in here.

Will Rafferty of Rhode Island practices his sharpening skills as he tunes up a chisel.



Once a mock-up is complete (such as this one), the student can make the full-size drawings necessary to build the project.

Like the teachers at the College of the Redwoods, the instructors at Rosewood teach a blend of machine skills and hand skills – the machines handle the brutal work of fabricating furniture parts; the hand tools are used for the joinery and details, Van Norman says.

"The majority of the refinement of a piece is done with hand tools," he says. "We don't have really sophisticated equipment."

Sophistication, of course, is in the eye of the beholder. While it's true that you won't see a lot of gee-whiz dovetail jigs on the shelves, the primary machine room at Rosewood is impressive. Rough stock is broken down on a General 12" jointer and a 14" heavy-duty planer. In the middle of the room is a 20" Northfield band saw with a rip fence. At the other side of the room there's a General cabinet saw set up only for crosscutting with a shopmade sled and an Excalibur overarm guard. A Wadkin shaper, Excalibur scrollsaw and Rockwell lathe round out the machinery housed in this center room of the school.

A second machine room is filled with smaller heavy-duty equipment: another General planer, a Delta 16½" drill press, a Davis & Wells horizontal boring machine, a Felder mortising machine, a Wadkin 9" jointer, a General 690 band saw, a Unisaw, a router table, a small Performax drum sander and a cabinet filled with hand power tools.

A Sharpening Session

On a recent Saturday morning, however, the machines are mostly quiet. Student Tom Masirovits heads to the jointer at one point, but it is to flatten the sole of his smoothing plane with the assistance of a strip of sandpaper and the machine's long bed. Three other students are sharpening chisels and plane blades. The only sound that rises above the rushing rapids outside the tall windows is the occasional "hum" and "grrr" of a Baldor grinder as it shapes another tool's bevel.

Doug Wing, a student from Montana, sharpens a plane blade on a waterstone and checks his progress. He's at the beginning of Rosewood's 12-week intensive course, something he left a job in Antarctica to pursue.

"I want to make my own furniture when I finish," he says, frowning a bit at his plane iron and returning it to the waterstone. "Then I'll see what happens."

Will Rafferty, a student from Rhode Island, chimes in. "I've always chosen careers that don't make much money," he says. "But with this – woodworking – you have something to show for it at the end of the day."

Van Norman says this is typical for the students who attend the 12-week course. Many are interested in pursuing a career in building furniture, though the instructors are realistic about the risks.

"We caution them that 12 weeks is not enough to make you a pro," he says. "But it depends on where you are as a woodworker when you begin the course. Some of these people are new to the craft and some have 30 years experience building cabinets."

Some people are beginning to take notice of the skill of Rosewood's graduates. Vicki Rosenzweig, who completed the 12-week intensive course, was hired by Paul Down Cabinetmakers in Bridgeport, Pa. And gradu-

ABOUT ROSEWOOD

Rosewood Studio
83 Little Bridge St.
Almonte, Ontario, Canada K0A 1A0
866-704-7778 or rosewoodstudio.com

ate Michael Mulrooney works in Ed Krause's shop in Minneapolis, Minn., and teaches at the Wild Earth School in Hudson, Wis.

But many of the students who pass through the doors of Rosewood are there for the shorter courses taught by the school's faculty and a rather impressive roster of visiting woodworkers – Garrett Hack teaches there regularly about hand tools; Chris Pye teaches carving; Yeung Chan teaches joinery.

The students come from all over the world. Americans in particular have benefited recently from the Canadian exchange rate. (For example, the $7,900 tuition in Canadian dollars for the 12-week course translated to less than $6,000 in U.S. dollars in March. A one-week course costing $800 Canadian was $607 in U.S. dollars – a good value.)

The Peaceful Bench Room

After the students get their tools sharp, they move to the bench room, an "L"-shaped room that wraps around the primary machine room. Machines are forbidden in this room, which has high white walls and large windows that look out on the river. Fifteen European-style workbenches line the walls with a cabinet above each for the student's tools.

Today the students are practicing dovetailing with a gent's saw or are tuning up their smoothing planes to true up a maple board.

The room is relatively quiet, and one of the students gazes out the window for a few peaceful moments before returning to the maple on his bench. Another student scurries off to the bakery a few doors down for a cup of coffee and a warm pastry.

Making your own tools is one important part of the curriculum for the students in the intensive 12-week course at Rosewood.

In a few weeks, these students will build a piece of furniture using the skills they are learning today. First they will make a rough sketch. Then they'll build a mock-up using 2x4s and cardboard. They might even have to make full-size drawings.

It sounds like a lot to accomplish. But the most important lesson they'll learn, Van Norman says, is to avoid rushing a project.

"One of the things we stress here is slowing down and working on the details," he says. "That is what really makes a piece. We talk about production work. We show them how to efficiently do multiples and make jigs for repeating complex operations.

"But what we focus on is how to make one-of-a-kind pieces."

Instructor Robert Van Norman's tool cabinet is filled with tools he has made or modified during his career as a woodworker.

Van Norman, a professional woodworker for 17 years, finally pulls out a small wooden plane from his cabinet that has an exotic-wood sole. This plane, he explains, was made for him by Krenov. He places it next to a set of astonishingly tight and curved dovetails he cut recently, then looks up from his bench.

"I really like watching the students develop," he explains. "James Krenov would be the first to tell you that we spend a lifetime learning (woodworking). And now I'm here helping students at the beginning." **PW**

This walnut and rosewood knitting cabinet was built by graduate Vicki Rosenzweig.

Fred Ingram from Perth, Ontario, constructed this bubinga and sea grass hall bench at Rosewood.

This French walnut table was completed by student Rotem Almagore of Tel Aviv, Israel.

WOODWORKER'S MARKETPLACE

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Master the Wipe-on Finish

These products are easy to apply with good results – choosing the right one for the job is the hard part.

When applying an oil/varnish blend, wipe or brush it on as shown, then wipe off the excess after it has sat on the surface for a few minutes.

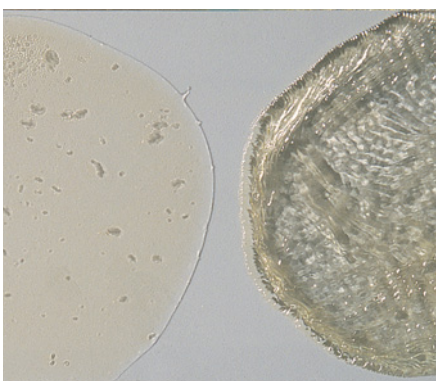
Photos by Al Parrish

The easiest of all finishes to apply on your project is one you wipe on and wipe off the wood. All finishes can be wiped on wood, of course, but finishes that dry and harden rapidly are difficult to control because they don't allow the time necessary to get the excess wiped off evenly.

Oils, blends of oil and varnish, and "wiping" varnishes dry slowly, so these are the finishes usually referred to as "wipe-on" finishes. (Wiping varnish is regular oil-based varnish or polyurethane varnish that's thinned enough so it can be wiped on rather than brushed on the wood.)

You may encounter all sorts of rationalizations for using these finishes – they protect the wood from the inside, they are easy to repair, and so on – but the real reason wipe-on finishes are popular is that they are easy to apply with good results. (Finishes don't protect from the inside, anyway; they protect by being built up on the surface. And all finishes are easy to repair if they're applied very thinly.)

The only difficulties with wipe-on finishes are identifying which is which and choosing the one to use in your shop.



To tell if a product is an oil/varnish blend or a wiping varnish, pour a puddle onto glass or another non-porous surface (such as the top of the can) and let it cure. If it cures hard and smooth, it's wiping varnish (left). If it cures soft and wrinkled, it's a blend of oil and varnish (right).

Knowing Which is Which

What should be a very easy task – simply reading the label – is a chore with wipe-on finishes because of manufacturer mislabeling. You often have to resort to tests to figure out what type of finish is in the can.

Linseed oil is always labeled "linseed oil," so this finish doesn't cause a problem. (Always use boiled linseed oil because raw linseed oil takes much too long to cure.)

Tung oil, the other vegetable oil that cures well enough to be used as a finish, is always labeled "tung oil," but so are some brands of oil/varnish blend and many brands of wiping varnish. No brand of real tung oil comes already thinned with mineral spirits, so if a container labeled "tung oil" doesn't list petroleum distillate as an ingredient, it really is tung oil. Notice also the smell of tung oil. Once you've used it, you'll always recognize it.

Varnish cures hard (unlike linseed oil and tung oil), so it can be built up for better protection against liquid penetration. But varnish is too thick to be wiped easily on wood, so many manufacturers provide a thinned version I call wiping varnish.

The problem is that none of these manufacturers tell you the contents on the label. Some call their wiping varnishes "tung oil" and others use nondescriptive names like Waterlox, Sealacell or Salad Bowl Finish. (Gel varnish, which can also be wiped on wood, is thickened wiping varnish.)

There's no way to tell from the label if a finish listing petroleum distillate is wiping varnish, but you can always find out by pouring a little onto the lid of the can or a nonporous surface like glass or plastic laminate, as shown at left. If the finish is watery thin and the puddle cures hard and smooth after a few days, the product is wiping varnish.

Varnish and oil can be mixed together in any proportion, and many manufacturers

by Bob Flexner

Bob is the author of "Understanding Wood Finishing" and a contributing editor to Popular Woodworking.

supply ready-made oil/varnish blends. Unfortunately, labeling is also unhelpful with these finishes. Many go by names such as Danish oil, antique oil and sometimes even tung oil.

You can identify oil/varnish blends using the same procedure you use for wiping varnish. Pour a little finish onto the lid of the can or a non-porous surface. If the finish cures soft and wrinkled after several days and the label lists petroleum distillate as an ingredient, the finish is an oil/varnish blend.

Make Your Own

You can easily make your own wiping varnish or oil/varnish blend. To make a wiping varnish, thin any oil-based varnish or polyurethane with mineral spirits (paint thinner) until you reach a thinness that's easy to wipe on. The higher the ratio of finish the faster it will build, so begin with as little as 25 percent mineral spirits and increase the amount if this doesn't give you enough working time.

To make an oil/varnish blend, mix any brand of oil-based varnish or polyurethane varnish in any proportion with linseed oil or tung oil. The higher the ratio of varnish you use, the glossier, more protective and durable the finish. The higher the ratio of oil you use, the longer the working time.

If the mixture is too thick for your tastes, thin it with mineral spirits. As with wiping varnish, it doesn't take much thinner to make a big difference. Commercial brands of wiping varnish and oil/varnish blend are thinned far more than they need to be.

If you want to build a thick film of varnish rapidly and eliminate brush marks, brush on several full-strength coats of varnish, sand the surface level, then brush on a coat of wiping varnish (or the varnish you're using thinned 25 percent or more) and leave it.

FIRE SAFETY

To avoid the possibility of spontaneous combustion, drape your finish-soaked rags over the rim of a trash can or hang them to dry. Don't put one rag on top of another. When the rags harden, you can safely throw them away.

How to Choose What to Use

Choosing among these finishes (oil finishes, wiping varnishes and oil/varnish blends) is easy if you know what you're looking for. Wiping varnish is much more protective and durable (and glossier, unless you use a satin varnish) than the others because it hardens and can be built up on the wood. Blends of oil and varnish are somewhat more protective and durable than oil alone. Though the differences are small by comparison, tung oil is a little more protective than linseed oil, and polyurethane varnish is a little more protective and durable than varnish.

Linseed oil and tung oil add more amber color to wood than varnish or polyurethane. But each colors the wood more than any other finish except amber shellac.

How to Apply

Apply linseed oil, real tung oil and oil/varnish blends in the same manner – wipe or brush the finish onto the wood, keep the surface wet for a few minutes, then wipe off the excess. If the finish bleeds back out of the pores, continue wiping every hour or so until it stops.

Allow overnight drying in a warm room (three days for tung oil), then sand the surface smooth with very fine sandpaper (#280-grit or finer). Apply a second coat and then as many additional coats as you need to achieve the appearance you're after. Using more than three or four coats is seldom necessary. Continue sanding between coats if the surface isn't already smooth to the touch.

Wiping varnish can be applied the same way, or it can be applied like full-strength varnish – by brushing and leaving it. You can also brush or wipe on the finish and then partially wipe it off, leaving a thin film. Allow overnight drying after each coat and sand between each coat to remove dust nibs. Apply as many coats as you need to get the appearance you want.

To get a satin sheen without having to rub the finish with fine steel wool, make your own wiping varnish from a satin varnish or polyurethane. Leave a thin film on the surface to get an even satin effect.

Wiping varnish doesn't build nearly as rapidly as full-strength varnish. But it levels extremely well, so brush marks aren't left behind. To remove small dust nibs from the final coat so the surface feels smooth, rub the surface with a brown paper bag. **PW**

Above are a number of commonly available wipe-on finishes. But with the exception of Minwax's Wipe-On Poly, the labels aren't helpful. This list will help.

COMMON WIPING VARNISHES:

- Behlen Salad Bowl Finish
- Daly's ProFin
- Formby's Tung Oil Finish
- General Finishes Arm-R-Seal
- General Finishes Salad Bowl Finish
- General Finishes Sealacell
- Gillespie Tung Oil
- Hope's Tung Oil Varnish
- Jasco Tung Oil
- Minwax Tung Oil Finish
- Minwax Wipe-On Poly
- Waterlox

COMMON OIL/VARNISH BLENDS:

- Behlen Danish Oil
- Behlen Teak Oil
- Behr Scandinavian Tung Oil Finish
- Deft Danish Oil
- Maloof Finish
- Minwax Antique Oil Finish
- Olympic Antique Oil Finish
- Velvit Oil
- Watco Danish Oil
- Watco Teak Oil

SAW-SHARPENING SAVANT LEAVES THE BUSINESS

Tom Law, who has sharpened thousands of handsaws and taught hundreds of other people to do the same, is out of the sharpening business. The Smithsburg, Md., resident said the volume of saws he was being asked to sharpen was getting overwhelming and preventing him from working on other projects, such as completing his own workshop.

Law, a retired carpenter, never intended for sharpening to be a career. He started sharpening saws for other people to be helpful, but pretty soon word got out via the Internet (and in woodworking magazines – sorry Tom), and what started out as sharpening a dozen saws annually ballooned into 500 a year.

If you still want your saws sharpened the old-fashioned (and best) way – which is by hand with a file – you aren't out of luck. Law has a video that teaches saw sharpening (available at toolsforworkingwood.com, 800-426-4613). If you still need someone else to file your saws, you can check out Cooke's Sharpening Inc. in York, Pa. (717-793-9527). Another service is run by Daryl Weir of Knoxville, Ill. (309-289-4070 or send an e-mail to weir@gallatinriver.net). Both services also sell sharpened vintage saws at fair prices.

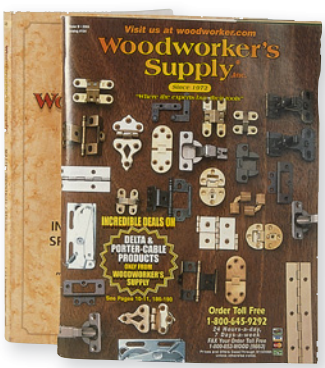
But Law isn't entirely out of the saw business, either. He still sells vintage handsaws that will beat the pants off most new saws. The price is right – Law charges between $25 and $45 for a solid working-class example. And he still sharpens those saws before they go out the door. Contact Law at 301-824-5223.

— Christopher Schwarz

WOODWORKER'S SUPPLY BUYS 'WAREHOUSE' NAME

While Woodworkers Warehouse may be gone, the company's legacy will live on through a pair of former rivals.

In December, Woodworkers Warehouse filed for Chapter 11 bankruptcy protection and ceased operations. All its assets were liquidated. Then on March 25, Woodworker's Supply paid $158,000 in a bankruptcy auction to buy Warehouse's 4.2-million name customer database, vendor lists, purchase histories, inventory data, catalog content, patents, trademarks and web site names.



"We're going to exploit all the assets we bought," John Wirth Jr., president and founder of Woodworker's Supply, told *Catalog Age* magazine. "We'll derive revenue from pretty much all the assets by finding new products, new vendors [and] better deals with our existing vendors." Wirth added that Woodworker's Supply is planning to mail out its catalogs to many former Warehouse customers.

Unfortunately, Woodworker's Supply doesn't plan to reopen any of the former Warehouse stores – that's where Western Tool Supply comes in. The company bought a number of leases to the old Warehouse buildings and plans to reopen them as Western Tool stores in the near future.

Check out woodworkerswarehouse.com, woodworkerssupply.com or westerntool.com for more information.

— Michael A. Rabkin

Photo courtesy of DIY-Do It Yourself Network

EDITOR HITS THE AIR WITH 'DIY TOOLS & TECHNIQUES'

If you're looking for a new television program all about tools, we've got just what you need. *Popular Woodworking* Senior Editor David Thiel has been working with the DIY network to produce "Tools & Techniques," a show that provides you with information on every tool in your workshop and some great tips to help you use them better. You name it, David will talk about it – from stump grinders to cordless drills and more.

For complete information about the show and airtimes, see diynet.com and click on "DIY Shows A-Z" for a program listing, or check your local listings.

— MR

TAGE FRID, 88, WOODWORKER, DESIGNER, AUTHOR

Tage Frid, an influential Danish-born woodworker and designer who adopted the United States as his home in 1948, died May 4. Frid was one of a handful of craftsmen who rekindled the nation's interest in making hand-crafted furniture, inspiring untold numbers of woodworkers.

Frid wrote the groundbreaking three-volume "Tage Frid Teaches Woodworking" (Taunton Press). A longtime teacher at the Rhode Island School of Design, he helped start *Fine Woodworking* magazine. **PW**

— Steve Shanesy

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