

WIN a Festool Domino! page 16

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Lidded Box
with Alan Lacer

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#128 April/May 2007

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EDITOR'S LETTER

What's Your Story?

One the great things about working for a woodworking magazine is that I get to meet a lot of other woodworkers, both amateurs and professionals. It's fun to hear about their shops, their projects, or a joinery technique they recently mastered.

I met a woodworker from Montana at a recent trade show whose day job is surveying. On weekends he spends his time building furniture for his new home and for his grandkids. When I asked him about his shop he cracked a big grin and said, "I wish I could build more, but I've got a walk-out basement shop with a terrific view. One wall slides open like big double barn doors. The view of the mountains is so spectacular that sometimes I spend more time gazing than woodworking."

So, what's been happening in your shop these days? Do you have a story that you'd like to share with other readers? If so, send it to us. We welcome submissions and suggestions for stories. For more information, see page 48.

We're also collecting photos for our Reader's Showcase of projects that you've built. To send us your brag pictures, see page 48. And don't miss our Workshop Tips Tool Give Away on page 16. If we pick your tip as one of the best of the bunch, you'll receive a valuable new tool.

Until next time,



Randy Johnson
Editor

rjohnson@americanwoodworker.com



AMERICAN WOODWORKER

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Editor	Randy Johnson
Senior Editor	Tom Caspar
Associate Editors	Tim Johnson Dave Munkittrick
Tools and Products Editor	George Vondricka
Contributing Editors	Brad Holden Seth Keller Alan Lacer Richard Tendick
Office Administrator	Shelly Jacobsen

ART & DESIGN

Art Director Vern Johnson

Category President/Publisher	Roger Case
Associate Publisher/ National Sales Manager	James Ford
Vice President/Production	Derek W. Corson

ADVERTISING SALES

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CHICAGO James Ford (219) 462-7211
Classified Advertising, The McNeill Group, Inc.
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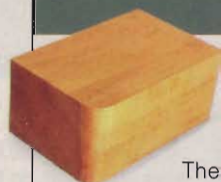
Write to us at American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. (651) 454-9200, fax (651) 994-2250, e-mail aweditor@americanwoodworker.com.

Bandsaw Fence Dilemma

Q I'd like to set up my bandsaw for making straight cuts. What kind of fence should I use?

A You've got a choice between two kinds: a single-point fence and a long, straight fence. Here are their pros and cons.

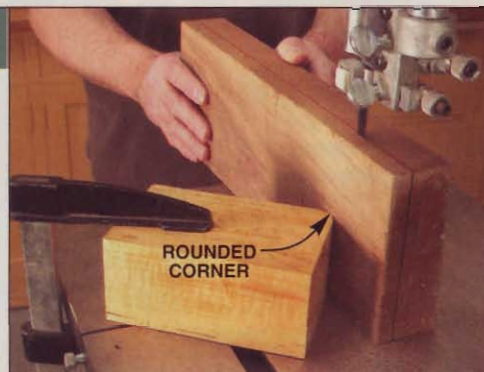
Single-Point Fence



A **single-point fence** is easy to make, set up and use, but it's not particularly accurate. It's the best choice for quickly resawing a small number of boards.

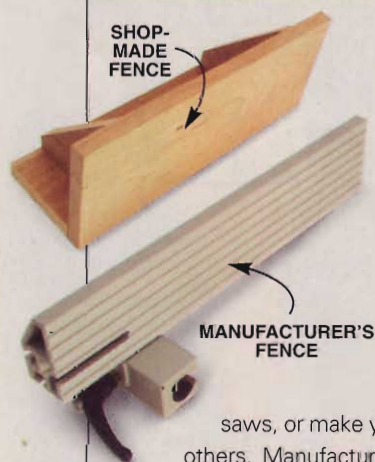
The surface you get will be slightly wavy because you'll be steering freehand.

All you need to make a single-point fence is a block of wood 3 or 4 in. tall. Round one corner. Align the block's nose with the front of the blade's teeth. Draw a line down the workpiece to guide your cut. Pivot the workpiece left or right as you're cutting to stay on the line. Some manufactured fences have single-point accessories that also work well. They are rods that bolt to a straight fence.



A single-point fence is easy to set up for rough resawing.

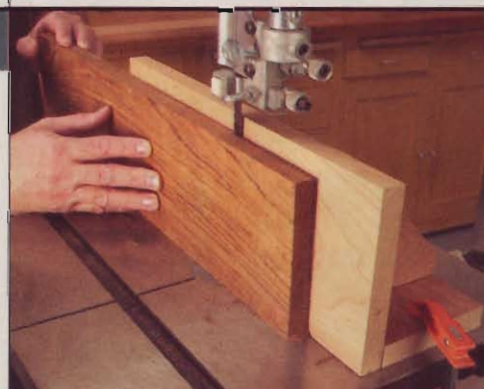
Straight Fence



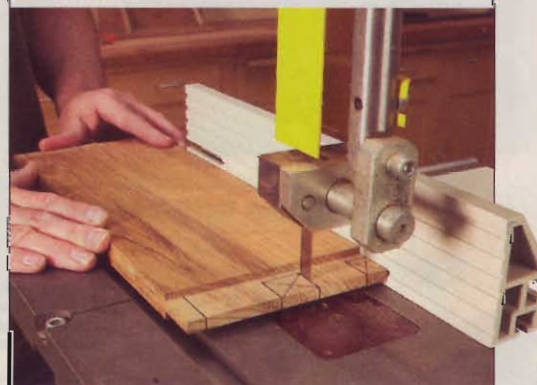
A **straight fence** often takes more time to set up than a single-point fence, but it's much more accurate. A straight fence is good for short, precise joinery cuts, long rip cuts, resawing a large number of boards and resawing a precise thickness. The surface you get will be much smoother than using a single-point fence, assuming you use the correct blade and it's clean and sharp.

Straight fences come in many forms. You can buy one from your saw's manufacturer, buy an aftermarket fence that adapts to many saws, or make your own. Setup with some fences is easier than others. Manufactured fences mount on a guide rail, so tweaking them left or right to position the cut is as simple as nudging a table-saw's fence. A shop-made fence without a guide rail is harder to adjust.

Setting up for resawing with a straight fence can be complicated because you must compensate for blade drift (the tendency for the blade to wander off a straight line). Blade drift is easy to see when you're using a single-point fence. In that situation, you steer the wood to stay on the line. As you saw, you'll find that one particular angle yields the straightest cut. This drift angle is usually a few degrees out of parallel to the bandsaw table's miter slot. Obviously, you can't steer the wood when using a straight fence. Instead, you set the fence to match the drift angle (for more information, see "Bandsaw Fence," AW #118, November 2005, p. 65). For short cuts, you usually don't have to compensate for blade drift.



A tall shop-made straight fence works well for precision resawing, such as making veneer.



A manufacturer's straight fence is easy to micro-adjust for joinery cuts.

WHY DO PLUGS VARY?

Q I'm confused by the variety of 240-volt plugs and outlets. Does it matter what type I use with my machines?

A Sure does. Each type is designed for a different amp load. To protect your machine's motor, you must match the amp ratings of the motor, plug, outlet and circuit breaker.

Most 240-volt woodworking machines designed for small shops run on 15, 20 or 30-amp circuits. There's a unique plug and outlet configuration for each circuit. Amperage ratings are always printed or stamped on the plugs. If your machine already has a 240-volt plug on it, install the appropriate outlet in your wall and the same size breaker in your fuse box. If your machine doesn't come with a plug, consult the owner's manual and install the appropriate plug, outlet and breaker.

Allowing too many amps to be delivered to a motor may damage or destroy it. You shouldn't plug a motor that's rated at 12 amps into a 30-amp circuit, for example. During a heavy cut, a motor calls for more amperage to

Components		
15 AMP	20 AMP	30 AMP
		
		
		

maintain torque. A 15-amp circuit breaker would trip in time to protect the motor from overheating. A 30-amp circuit breaker wouldn't offer the same protection. It would continue to provide amperage well past the motor's rating and lead to excessive heating, a motor's biggest enemy.

LAGUNA TOOLS

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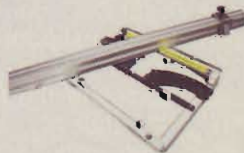
TSS TABLE SAW

The new Laguna TSS series is setting a new standard in Table saws. Our TSS series Table saw come complete with 10" or 12" blade capacities, American-made Baldor motors, and optional scoring. The TSS table saw features a heavy-duty sliding table.



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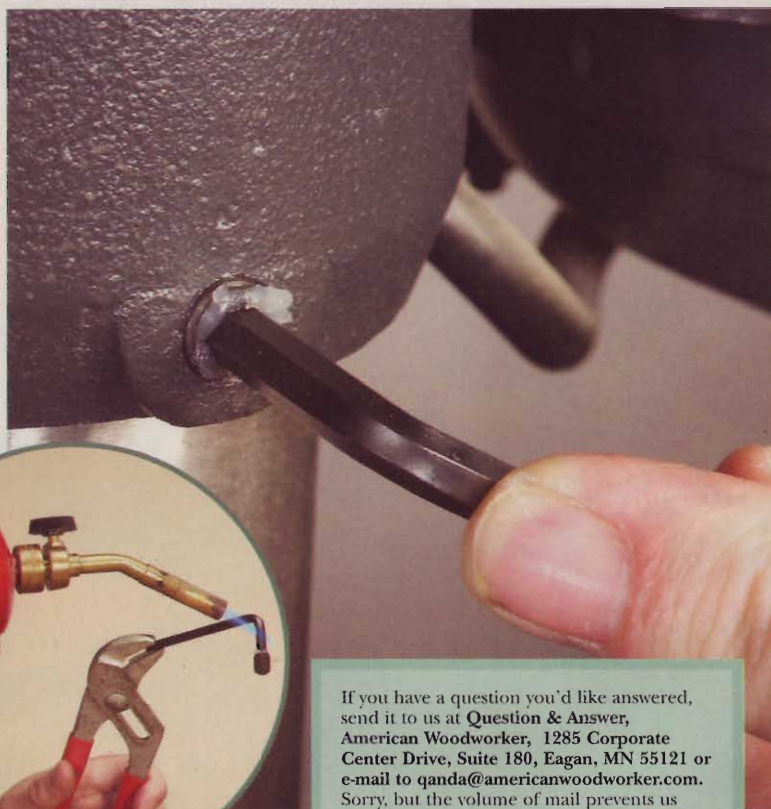
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STRIPPED-OUT ALLEN HEAD

Q Do you have a fix for a stripped-out Allen head on a setscrew?

A Fortunately, there is a simple solution to this aggravating problem. Put a little 5-minute epoxy on the end of an Allen wrench and set it in the stripped out hole. Let the epoxy cure over night, so it's good and hard, then turn the screw out as you normally would. You can toss the fused wrench and nut or, if you're cheap like me, take a blowtorch to the nut. The heat will soften the epoxy and release the damaged nut, leaving your wrench ready for use.



If you have a question you'd like answered, send it to us at **Question & Answer**, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121 or e-mail to qanda@americanwoodworker.com. Sorry, but the volume of mail prevents us from answering each question individually.

12 American Woodworker MAY 2007

"Little Victor" Plane

This little plane is a close copy of Leonard Bailey's 1877 "Little Victor" #51 block plane, which was once advertised as the "perfect tool, useful in house, shop, bank, office and especially in scroll saw work". A simple and effective tool with an elegant design, it is a great miniature-maker's or modelmaker's plane. For a highly controlled cut on a flat surface, it can be pushed with a thumb on the lipped toe while the palm



With a hand firmly planted on a work surface, a thumb pushes the plane along for a highly controlled cut.

of the hand is firmly planted on the work, similar to using two hands for a paring cut with a chisel. The investment-cast steel body is accurately machined, has a 45° bed angle and a fixed mouth, and uses a cogwheel screw to secure the included 30° bevel O1 tool

steel blade (measures 0.085" thick by 1" wide). Both the sole of the plane and the working surface* of the blade are lapped to a flatness tolerance of ± 0.0002 " or better. At 3 1/8" long by 1 1/4" wide, and weighing just under 5 oz, this is truly a pocket plane. Made in Canada.

*The working surface is the 1/2" section of the face closest to the cutting edge.

Introductory special until May 15, 2007, save 20%.

15P01.01 "Little Victor" Plane Intro Special \$29.50 Reg. \$37.50

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Double Duty Clamp Rack

One sure thing about clamps is that they're never close enough when you need them. That's why I devised this rolling rack. Its 4-in. locking swivel casters easily plow through sawdust and over cracks and power cords (see Source, right). To make this rack doubly useful, I designed it to work as an

outfeed support for my tablesaw. Its 2x6 top inclines at a 5-degree angle so its top edge matches my table-saw's height.

I made the rack from 2x4s, a 2x6 and 5/8-in. electrical conduit. Drill 11/16-in. holes for the conduit in the doubled-up 2x4 rails, spaced to suit your clamp lengths. Then cut

the conduit in 18-in. to 24-in. lengths as needed and install them. To keep the clamps from sliding off, cap the conduit support arms with rubber chair leg caps from the hardware store.

Brian Rajewski

Source

Grizzly, www.grizzly.com, (800) 523-4777
H0684 4" swivel locking caster, \$7.50 each



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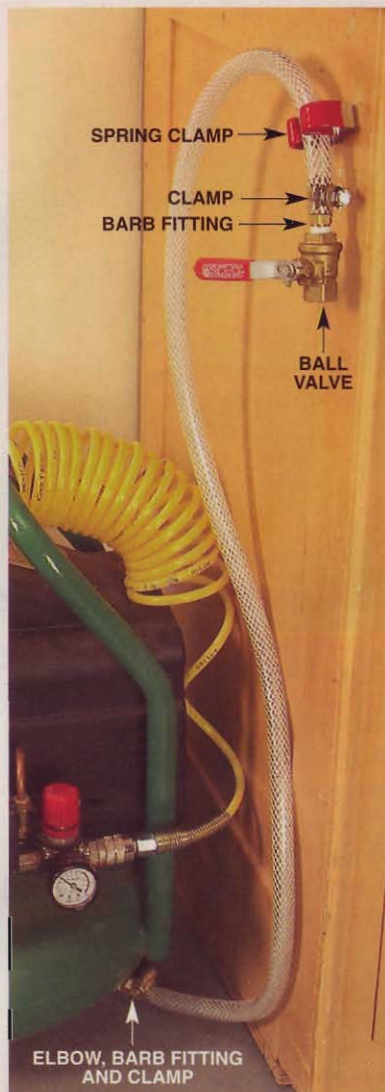
Tips that save money, time or space. Tips for gluing, clamping and assembling. Tips for measuring, machining or finishing. Look around your shop: Send us every tip you have that makes your woodworking successful and fun.

The editors of American Woodworker will choose their six favorite tips. The submitters of the top three tips will each receive a complete **Festool Domino package including both accessory stops and a Systainer full of Domino tenons—a \$990 value!** For complete information about the Festool Domino visit www.americanwoodworker.com/domino.

The submitters of the remaining three favorite tips will each receive their choice of a **Festool OF1400EQ Router** (\$405 value), a **Festool C12 Cordless Drill** (\$350 value) or a **Festool CT Midi Dust Extractor** (\$330 value). All other tips that are published in our Workshop Tips department will earn the submitter \$100.

To enter: E-mail your original tips with photos to toolgiveaway@americanwoodworker.com or mail them to Workshop Tips Tool Giveaway, American Woodworker Magazine, 1285 Corporate Drive Center, Suite 180, Eagan, MN 55121. Submissions must be received by July 31, 2007. Winners will be announced in the October 2007 issue of American Woodworker. Submissions cannot be returned and become our property upon acceptance and payment.





KNEE-SAVING COMPRESSOR DRAIN

Crouching to operate my compressor's drain valve was no big deal until my football-ravaged knees started acting up. To keep from grimacing in the sawdust, I devised a more civilized way to clear the tank. I replaced the drain valve with a 90-degree elbow, a 200-psi-rated reinforced hose and a ball valve. Barb fittings on the elbow and ball valve and clamps on the hose keep everything air tight. I chose a ball valve instead of an air nozzle so no one would mistake my new drain hose for a regular air hose.

Richard Fenwick

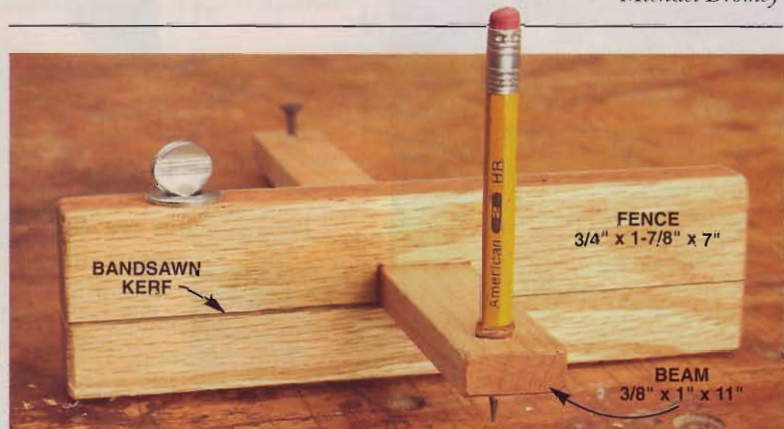


LEATHER TOOL SHEATHS

When I'm not using my chisels I keep them in a drawer, so I made a set of leather sheaths to protect their sharp ends. I bought the leather and some rivets from a hobby shop and made sheaths for all my chisels in about an hour.

To make your own sheaths, cut leather strips twice the length of the finished sheath, and about 3/4" wider than the chisel's blade. Fold the leather strip in half lengthwise and punch holes for the rivets with an awl. Split rivets are the simplest to install because all you need is a hammer and a piece of steel—I used the edge of my vise.

Michael Dromey



30-MINUTE MARKING GAUGE

Make this handy little gem for less than \$5. You'll need one piece of hardwood for the beam and another for the fence. You'll also need two 1/4-20 threaded inserts and a thumbscrew. Drill a hole through the fence for the thumbscrew, 1-1/2-in. from one end. Then rip the fence into two pieces. Cut a dado for the beam in the center of the top piece. Enlarge the drilled hole in the bottom piece and install one threaded insert. Glue the pieces back together and bandsaw a kerf up to the beam opening. Install the other threaded insert in the beam, 3/4-in. from the end. The pencil threads into this insert, so it really stays put. On the beam's other end, I installed a hardened screw after grinding the point sharp, to use for scribing.

Rich Scudero

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WORKSHOP TIPS



A REAL SWINGIN' TOOL RACK

I try to use every square inch of space in my shop, so I made a storage rack for my turning tools that swings out when I need it. When I'm done turning, it swings back, completely out of the way. Two 5-in. strap hinges mount the rack to a 3/4-in. x 8-in. x 24-in. piece of plywood that's screwed to the wall. Plastic shields on the front and sides guard my hands and protect the tools while leaving them easy to identify. The bottom is open, so wood shavings fall right through.

Walt Everett

NEVER A DULL PENCIL

Precise marks are one key to accurate cuts. Rather than mounting pencil sharpeners all around the shop, I just stick 120-grit PSA-backed sandpaper wherever I need a sharp pencil; at both ends of my workbench, right next to my miter saw, on top of my tablesaw's rip fence, etc.

Thad Bolden



Circle No. 15



INSTANT GLUE

I hate waiting for the glue to get to the tip of the bottle, especially when it's almost empty. So I store my glue bottle upside down in a plastic peanut butter jar. The glue is always ready to flow and the tip never gets plugged with dried glue.

Frank Penicka



GLUE-FREE CLAMPS

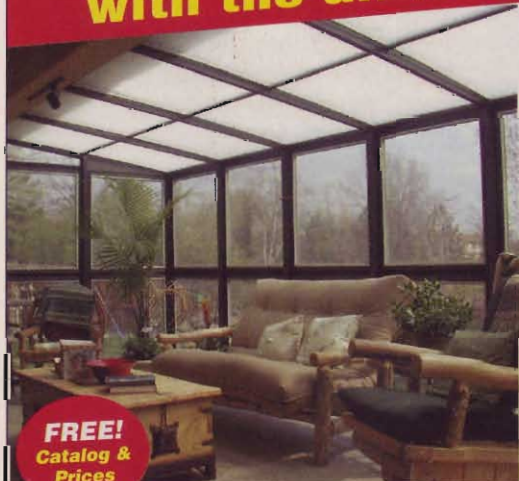
Dried glue used to make my pipe clamps hard to handle and use. Now I give the pipes a light coat of paste wax from time to time. The wax makes dried glue pop right off. The bottom jaw slides more easily, too.

Mandy Houston

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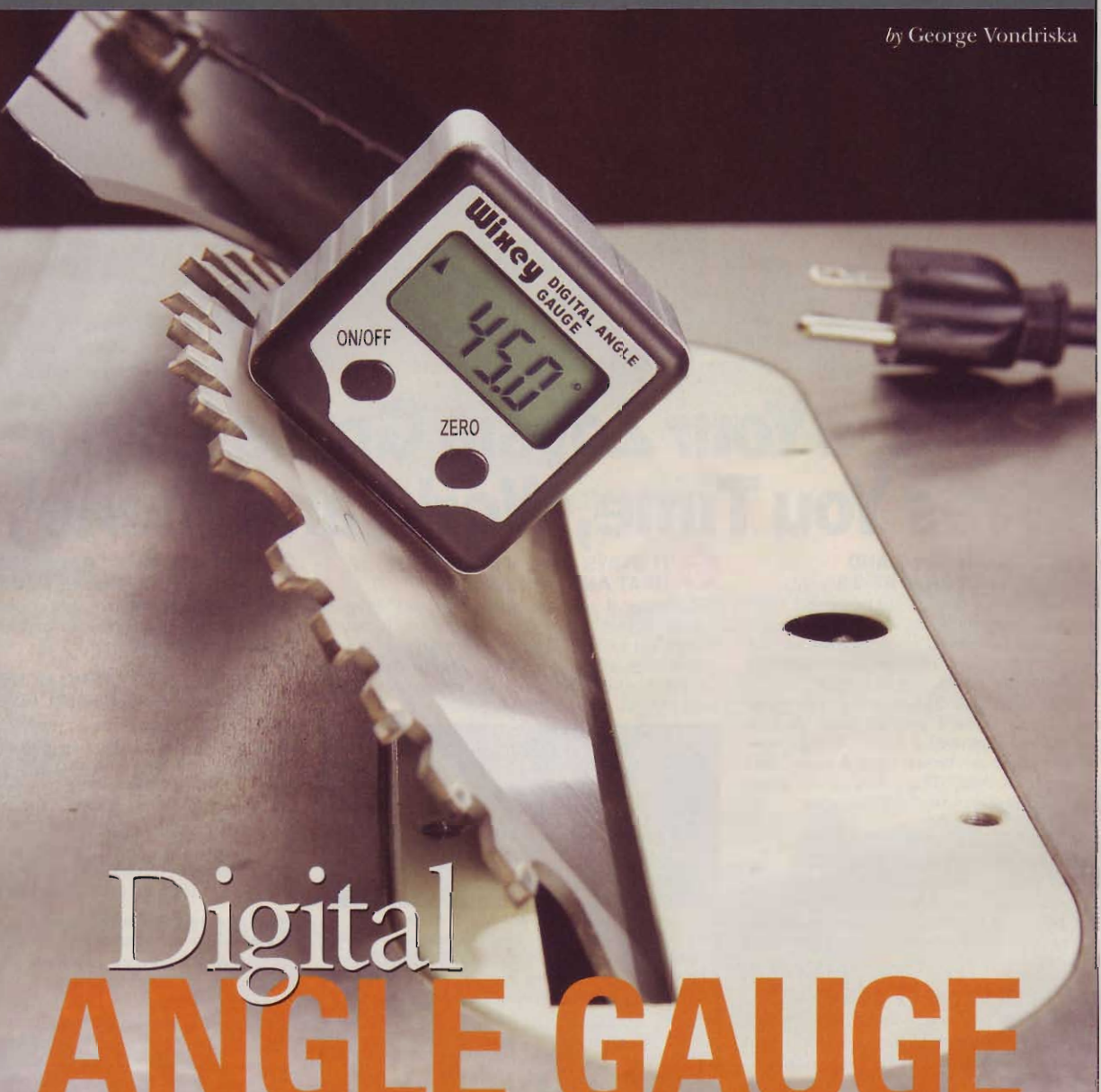
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THE WELL-EQUIPPED SHOP

by George Vondriska



Digital ANGLE GAUGE



Sources

- 1) Wixey, www.wixey.com, Wixey Angle Gauge, WR 300, \$40.
- 2) Woodcraft, (800) 225-1153, www.woodcraft.com, Wixey Digital Angle Gauge, #147281, \$40.

What woodworker hasn't lamented over the protractors on table saws and miter saws? If you've been disappointed, Wixey can make your life a lot easier with its Digital Angle Gauge, \$40. It takes the guesswork out of setting a blade to a precise angle.

Using the Angle Gauge is easy. Turn it on, set it on the table, and push the Zero button. Then, using the magnets in the base of the Angle Gauge, stick the gauge to the saw blade. As you angle the blade the gauge will provide a continuous readout of where you are within one tenth of a degree.

The magnets don't need to stick to the table surface, only the blade. So the Angle Gauge can be zeroed on cast iron, aluminum, or any other horizontal surface.

The table saw was the first application that sprang into my mind, but the Angle Gauge also works great on miter saws, jointers, even bandsaws. It's a great way to make sure you've got the correct angle on lots of tools.

ART DIRECTION: EVANGELINE EKBERG • PHOTOGRAPHY: RAMON MORENO, UNLESS NOTED

Chairmaker's Delight by Tom Caspar

Imagine a spokeshave that never tears out the grain, no matter which direction you go, and you have the essence of this wonderful new tool, the Veritas Scraper Shave (\$59).

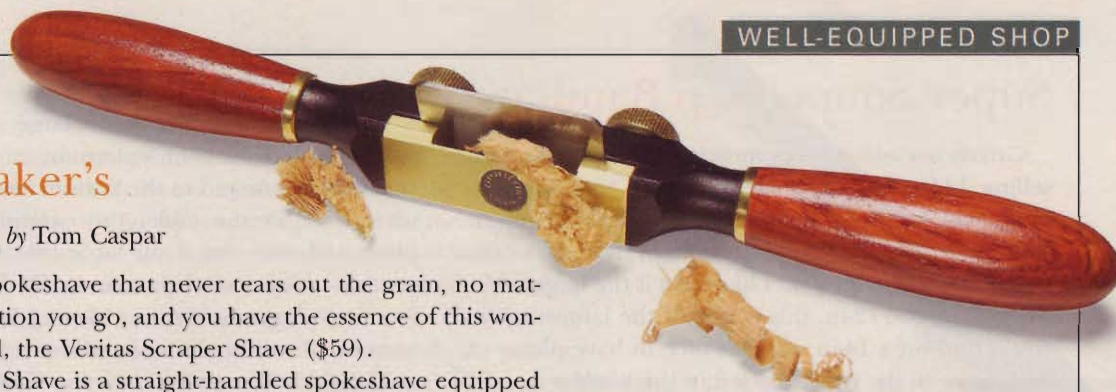
The Scraper Shave is a straight-handled spokeshave equipped with a scraper blade. As with all scrapers, the cutting edge attacks the wood at a very high angle in order to prevent tearout. You can make a continuous cut the entire length of a curved surface without having to worry about grain direction.

This type of tool has a long and venerable history. Before the machine era, chairmakers made their own scraper shaves with a variety of flat, convex and concave bottoms. Antique artisan-made scraper shaves are difficult to find, however. Mass-produced scraper shaves, such as the Stanley 62, are very rare. My set of artisan-made shaves, which took a long time to assemble, is an essential part of my tool kit. I've also made my own scraper shaves, but now that's no longer necessary.

This is a beautifully made tool. I found its straight handles more comfortable to pull than push. Its brass bottom, which is flat, would be easy to file or grind into a slight concave or convex shape to improve the tool's effectiveness on curved surfaces. Unlike most scrapers, the blade is very hard, so it cannot be sharpened with a file. You must use stones or sandpaper.

Source

Lee Valley, (800) 871-8158, www.leevalley.com Veritas Scraper Shave, #05P33.70, \$59.



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We took a different perspective.

Super Souped Up Bandsaw

Grizzly has added some muscle to one of their best-selling 14-in. bandsaws and come up with the new model G0555X machine, \$595. I like the large motor (1-1/2-hp, 15-amp), I like the built-in light, I like the tall resaw fence, but what I like most is the large table. At 14-in. x 20-1/2-in. this is one of the largest tables you'll find on a 14-in. saw. It's nice to have plenty of real estate to the right and left of the blade.

Grizzly accomplished such a large table by making it in two pieces. A 5-in. extension on the left side of the table is fastened to the bottom half of the saw. So, when you tilt the table, the extension remains in place and only the main table tilts. Otherwise, you wouldn't have the clearance to tilt the table all the way to 45-degrees. This is a clever idea that I've only seen on one other 14-in. bandsaw.

The G0555X uses ball bearing blade guides above and below the table. Ball bearing guides are especially handy when using wide resaw blades. The saw accepts blades from 92-1/2-in. to 93-1/2-in. long, and 1/8 to 3/4-in. wide. A riser block, which increases the thickness capacity from 6 in. to 12 in. is available, \$57.95. Adding the riser block increases the blade's length to 105 in.



Source

Grizzly Industrial, (800) 523-4777,
www.grizzly.com G0555X bandsaw,
\$595. 6-in. riser block, H3051 \$57.95.

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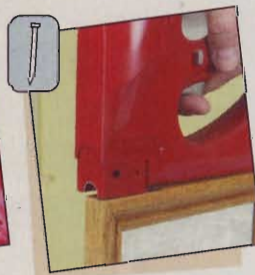
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The Domino Effect – Fast, Easy and Strong

Festool has introduced a truly new joinery machine called the Domino. It looks and handles like a biscuit joiner, but the Domino uses an oscillating cutter to make oval-shaped mortises. A Domino tenon fits precisely into these mortises to join parts together. Optional attachments – for centering the Domino on narrow face-frame stock, and for making equally spaced mortises along the edge of a long board – make these tasks easy and accurate. It even cuts angled joints. For those of you familiar with Festool's quality engineering – you won't be disappointed. Using the Domino is like driving a fine German car.

Source

Festool, (888) 337-8600, www.festoolusa.com
Domino Joiner, DF 500 Q, \$660 (introductory price).



A Natural Progression to...



15-amp Router, Above-The-Table Adjustability

Typically, it's difficult to use a plunge router in a router table. That's because you often need to remove the router from the table in order to change bits. Setting the bit's height requires fighting the plunge springs while pushing the motor to the correct bit depth. Freud's new 15-amp FT3000VCE plunge router, \$290, is a back-saving machine that allows you to make all your adjustments from above the table, from bit changes to height adjustments. Yes, other routers offer above-the-table adjustments, but most are smaller, 12-amp machines.

In addition to its easy above-the-table use, the FT3000 has a micro-adjust dial that makes it easy to fine tune bit depth in 1/128-in. increments. This machine has variable speed (8,000-21,000 rpm) and, like many variable speed routers, soft start and electronic speed control. Variable speed is especially important when you use large diameter bits in a router table. It comes with both 1/4-in. and 1/2-in. collets, and a dust port for handheld routing. The height adjustment knob required for making adjustments from above the table is included with the machine.



Source

Freud Tools, (800) 334-4107, www.freudtools.com
15-amp router, FT3000VCE, \$290.

American Woodworker MAY 2007 29

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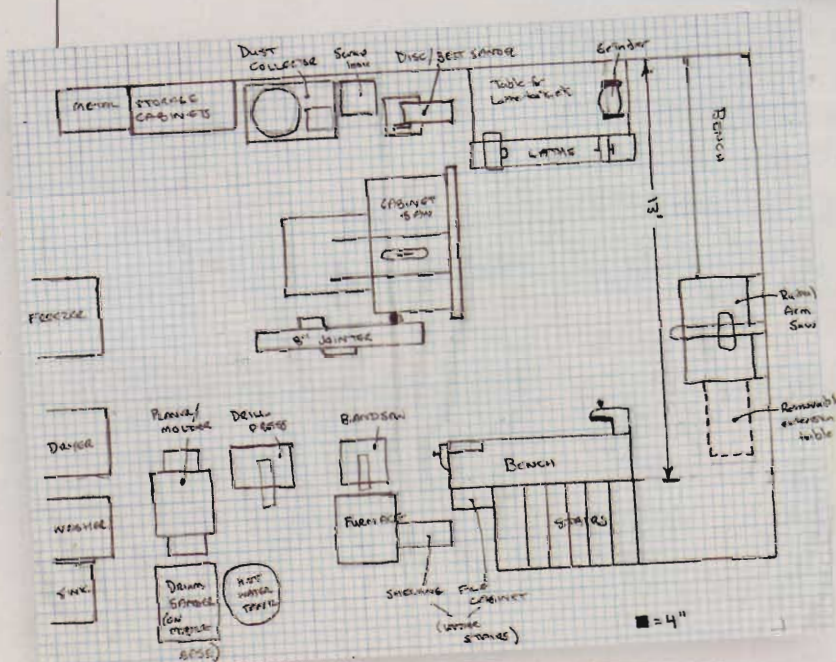
Circle No. 16





Rhode Island-Sized Haven

When I saw the "Texas-Sized Hideaway" in the November 2006 issue, I knew that I had to write about my "Rhode Island-Sized Haven" (even though I live in Western New York!). I can only dream about a big shop, but I love my basement workspace.



When I set up my shop I had to work around a metal support post, the washer and dryer and other typical basement obstacles, so I used graph paper and scale cutouts of my machines to get everything to fit and function effectively. The only machines that I have to roll into place to use are the drum sander and my router table, which stores under my tablesaw. My tablesaw has internal casters, so it's easy to reposition when I have to cut large pieces. I made most of the blast gates for my dust-collection system.

My cabinetmaker's bench, modeled after Tage Frid's design, is my pride and joy. I started to build it 25

years ago, but quickly realized that I had neither the skills nor the equipment to complete it. Then, after my skills improved, I didn't want to use my limited shop time to work on a workbench. I finally finished it last winter and now I wish I had done it years ago! As much as I love power tools, there is something very relaxing about hand-planing a nice board.



Tell us about your shop!

Send us photos of your shop, a layout on graph paper and a description of what makes your shop interesting, what you make in it and what makes your shop important to you. If My Shop features your shop, you'll receive \$100.

E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with prints or digital photos on

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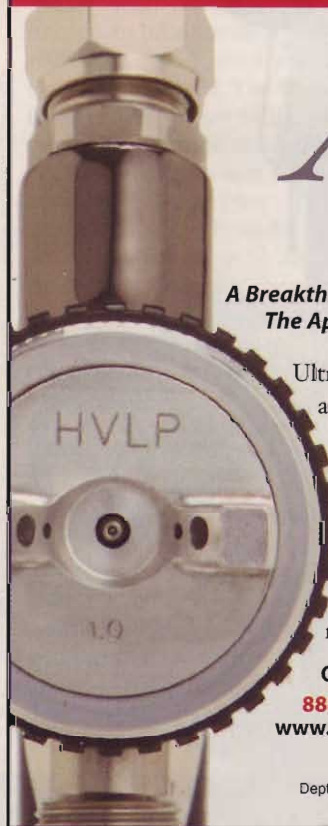
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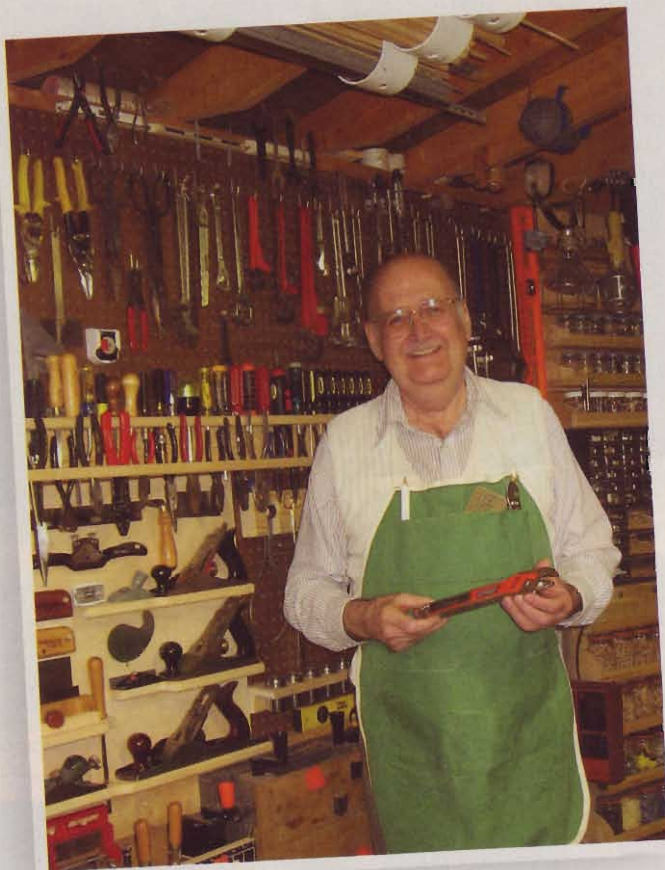
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Circle No. 175



THE TOOL WHISPERER

My wife always steers me away from hardware stores. Despite her best efforts, whenever I see a new hand tool or whacky gizmo I always find a way to get it home. My doctor says I have Nada-needit-gotta-getit syndrome.

My shop is filled with hundreds of tools that I don't use every day, but they sure do look good displayed with custom-made holders. Each tool thinks it's the center of attention.

When I bring a new tool home, I love to figure out just the right place for it. Not just any place will do. It's the new kid on the block and needs special attention. That is, it's special until next week when another new kid moves in.

Some days I can actually hear my tools whispering to me, "Use me, pick me up, it's been too long." I like to be needed, even if only by a crescent wrench. You know, listening to tools makes me think I better get back to the doctor's office. Maybe I have a bigger problem than Nada-needit-gotta-getit. Much bigger!

Phil Bailey

CAST IRON RULES!

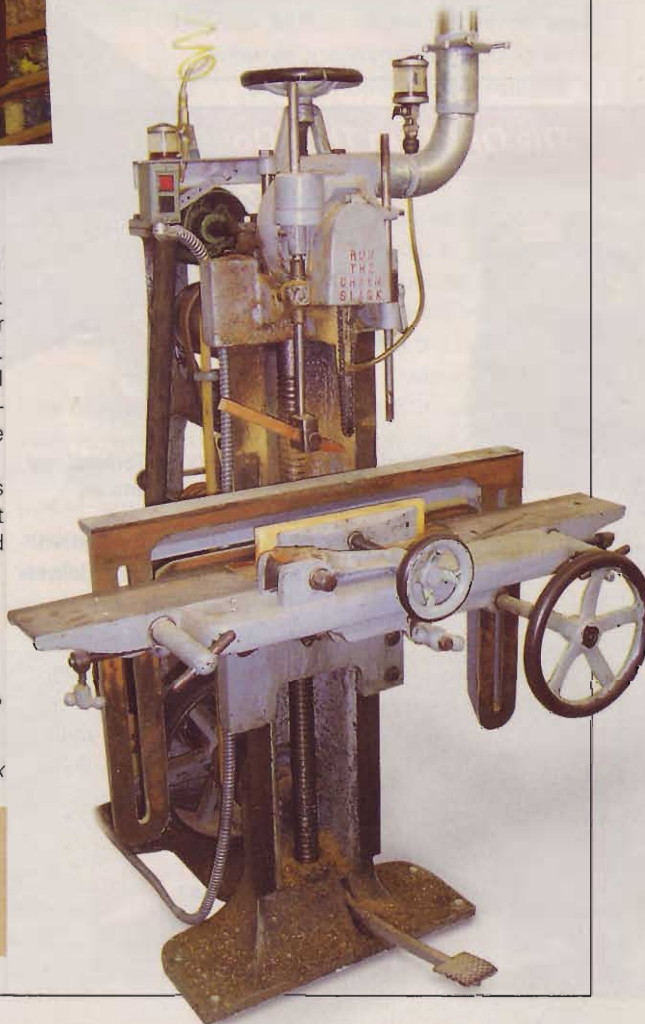
This 1,700-lb. beast is a circa 1910 New Britain chain mortiser. It uses a cutter similar to a chainsaw bar and chain to cut big or little mortises in one pass. My largest cutter is 1/2-in. thick, 3-in. wide and can cut a 6-1/2-in. deep mortise. The smallest cutter I have is 1/4-in. thick, 1-1/4-in. wide and can cut a 4-in. deep mortise. The table can be moved side-to-side to make a mortise wider and tilted for angled work.

There's an incredible set of belts and pulleys that operate this machine. It was originally designed to be powered by a large flat belt via an overhead line shaft, but an electric motor was added years later.

I just love vintage cast iron and my crowded shop shows it. I just bought a circa 1920 Whitney #110 single-spindle shaper to add to the five other shapers I own, but I'm perplexed about how to rearrange my shop to make room for it. Hmm... didn't I see an old cast iron lathe for sale somewhere? Maybe I should sell one of those shapers. Anyone interested?

Kirk Fox

We'll pay you \$150 to share your favorite tools, new or old, with fellow readers. Contact us by e-mail at toolnut@americanwoodworker.com, or mail us at American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tool if possible.



EDITED BY: TOM CASPAR • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: READER SUPPLIED

by Brad Holden

Outdoor Finishes

Simple to Super Durable



Outdoor finishes have one thing in common; they all require maintenance. Of course, paint is unequalled at protecting the wood from its two biggest enemies: moisture and ultraviolet (UV) light. Moisture causes the wood to rot, and sunlight bleaches out its natural color. Still, who wants to cover-up beautiful wood with paint? If you want the wood to show through on your outdoor projects, you need a clear finish.

There are three basic clear finishes for outdoor furniture: exterior oil, exterior varnish, and an epoxy sealer with an exterior varnish topcoat. Application ease and service life are the two major differences between these finishes.

Of the three clear exterior finishes, exterior oil is by far the simplest finish to apply. Just flow it on, let it soak in and wipe off the excess. Unfortunately, oil offers the least amount of protection and it must be reapplied every season. Exterior varnish, on the other hand, is more difficult to apply: up to 8 coats have to be carefully brushed on. While exterior varnish offers excellent protection from moisture and UV light, it has to be recoated every few years to maintain that protection. An epoxy sealer with an exterior varnish topcoat is the most durable outdoor finish and can last for many, many years. However, the initial application does take longer than exterior varnish.

EDITOR: DAVE MUNKITTRICK • ART DIRECTION: EVANGELINE EKBERG • PHOTOGRAPHY: VERN JOHNSON

Exterior Oils



An exterior oil finish is definitely the simplest, quickest way to treat an outdoor project. On the downside, it will only give you about a year of protection from the ravages of outdoor life. Oil finishes don't provide a protective film that sits on top of the wood like varnish does. Instead oil soaks into the wood fibers and dries. Exterior oils have added trans-oxide pigments for UV protection and mildewcides to protect against mold and mildew. You'll find colors ranging from dark brown to light amber.

Application is simple: a garden sprayer and a rag are all you need. First, flood the surface of your project with oil. I use an inexpensive hand pump garden sprayer. It's fast, easy and only costs about \$8.00. Let the oil soak in according to the manufacturer's directions, then wipe it off. That's it. Done! Depending on local conditions, you'll have to reapply about once per year. The built-in UV protection should keep your wood looking natural for many years (as long as you keep up with the applications).



Exterior Varnish or Urethane



Exterior varnish or urethane (both finishes are technically "varnishes") builds a protective layer over the wood. It offers superior protection and durability over an oil finish. Often, the term "Spar" is found in the name, but this does not indicate any additional or special ingredient. The term "Spar" originates with its use as a coating for the spars on sailing ships. All exterior varnishes are formulated to protect against moisture and UV radiation.

Exterior varnish is applied with a natural bristle brush in multiple coats. Manufacturers recommend eight thin coats for maximum protection and a deep lustrous finish. Sand the hardened varnish lightly between each coat.

Exterior varnishes cure to a more flexible film than ordinary varnish. The flexible coat is not as likely to crack from seasonal wood movement caused by humidity extremes in an outdoor environment.

Exterior varnish will usually last 2-3 years before it starts to look chalky. As soon as you see a chalky film start to develop, it's time to freshen the finish. Simply sand the topcoat smooth, and apply a new coat of varnish. Don't put this important maintenance step off too long or cracks will develop in the finish allowing moisture to penetrate and degrade the wood. That will necessitate a complete strip and refinish to restore the furniture. You don't want to go there.



Epoxy with Exterior Varnish

CUT UP
FOAM
ROLLER



An epoxy sealer with exterior varnish topcoats is the most durable, but also the most labor-intensive finish you can apply to outdoor furniture. This is the finish favored by boat builders so you know it's going to last a long time. Epoxy and exterior varnish enjoy a symbiotic relationship: The epoxy forms an impenetrable moisture barrier that prevents seasonal swelling and shrinking of the wood. This dimensional stability in turn gives longer life to the exterior varnish because it no longer has to stretch and shrink with the wood. The exterior varnish returns the favor by providing UV protection, without which the epoxy would rapidly deteriorate.

Apply three thin coats of epoxy. The best way to get thin, even coats is to use a foam roller cut in half. It works kind of like a squeegee. Epoxy cure times vary depending on their formulation and the ambient temperature. Be sure to use an epoxy with a long enough open time (approximately 30 minutes), so it doesn't set up before you're done putting it on. For large projects, mix the epoxy in small batches so you can finish



Sand out any unevenness and defects in the cured epoxy before applying the exterior varnish topcoats.

an area before the epoxy sets. Also, for optimal flow out and penetration into the wood fibers, make sure the epoxy you use doesn't contain any thickeners. Always read and follow the instructions that come with your epoxy. If possible, apply the epoxy undercoat prior to assembling the parts. You can recoat without sanding while the previous coat is still soft but not sticky. If the epoxy seems uneven or bumpy, allow it to harden. Then, sand it smooth and apply the next coat.

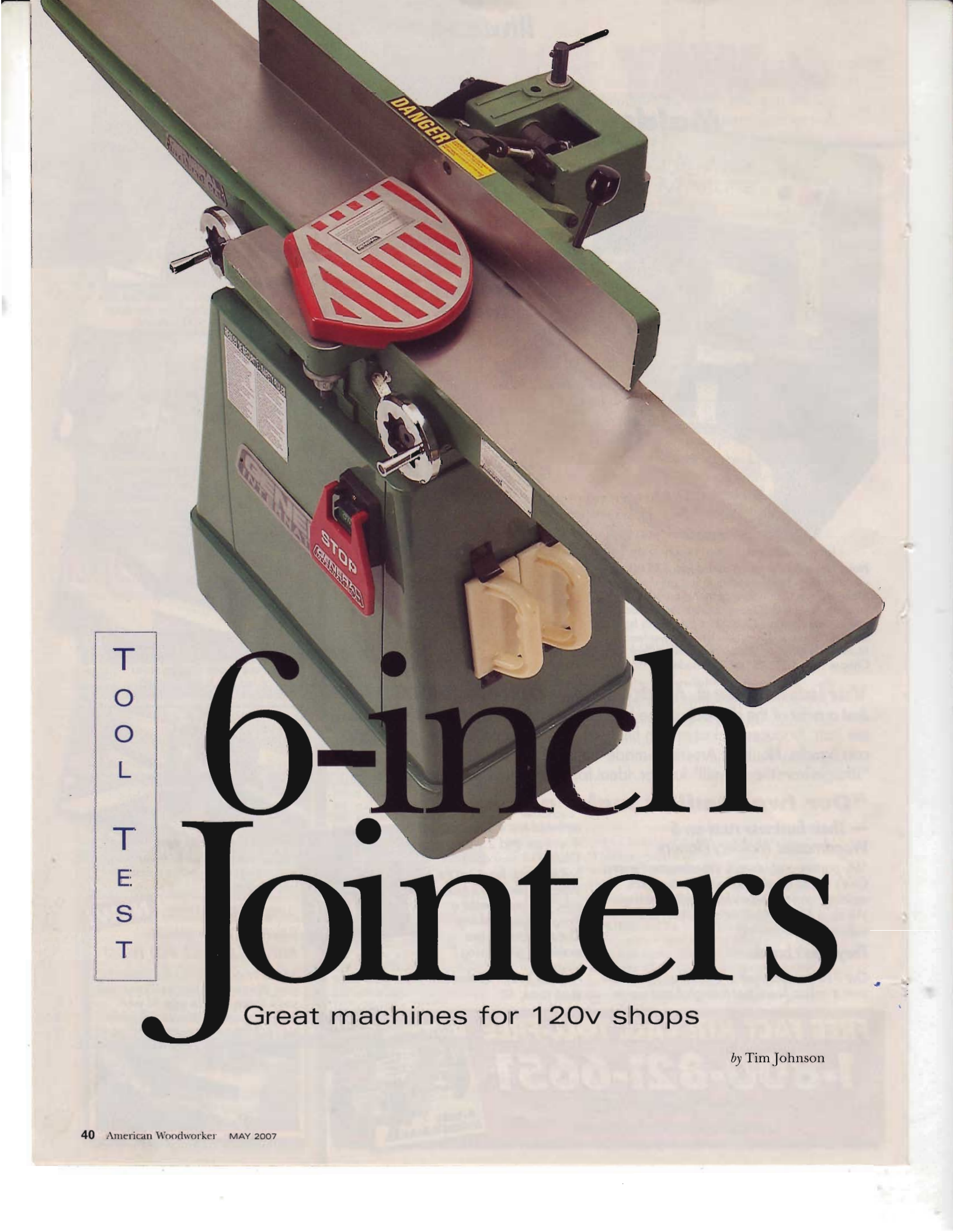
Before applying the varnish topcoats, I use a card scraper or sanding block with 100 - 120 grit sandpaper to level the cured epoxy (see photo below left). The sanded surface also provides some tooth for the spar varnish to adhere to.

Rinse the sanded epoxy with clean water and dry with paper towels. The rinse water should not bead on the surface. Beading indicates that contaminants from the epoxy curing process are still on the surface and could interfere with the varnish bond. To remove the contaminants, wipe down with mineral spirits and dry with paper towels or a rag. Follow this with eight coats of exterior varnish, sanding lightly between coats.



Sources

Epoxyheads, (866)376-9948, www.epoxyheads.com, epoxy resin #7710 \$33.00/qt, epoxy hardener #7720 \$17/ 1/2 pt., metered pump set #7801 \$11. Penofin penetrating oil finishes, www.penofin.com, 800-penofin, Original Blue Label Oil Wood Finish, \$15/qt. Garden sprayer, Home Depot, www.homedepot.com, 48 oz. Chapin multi-purpose hand sprayer model 1002 \$8. Home center/hardware stores, exterior oil varnish or urethane.



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6-inch Jointers

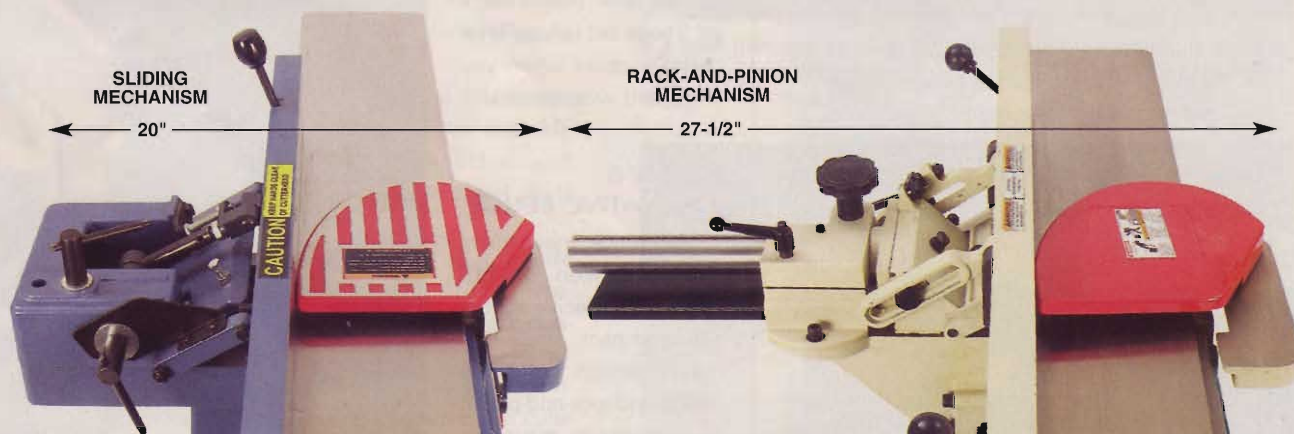
Great machines for 120v shops

by Tim Johnson

Name two of wood-working's most basic tasks and you'll see why a jointer is a shop essential. No other tool can level a board's surface or square its edge as quickly or accurately. Whether you want to process rough lumber, perfectly edge-glue boards or precisely make tiny adjustments in width for a custom fit, a jointer does the job better than any other machine.

Our recommendation has always been to buy the biggest jointer your shop will allow, but most 8-in. jointers require 240-volt circuits. Smaller 6-in. jointers run on 120 volts. They also cost less and require less space.

The market is loaded with 6-in. jointers that vary widely in size, design and price. That means choosing the right one can be confusing, especially when jointers that appear to be identical are priced hundreds of dollars apart. To define the differences and learn which features are most important, we tested seventeen machines, a representative sample of currently available 6-in. jointers. (see Chart, page 46)



WIDTHS ARE SIGNIFICANTLY DIFFERENT

If you're planning to place your jointer against a wall, consider how much space it will require. Some fence mechanisms need more room.

Mechanisms that simply slide the fence across the table

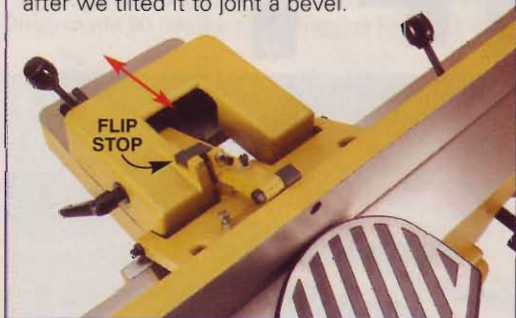
are the most compact (left). Rack-and-pinion style mechanisms (right) extend much farther behind the machine. Other factors such as protruding adjustment wheels or a wide base can also affect a jointer's overall width.

FEATURES WE LIKE

SIMPLE FENCE MECHANISMS

Fence mechanisms allow you to tilt the fence and adjust it laterally. For lateral adjustments, we prefer sliding mechanisms. Just release the lock handle and pull or push. Rack-and-pinion mechanisms move the fence more precisely, which makes them great for rabbeting, but this precision isn't essential for general jointing.

Every fence-tilting mechanism is equipped with adjustable stops at 90- and 45-degrees. Some feature flip-up stops, others use an indexed pin. We recommend keeping your square handy when you tilt the fence; none of the mechanisms on our test machines would consistently return the fence to 90-degrees after we tilted it to joint a bevel.



BUILT-IN CASTERS

Several 6-in. jointers are equipped with built-in casters at one end and a retractable swivel caster at the other. We love this system! These casters don't stick out in front of the machine like a mobile base does, so you won't stumble over them. There's one minor catch: On our smooth concrete floor, these jointers slid forward during use. Placing wedges under the outfeed end solved the problem.



EASY TABLE ADJUSTMENTS

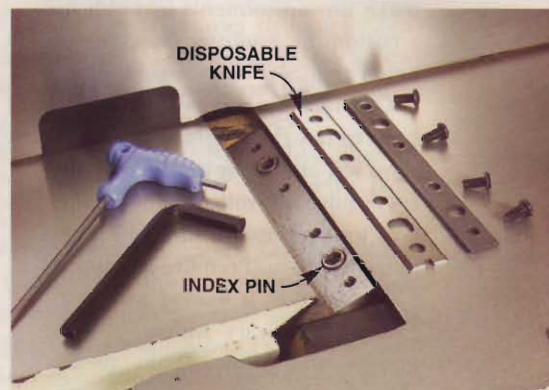
Two lever-operated machines were our favorites (see "Benefits of a Parallelogram Bed," page 43). We also liked the dual-action lever found on the Powermatic 54A. The remaining machines were equipped with conventional levers or wheels. We prefer large wheels: They're best for making precise adjustments. Front-mounted wheels are marginally easier to operate, but their handles stick out and can get in the way.

We prefer depth-of-cut scales that directly face the operator. On most machines the scales are somewhat hard to read because they slope away from the operator. You have to stoop down and bend sideways to read them.

DISPOSABLE KNIVES

Disposable knives make knife changes super-easy. They're indexed on the cutter-head so you don't have to go through the tedious process of adjusting their height—you can change all three knives in about ten minutes, compared to a half hour or more with standard knives.

Each knife has two sharpened edges, so when one edge gets dull, you just turn it around. Disposable knives are standard equipment on the Jet JJ-6CSDX and the Powermatic 54A and available as additional-cost accessories on other 6-in. jointers.



A TALL FENCE

Half of the jointers we tested are equipped with fences taller than 4 inches. These tall fences offer better support when you edge-joint wide boards.

RIKON'S INNOVATIVE FENCE

The fence mechanism on the Rikon 20-110 offers both precise control and compact size. This hybrid design combines sliding and rack-and-pinion adjustments to move the fence laterally. The fence-tilting mechanism also operates with rack-and-pinion precision.



USER-FRIENDLY SWITCH BOXES

We like the convenience of post-mounted switch boxes, as long as the box is offset far enough behind the fence. On some machines, the box sits so close it can get in the way. The Rikon 20-110's switch box can be mounted behind the infeed or outfeed table. We also like large paddle-style OFF switches. Some boxes are equipped with a built-in circuit breaker and reset button.



SOME JOINTERS CUT FASTER

To test each machine, we timed how long it took to joint the 2-in.-wide edges and 5-1/2-in.-wide faces of 24-in.-long white oak boards. We made multiple passes, feeding each board at a fast but reasonable rate, one that produced a good finish without bogging down the motor. After making numerous cuts at both 1/16-in. and 1/8-in. deep on each machine, we computed the average times.

When we jointed edges, all machines performed equally. But when we jointed faces, we noted differences. Machines with motors of equal-rated horsepower did not deliver equal results. On some machines, deep full-width cuts slowed feed rates by more than 50 percent. The results are listed in the chart on page 46.

**Like a workshop cop,
a jointer makes
crooked boards
go straight.**

Carbide Cutterheads

Segmented carbide cutterheads are now available factory-installed or as an additional-cost accessory on several 6-in. jointers. These cutterheads contain individual carbide cutters indexed in a spiral or chevron pattern. Segmented carbide cutterheads produce super-smooth surfaces and are noticeably less noisy than straight-knife cutterheads. They also reduce tearout. Carbide cutters stay sharp much longer than high-speed steel (HSS) knives and they'll stand up to manufactured materials, such as plywood, particleboard and plastic laminate. Blade changes are easy because each carbide segment has 4 sharp edges.

However, carbide cutterheads are an expensive upgrade, adding nearly \$300 to the cost. They also require a much slower feed rate for face-jointing wide boards—up to three times longer on a typical 1-hp. machine. We experienced a similar power drain with carbide cutterheads in 8-in. jointers (see Carbide Cutterheads for Jointers, AW #116, Sept. 2005).

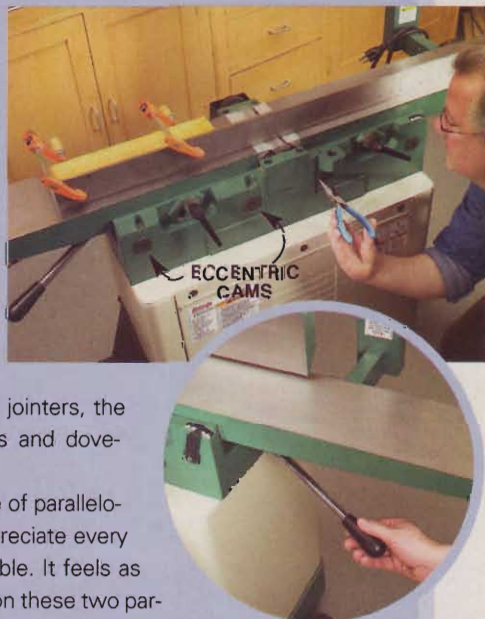
If you primarily use your 6-in. jointer for edge jointing, a carbide cutterhead's durability and versatility may make the upgrade worthwhile. Straight carbide knives (\$75-\$150) are another option. Carbide knives allow jointing manufactured materials, and because they mount in a traditional cutterhead, there's no significant reduction in feed rate. However, they won't leave surfaces as smooth or reduce tearout as much as a spiral cutterhead does.



Benefits of a Parallelogram Bed

We were impressed with the two parallelogram bed jointers we tested. In a parallelogram jointer, each table is supported by four eccentric cams. The eccentric cams make it easy to adjust the tables to be co-planar during set-up (photo, right). Just remove the fence and rotate the cam to raise or lower each corner of the table. On other jointers, the tables are supported by gibs and dove-tailed ways.

Another notable advantage of parallelogram design is one you'll appreciate every time you adjust the infeed table. It feels as light as a feather! The levers on these two parallelogram jointers move the table easily and precisely. They were clearly the best infeed table adjustment systems in the test.



RECOMMENDATIONS

Every 6-in. jointer we tested delivered smooth surfaces, but we found noteworthy differences. For example, some machines power through deep cuts, others labor. Some machines operate more smoothly than others. Some machines contain user-friendly features that go beyond bed length and fence design.

Every woodworker has different priorities, so we won't rec-

ommend one jointer as the very best. Instead, we've grouped the jointers into different categories. To make your pick, select the category that most closely suits your needs.

Be aware that street prices can vary from the suggested retail prices we list, so shop around. Also, be sure to include shipping costs (usually about \$100) when you consider mail order and internet prices.

LONG BED LENGTH

If the ability to joint long boards tops your list, consider the Powermatic 54A and the Steel City 40615. Both are equipped with extra-long tables and 5-yr warranties. If you're willing to step down one size in table length, the Grizzly G0604X, Jet JJ-6CXDS and General-International 80-100L deserve a look.

POWERMATIC 54A • \$899

Pros: Our test machine operated with virtually no vibration and it easily powered through every full-width cut. Its cutterhead rotates at 6000 rpm—the fastest in the test—and its 1-hp. motor has enough power to drive it without bogging down. Disposable knives are standard. This machine has a sliding fence mechanism with user-friendly controls and a cool dual-action infeed table lever: Raise and lower to make coarse adjustments, twist its handle to make fine adjustments.

Cons: The angled depth-of-cut scale is somewhat hard to read.

Source WMH Tool Group, Inc., (800) 274-6848, www.wmhtoolgroup.com

STEEL CITY 40615 • \$699

Pros: This jointer has an extra-long infeed table to provide more support for long, uneven stock, a sliding fence mechanism with user-friendly controls, a large diameter wheel for precise infeed table adjustments, a 1-1/2-hp. motor and built-in casters. Its depth-of-cut scale faces the operator, so it's easy to read. We like the post mounted switch box, its paddle-style OFF switch and built-in circuit breaker.

Cons: The switch box post interferes with locking and unlocking the infeed table. The base sticks out too far in front of the machine.

Source Steel City Tool Works, (877) 724-8665, www.steelcitytoolworks.com



AMPLE POWER

If you plan to face-joint wide boards, you need a machine that does the job without bogging the motor. In our tests, the standard-bed Craftsman 21705, the long-bed Jet JJ-6CSDX and the extra-long-bed Powermatic 54A made the fastest full-width cuts, followed closely by the Steel City 40600 and 40615 and the Grizzly G0604X.

CRAFTSMAN 21705 • \$480

Pros: The Craftsman is one of only two standard-bed jointers in this test equipped with a 1-1/2-hp. motor. Its depth-of-cut scale faces the operator, so it's easy to read. We like its tall fence, post-mounted switch box, paddle-style OFF switch and built-in circuit breaker.

Cons: The fence mechanism is lightly built, compared to the other recommended machines. The infeed table adjusts with a lever; a wheel is better for precise adjustments.

Source Sears Craftsman, (800) 377-7414, www.sears.com/powertools

JET JJ-6CSDX • \$579

Pros: This jointer's feed rate is outstanding and its overall performance is excellent. Its cutterhead rotates at 6000 rpm—the fastest in the test—and its 1-hp. motor has enough power to drive it without bogging down. This machine, a longer version of the standard-length JJ-6CSX, is equipped with disposable knives. Our test machine exhibited very little vibration, even during heavy cuts.

Cons: The fence controls are thin T-handle rods that aren't particularly user-friendly and the angled depth-of-cut scale is somewhat hard to read.

Source WMH Tool Group, Inc., (800) 274-6848, www.wmhtoolgroup.com



EASY TO MOVE OR STORE

If your shop shares space with a car, or if you work in a small space, stowability may top your list. To be stowable, a jointer must be easy to move or compact in size. We recommend the Grizzly G0452, which comes with built-in casters and the Jet JJ-6CSX, which has a very small footprint. Both of these machines have standard-length beds (46-in.). The Craftsman 21705 and the Rikon 20-110 are nearly as compact as the Jet. The Shop Fox W1745 has built-in casters, like the Grizzly, and the same footprint. Several longer jointers also feature built-in casters.

GRIZZLY G0452 • \$355

Pros: This standard-length machine features built-in casters that make it very easy to move. It also comes with a tall fence, a post-mounted switch box, a 1-hp. motor and an attractive price. It performed best during shallow (1/16-in. or less) full-width cuts. Heavier cuts caused some vibration.

Cons: The rack-and-pinion fence creates a wide footprint. The infeed table adjusts with a lever; a wheel is better for precise adjustments. The switch box post interferes with locking and unlocking the infeed table. The angled depth-of-cut scale is somewhat hard to read.

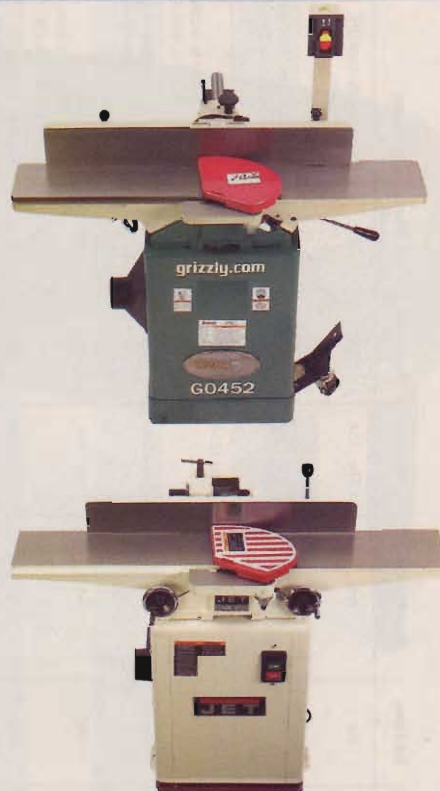
Source Grizzly Industrial, (800) 523-4777, www.grizzly.com

JET JJ-6CSX • \$479

Pros: The Jet is one of the narrowest machines (less than 21-in. wide), thanks to its compact sliding fence design. This is a no-frills jointer, but it's solidly built and it works well. We felt very little vibration on our test machine, even during full-width cuts. This machine is equipped with a 1-hp motor.

Cons: The fence controls are thin T-handle rods that aren't particularly user-friendly. The angled depth-of-cut scale is somewhat hard to read.

Source WMH Tool Group, Inc., (800) 274-6848, www.wmhtoolgroup.com



VALUE

If value is most important, the Grizzly G0604X, the Steel City 40615 and the Sunhill SM-150 rise to the top. The Grizzly and Steel City jointers score well in several categories. The Sunhill provides long-bed capacity at an attractive price. Of the standard-bed jointers the Grizzly G0452 and the Jet JJ-6CSX offer the most bang for the buck.

SUNHILL SM-150 • \$359

Pros: This jointer's best features are its price and its 6-year warranty. Its depth-of-cut scale faces the operator, so it's easy to read. This machine is similar in appearance to the Jet JJ-6CSDX. It has the same table length and sliding fence mechanism. It's equipped with a 1-hp motor.

Cons: We recorded slow feed rates with this jointer, and some vibration. The fence controls are thin T-handle rods that aren't particularly user-friendly. The infeed table adjusts with a lever—a wheel is better for precise adjustments. The angled depth-of-cut scale is somewhat hard to read. The owners manual we received didn't match the machine.

Source Sunhill Machinery, (800) 929-4321, www.sunhillmachinery.com

GRIZZLY G0604X • \$575

Pros: This jointer features parallelogram design (see "Benefits of a Parallelogram Bed," page 43) and a four-knife cutterhead, which provides more cuts per inch at a given feed rate. It's equipped with a tall sliding fence, a 1-1/2-hp motor, a post-mounted switch box, a paddle-style OFF switch and built-in casters. The table lock levers are large and easily accessible and the depth-of-cut scale faces the operator, so it's easy to read. Our test machine exhibited very little vibration, even during heavy cuts.

Cons: We'd prefer to have the switch box offset farther away from the fence.

Source Grizzly Industrial, (800) 523-4777, www.grizzly.com



Manufacturer/Model Contact	Retail Price	Bed Length*	Width	Fence Design	Infeed Table Adjustment	Scale Faces Operator	Built-in Casters	Tall Fence	Post-Mounted Switch Box	Motor	Cutterhead RPM	Feed Rate in seconds**	Comments
Craftsman 21705 (800) 377-7414 sears.com/powertools	\$480	Standard	23"	Sliding	Lever Under Table	Yes	No	Yes	Yes	1.5-hp / 15A	5000	6 / 9	Large paddle-style OFF. 1-yr. warranty.
Delta JT-360 (800) 438-2486 deltamachinery.com	\$369	Standard	26-1/2"***	Sliding	Lever Under Table	Yes	No	Yes	No	0.75-hp / 13A	4800	10 / 14	Open leg stand. 1-yr. warranty. Appears similar to Steele ST1001.
Delta 37-275X (800) 438-2486 deltamachinery.com	\$649	Standard	27-1/2"	Rack-and-Pinion	Lever Under Table	No	No	Yes	Yes	1-hp / 13.5A	4800	9 / 19	5-yr. warranty. Appears similar to Grizzly G0452 & Shop Fox W1745.
General International 80-100L (514) 326-1161 general.ca	\$649	Long	20"	Sliding	Front-Mounted Wheel	No	No	No	No	1-hp / 13A	5000	7 / 10	2-yr. warranty. Appears similar to Jet JJ-6CSDX, Sunhill SM-150 & Woodtek 141-701.
Grizzly G0452 (800) 523-4777 grizzly.com	\$365	Standard	27-1/2"	Rack-and-Pinion	Lever Under Table	No	Yes	Yes	Yes	1-hp / 14A	4800	7 / 10	1-yr. warranty. Appears similar to Delta 37-275X & Shop Fox W1745.
Grizzly G0604X (800) 523-4777 grizzly.com	\$575	Long	23-3/4"	Sliding	Lever Under Table	Yes	Yes	Yes	Yes	1.5-hp / 15A	4850	7 / 10	Parallelgram bed. Large paddle-style OFF. 1-yr. warranty. Appears similar to Steel City 40650.
Harbor Freight 31049-3VGA (800) 423-2567 harborfreight.com	\$300	Short	18-1/4"****	Sliding^	Wheel Under Table	No	No	No	No	1-hp / 8A	4850	10 / 30	Cutterhead has no jackscrews. Plastic blade guard. End-mounted fence. 1-yr. warranty; 90 day warranty on motor.
Jet JJ-6C5X (800) 274-6848 wmtoolgroup.com	\$479	Standard	20-1/4"	Sliding	Front-Mounted Wheel	No	No	No	No	1-hp / 13A	4800	7 / 11	5-yr. warranty.
Jet JJ-6CSDX (800) 274-6848 wmtoolgroup.com	\$579	Long	20-1/4"	Sliding	Front-Mounted Wheel	No	No	No	No	1-hp / 13A	6000	5 / 8	Disposable knives. 5-yr. warranty. Appears similar to General International 80-100L, Sunhill SM-150 & Woodtek 141-701.
Powermatic 54A (800) 274-6848 wmtoolgroup.com	\$899	Extra-Long	23-1/4"	Sliding	Lever Under Table	No	No	No	No	1-hp / 13A	6000	6 / 9	Disposable knives. 5-yr. warranty. Dual action infeed table adjustment lever.
Rikon 20-110 (877) 884-5167 rikontools.com	\$499	Standard	23-3/4"	Sliding/ Rack-and-Pinion Hybrid	Front-Mounted Wheel	No	No	Yes	Yes^^	1.5-hp / 12A	4500^^ 5500^^^	7 / 10 7 / 12	Rack-and-pinion fence-tilt adjustment. Switch box can mount behind infeed or outfeed table. 2-yr. warranty.
Shop Fox W1745 (800) 840-8420 woodstockint.com	\$530	Standard	27-1/2"	Rack-and-Pinion	Lever Under Table	No	Yes	Yes	Yes	1 / 14A	4800	7 / 10	2-yr. warranty. Appears similar to Delta 37-275X & Grizzly G0452.
Steelex ST-1001 (800) 840-8420 woodstockint.com	\$410	Standard	26-1/2"***	Sliding	Lever Under Table	Yes	No	Yes	No	1 / 13A	4800	6 / 10	Open leg stand. 2-yr. warranty. Appears similar to Delta JT-360.
Steel City 40600 (877) 724-8665 steelcitytoolworks.com	\$699	Long	23-3/4"	Sliding	Lever Under Table	Yes	Yes	Yes	Yes^^	1.5-hp / 15A	5500	6 / 10	Parallelgram bed. Large paddle-style OFF. 5-yr. warranty. Appears similar to Grizzly G0604X.
Steel City 40615 (877) 724-8665 steelcitytoolworks.com	\$699	Extra-Long	21-3/4"	Sliding	Wheel Under Table	Yes	Yes	No	Yes	1.5-hp / 15A	5000	7 / 10	Large paddle-style OFF. 5-yr. warranty.
Sunhill SM-150 (800) 929-4321 sunhillmachinery.com	\$369	Long	20"	Sliding	Lever Under Table	Yes	No	No	No	1-hp / 13A	4500	9 / 13	6-yr. warranty. Appears similar to Jet JJ-6CSDX, General International 80-100L & Woodtek 141-701.
Woodtek 141-701 (800) 645-9292 pro.woodworker.com	\$530	Long	20"	Sliding	Lever Under Table	Yes	No	No	No	1-hp / 12A	5060	7 / 13	1-yr. warranty. Appears similar to Jet JJ-6CSDX, General International 80-100L & Sunhill SM-150.

*Short approx. 42", Standard approx. 46", Long approx. 56", Extra-long approx. 66". **5-1/2"-W x 24"-L board at 1/16" & 1/8" deep cuts. ***Including splayed-leg stand. ^End-mounted. ^^Switch box is too close to the fence. ^^Two speeds.



Showcase

View your
treasures from
every angle.

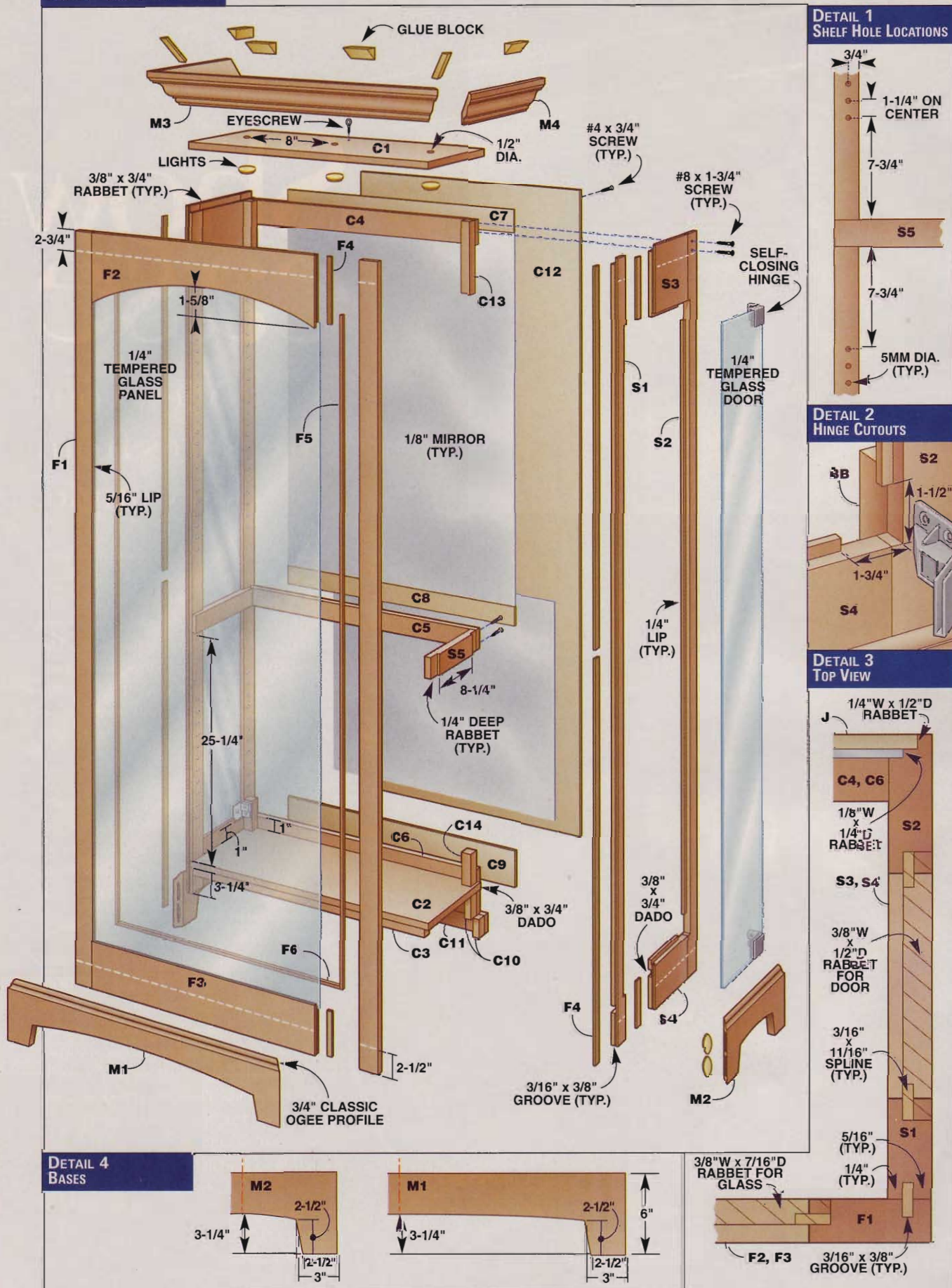
Any collection you want to display, from fish fossils to Baccarat crystal will look great inside this cabinet. It allows unobstructed viewing from the front because the doors are on the sides. The doors themselves are frameless glass to maximize the side views. Inside, the mirrored back presents views from still another perspective, and glass shelves allow the built-in lighting to filter throughout the cabinet.

This showcase features 12-in.-deep shelves, graceful proportions and slender stiles and rails that elegantly frame the display area. It's built with spline joinery that's both simple and strong. I made the crown molding with new dedicated router bits that do an impressive job.

Glass is easily the most expensive component of this project—I spent about \$625, including \$40 to bevel the arched front panel. This piece and the side doors are tempered glass, for safety. The seven glass shelves aren't tempered (for more information, watch for "Glass for Cabinets" coming in AW's July issue). The cabinet requires only 25 bd. ft. of 4/4 lumber, so I splurged on genuine mahogany. My total cost, including the hardware and lighting, was about \$1000.

by Luke Hartle

FIG. A EXPLODED VIEW

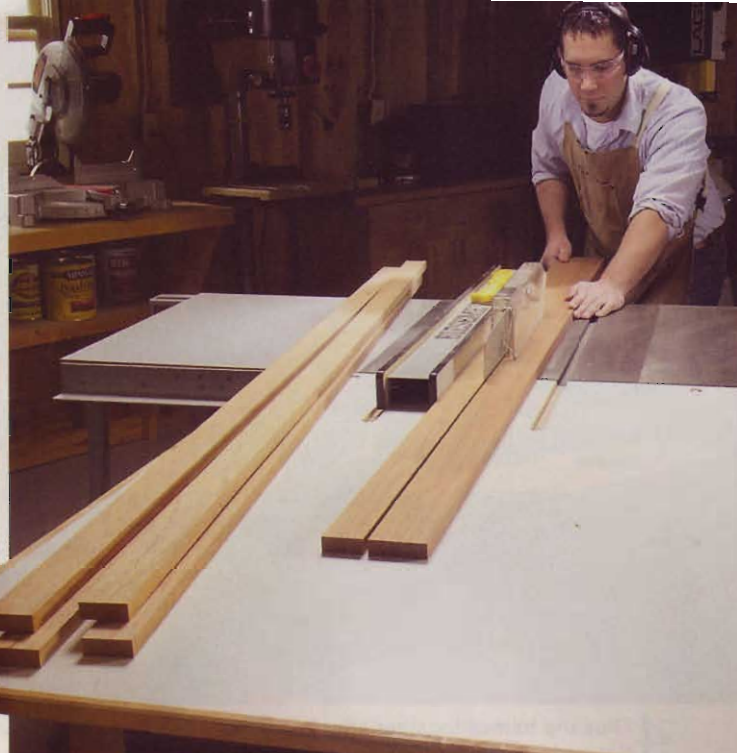


EDITOR: TIM JOHNSON • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: RAMON MORENO • ILLUSTRATION: FRANK ROHRBACH

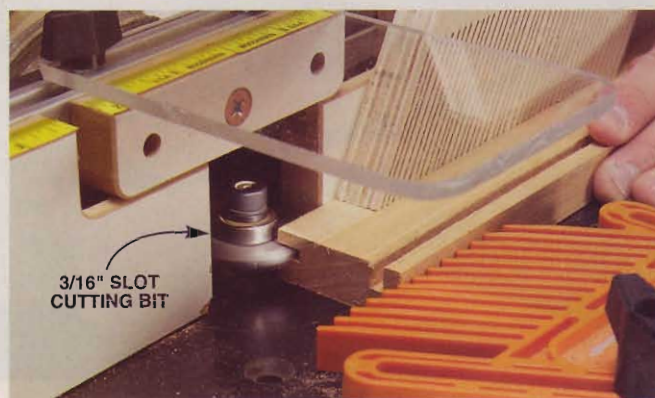
BUILD THE FRAMES

The cabinet's basic structure consists of three frames joined together. The frames and the cabinet must all be square so the glass will fit.

1. Rip the boards for the frame stiles about 1/4-in. oversize in width (Photo 1). To prevent headaches when installing the glass it's important for all the stiles to be straight and flat. Let these pieces sit overnight to stabilize. Then joint and gang-plane them to final width.
2. Using a 3/16-in. slot-cutting bit, rout grooves for splines in all the stiles and rails (Photo 2, Fig. A, Parts F1-F3 and S1-S4, page 50 and Sources, page 54). All the grooves have the same offset, a 5/16-in. lip at the front and a 1/4-in. lip at the back (Fig. A, Detail 3). The front frame stiles (F1) and the front side frame stiles (S1) receive two slots.
3. Cut the arch on the front frame top rail (F2) and sand it smooth.
4. Cut the splines (F4) by ripping pieces slightly oversize in thickness and then planing them to fit the grooves.
5. Assemble the front and side frames. After the glue is dry, trim flush any splines that protrude.
6. Rout rabbets in the frames for the glass (Photo 3 and Fig. A, Detail 3). The rabbets go on the back of the front frame and on the front of the side frames. The spline grooves that you've routed automatically define the depths of all the rabbets: Because the splines aren't centered, the rabbets in the side frames are 1/16-in. deeper than the rabbet in the front frame.
7. Rout rabbets in both side frames for the top (C1). Rout dados for the fixed shelf (C2) in both the side frames and the bottom rail (C6).
8. Cut stepped rabbets in the back of the side frames for the mirrors and the back. (Fig. A, Detail 3).
9. Use a dado set to cut rabbets in the side frame center rails (S5). Glue these rails to the side frames, making sure they are parallel to and exactly the same height from the fixed shelf dado on each frame.
10. Drill holes for the shelf supports in the side frames (Fig. A, Detail 1). I made a drilling template and used my cordless drill and a self-centering drill bit (see Sources).
11. Measure for the glass after the frames are completed. Measure for the mirrors after the cabinet is assembled. Ask your glass supplier to recommend how much to reduce the dimensions to make sure the front glass panel fits the opening. I made this panel 1/8-in. smaller than the opening in both length and width. I also gave my supplier a full size template of the arched



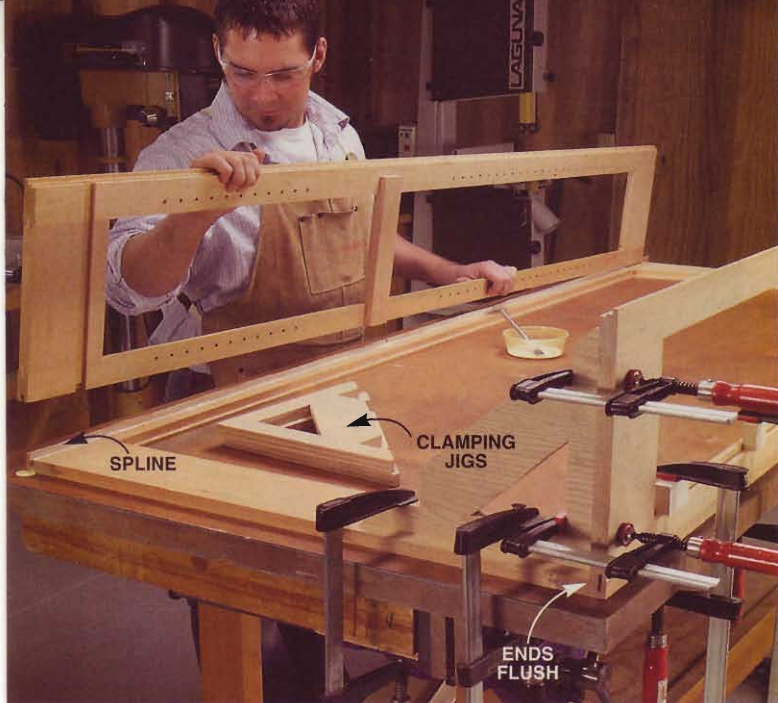
1 Start by cutting the stiles for the three frames that form the cabinet. Rip these pieces oversize in width. The extra width allows you to straighten pieces that develop a crook.



2 Rout grooves for splines in the stiles and rails. Most of the stiles have more than one groove. All the grooves are routed from the same setting.



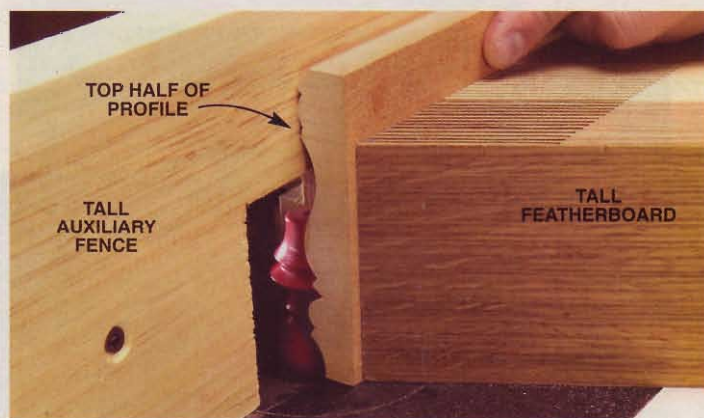
3 Rout rabbets for glass in the frames. The rabbets go on the front faces of the side frames, but on the back face of the front frame.



4 Glue the frames together after installing the splines. Work on a flat surface and make sure the ends of the frames are flush. Shop-made 90 degree clamping jigs keep the corners square.



5 Cut and fit the miters on the base pieces before you lay out the arches. First, miter the side pieces and clamp them in place. Then miter the front piece to fit between the side miters.



6 Rout the crown molding with dedicated crown molding bits. First rout the top half with one bit. Then install the second bit and flip the workpiece to finish the job. A tall fence and featherboard securely hold the workpiece while using these tall bits.

top. Another, even safer option would be to provide your supplier with a full-size plywood or hardboard template (if this template fits the front opening, the glass will surely fit). To work with the hinges, the sides' glass doors must be 1/4-in. smaller than their openings in both length and width.

ASSEMBLE THE CABINET

12. Glue the frames together (Photo 4). The splines perfectly align the edges. To ensure a square glue-up, I made 90-degree plywood clamping jigs for each corner and went crazy with the clamps.
13. Glue on the top (C1) after drilling 1/2-in.-dia. access holes for the lights. Install an eyescrew for tethering the cabinet to the wall, so there's no chance it can tip over.
14. Glue in the fixed shelf (C2). Then glue the cleat (C3) that supports the shelf's front edge.
15. Glue and screw the top and bottom cabinet rails (C4 and C6) flush with the inside edges of the stepped rabbets—make sure the crown molding will hide the top rail's screws. Fasten the bottom cabinet rail to the fixed shelf and to blocks (C10) glued to the side frames. Don't install the middle cabinet rail (C5) yet.
16. Affix spacers (C7-C9) to all three back rails. They create the top and bottom rabbets for the mirrors.
17. Cut blanks for the base molding pieces (M1 and M2) oversize in length. Then rout the top edges with a Classic Ogee router bit (see Sources).
18. Cut miters on the side molding pieces, trim them to length and clamp them in position. Then miter the front piece to fit (Photo 5).
19. Remove the base pieces and cut slots in their miters for biscuits.
20. Use the patterns (Fig. A, Detail 4) to create the legs and arches on the base pieces. Cut the profiles on the bandsaw and then sand them smooth.
21. Install the biscuits and then glue and clamp the base moldings to the cabinet.
22. Install the back cabinet rail (C11) after fastening blocks (C10) inside the base moldings.
23. Remove the lips from the side frame corners to make room for the door hinges (Fig. A, Detail 2). Install the hinge mounting blocks (C13 and C14) flush with the stiles' edges.

MAKE THE CROWN MOLDING

I used specialized router bits to make the crown molding (M3 and M4, see "Router-Made Crown

Molding, page 53). These bits must be used in a router table.

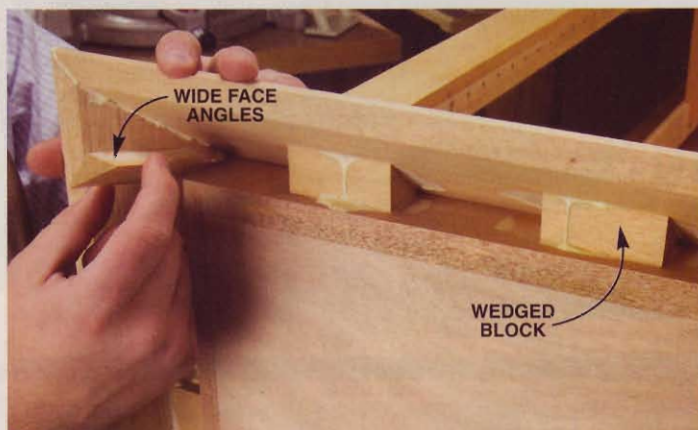
23. Mill the crown molding blanks 1/4 in. wider than their final width. Make extra blanks for test cutting, to get the hang of using the bits. Install a tall fence on your router table to fully support the blank and a featherboard to hold it securely against the fence during each routing pass.
24. Use one bit to rout the top half of the molding profile and the other bit to rout the bottom half (Photo 6). The bits are designed so their profiles overlap. To shorten the molding's width, I lowered the bottom bit below the table, so I didn't use its full profile.
25. Using the table saw, rip the molding to final width. Then install a tall fence and tilt the blade away from it at 38 degrees to cut the bottom bevel. Stand the molding on edge, with its face against the fence to make this cut.
26. Attach the crown molding in stages. First, tack everything in position (Photo 7). Then install glue blocks to fortify the joints (Photo 8). Calculating perfect angles for the corner blocks can be a nightmare; they're easier to fit by hand.

APPLY FINISH BEFORE YOU INSTALL THE GLASS

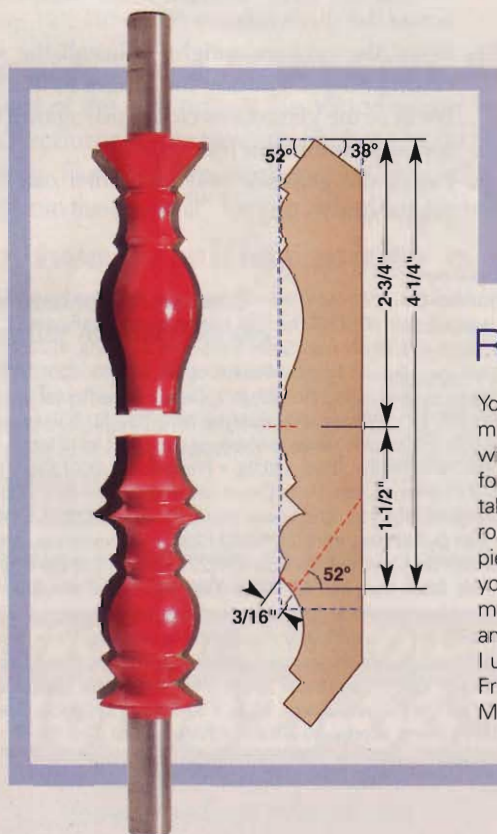
27. Finish the cabinet now. Don't forget to finish the back middle rail, which is added after the



7 Glue on the crown molding after dry-fitting the miters. Brad nails in the corners pin each piece in position before you apply the clamps. Fasten the top of each mitered corner with a single brad.



8 Reinforce the crown molding with glue blocks. Cut the wedged blocks on your tablesaw. The wide-angled corner blocks are hard to cut precisely. It's easier to sand or hand-plane these blocks to fit.



ROUTER-MADE CROWN MOLDING

You can make crown molding several ways: with a molder-planer, for example, or on a tablesaw or by stacking routed and sawn pieces. And of course you can buy it ready-made. I discovered another way... This time I used two bits from Freud's Wide Crown Molding System (see

Sources, page 54). Six bits are available. They combine to create nine different profiles. These bits are designed to create super-wide ceiling moldings, but I found it easy to reduce the molding's size to fit this slender cabinet (see profile, left). These bits are very easy to use, and they

make great-looking moldings amazingly fast. I finished my moldings by cutting the bevel angles on my tablesaw, but Freud also offers a 38/52-degree bevel-cutting bit as part of the system, so the molding can go from start to finish right on the router table. Very slick!



9 Lower the front glass panel through the back. This large tempered piece of glass is heavy and awkward to maneuver, so get help.



10 Install the mirrors after attaching the middle rail and spacer. Then install the back to protect the mirrors. The cabinet sides have two stepped rabbets, one for the mirrors and one for the back.

CUTTING LIST		OVERALL DIMENSIONS: 15-3/4" x 37" x 82"	
Part	Name	Qty.	Dimension
Front Frame			3/4" x 32" x 77-3/4"
F1	Stile	2	3/4" x 2-1/8" x 77-3/4"
F2	Top Rail	1	3/4" x 7-1/4" x 27-3/4"
F3	Bottom Rail	1	3/4" x 5" x 27-3/4"
F4	Spline	many	3/16" x 11/16" x cut to length
F5	Side Glass Retainer	2	1/4" x 3/8" x 66-1/4"
F6	Bottom Glass Retainer	1	1/4" x 3/8" x 27-3/4"
Side Frame			3/4" x 12-1/2" x 77-3/4"
S1	Front Stile	2	3/4" x 1-3/4" x 77-3/4"
S2	Back Stile	2	3/4" x 2-1/2" x 77-3/4"
S3	Top Rail	2	3/4" x 7-1/4" x 8-1/4"
S4	Bottom Rail	2	3/4" x 5" x 8-1/4"
S5	Center Rail	2	3/4" x 2" x 11-1/4"
Cabinet			13-1/4" x 32" x 77-3/4"
C1	Top	1	3/4" x 12-1/2" x 31-1/4"
C2	Fixed Shelf	1	3/4" x 11-3/4" x 31-1/4"
C3	Cleat	1	3/4" x 1" x 30"
C4	Top Rail	1	3/4" x 3-3/4" x 30-1/2"
C5	Middle Rail	1	3/4" x 2" x 30-1/2"
C6	Bottom Rail	1	3/4" x 5" x 30-1/2"
C7	Top Spacer	1	1/8" x 3-5/8" x 28-1/2"
C8	Middle Spacer	1	1/8" x 1-3/4" x 28-1/2"
C9	Bottom Spacer	1	1/8" x 4-3/4" x 28-1/2"
C10	Glue Block	4	3/4" x 1" x 3-1/4"
C11	Back Rail	1	3/4" x 3" x 32"
C12	Back	1	1/4" x 31-1/2" x 77"
C13	Top Hinge Block	2	3/4" x 1" x 7-1/2"
C14	Bottom Hinge Block	2	3/4" x 1" x 2-1/4"
Molding			
M1	Base Front	1	3/4" x 6" x 33-1/2"
M2	Base Side	2	3/4" x 6" x 14"
M3	Crown Front	1	3/4" x 4-1/4" x 37"
M4	Crown Side	2	3/4" x 4-1/4" x 15-3/4"

* Mahogany plywood ** Plywood *** Final length, after mitering

glass and mirrors are installed. My mahogany wasn't a uniform color, so I chose a dark gel stain to minimize the differences and applied two coats. Then I wiped on three satin varnish topcoats.

INSTALL THE LIGHTS, GLASS AND MIRRORS

28. Install the lights. I chose xenon lights because they produce bright, warm light similar to halogen bulbs, without generating nearly as much heat.
29. Install the front glass through the back of the cabinet (Photo 9). Because of the weight and size of the glass, this is a two-person job.
30. Nail in the retainer strips (F5 and F6) with 1/2-in.-long 20-ga. wire brads. Be careful: The edges of tempered glass panels are fragile. One nail nick and there goes a very expensive piece of glass. To avoid disaster, pre-drill the holes in the support strips and install the brads, then position the strips. Lay a piece of cloth on the glass. Slide the hammer back and forth on the cloth to drive the brads home.
31. Screw the middle cabinet rail (C5) to the side frame center rails (S5). Don't glue this piece. If the front glass panel ever breaks, this rail will need to be removed.
32. Install the mirrors (Photo 10). Secure them with dabs of silicone caulk.
33. Screw on the back (C12) after carefully pre-drilling holes on the edges of both sides and across the three rails.
34. Stand the cabinet upright to install the self-closing hinges. Position the hinges so that the backs of the glass doors close flush against the top and bottom rail lips.
35. Install the glass shelves. Each shelf can support about 15 lbs.

Sources

Rockler, (800) 279-4441, www.rockler.com Brass no-bore glass door pull, #29140, \$2.39 ea. Self closing glass door hinges, #37228, \$12.79 per pair. 5mm brass shelf supports, #22252, \$3.09 per 16-pack. 5mm self-centering bit, #22575, \$20. 3/16" 3-wing slotting cutter, #92189, \$27. Classic Ogee Router bit, #91680, \$33. • Pegasus Associates, (800) 392-4818, www.pegasusassociates.com Xenon low voltage puck light kit (3 lights), #PALPX-60-BK-PALTR60, \$30.99. • Freud Tools, (800) 334-4107, www.freudtools.com Wide Crown Molding System Bits: Upper profile #3, #99-416, \$70. Lower profile #2, #99-415, \$70. • Van Dyke's Restorers, (800) 558-1234, www.vandykes.com Bartley Gel Stain, Jet Mahogany, #02236854, \$16.99 per quart. • The Glass Man Inc., (877) 636-9080 1/4-in. clear tempered front glass panel with arched top and 1-in. bevel, approx. 28-3/8 in. x 67-3/4 in., \$153 (\$120 without the bevel). Two 1/4-in. clear tempered glass side door panels with flat-polished edges, approx. 8-3/4 in. x 66-in., \$40 each. Seven 1/4-in. clear glass shelves with flat polished edges, approx. 12-in. x 30-3/8-in., \$39 each. One 1/8-in. mirror, approx. 30-7/8 in. x 42-3/8 in., \$69. One 1/8-in. mirror, approx. 24-3/4 in. x 30-7/8 in., \$41.

Kitchen STOOL

Round legs
without a lathe

by Seth Keller



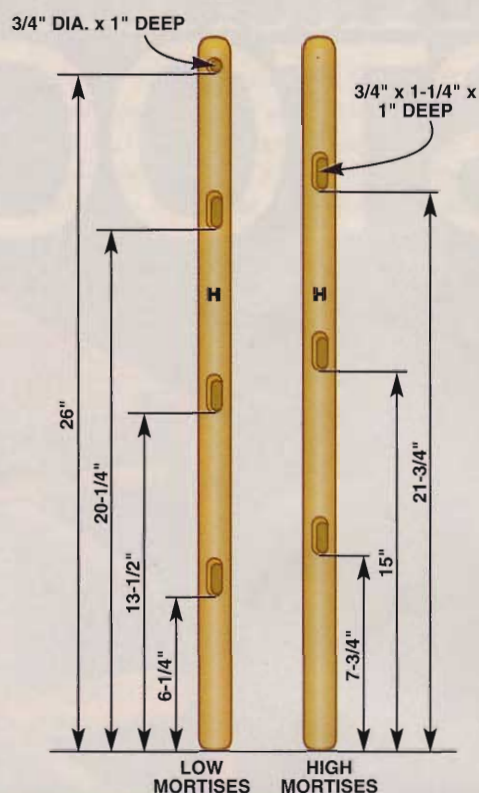
Few stools are as clean and elegant as this one. I built it with splayed legs to provide a stable footing. The multi-level rungs offer a variety of foot perches to satisfy just about anybody, no matter how short or tall they are. I topped it off with a gently scooped seat that's comfortable enough to permit lingering over a satisfying meal. I used contrasting wood for visual interest. I really like how the light-colored legs peek up through the dark seat. The legs and stretchers are made from strong, durable beech. The seat is made from cherry and reminds me of old, soft leather.

EDITOR: DAVE MUNKITTRICK • ART DIRECTION: EVANGELINE EKBERG • PHOTOGRAPHY: MIKE KRIVIT ILLUSTRATION: FRANK ROHRBACH UNLESS OTHERWISE NOTED • DESIGN: SETH KELLER

FIGURE A EXPLODED VIEW



DETAIL 1 LEG MORTISE LAYOUT



EVANGELINE EKBERG

PROJECT REQUIREMENTS AT A GLANCE

Special Tools:	Plunge Router
Lumber qty. and price:	4 bf. 8/4 Beech, 4 bf. 4/4 Beech, 3 bf. Cherry. Approx cost: \$65.00

CUTTING LIST

OVERALL DIMENSIONS:
28" x 16" x 16"

Part	Name	Qty.	Material	Dim. (Th x W x L)
A	Rung	2	Beech	3/4" x 1-1/4" x 14"
B	Rung	2	Beech	3/4" x 1-1/4" x 13-3/4"
C	Rung	2	Beech	3/4" x 1-1/4" x 12-3/4"
D	Rung	2	Beech	3/4" x 1-1/4" x 12-1/2"
E	Rung	2	Beech	3/4" x 1-1/4" x 11-9/16"
F	Rung	2	Beech	3/4" x 1-1/4" x 11-5/16"
G	Stretcher	2	Beech	3/4" x 1-1/4" x 10-5/8"
H	Leg	4	Beech	1-7/16" x 1-7/16" x 28"
J	Seat	1	Cherry	1-1/4" x 13" x 13"

This project will keep your router humming and uses some very clever jigs to simplify and speed up construction. It's almost as easy to make half a dozen stools as it is to make one. Our stool is sized for a 36-in. counter height.

There will be a lot of parts floating around your shop as you build this stool and a lot of mortises to keep track of. So take my advice and mark your parts clearly as you go to avoid mix-ups.

Mortise the Legs

1. Mill the leg blanks (H) and cut them to length.
2. Lay out the mortises (Fig. A, above) (Photo 1). The mortises are offset so one set of rungs (B, D and F) are

positioned higher on the leg than the other set (A, C, E and G). Mark the higher mortises first, then rotate the legs and mark the lower ones (Photo 2).

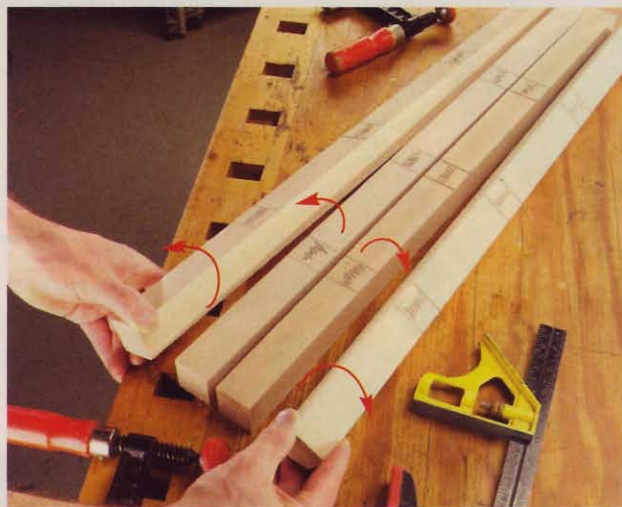
3. Rout the mortises using a jig and a 3/4-in. plunge router bit (Fig. B, p. 57) (Photo 3). Orient each leg in the jig in the same manner: the top of each leg should stick out of the jig's indexed end. Make the round seat stretcher mortise with a single plunge.
4. Roundover the edges of the legs with a 3/4-in. roundover bit (Photo 4.) Round over the ends of each leg with a 3/8-in. roundover bit (Photo 5.)

Rungs and Stretchers

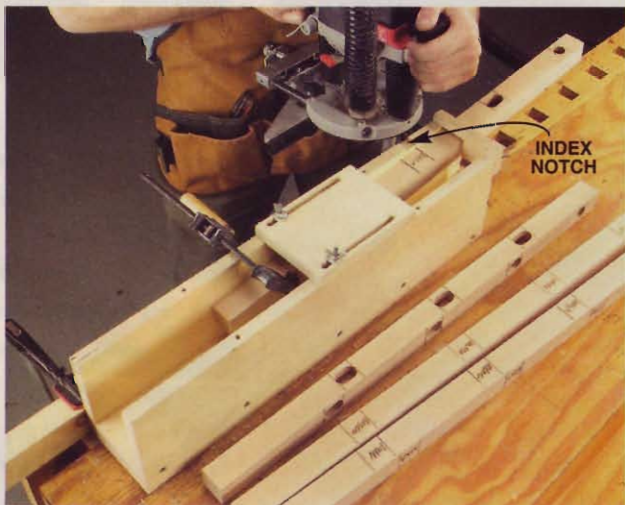
5. Round over four 5-foot long pieces of rung stock with



1 Begin building the stool by laying out mortises on the legs. The mortises are offset with one set higher than the other. Clamp the legs together and lay out all the high mortises first. I like to shade each mortise to avoid mistakes.



2 To layout the lower mortises, rotate the two outside legs 90-degrees away from the center. Then roll the two center legs away from the center as well. This automatically positions the correct face of each leg.

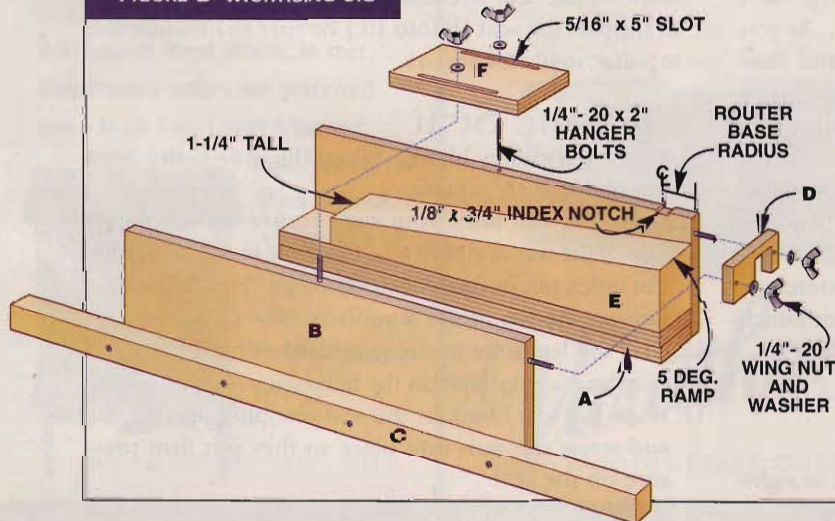


3 Cut the angled mortises with a jig and a plunge router. To position the leg, line up the top of the mortise with the top of the index notch on the jig.



4 Round over all four corners on the legs. When you're done, they'll almost look like they were turned. A featherboard maintains consistent pressure against the fence.

FIGURE B MORTISING JIG



CUTTING LIST: MORTISING JIG

Part	Name	Qty.	Dim.	Th x W x L
A	Bottom	2	3/4" x 3-1/4" x 24"	
B	Side	2	3/4" x 6" x 24"	
C	Clamp Rail	1	1" x 1-1/2" x 30"	
D	End Stop*	1	3/4" x 1-3/4" x 4-3/4"	
E	Ramp**	1	3" x 3-1/4" x 18"	
F	Adj. Stop	1	3/4" x 4-3/4" x 6"	

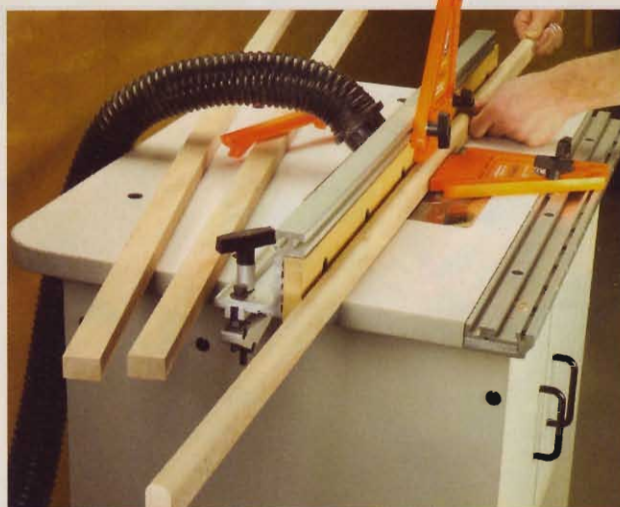
* Cut the notch to accommodate leg stock.

** Ramp tapers from 3" to 1-1/4"

With the end stop in place (D), rout an index notch on the jig to ensure proper alignment of the leg in the jig. For more details on using this versatile jig, see AW #120, March 2006, p. 44.



5 Round over the ends of each leg. Hold the leg tight against a stop block as you feed it into the bit. When the leg contacts the bearing, rotate it slowly to complete the roundover.



6 Mill roundovers on long lengths of rung stock. Cut the rungs and seat stretchers to length afterward. This is more efficient and safer than shaping short lengths. Featherboards produce a clean, consistent cut.



7 Shape the seat stretchers on the bandsaw. It's best to make two cuts. Cut the short angle first, then make the long straight cut.



8 Cut the round tenons on the seat stretchers. When the cut hits the wide part of the stretcher, let it ride on the bearing until it contacts the fence on the outfeed side.

a 3/8-in. roundover (Photo 6). The ends of each stretcher fit like tenons into the leg mortises. As you mill the rungs, use some extra stock to test and fine-tune your cuts by adjusting the bit height or fence position. You should be able to insert the rungs into the mortises by hand.

6. Cut the rungs and seat stretchers to length and label them. Shape the seat stretchers on the bandsaw (Photo 7).
7. Create the 3/4-in. round tenons on the seat stretchers (Photo 8). Drill pilot holes for the screws that attach the seat (Fig. A).

Assemble the Base

8. Dry fit all of the base parts.
9. Glue up the base in stages (Photo 9). Place a straight-

edge on the seat stretchers to make sure they lay flat to support the seat (Photo 10.) Be sure to measure the top diagonally for square.

Make the Seat

10. Glue up a cherry blank. When the glue is dry, trim the blank to 13" square.
11. Draw diagonal lines from each corner on the underside of the seat and drill a 1/4-in. hole in the center for the index pin in the seat-scooping jig (Fig. D, p. 60).
12. Lay out the top of the seat blank (Fig. C, p. 59).
13. Drill the leg holes in the seat blank (Photo 11).
14. Cut the seat to shape on the bandsaw; sand it smooth.
15. Place the seat blank in the seat-scooping jig (Fig. D) and screw the rails into place so they put firm pressure on the seat.

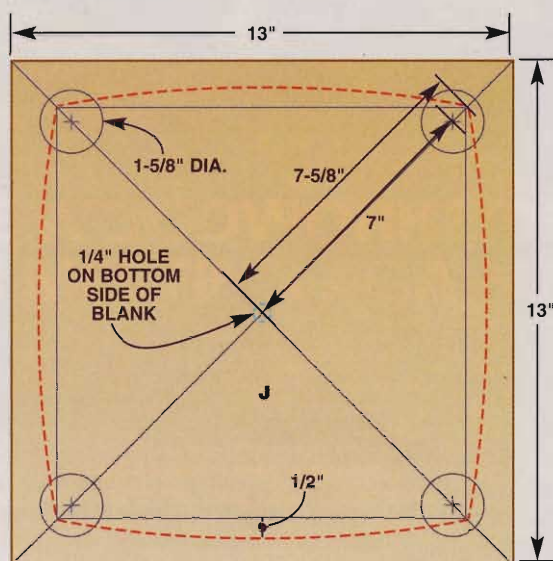


9 Glue up the base in sections. Have all of your parts labeled and laid out in sequence. Glue up the two halves with the three mortises first. When they're dry, glue the whole stool together with the seat stretcher and remaining rungs.

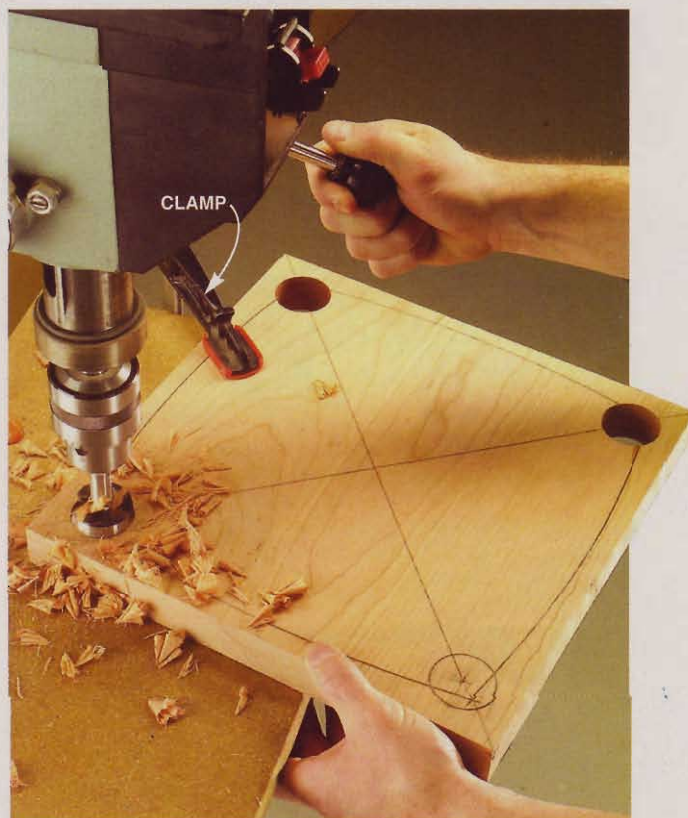


10 Clamp up the base on a flat surface. Angled blocks will prevent the clamps from slipping. Use a straightedge to make sure the wide section on the seat stretchers lies flat.

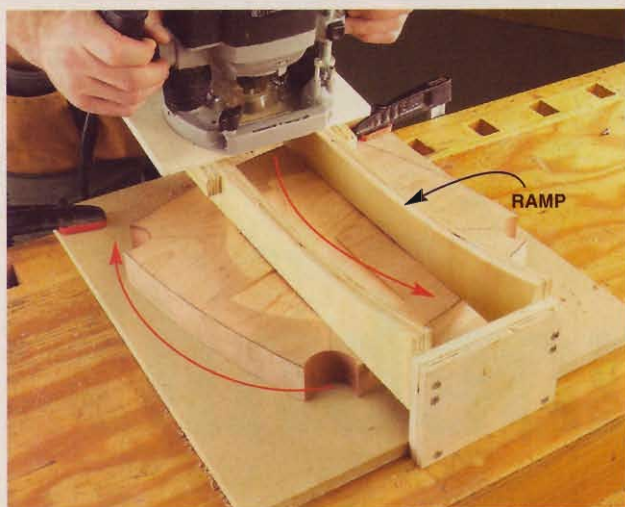
FIGURE C SEAT BLANK LAYOUT



To layout the leg holes, draw diagonal lines on the seat blank and measure 7" from the center out to each corner. This marks the center of each hole. Measure 7-5/8" to mark the four corners of the finished seat. Use a flexible stick to mark the 1/2" bow on the four edges.

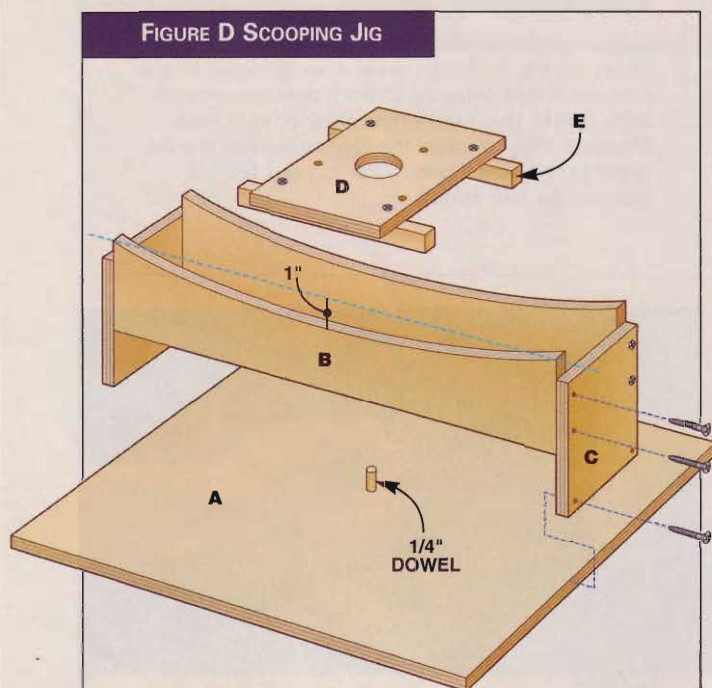


11 Bore leg holes through the seat blank. Clamp the blank to a sacrificial table to prevent blow out. Cut the curved sides on the bandsaw after drilling the holes.



12 Scoop the seat with a router and a simple jig. Slide your router across the curved ramp. Rotate the seat a router bit's worth after each pass. Keep the cuts shallow.

FIGURE D SCOOPING JIG



Set the seat blank on the dowel. Screw the two ends (C) to the base (A). Then hold the ramp (B) down on the seat and screw in place. The ramps should put enough downward pressure on the seat to hold it while it's routed, but loose enough to rotate the seat between passes.

CUTTING LIST: SCOOPING JIG

Part	Name	Qty.	Material	Dim. Th x W x L
A	Base	1	Plywood	3/4" x 18" x 18"
B	Ramp	2	Plywood	3/4" x 2-5/8" x 18"
C	End	2	Plywood	3/4" x 3-3/4" x 5-1/8"
D	Sub-base	1	Plywood	1/2" x 6" x 8"
E	Runners	2	Plywood	3/4" x 1" x 8"



13 It's best to pre-finish the seat and base before final assembly. Then simply attach the seat to the stretchers with screws.

16. Scoop out the seat using a long straight bit (Photo 12) (see Sources below).
17. Round over the edges of the seat around the leg holes with a 3/8-in. roundover bit. Use a 3/4-in. roundover bit on the outside edges of the seat.
18. Sand the entire stool to 180-grit if you'll be finishing the stool with varnish or lacquer. Use 220-grit if you plan on an oil or a wipe-on varnish finish.
19. Attach the seat to the base (Photo 13).

Sources

Woodcraft Supply, (800) 225-1153, www.woodcraft.com
 1/2" x 4-1/8" Straight Cut Double Flute Bit, #815761, \$25.00.
 MLCS, (800) 553-9298, www.mlcswoodworking.com
 3/4" Plunge Router Bit, #7755, \$14.00.
 3/4" Roundover Bit, #8656, \$21.00.
 3/8" Roundover Bit, #8654, \$16.00
 1-5/8" Forstner Bit, #9223, \$12.00.

Tips for . Repairing Finishes

Rescue
battle-scarred
finishes
with ordinary
materials.

by Bob Flexner



Revive A Dull Finish

All finishes dull as they age, but you can usually bring back their shine. The easiest way is to apply paste wax. If the dulling has progressed too far, however, you must rub the finish with fine abrasives or apply another coat or two of finish.

To rub a finish, choose an abrasive that produces the sheen you want. You can use a powder, such as rottenstone or pumice, steel wool or a commercial rubbing compound. Rottenstone produces a glossy finish; pumice and #0000 steel wool produce a satin finish. Use mineral oil or mineral spirits as a lubricant with rottenstone, pumice or steel wool. Commercial rubbing compounds don't require an additional lubricant.

If you must recoat the finish, be sure the surface is clean. Wash it with mineral spirits to remove grease and wax. Wash it with soap and water to remove sticky dirt. Then apply the finish you originally used, or apply oil, shellac, water-based finish, or any type of varnish, including polyurethane. Lacquer is risky to apply because lacquer thinner may cause the old finish to blister.

REMOVE FELT-TIP PEN MARKS

Felt-tip pen ink almost always dissolves in alcohol, acetone or lacquer thinner. Any of these solvents can be used to remove marks on a wood finish, but because acetone and lacquer thinner damage most finishes, it's best to use denatured alcohol. Shellac is the only finish this solvent will damage.

To remove an ink mark, simply dampen a cloth with denatured alcohol and wipe it lightly over the colored area. To reduce any chance of damage, avoid making the finish wet with alcohol. A light wipe or two should remove all of the ink.





RUB OUT WHITE MARKS

White marks may be caused by water or heat. Water-created marks are easier to repair because the damage usually doesn't go very deep.

Water marks are usually caused by sweaty glasses. They're almost always confined to the finish's surface, so they're easy to remove by rubbing with an abrasive. If the surface is glossy, try rottenstone and mineral oil on a cloth, or toothpaste on your finger. If these abrasives don't cut fast enough, use #0000 steel wool to cut through the damage quickly, then restore the finish's gloss by rubbing with rottenstone and mineral oil. If the surface is satin or flat, abrade with #0000 steel wool and mineral oil. If you can't get the sheen of the damaged area to match the rest of the surface, rub the entire surface with the same abrasive.

White marks caused by heat damage go deeper into the finish than those created by water. They're more difficult, and sometimes impossible, to remove by abrasion. You may have to strip and refinish.

REMOVE CRAYON AND CANDLE WAX

Wax dissolves in mineral spirits, naphtha and turpentine—none of which damage a finish when used sparingly, so they're the best solvents for removing crayon marks.

Mineral spirits is less expensive and more widely available than naphtha or turpentine. To remove crayon wax, simply dampen a cloth with mineral spirits and wipe it over the surface.

Candle drips are usually too thick for a solvent to be effective. It's much faster to freeze or scrape off most of the wax and then clean up any remainder with solvent. To freeze wax, hold an ice cube on it for a short time, then pop off the wax with your fingernail. To scrape wax, use a credit card or any hard-edged utensil or tool, but be careful to avoid cutting into the finish.

You can also use a blow dryer or heat gun to soften wax. Be very careful with a heat gun because it can blister the finish. Clean up any remaining wax residue with one of the solvents.



MATCH COLORS ON GLASS

Replacing missing color usually involves color matching, which most people find difficult. To make it easier, do the color matching on a small piece of glass or rigid, clear plastic placed on a part of the surface you're matching. Use an artist's brush to mix several colors until the blend matches the color underneath the glass or plastic. Brush the colorant onto the damage and protect it by applying a finish.

For the colorant, you can use concentrated oil, acrylic, universal or Japan colors, available from woodworking suppliers and paint and hobby stores. Or you can blend ready-made stains.

Touch Up A Scuffed Edge

Sharp edges are easily scraped. A scrape may not damage the wood, but it often removes the wood's stained color, leaving a light area that stands out like a sore thumb. To repair the damage, simply drag an appropriately colored felt-tip marker over the damage. If the marker is pointed, use its side. This fix also works well with new finishes if you've accidentally sanded through a stained edge.

Felt-tip markers in various wood tones are available from most woodworking suppliers and home centers (see Source, below). "Magic" markers rarely match wood tones so they are seldom a good choice.

After the marker repair is thoroughly dry, apply some finish to protect the color from being rubbed off. Wiping varnish is easy to apply and won't smear the color. You can make your own by thinning any regular or polyurethane varnish with mineral spirits. Mix equal parts of varnish and thinner. Dampen a

cloth wrapped around your finger with this mixture and drag it along the repaired edge.

Source: Minwax, (800) 523-9299, www.minwax.com
Wood Finish Stain Markers, about \$5 ea.





REMOVE DIRTY DISCOLORATION

Discoloration around drawer and cabinet-door pulls, or on chair arms and backs, may simply be dirt that's easy to wash off with soap and water. On the other hand, it may be dirt mixed with deteriorated finish. In that case, the finish may have to be removed and replaced.

The first thing to do is to wash the dirty area with a mild soap and warm water. Ordinary liquid dishwashing soaps are best. If this doesn't remove the discoloration, the finish is probably deteriorated. Many finishes break down under extended contact with acidic body oils. In addition to being discolored, the finish may be soft enough to scrape away with your fingernail.

Sometimes you can remove the top layers of a deteriorated finish using fine sandpaper or steel wool, but if the finish has deteriorated to the wood, you usually have to strip and refinish the entire surface.

REMOVE CRAZING AND LIGHT SCRATCHES

Film finishes craze with age. That is, they develop a tight pattern of cracks similar to what you'd see on an old oil painting. If the cracks are shallow, and don't penetrate through a layer of color, they may be sanded out. Light scratches can be removed in the same way.

Choose a sandpaper grit coarse enough to efficiently cut through the damage but not so coarse that you create large scratches or risk sanding through to the wood. The best choices are usually 320- or 400-grit steared sandpaper (3M Tri-M-ite or Norton 3X), or 600- or 1000-grit wet/dry (black) sandpaper. Use steared sandpaper dry and wet/dry sandpaper with a lubricant of mineral oil or mineral spirits. Dry sanding lets you see your progress better so you are less likely to sand through.

Begin by sanding a small part of the surface to test that you're using the correct grit. Then sand the entire surface. Back the sandpaper with a flat block only if the surface is flat, or you may sand through high spots. When you have removed the crazing or scratches, rub out the finish or apply new finish (see "Revive A Dull Finish", page 62).



Remove Stickers and Tape

Stickers and tape may not neatly peel off if they've been stuck to a finish for a long time. Here are several methods for removing them.

If a sticker is made from paper, wet it for a few minutes and try rubbing it off with your finger. If this doesn't work, or if you're dealing with tape, try heating with a blow drier or heat gun to soften the adhesive. (Be very careful with a heat gun because it can blister the finish.) Once the bulk of the sticker or tape is gone, remove the remaining adhesive with naphtha, toluene or xylene. (Don't use acetone or lacquer thinner; they may damage the finish.) Products designed to remove latex paint spatter, such as Oops! and Goof Off, may also work. None of these solvents will damage any finish except a water-based one, but try them out on a hidden area first. If the sticker or tape is very stubborn, try working one of these solvents under it.

If these methods don't work, you'll have to sand or scrape off the sticker or tape and repair the finish.



REPAIR COLOR DAMAGE

There are at least four methods of repairing color damage in finished wood. The first step is to determine which method works best. To do this, apply a liquid to the damage and see what happens.

The best liquid to use is mineral spirits. It won't damage any finish, and it penetrates any wax that might be on the surface to give a more accurate diagnosis. Liquid from your mouth also works well, so I call this the "spit test." When you dab any of these liquids, one of four things will happen:

- 1) The color comes back. That's great, because the solution is merely to apply some finish.
- 2) The color only partially comes back. You'll have to stain before putting on more finish.
- 3) The color doesn't change. Stain won't work.

You'll have to "paint" in the color with a colored marker or artist's brush before applying finish.

- 4) The color gets too dark. The best fix is to apply clear paste wax, or seal the damage with a fast-drying finish such as shellac, then coat with the finish of your choice.



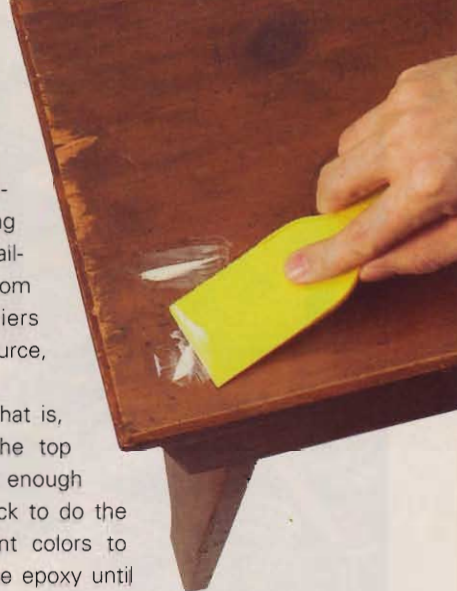
Fill Gouges With Epoxy

The easiest method of filling dents and gouges is using an epoxy stick. Sticks are available in a variety of colors from most woodworking suppliers and home centers (see Source, below). Here's how to do it.

First, level the surface. That is, remove all roughness at the top edge of the gouge. Then cut enough material from the epoxy stick to do the job. You can blend different colors to match your wood. Knead the epoxy until it's a uniform color.

Press the epoxy into the gouge leaving a slight rise above the wood's surface. Dampen the epoxy with water, then remove the excess by scraping the filled area with a credit card or plastic putty knife. You can also level the epoxy by sanding after it hardens, backing your sandpaper with a small flat block. Sanding usually damages the finish around the fill, though.

Source: Woodworker's Supply, (800) 645-9292, www.woodworker.com
WoodFil epoxy sticks, \$12 each.



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BLEACHED WENGE

EDITOR: DAVE MUNKITTRICK • ART DIRECTION, PHOTOGRAPHY, AND ILLUSTRATION: VERN JOHNSON

Of all the different forms of woodturning, I find the most delight in creating lidded boxes. The satisfying snap of a well fit lid as it closes, the beauty of the shape and the wood combined with the usefulness of a lidded container just do it for me. Turning a lidded box is a demanding project, but anyone with a few bowls and some spindle work under their belt can produce these wonderful objects. All it takes is a methodical approach and sound technique.

A lidded box presents two unique challenges. One is creating the perfect fit between the lid and base. Think of it as a precise joint that's designed to come apart.

The other challenge is hollowing end grain. End grain can be up to five times harder than side grain and is prone to tear out. Even experienced bowl turners are surprised when they first try hollowing end grain. Fortunately, these problems can be overcome by switching from a gouge to a scraper when hollowing end grain. If you fall in love with lidded boxes, you might consider purchasing a ring or a hook tool that's designed specifically for cutting end grain.

Why hollow end grain when you can make a box from face grain? The answer is simple: an end-grain box is more stable. That means your lid will fit well all year long. Face-grain turnings change shape more dramatically with changes in humidity causing the lid to fit perfectly one day and fit too tight the next. If you want a loose fitting lid and a different grain look, then a face-grain box is acceptable.

For this story, I will take you through the entire process of making an end-grain box with a snug, friction-fit lid. We'll cover chucking the parts in different manners, cutting end grain, tight tolerances, hollowing in a narrow space, creating the desired "perfect fit," and dealing with a joint designed to come apart.

What you'll need:

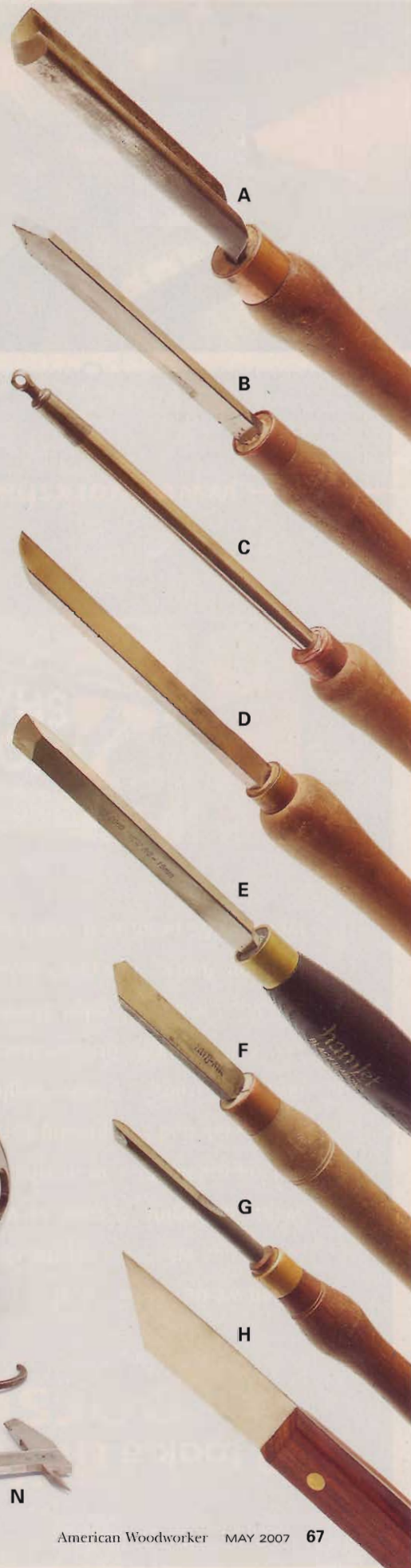
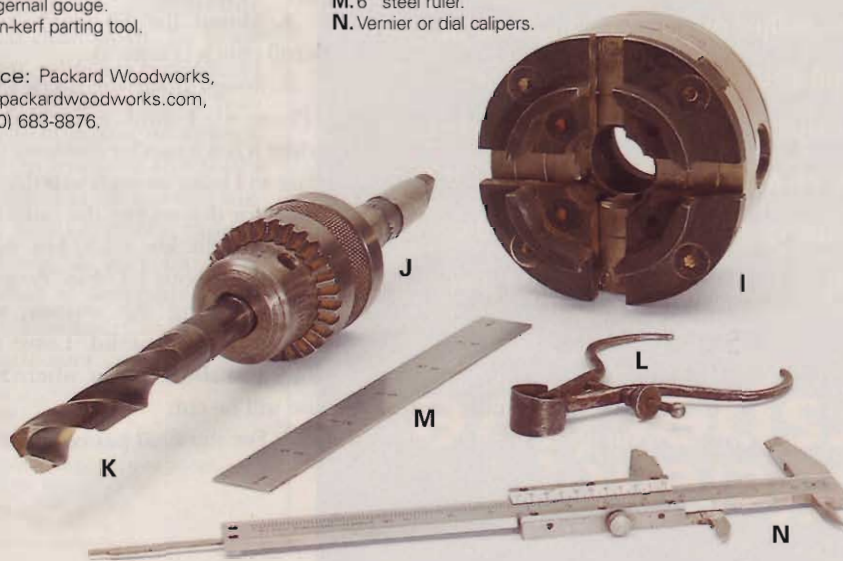
Turning tools:

- A.** A spindle-roughing gouge for shaping; I prefer a 1-1/4 in. for boxes.
- B.** Parting tool; either 3/16" or 1/4".
- C.** Ring Tool for finish cuts on end grain.
- D.** 1/2 in. side profile heavy-duty scraper.
- E.** Skew chisel; a 1/2 in. or 5/8 in. is best
- F.** Spear point scraper; 3/4-in. or 1-in.
- G.** 3/8 in. or 1/2 in. shallow gouge; also called a detail, spindle or fingernail gouge.
- H.** Thin-kerf parting tool.

Accessories:

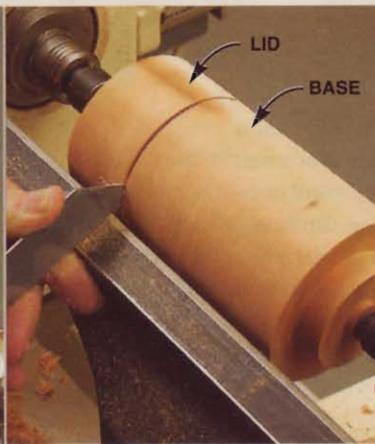
- I.** A scroll chuck with serrated jaws such as the Oneway Talon or Stronghold or a Vicmarc VM100 or VM120.
- J.** A drill chuck to fit the lathe tailstock.
- K.** A 5/8" to 1" in diameter twist or brad-point drill bit.
- L.** Outside calipers with a 4" capacity. Important: be sure to roundover the points.
- M.** 6" steel ruler.
- N.** Vernier or dial calipers.

Source: Packard Woodworks,
www.packardwoodworks.com,
or (800) 683-8876.

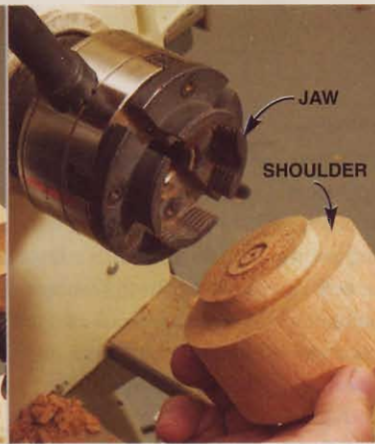




1 Turn your blank into a cylinder then cut tenons on each end with a parting tool. Use a caliper to size the tenon to fit your scroll chuck.



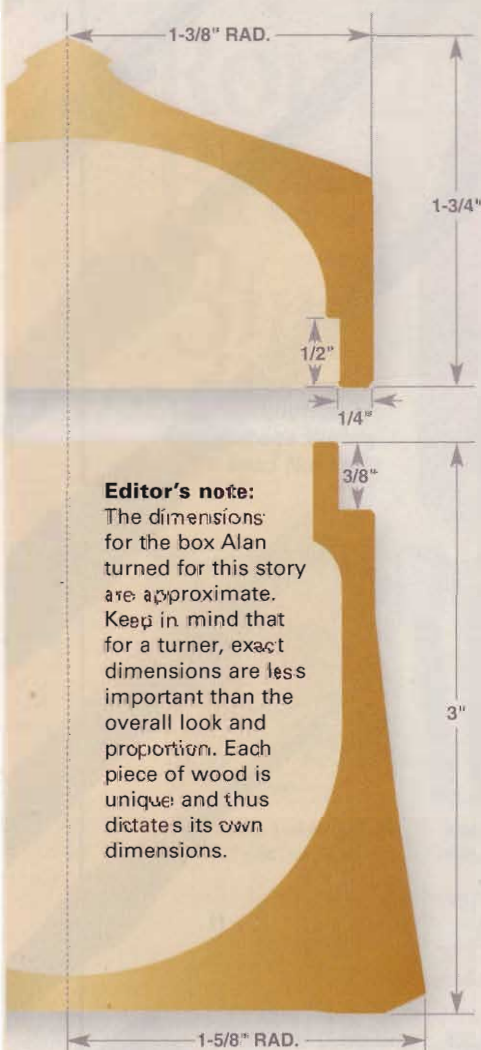
2 Use a thin-kerf parting tool to separate the lid from the base. This tool removes as little material as possible and helps maintain the grain match at the joint.



3 Mount the lid blank on your scroll chuck. Push the tenon all the way in so the shoulder sits firmly on top of the jaws.



4 Rough out the inside of the lid with a 1/2-in. side scraper. Hollowing end grain is best done from the center out to minimize tear-out.



Editor's note:

The dimensions for the box Alan turned for this story are approximate. Keep in mind that for a turner, exact dimensions are less important than the overall look and proportion. Each piece of wood is unique and thus dictates its own dimensions.

CHOOSING YOUR WOOD

If you are new to box making I suggest using walnut, soft maple or cherry. These woods are easy to turn and make fine looking boxes. Select a piece that's 3-in. square and 5 to 6-in. long. The wood needs to be dry throughout, as you can afford very little dimensional change as you turn these boxes. Move up to exotic domestic or imported woods as you gain experience.

A perfect fitting lid is best achieved by roughing out the lid and base interiors first, then letting them sit for a few days or more before finishing the box. Almost all species of wood will change shape when extensively hollowed, no matter how well they are dried.

PREPARE THE BLANK FOR THE CHUCK

1. Mount your blank between centers as you would for spindle turning. Create a cylinder with the spindle-

roughing gouge.

2. Cut tenons on both ends of the cylinder (Photo 1). Set your outside calipers to a size that fits the jaws of your scroll chuck. Cut the tenons slightly shorter than the depth of the scroll chuck's jaws so the tenons don't bottom out before the chuck is tightened. The shoulder should be 90-degrees to the tenon in order to seat firmly in the jaws.

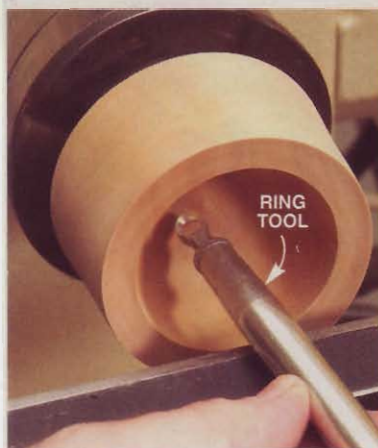
3. Separate the lid from the base (Photo 2). On a 5-in.-long box I normally make the lid blank about 1-3/4 in. long.

SHAPE THE INSIDE OF THE LID

4. Mount the lid blank into your scroll chuck (Photo 3).

5. Rough shape the inside of the lid (Photo 4). I think a lid looks better when it has a smaller diameter than the base so I leave enough wall thickness to allow for downsizing the outside diameter later on. For a 1-3/4-in. high lid I hollow to about 1-1/4 in. deep, generally following the outside shape I intend to give the lid. Leave the wall thickness about 3/8-in. where the mortise will be cut.

6. For the final passes, use a ring or



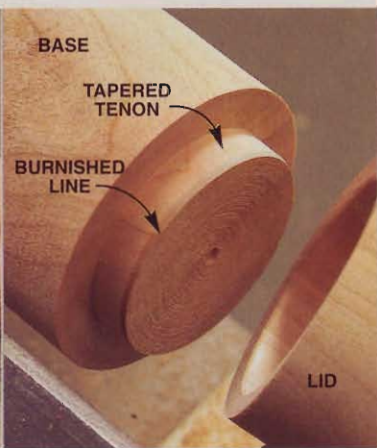
5 Make the finish cuts with a ring or hook tool to leave a smooth surface.



6 Cut the lid mortise with a spear point scraper held flat against the tool rest. Finish with light cuts and the tool held at a 45-degree angle (shown). This is known as a shear scraping cut.



7 Check that the mortise does not taper in towards the center of the lid by holding a rule against the mortise. The perfect mortise will position the ruler so that it sits parallel with the lathe bed.



8 Mount the base in the jaw chuck. Cut a tenon that tapers so the lid just fits on the end. Twist the lid to create a burnished line then shave the tenon down to that line. The fit has to be tight so the lid won't spin as it's turned on the base.

hook tool designed to solve the problem of cutting end-grain cleanly (Photo 5). An alternative is to shear scrape with your side scraper. Simply tilt the scraper at a 45-degree angle and take a very light cut, just a little above center.

7. Cut the lid's mortise with the spear point scraper (Photo 6). The sides of the lid at the opening are often referred to as the mortise because it fits over the tenon on the base. This area of the lid must be cut as clean as possible and left untouched by sandpaper. Sanding will change the circularity of the mortise ever so slightly and result in a poor fit. I plan on a 3/8-in. tenon on the base so the lid mortise is cut 1/2 in. deep.

8. Check that the mortise does not taper in towards the center (Photo 7). I strive for either a straight wall or a very slight taper away from center. Finish off this area with a light shear scraping action. Don't sand the mortise, or you may distort it.

9. Remove the lid from the lathe. Measure the inside diameter and depth of the lid with a Vernier or dial caliper. Record the diameter on paper but lock the setting for the depth on the calipers.

MOUNT THE LID ON THE BASE

10. Mount the base blank into the chuck. Make sure it is seated securely.

11. Create the rough tenon on the base with a standard parting tool. Set your calipers 1/4 in. larger than the mortise. Once you're within 1/4 in. of your finished tenon size, it's time to slow down. You will be amazed how much you can take off with a light cut. That's because pushing the parting tool in 1/16-in. actually removes 1/8-in. from the tenon's diameter. Plan on making 5 or 6 light cuts, turning off the lathe and checking the fit after each cut. At this point you need a tight fit on the lid because the outside of the box is turned with the lid in place. The objective is to create a fit that is tight enough to hold the lid on the base while turning but still loose enough to pull off when ready to hollow the base. This is not the final fit of the lid. We'll get to that later. To simplify "creeping up" on the fit, cut a tenon that tapers slightly in towards the end (Photo 8).

12. If, after all your best efforts, you end up with a fit that's a tad loose, use a tissue paper shim to tighten it up (Photo 9).

TURN THE OUTSIDE OF THE BOX

13. With the lid now firmly mounted on the base, begin shaping the outside of your box. Use the measurement from step #9 to mark the depth of the hollow on the lid (Photo 10). I start the outside of the box by shaping the lid first (Photo 11).

14. With the lid to your liking, establish the overall height of the box. Use a parting tool to mark the bottom with a 1/4" deep groove. Start on the long side, then nibble away at the height until the box's proportions look the way you want. Play with different ratios using your eye rather than exact measurements. I like a 1/3 lid, 2/3 base ratio.

15. Shape the sides of the box (Photo 12). I make my boxes with a little asymmetry: the lid has a smaller diameter than the base with a slight curve in the side. This entails working from both ends towards the joint in order to keep working with the grain.

16. Cut a chamfer on the box's bottom (Photo 13).

17. Make a V-shaped cut at the joint (Photo 14).

18. Sand the outside of the box up to 220 grit. If "ringing" (telltale sanding



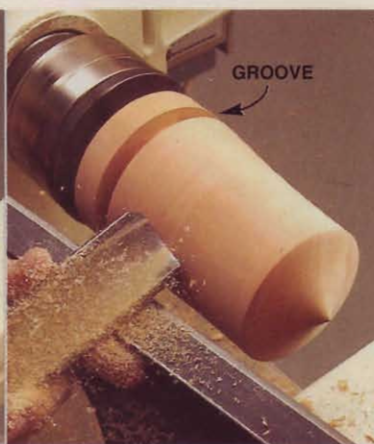
9 If you inadvertently cut the base tenon too deep, the lid will spin or come off when you shape the box. A tissue paper shim will fix a fit that's a tad loose.



10 Use the points on a dial or Vernier caliper to mark the depth of the interior hollow on the lid. Be sure the calipers are laying flat on the tool rest.



11 Shape the top of the lid with a shallow gouge. Let your creativity be your guide for the top design. Shoot for a 3/16" - 1/4" thick top.



12 Use a spindle-roughing gouge to shape the rest of the box. A groove cut with a parting tool marks the bottom of the box.

scratches encircling the box) is a problem—as it often is with cherry and maple—you may have to sand to 400 grit.

HOLLOW THE INSIDE OF THE BASE

19. Remove the lid from the base. If the smooth surface makes it hard to get a grip, try using one of those rubber gadgets for removing jar lids.

20. Drill the base interior to establish a finish depth (Photo 15).

21. Hollow the base (Photo 16). Complete both the bottom and sides with a shear scraping action.

22. Sand the inside of the box. Do not touch the outside of the tenon with sandpaper.

FINAL FIT THE LID

23. At this point the lid is too tight for use. With a parting tool, take extremely light cuts from the tenon to loosen the fit. Turners refer to them as “dust cuts” because you barely remove any wood. There are any number of ways to fit the lid to the base: loose, light suction, snap, or tight. The “correct” fit is the one targeted by the turner. If you would like to remove the lid without picking up the piece, then a

loose fit is in order. If you want the closest thing to a locking lid then a tight fit is appropriate.

To create a snap fit,

remove a small amount of wood from the bottom half of the tenon near the shoulder, leaving a fairly tight fit in the upper half. The snap is created when the first sensation of resistance is felt in putting on the lid followed by little or no resistance as it is seated. Like all of the tenon to mortise tolerances in box making, go at this in the tiniest increments to achieve the desired fit—it is very hard to put wood back on.

SHAPE THE BOTTOM OF THE BASE

24. Part the base off from the blank stock (Photo 17).

25. Use a parting tool to cut a tenon on the blank stock left in the chuck. The tenon is sized to fit the base open-

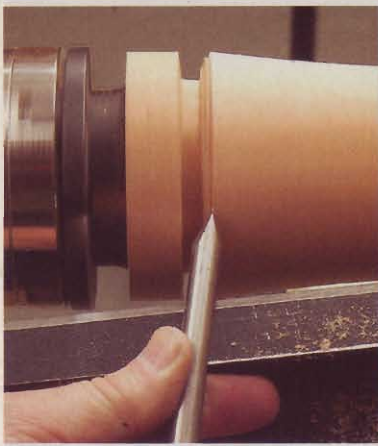
ing in the same way the base tenon was sized to fit the lid. You want a tight fit that will hold the base while you finish the bottom. This is often referred to as jam chucking.

26. Run the lathe at a slow speed (under 500 rpm if possible) and shape the bottom of the box with the ring tool (Photo 18). As an alternative, use the 1/2 in. side radius scraper—but with very light shear scraping cuts. Be sure and note how deep you hollowed the inside of the base. If there is enough wood at the bottom of the base then make this concave area fairly deep to lighten the feel of the box. Shoot for a bottom thickness of 3/16 in. to 1/4 in.

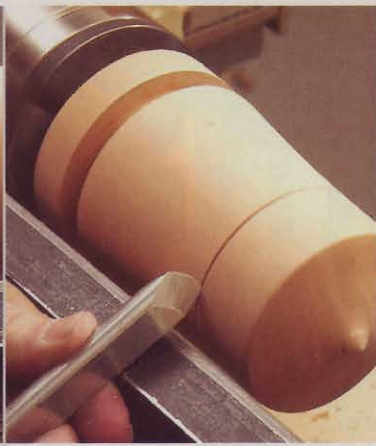
27. Pull the base off the jam chuck, place the lid on the base and admire your workmanship.

THOUGHTS ON FINISHING

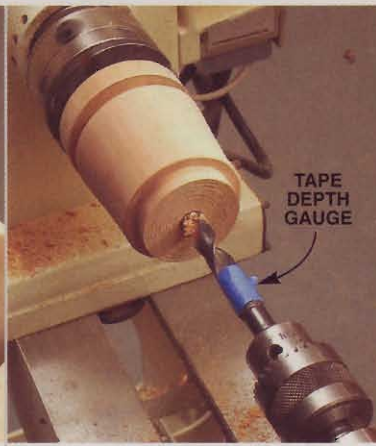
If the box is a light colored wood, such as maple or holly, I use either wax or white shellac. Both of these products can be applied while your box is on the lathe. For darker woods, such as cherry and walnut, I use pure tung oil or an oil-and-varnish blend. The blend is one part varnish, one part pure tung oil and one part boiled linseed oil.



13 Use a skew chisel to cut a slight chamfer on the bottom of the box. This softens the sharp corner and creates a small shadow under the box to give it a visual lift.



14 Cut a shallow V-groove at the joint with a skew. This detail helps disguise slight changes in circularity that may show up at the joint over time.



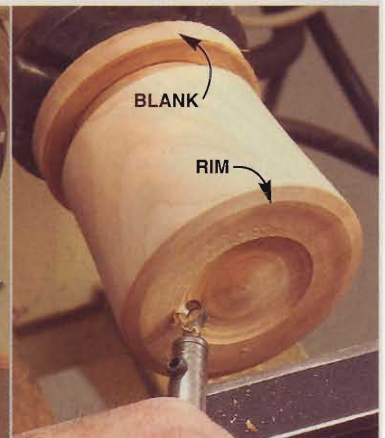
15 Drill out the base's interior using a drill chuck in the tailstock and a 5/8- to 1-in. drill bit. Mark the desired depth of the base interior with a piece of tape.



16 Use a side radius scraper to continue hollowing the base. Start in the drilled opening and work from the center out.



17 Part the base off from the blank. Be sure to leave enough wood on the base so the bottom can be scooped out in the next step.



18 Turn the base around and mount it on a tenon cut on the remaining blank stock. Use the ring tool to cut from the center out to create a concave bottom with a small rim.

Alan Lacer has been turning for over thirty years. His work has appeared in a number of national and international shows, magazines and videos. He is a regular instructor and demonstrator in over 45 states and 4 foreign countries. For more information visit his website, www.alanlacer.com.

IMPROVED Crosscut Sled

A split fence
guarantees
accurate cuts

by Tom Caspar

Whenever I want to make an accurate square cut, I reach for my crosscut sled. Unlike a miter gauge, its right-angle setting doesn't need constant tweaking. My cuts are always right on the money.

Crosscut sleds have been around for a long time, but few are ideal. Many are heavy and hard to store. Most develop an extra-wide saw cut in the fence and allow the blade to throw sawdust in your face. My design solves all these problems.

ART DIRECTION: EVANGELINE EKBERG • PHOTOGRAPHY: RAMON MORENO • ILLUSTRATION: FRANK ROHRBACH • PROJECT BUILDER: RICHARD FENDICK

3 NEW FEATURES

Take a look at these great features:

Zero-clearance subfence. The subfence is composed of two adjustable sides, like many router table fences. When the saw cut between the sides widens with use, simply remove the subfences, re-cut their ends square and re-install them. A zero-clearance slot allows you to quickly make a super-accurate cut. Just align a pencil mark on the workpiece with the saw cut in the fence and you're good to go. A zero-clearance slot also eliminates tear-out.

Adjustable stops. Two stops mount on the sled's T-track, making repetitive cuts very easy to set up. One stop is for short stuff; it only travels the sled's width. The other stop is on a long arm; it's used for pieces 18 to 48-in. long.

Easy storage. This sled stands upright on either end.

In addition, this sled weighs only 24 lbs., making it easy to lift on or off the saw. A clear plastic guard over the blade keeps sawdust from flying in your face. Blocks behind the fence surround the blade when it exits the cut.

I've engineered this sled to give you years of reliable use. The fence and back brace are laminated to prevent twist or warp. They won't sag because they're stiffened by aluminum. The runners won't be loose in one season and tight in another, unlike most sleds, because they only bear against one side of the miter slots.

SIZING YOUR SLED

Stood on end, this sled is 31-in. tall and just fits under my saw. If you make a shorter sled to fit under your saw you'll reduce the sled's 24-in. crosscut capacity.

I used one full sheet (60-in. x 60-in.) of 1/2-in. thick Baltic birch plywood to make my sled's base, which is 36-in. wide and 31-in. deep. If you're willing to give up 1-in. of crosscut capacity, you can make the base from one half-sheet of Baltic birch plywood (30-in. x 60-in.).

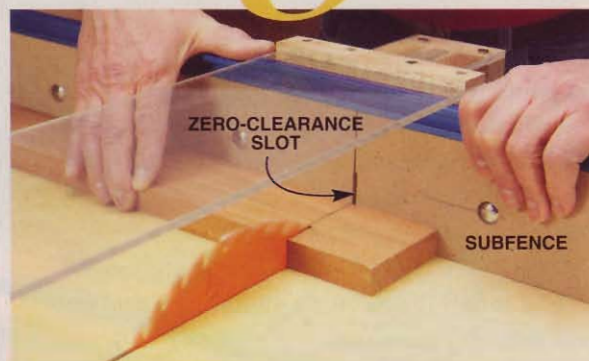
MAKE THE BASE

1. Cut the base (A) to size.
2. Make the runners (B). I made mine from the same material as the base: Baltic birch plywood. It's 1/2-in. thick, but the runners must be 3/8-in. thick. To make the plywood thinner, cut a piece 4 in. wide by 33 in. long. Remove the tablesaw's guard, raise the blade 1-in. high and set the fence 3/8-in. away from the blade. Stand the plywood on edge and rip both sides. Replace the guard, lay the plywood flat and cut the runners about 1/32-in. narrower than the miter-gauge slots on your tablesaw.
3. Position the runners in the table saw's miter slots (Photo 1, p. 75). Run tape along the miter slots to avoid getting glue on your saw, then glue the base to the runners (Photo 2). When the glue is dry, reinforce the runners with screws (Fig. A). Trim the runners flush to the base with a handsaw.

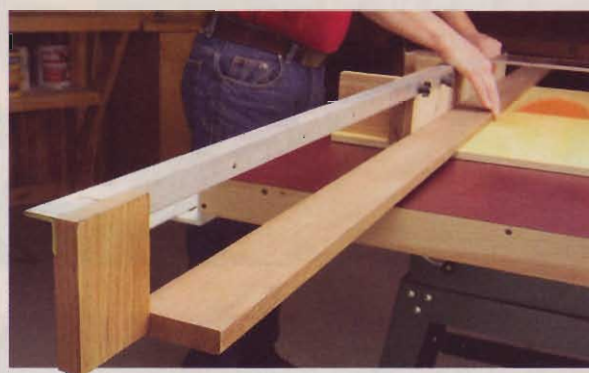
BUILD AND ATTACH THE FENCE

4. Build the fence and braces (parts C through G) from a kiln-dried lightweight wood, such as pine, poplar or

2 KEY FEATURES



Zero-Clearance Subfence

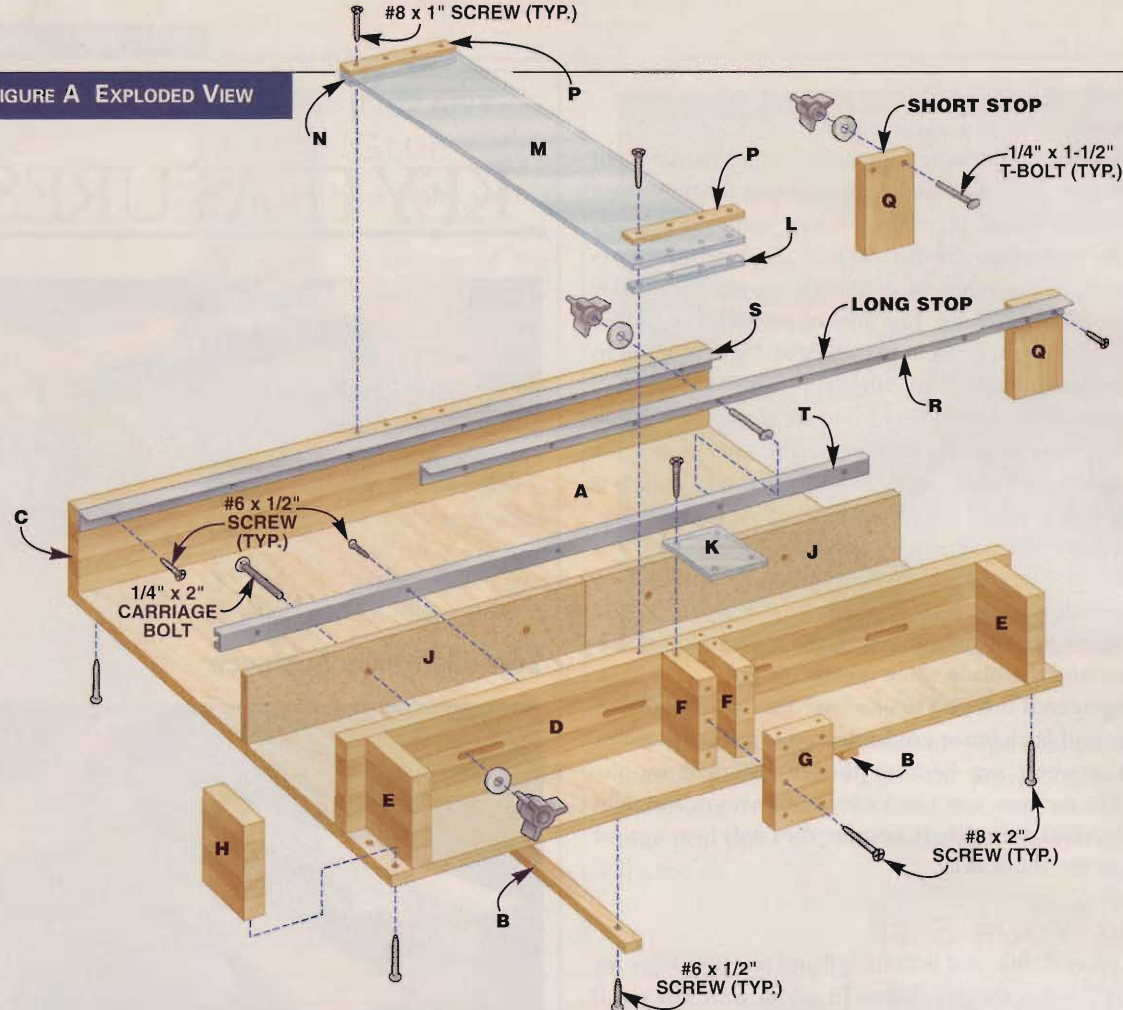


Adjustable Stop Arm



Stores Under The Saw

FIGURE A EXPLODED VIEW



CUTTING LIST		OVERALL DIMENSIONS: 36" W. x 5-1/2" H. x 30" D.				DETAIL 1 BASE SCREW HOLES	
Part Name	Qty.	Th.	Width	Length	Material	TOP VIEW	
A Base	1	1/2"	36"	31"	Baltic birch		
B Runner	2	3/8"	3/4"	31"	Baltic birch		
C Rear brace	1	1"	4"	36"	Poplar		
D Fence	1	1"	4"	36"	Poplar		
E Front brace	2	1"	4"	4"	Poplar		
F Blade guard side	2	1"	4"	3"	Poplar		
G Blade guard end	1	1"	4"	3"	Poplar		
H Temporary block	1	1"	4"	3-1/2"	Poplar		
J Sub-fence	2	1/2"	3-1/4"	18"	MDF		
K Blade guard cover	1	1/4"	3"	4"	Acrylic plastic		
L Front guard spacer	1	1/4"	1/2"	6"	Acrylic plastic		
M Guard	1	1/4"	6"	27"	Acrylic plastic		
N Rear guard spacer	1	1/4"	1"	6"	Acrylic plastic		
P Clamping piece	2	1/4"	1"	6"	Poplar		
Q Stop	2	3/4"	3"	4"	Poplar		
R Stop extension	1	1/8"	1"	48"	Aluminum angle		
S Stiffener	1	1/8"	1"	36"	Aluminum angle		
T T-track	1	1/2"	3/4"	36"			
						DETAIL 2 FENCE SLOTS AND SCREW HOLES	

basswood. I laminated these pieces from 3/4-thick strips to ensure that they stay straight and flat. Rout the slots in the fence (D, Fig. A, Detail 2) and add the fence pieces (E,F and G). Add T-track (T) to the fence and aluminum angle to the rear brace (C). (Look for an aluminum angle with a square, not rounded, internal corner. This will be necessary for the aluminum stop

arm (R) to fit tight against the T-track.) Drill and countersink pilot holes through the base for attaching the fence and braces (Fig. A, Detail 1).

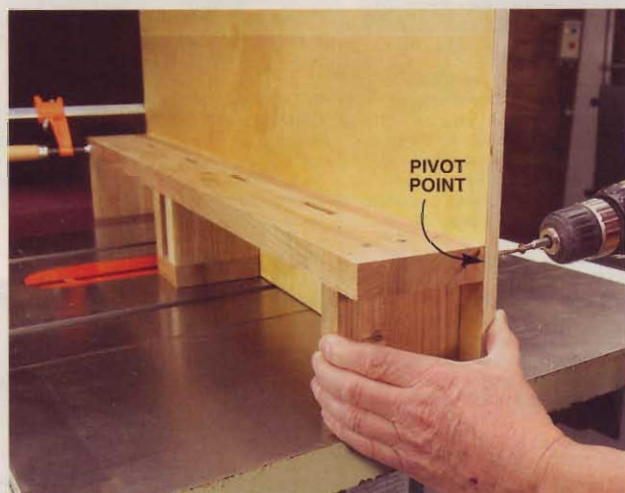
5. Attach the fence and braces. Put all the screws into the rear brace, but only one screw into the fence's right end (Photo 3). Temporarily attach a block (H) at the fence's left end.



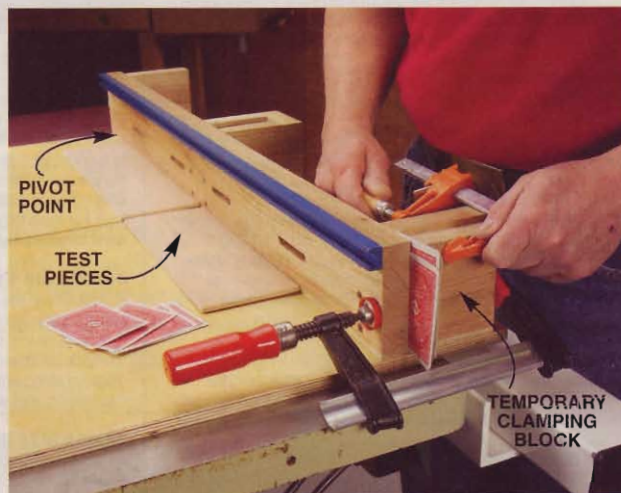
1 Make runners 1/32-in. narrower than your saw's miter slots. Place nickels in each miter slot, then put the runners on top to raise them above the saw table. Insert playing cards to force each runner tight against the slot's outside edge, farthest from the blade. Cut the cards flush.



2 Glue the sled's base to the runners. Square the base using the tablesaw's fence. Place weights on the base to apply clamping pressure. When the glue is dry, lift the base and remove the playing cards. In use, the sled won't wiggle in the slots; each runner bears against a slot's outside edge.



3 Install the fence assembly. Begin by driving one screw through the base and into the fence's right end. This screw will serve as a pivot point when you adjust the fence in the next step. Install the brace that spans the other end of the base.



4 Insert playing card shims between the fence's left end and a block that's temporarily screwed to the base. Clamp the fence to the block. Check the squareness of the fence with a test cut. Add or remove playing cards to rotate the fence's left end forwards or backwards as needed.

ALIGN THE FENCE

- 6.** Set the fence approximately square. The easiest way is to align it with your tablesaw's rip fence using a carpenter's square. Once aligned, clamp the sled's fence to the temporary block (H). Remove the sled from the saw and raise the blade 1 in. or so, just enough to cut through the base and 1/4-in. thick plywood.
- 7.** Make a test cut with a piece of 1/4-in. plywood. Your first cut will split the base in half and go through the fence. Chances are the cut won't be perfectly square, however. To adjust the fence, add or remove playing card shims between the temporary block and the fence (Photo 4). Make a few more test cuts. Once the sled cuts perfectly square, turn it over and drive the eleven remaining screws through the bottom of the base and into the fence. Add the guard parts (K through P). Attach the subfences, make the stops (Q, R) and you're all set (Photo 5).

Source

Rockler, (800) 279-4441, www.rockler.com, T-track, 3' long, #21746, \$11.
3-Star knob with 1/4-20 insert, #68064, \$1



5 Add the subfences. Butt them tight together, centered over the kerf in the sled's base. Make a saw cut to create a zero-clearance opening in the subfences. This opening will gradually widen with normal use. To make a new zero-clearance opening, remove the subfences, recut their ends and reinstall them.

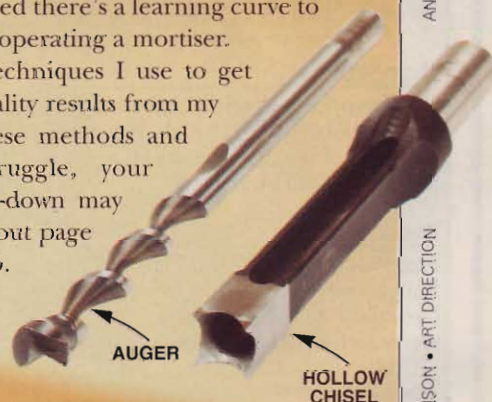
Master your. Mortiser

**Shop-tested techniques
guarantee great results**

The first time I used my benchtop mortiser was almost my last. It was tedious to set up, difficult to operate and my results stunk. But now the mortiser is my first choice whenever I have mortises to cut. It turns out the problem wasn't the machine—in fact, the newest benchtop mortisers do a great job (see "Benchtop Mortiser Tool Test", AW #125, November 2006, page 50). Instead, the problem was my inexperience. I discovered there's a learning curve to successfully setting up and operating a mortiser.

Read on to learn the techniques I use to get consistent, professional-quality results from my mortiser. If you follow these methods and mortising is still a struggle, your machine's fence and hold-down may need tuning. If so, check out page 76 in AW #81, August, 2000.

The hollow chisel and auger bit work together to cut square mortises. The auger drills a hole and then the chisel squares the corners. Chips produced while cutting are lifted by the auger and ejected through holes in the chisel.

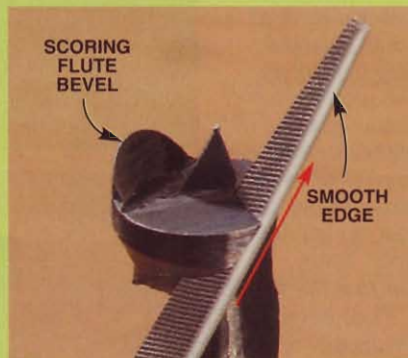


AND PHOTOGRAPHY: VERN JOHNSON

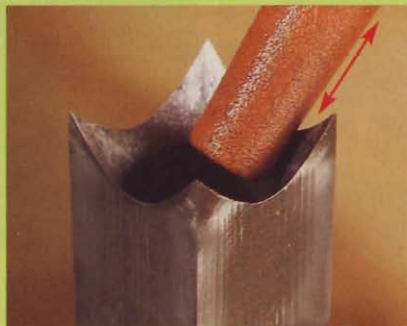
EDITOR: TIM JOHNSON • ART DIRECTION

Start Sharp, Stay Sharp

You'll get better results with less effort if you take a few minutes to sharpen your bit and chisel before each use.



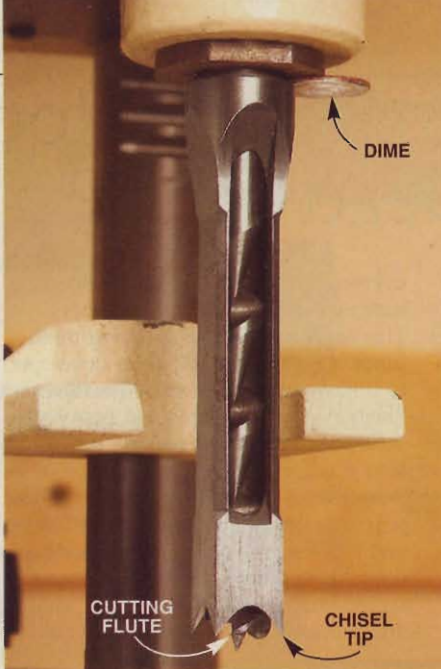
Sharpen the auger's flutes with a small auger file (this one's from Nicholson's miniature file set #42030, about \$17 at Amazon.com). An auger file has smooth edges that won't harm adjacent surfaces during close work. Hold the file flat on the bevel and move it forward only, toward the cutting edge.



Sharpen the chisel's inside bevels with a round slipstone (about \$15 at woodworking specialty stores).



Hone the outside faces on a flat stone, using even pressure and a circular motion.



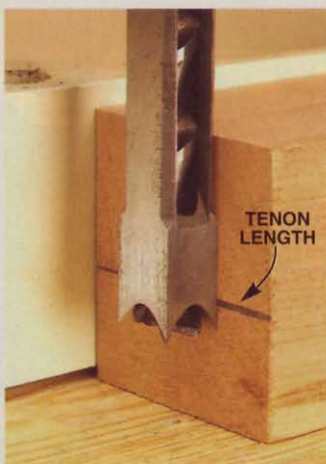
INSERT A DIME TO INSTALL THE BITS

To work properly, the auger must slightly project beyond the hollow chisel. Here's an easy way to achieve the perfect projection. Temporarily install the chisel with a dime squeezed between its shoulder and the machine. Then lock the auger in position with the edge of its cutting flute even with the chisel's tips. Remove the dime, slide the chisel's collar tight to the machine and lock it.



INSTANTLY ALIGN THE CHISEL

To create perfect mortises, the chisel must be parallel to the fence. It's easiest to place a board against the fence, move the fence forward and pivot the chisel until its face is flush with the board.



ARCHES SET THE DEPTH OF CUT

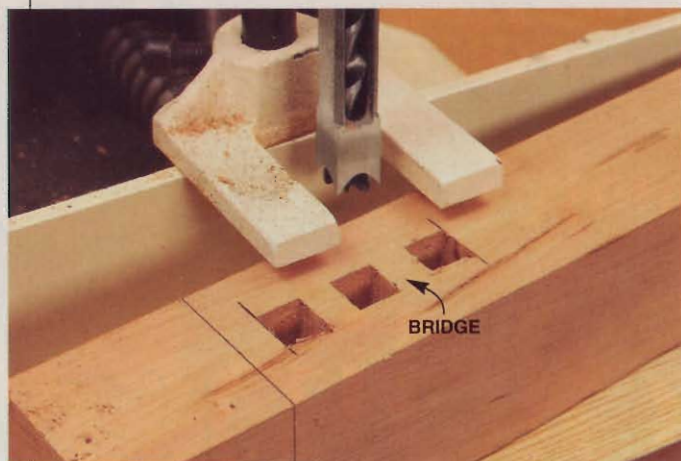
Mark the tenon's length on the end of the workpiece. Then lower the chisel. Lock the depth-of-cut stop when the tops of the chisel's arches are even with your line. This method assures that your tenons will seat properly, because it automatically creates a mortise that's slightly deeper than the tenon's length.



STAY COOL

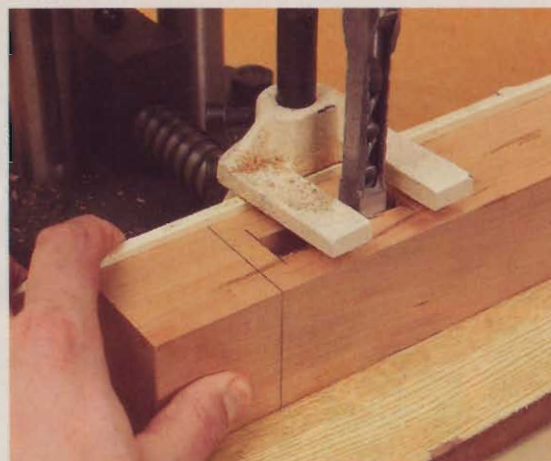
Make life easier for the chisel and auger by spritzing them with cutting lubricant before each use. This prevents overheating, helps the auger to evacuate chips effectively and allows the chisel to smoothly enter and exit the workpiece. It'll also help your ears; lubricating keeps the bits from squealing.

Source
Empire Manufacturing, (866) 700-5823,
www.empiremfg.com OptiCut XL,
\$6 for a 2-ounce bottle.



CONNECT SQUARE HOLES TO CREATE A MORTISE

Establish the ends of the mortise first. Then clear out the middle: First cut individual holes spaced by slightly less than the width of the chisel. Then go back and remove the remaining bridges. Always engage the chisel on all four sides or on two opposite sides, but never on three sides. Engaging three sides can deflect—and even break—the chisel.



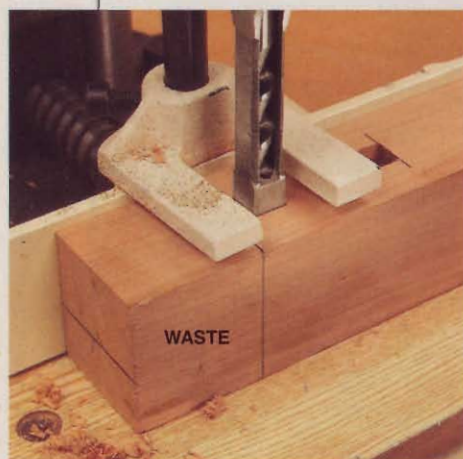
MAKE A CLEANING PASS

The first set of holes you cut will leave considerable debris in the bottom of the mortise. The mortise sides may also be slightly rough. A second pass, made with numerous plunges very close together, cleans both the bottom of the mortise and the sides.

Let the chisel & auger do the work.

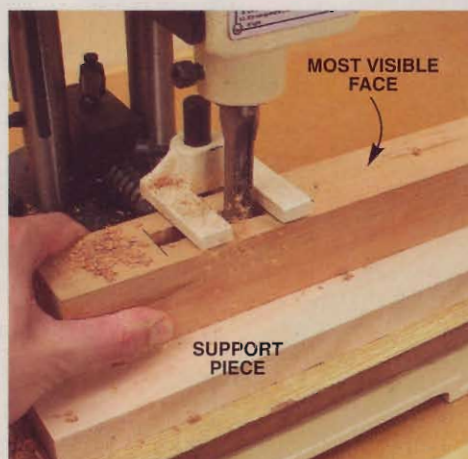
Synchronize your feed rate with the auger's cutting action by watching the flow of chips exiting the chisel.

Don't try to overpower the machine; easy—but firmly—does it.



MORTISE BEFORE CUTTING TO LENGTH

When a mortise starts near the end of a piece, as on the table leg shown here, leave the piece long until after the mortise is cut. Then you'll always have material under both arms of the hold-down. This greatly reduces the chances of jamming the chisel.



CUT THROUGH MORTISES FROM THE VISIBLE FACE

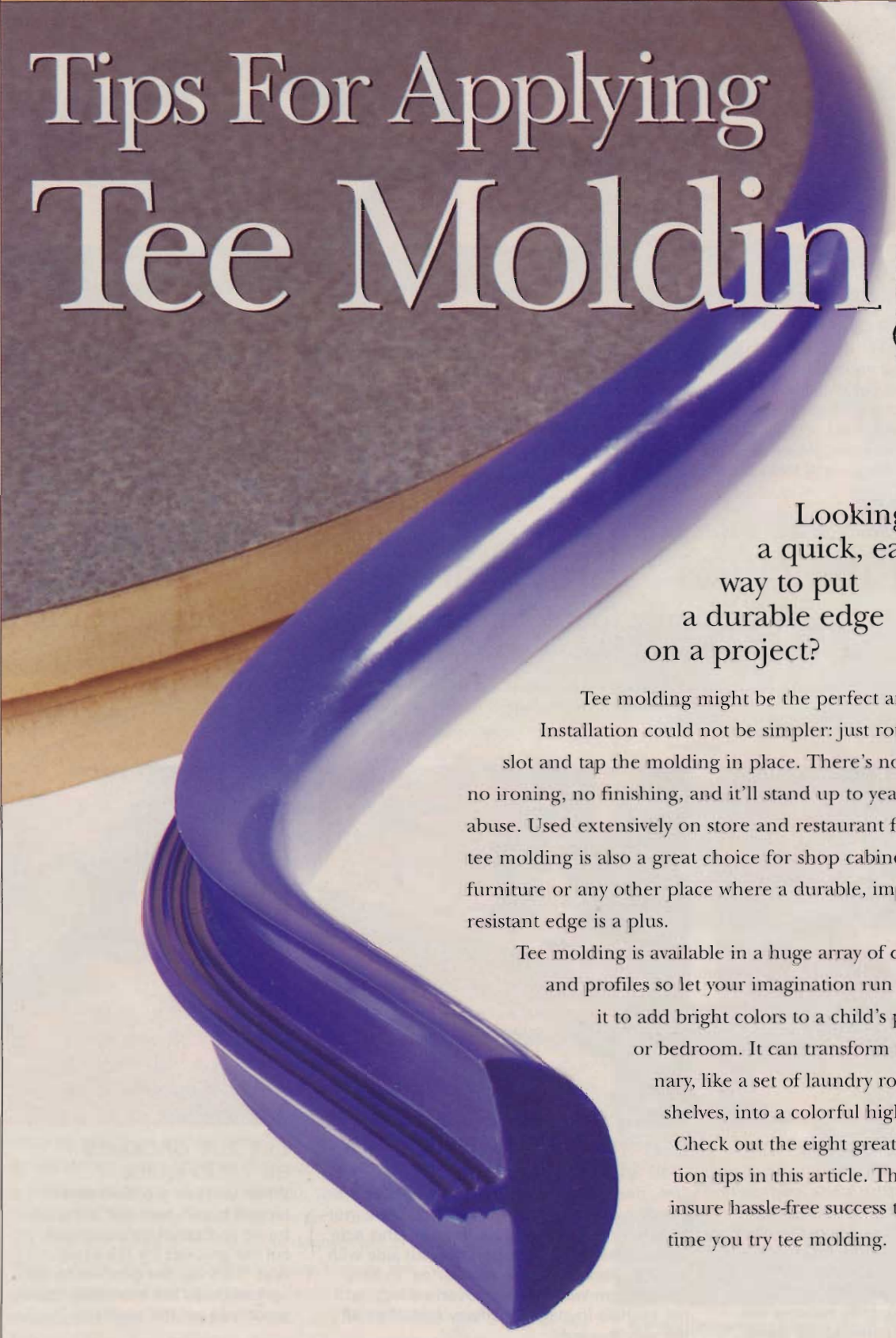
Only one side of a through mortise shows, so it only needs one perfect face. Cut these mortises with the most visible face up—this side will be cleanly cut. Support the exit side with a scrap piece to reduce splintering. To keep the bit from wandering or overheating, cut the mortise in stages, halfway first, then all the way through.



LET THE GROOVES BE YOUR GUIDE

When you use mortises and tenons to join rails and stiles on frame and panel constructions, cut the grooves for the panel first. Then use the grooves to set up and guide the mortising chisel when you cut the mortises.

Tips For Applying Tee Molding



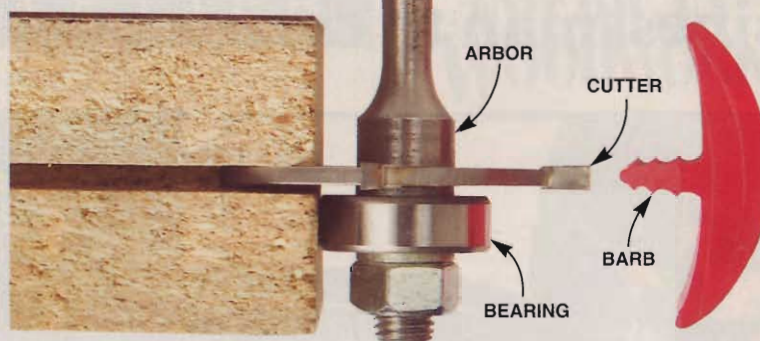
Looking for
a quick, easy
way to put
a durable edge
on a project?

Tee molding might be the perfect answer. Installation could not be simpler: just rout the slot and tap the molding in place. There's no gluing, no ironing, no finishing, and it'll stand up to years of abuse. Used extensively on store and restaurant fixtures, tee molding is also a great choice for shop cabinets, kid's furniture or any other place where a durable, impact resistant edge is a plus.

Tee molding is available in a huge array of colors and profiles so let your imagination run wild. Use it to add bright colors to a child's playroom or bedroom. It can transform the ordinary, like a set of laundry room shelves, into a colorful highlight. Check out the eight great installation tips in this article. They'll insure hassle-free success the first time you try tee molding.

USE THE RIGHT BIT

Use the appropriate sized slot cutter to cut the slot for the barb. If the slot is too wide, the barb won't hold properly. If it's too narrow, it can split the substrate. Suppliers specify what size cutter you need for each tee molding – don't cheat. Some manufacturers allow you to swap out different sized cutters on a single arbor (see photo right). Others sell each cutter size as an individual bit. (see Sources page 90)



MASSAGE OUT THE KINKS

Remove kinks in the barb before installation. Tee molding comes in rolled coils that can cause kinks in the barbs. The kinks can get hung up on the substrate slot and make barb insertion a real chore. Use a hair dryer to warm the kinked area. Then massage the kink out. If heat doesn't do the trick, as a last resort you can cut out a kink with a utility knife.

NOTCH AROUND A TIGHT CURVE

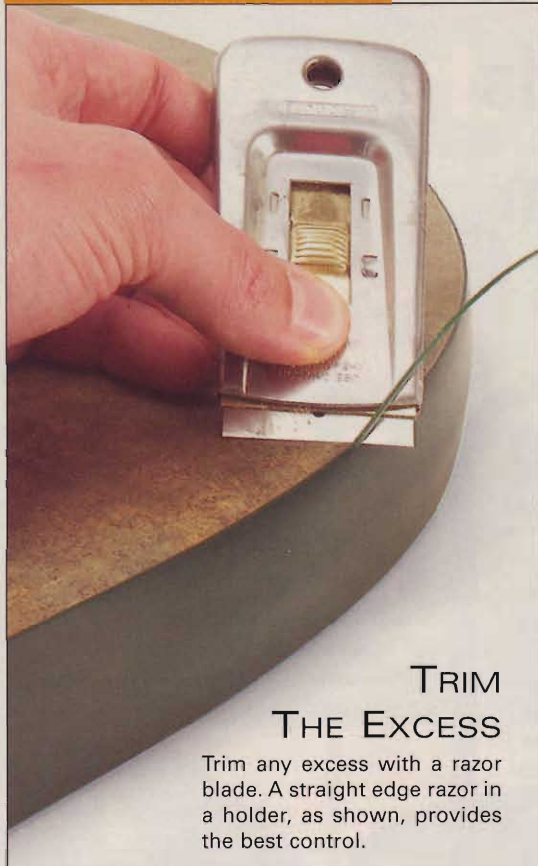
Cut "V" shaped notches in the barb where the tee molding bends around a corner. Three or four notches cut with a utility knife are usually enough. If you don't notch the corners, the barb will "bunch up" in the slot so the molding won't seat properly, and it could split the substrate.



TAP LIGHTLY

Tap tee molding into the slot using a rubber mallet. Use only enough force to seat the molding. You're not pounding in a nail here. Excessive force can cause the molding to compress and stretch. Eventually, it will spring back to its original shape.

This could leave gaps along the edges where it was trimmed flush to the surface and at the joints where the ends meet.



TRIM THE EXCESS

Trim any excess with a razor blade. A straight edge razor in a holder, as shown, provides the best control.

WARM UP A TIGHT BEND

Use a hair dryer to install large profile (thick) tee molding around tight corners. A little added warmth makes tee molding much more pliable. Consider room temperature to be a minimum for tee molding installation. Cold molding just won't cooperate when you install it.



Leigh Vacuum & Router Support

Revolutionary Design patent pending

VRS

coming
soon!
leighjigs.com



VRS Features

- Dust chute glides with router for dust & chip free routing
- Superb support for your router
- Easy to attach, use and remove
- Fits all Leigh Dovetail Jigs

No other jigs do so much, so easily and so well.



See the Video!
leighjigs.com

LEIGH
Leigh Router Joinery Jigs

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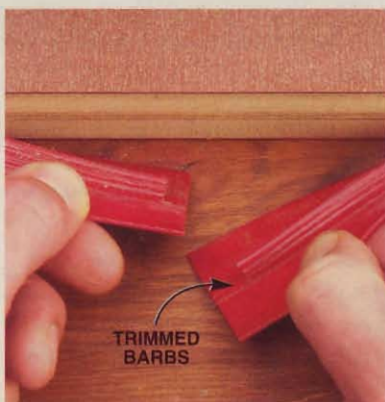
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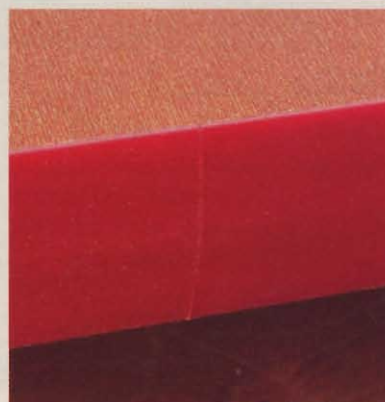
MAKE PERFECT BUTT JOINTS



Cut molding about 1/2 inch longer than needed. Then trim about 1/4 inch off the barbs at each end. Install one end and overlap the other.



Cut through both layers with a utility knife and a straight edge. Keep the knife at 90 degrees to ensure a square cut and a tight joint.



Voila! A perfect joint.

Sources

Outwater Plastics Industries, Inc., 800-631-8375, www.outwater.com, .25 cents per foot to \$2 a foot; 25' minimum order. Size of slot cutter specified for each molding. A complete cutter assembly includes the arbor and a slot cutter (\$33-\$40). There are nine different sizes slot cutters from \$25-\$33 that use the same arbor.

Woodworkers Hardware, 800-383-0130, www.woodworkershardware.com, One size slot cutter assembly (\$26), and basic T- edging (13/16" -- almond, black, brown, tan, and white. 1-1/2" -- almond and white). The 13/16" is available in 25 foot rolls, costing about \$12/ roll. The 1-1/2" comes in 50 foot rolls, and runs about \$22/ roll.

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TALL TENON TALE

After calculating that the slatted headboard I was about to glue up had 58 mortise and tenon joints, I enlisted my husband's help. We brushed glue in the rail mortises and on the

slat tenons and then quickly installed all the slats. But when we tried to draw the joints together, things got ugly. Clamping pressure merely bowed the slats. Desperate whacking with a mallet

just dented the rails. By the time I realized that no amount of force would close those joints, it was too late to pull them apart: Our headboard was doomed to display a bit of tenon at both ends of every slat. I'm not sure if the tenons were too long or the mortises too shallow, but I sure wish I'd taken the time to find out before we applied the glue.

Nina Johnson



FENCE FLUB

I upgraded my tablesaw with an aftermarket miter gauge. It had an adjustable fence that could be extended to support the workpiece right up to the blade. I tried a few 90-degree crosscuts—they were smooth, like cutting butter with a hot knife. Then I extended the fence and tried some angled cuts—they were just as smooth. "This is what woodworking should be like," I thought as I reset the miter gauge to 90 degrees and started making another crosscut. Whoa! What's that funny sound? Where did all those shiny flecks come from?

When I realized I'd forgotten to retract the fence before making the 90-degree cut, my heart sank. I turned off the saw and backed the miter gauge away from the blade. Yup, I'd sawn a 1-in.-high kerf through my new fence. At least I hadn't cut all the way through, although my pride was seriously kerfed, the fence was still usable.

Donna Menke



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