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Fine WoodWorking

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contents

JANUARY/FEBRUARY 2007 ISSUE 189

features

43 WHEN TO STOP SANDING

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up front

in the back

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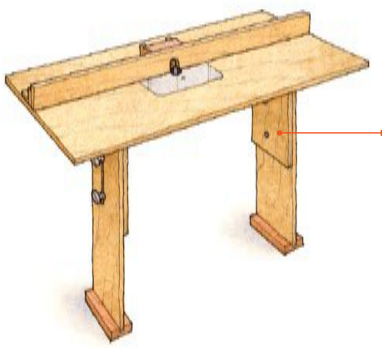

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Stow-and-Go Router Table

Roland Johnson ("Routers For Router Tables") builds a knockdown router table that clamps to any sturdy worksurface.

VIDEO

Details of a Country Hutch

Martin Milkovits ("Build a Country Hutch") narrates a tour of his project with details on its construction and design.

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VIDEOS

The Five-Minute Dovetail

December 18: Scared to fail? Many woodworkers freeze when it comes to hand-cut dovetails. Gary Rogowski shows how to practice without the pressure.

Using Scrapers on the Lathe

January 2: Ernie Conover explains the basics of the scraper, offering tips for sharpening and cutting with this versatile lathe tool.

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contributors

Martin Milkovits (*"Build a Country Hutch"*) turned his lifelong hobby into a profession. A former electrical engineer and general contractor, Milkovits has been building fine furniture and cabinets exclusively for the past eight years. His designs follow a traditional approach—call it Shaker with flair. He is a member of the League of NH Craftsmen, the Guild of New Hampshire Woodworkers, and the New Hampshire Furniture Masters Association. His other interests are touring the Northeast on his motorcycle, scuba diving, and hanging out with his family.

Ari Tuckman (*"When to Stop Sanding?"*) lives in West Chester, Pa., with his wife. As a professional psychologist, he finds this hat from Freud Tools fits both his job and his hobby. This is his second article for *Fine Woodworking* (*"Sand, Scrape, or Plane?"* appeared in #180), and he has vowed that his next article will involve less sanding. When Tuckman gets a chance to spend time in his basement shop, he uses a mix of hand tools and power tools to build furniture. He is working on a desk and a rocking chair and promises to finish them both before starting something new.

The name **Ernie Conover** (*Master Class*) first cropped up in issue #38 of *Fine Woodworking*. In the intervening 24 years he has written frequently for the magazine, mostly about aspects of turning, but also casting his critical machinist's eye over new tools. Visit www.conoverworkshops.com for information about the woodworking courses he runs at his shop in rural Ohio.

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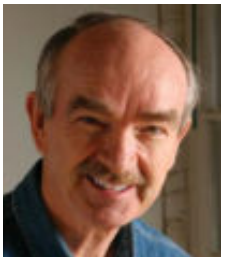
For more information on our contributors, go to www.FineWoodworking.com/authors.

David Heim (*"Sound Advice"*) joined our staff in late 2005, following a 28-year career as an editor at *Consumer Reports* magazine. An avid wood turner, he usually can be found at the lathe in the *FWW* shop when he's not planning another tool test.



Thomas R. Schrunk (*"An Introduction to Veneering"*) describes himself as an artist in lustrous materials (see *A Closer Look*, *FWW* #182). Recently, the *Minneapolis Star Tribune* described him as a "virtuoso of veneer." In addition to creating wood-veneer patterns for Steinway pianos, floors, and furniture, Schrunk works in lustrous metal and his latest medium, lustrous concrete. To see examples of his work in all three media, go to www.thomasschrunk.com.

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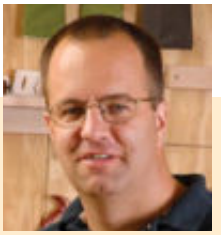
letters

From the Editor



MOVING FORWARD, ALWAYS

A comedian once said that a relationship is like a shark—it has to keep moving forward. Our relationship with you is no different. About a year ago, we completely revamped FineWoodworking.com, giving us more ways to meet your needs. Hundreds of video clips put woodworking in motion; expert forums address more of your questions; blogs let you follow projects from start to finish; tool reviews guide your purchases; there is an expanded gallery; and our entire archive of past articles is, like everything else, at your fingertips 24 hours a day (see p. 6 for a few of this month's online features).

With a free, cumulative, searchable index online, we've decided to stop printing the annual index in the back of the magazine. We'll use those four pages to bring you more tips, techniques, and inspiration.

We continue to move forward. For those who have called looking for full-size drawings and more detailed cutlists for projects featured in the magazine, we now have an answer. We selected 25 high-interest projects from past issues (we will continue to select projects going forward) to be drafted as full-scale plans. We also invited a leading publisher of plans to expand our lineup, bringing it to 59 and counting. Go to www.FineWoodworking.com/PlanStore to purchase them. Of course, project articles in the magazine will remain as thorough as ever, with the same detailed dimensions, clearly presented how-to, and exploded drawings.

Stay tuned for a few great new features in the magazine. And continue to let us know what you need from this relationship.

—Asa Christiana

The finer points of "Wood Movement"

I would like to clarify one aspect of Christian Becksvoort's article, "Stop Guessing at Wood Movement" (*FWW* #187).

When fitting a panel, one has to take into account that the panel will not always position itself evenly in the frame (unless it is pinned or glued in the middle). Because of glue residue or finish, panels often will stick in one of the vertical grooves, concentrating all of the movement in the opposite groove. And if a panel is used with the grain aligned horizontally, all of the movement will happen in the upper groove. So in many cases, one has to calculate for all of the movement happening in one groove, not two as demonstrated in the article, effectively doubling the allowance one must make for wood movement. For a drawer, this is not an issue.

—JAAP VAN DER HEIJDEN, Mierlo, The Netherlands

For those who don't want to do the math, I suggest the handy wood shrinkage calculator at www.woodbin.com/calcs/shrinkulator.htm

This free and easily bookmarked resource has helped me in many situations, and eased the stress of "design worry."

—JOHN BARCLAY, Winston-Salem, N.C.

Dovetail-jig review omitted some features

I enjoyed the article by Tim Albers on dovetail jigs (*FWW* #187). However, the Porter-Cable 4212 (which was the Best Value pick) has more features than were described in the article. It indeed comes standard with templates for through- and half-blind dovetails, but also includes templates for box joints and what the company calls a "dovetail dado," which is a sliding dovetail. Also, there is a template available for miniature dovetails.

—MATT STEVENS, Smithfield, R.I.

The recent dovetail-jig review (*FWW* #187) stated that the only differences between the Leigh D1600 and the more expensive Leigh D4R are width (16 in. vs. 24 in.) and the fact that the D4R offers adjustable pin size. But the author overlooked an important factor: the thickness of boards each of these jigs can handle. The D4R can handle boards that are roughly

Writing an Article

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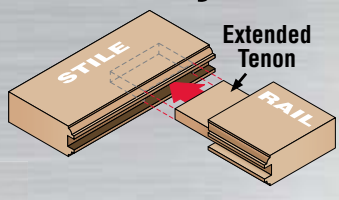

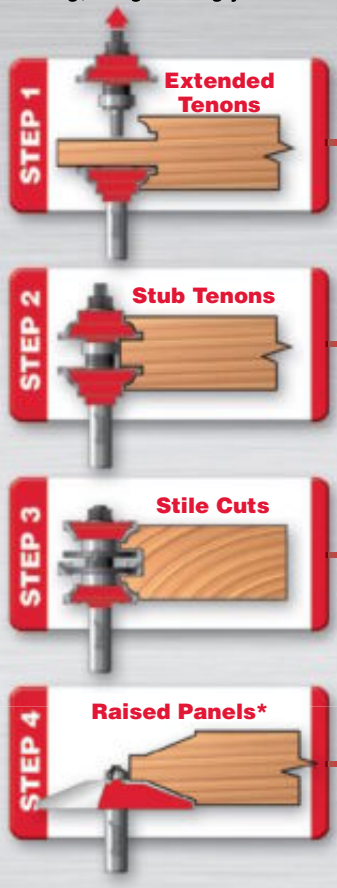

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½ in. thicker than those handled by the D1600. On through-dovetails, for example, the D4R will handle stock up to 1¼ in. thick, as opposed to 13⁄16 in. for the D1600.

—BRUCE BURNHAM, Pittsfield, Mass.

Confused about huntboard construction

The article on the huntboard in the last issue is great (*FWW* #187), but it left me with a few questions. First, is the bottom board glued in place or is it left to float on the spline? Also, white pine is used as a secondary wood in this cherry piece. My own success with this combination is zero. Inevitably, I end up with splits or joint failures, apparently due to the wide humidity changes in New Hampshire. These were not cross-grain failures. I've lost two or three pieces this way.

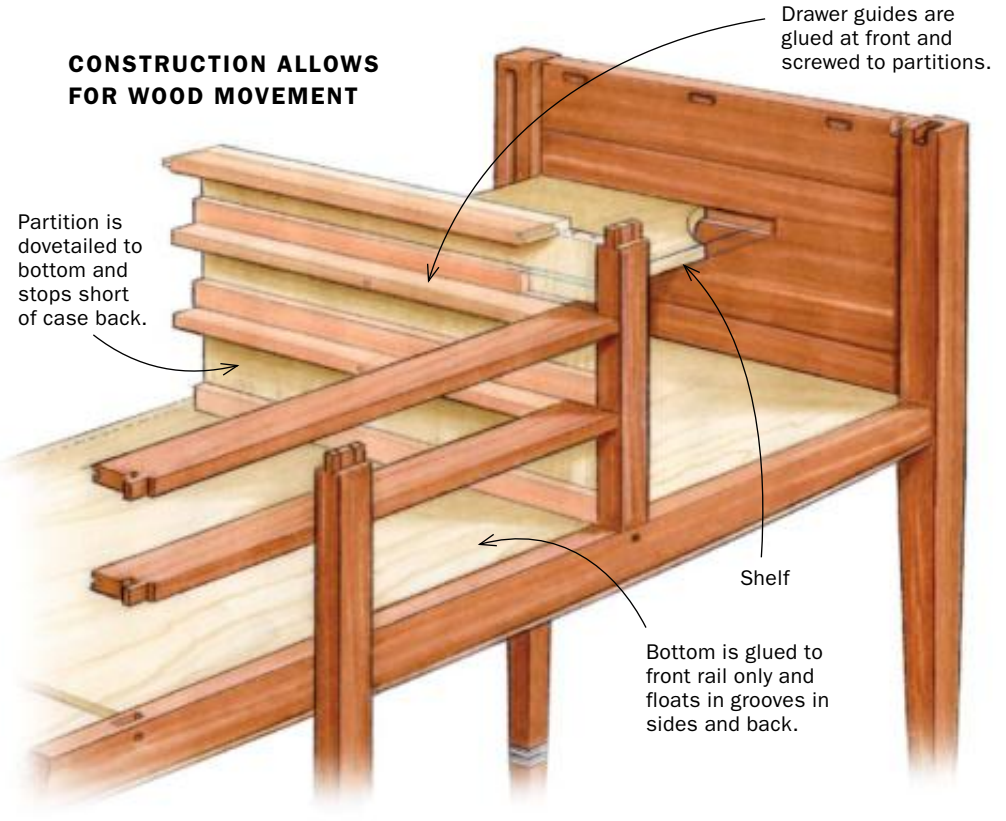
Last, I'm confused over the use of solid wood for vertical partitions between the two end cabinets and the center drawer section. It appears that the partitions are joined into the front and rear rails, creating a cross-grain situation in the carcase. Wouldn't a better solution have been to use frame-and panel partitions between these sections to eliminate their expansion and contraction?

—ALLAN WEBER, Sullivan, N.H.

Garrett Hack replies: The bottom board is constructed essentially as a floating panel within a frame. It is glued only to the front rail, so that all movement is directed toward the back of the case. It's notched around the rear legs—with a bit of extra space—and the tongue along the sides and back edges moves in the grooves cut into the lower side rails. I allowed for a little more than ⅛ in. of expansion, but being quartersawn, the board barely moves 1⁄16 in.

As for the interior partitions, frame-and-panel construction would be fine, but it's not as efficient as my solid-wood design. I've allowed for the minimal movement of the quartersawn pine partitions by stopping them just shy of the back, and attaching them only at the front of the case with glue and screws. The sliding dovetail that connects the bottom board to the partitions keeps those members flat, allows them to move together front to back, and makes the core of the case very rigid. The solid partitions also make the joinery with the shelf neat and strong.

Your failures using cherry and pine together are likely from insufficient allowance for the parts to expand or shrink, not from their different natures or the humidity extremes where you live.



Eye-protection review ignored fogging

In "A New Look at Eye Protection" (*FWW* #187) there's one thing that I think the author, Steve Scott, should have addressed: fogging. I try to wear eye protection at all times, but after a few minutes of wear I can't see anything because of fogging.

Which products are less prone to fogging? Is there anything that prevents it better than the scuba diver's trick of rubbing spit on the inside of goggles?

—DENNIS PETERSEN, Aurora, Colo.

Steve Scott replies: You are right—fogging is an important issue, and anyone who's worn safety glasses probably has experienced it. So I gave the eyewear that appeared in the article an informal test in my unheated shop on a cold evening. Some pairs boasted anti-fog coatings, others did not. I found that all of the glasses and goggles resisted fogging well when worn by themselves. Add a basic dust mask, however, and the fog begins to settle in. Almost all of the eyewear fogged at least a little, with my prescription lenses faring worst. The least vulnerable were the larger goggles with foam seals around the eye sockets. I can't say that the lenses with anti-fog coating were significantly better than those without it.

There are various wipe-on treatments available in liquid, aerosol, or tissue form. I wish I could tell you how they compare with a scuba diver's spit, but I think that might be another article.

About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't try to perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, don't do it. Look for another way. We want you to enjoy the craft, so please keep safety foremost in your mind whenever you're in the shop.

—Asa Christiana, editor

Drawing: Bob La Pointe

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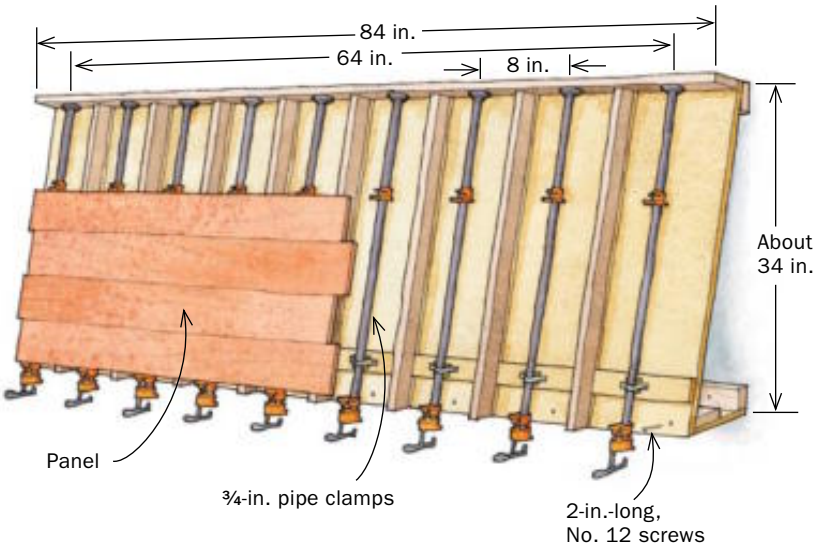
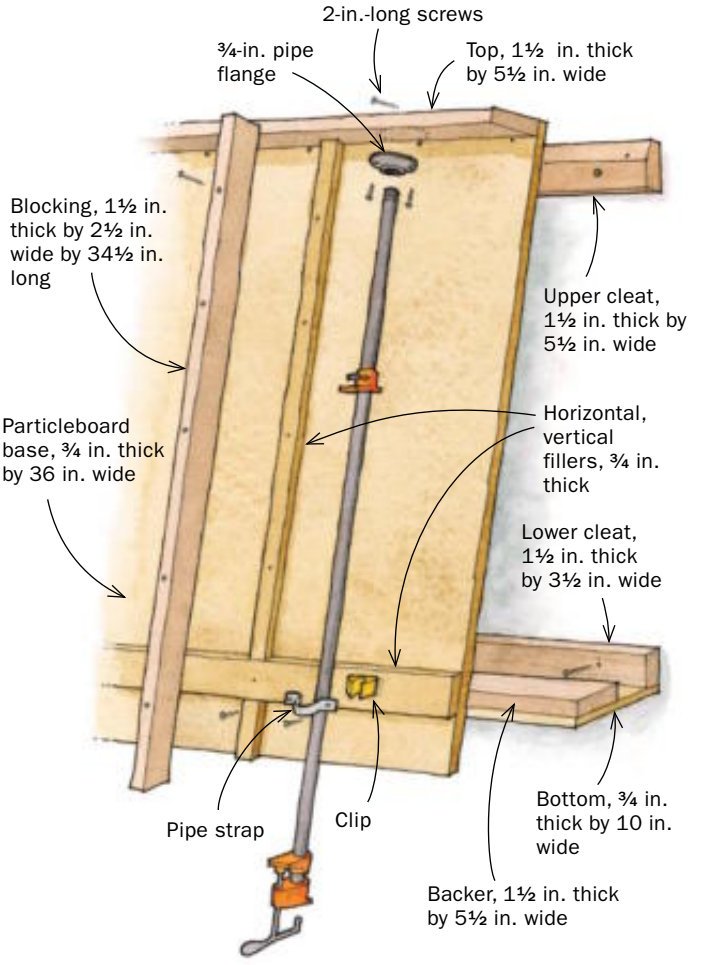




Best Tip

Wall-mounted clamp rack makes panel glue-ups quick and easy

When not at his day job as a supply-chain planner for the Kellogg Company, Bradley can be found spending time with the two dogs he rescued from a shelter, rooting for the University of Michigan Wolverines, or fishing for bass in the Kalamazoo River. In the woodshop, he enjoys making Shaker-style furniture.

With this clamp rack always set up and ready to go, I can edge-glue ¾-in.-thick boards in no time. And because the rack mounts almost flat to a wall, it takes up little floor space.

The rack is heavy, even before you add boards, so anchor it securely to wall studs or an equally strong structure. Mounting the upper cleat between 6 ft. and 7 ft. above the floor puts the rack at a good working height. The upper cleat has a 16° bevel along the front face to establish the angle of the rack.

The pipes rest in pipe-clamp clips (available from Hartville Tool; 800-345-2396; www.hartvilletool.com; part No. 46759). Horizontal fillers (¾ in. thick) elevate the clips to bring the pipes to the correct height dictated by the pipe flanges. Vertical fillers (¾ in. thick) support the blocking.

I mounted blocking between the pipes for two reasons. First, the blocking raises the stock off the pipe to prevent black stains. Second, the blocking brings the stock into what I call the "sweet spot" of the clamps. I contend that the sweet spot is low on the jaws, not high, so the center of ¾-in.-thick stock is in line with the clamp screws. Four or five coats of polyurethane on the blocking prevent glue squeeze-out from sticking.

To use the rack, first bring all of the sliding jaws snug along the top edge of the panel. Then tighten the screw jaws. If necessary, add more clamps from the front side to equalize the clamping pressure.

—KEVIN BRADLEY, Battle Creek, Mich.

A Reward for the Best Tip

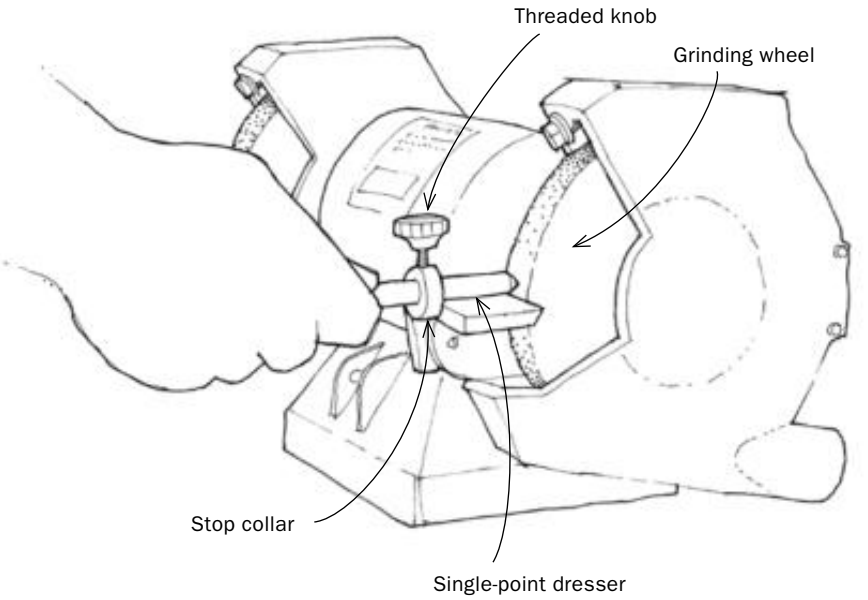
Send your original tips to Methods of Work, *Fine Woodworking*, PO Box 5506, Newtown, CT 06470, or email fwmow@taunton.com. If published, we pay $50 for an unillustrated tip; $100 for an illustrated one. The author of the best tip gets a pair of Brian Boggs spokeshaves (one flat, one curved) made by Lie-Nielsen Toolworks.

Stop collar makes it easier to dress a grinding wheel

I use a single-point diamond dresser to maintain the wheels on my bench grinder. To make the process easier, I slip a shaft collar on the dresser and use the collar as a depth stop. With the collar butted against the edge of the tool rest, and the business end of the tool just touching the wheel, I can slide the dresser from side to side and be sure that the cutting depth remains the same.

To make it easier to loosen or tighten the collar, I replaced the setscrew in the shaft collar with a threaded knob.

—MIKE HOLZHAUER, Lorain, Ohio

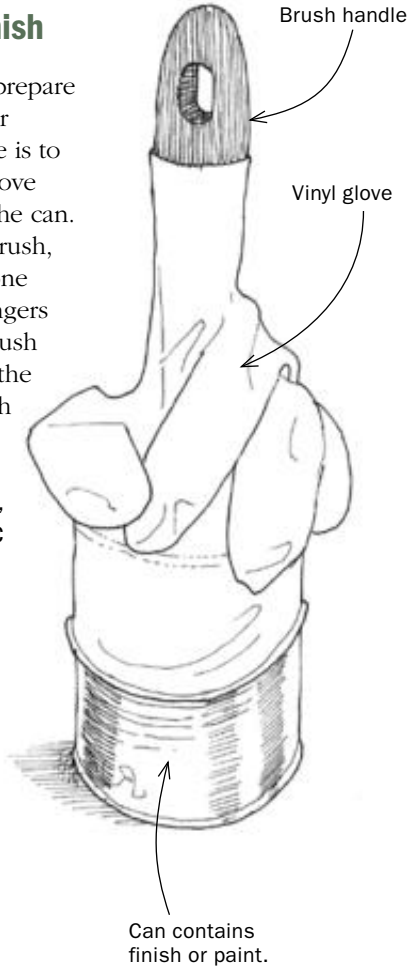


Vinyl glove preserves finish

A quick way to prepare finish or paint for overnight storage is to stretch a vinyl glove over the top of the can.

To include a brush, cut the top off one of the glove's fingers and poke the brush handle through the hole, then stretch the glove over the can.

—TOM JOHNSON, Greer, S.C



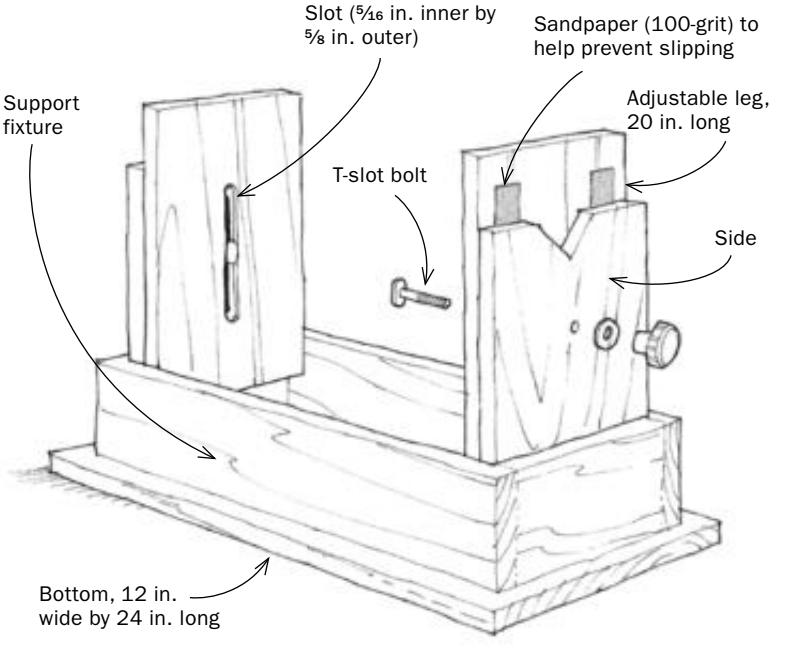
Adjustable support for installing upper cabinets

Scott Gibson's July/August 2006 article, "A Woodworker's Kitchen," shows a temporary shelf to support the upper cabinets during installation. I use a similar support, but mine is adjustable, so I can use it for a variety of installations.

Basically, the support is an upside-down box with adjustable legs that allow me to set various heights of upper cabinets. After the cabinet is set, I lower the legs to free the support. A 1-in.-wide by 3-in.-long hand-hold slot cut in the bottom makes it easier to carry.

The support has one more benefit: When not supporting a cabinet, it makes a pretty sturdy sawhorse.

—BRUCE WRENN, Apex, N.C.



Low-cost bed extension for a small lathe

To turn bedposts, you need a long-bed lathe—an expensive tool that uses lots of floor space. For less than $100, I made this bed extension for my midi-lathe. When not in use, the extension comes off and I store the midi-lathe out of the way.

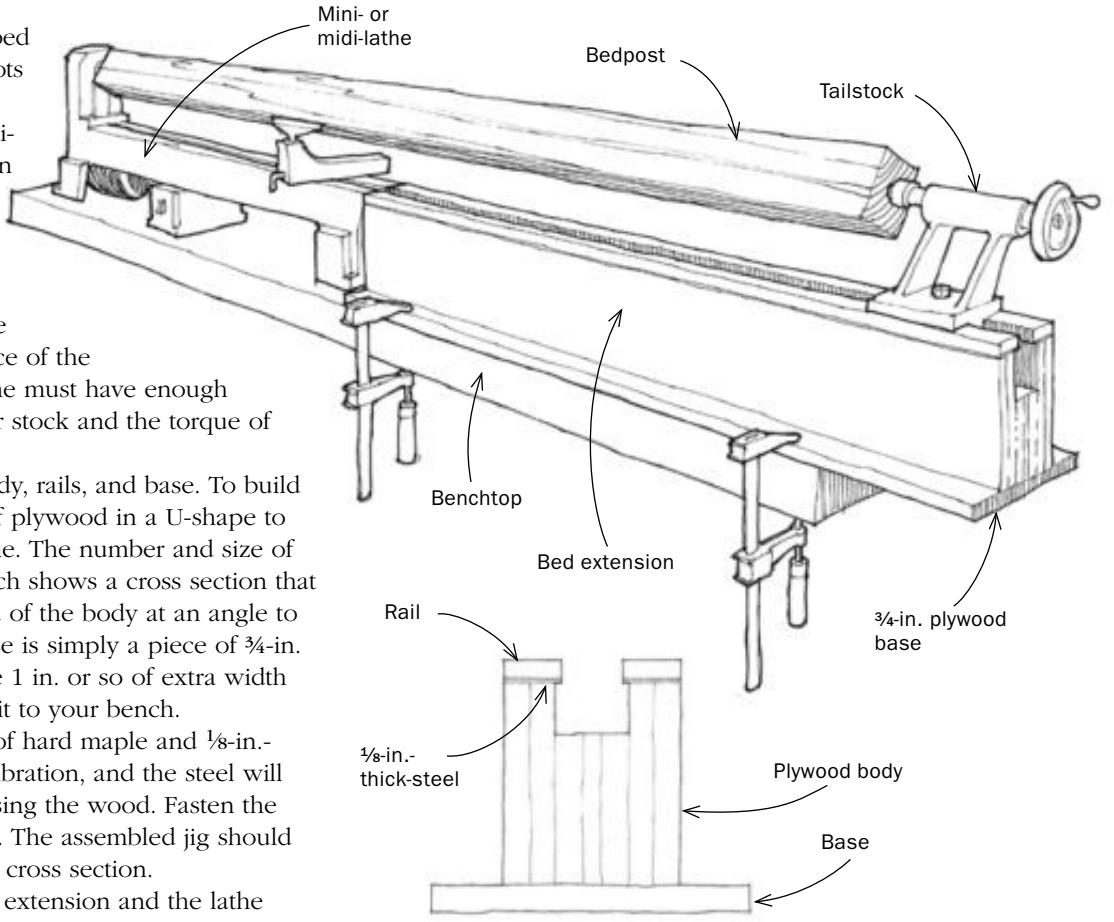
Before building the extension, there are some design parameters to consider. The rails must be dense enough to handle the clamping force of the tailstock and tool rest. Also, the lathe must have enough power to handle the longer, heavier stock and the torque of working at the far end.

The extension has three parts: body, rails, and base. To build the body, laminate several pieces of plywood in a U-shape to match the cross section of your lathe. The number and size of the laminations will vary. (The sketch shows a cross section that fits my Jet Mini Lathe.) Cut one end of the body at an angle to match the end of the lathe. The base is simply a piece of ¾-in. plywood as long as the body. Leave 1 in. or so of extra width on the base so that you can clamp it to your bench.

For the rails, I used a lamination of hard maple and ⅛-in.-thick steel. Maple will reduce the vibration, and the steel will prevent the tailstock from compressing the wood. Fasten the rails to the body with wood screws. The assembled jig should match your lathe bed in height and cross section.

To set up the extension, align the extension and the lathe with a straightedge and then clamp the extension to the bench.

—JASON BENNETT, Johnson City, Tenn.

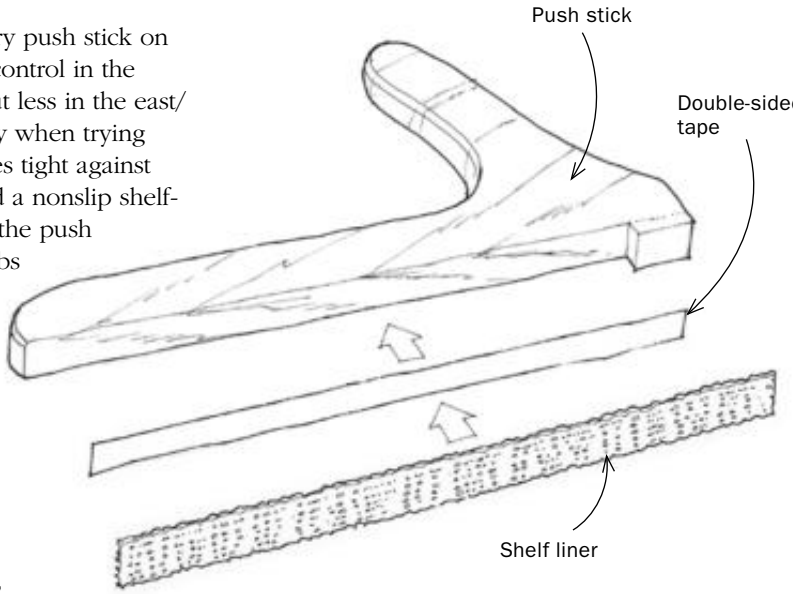


Nonslip push stick

When I used my ordinary push stick on a tablesaw, I had good control in the north/south direction but less in the east/west direction, especially when trying to keep small workpieces tight against the rip fence. So I added a nonslip shelf-liner strip to the sole of the push stick. The shelf liner grabs the workpiece, giving me more control in all directions.

To attach the liner, first sand the sole of the push stick to help ensure a good bond, then attach the strip with double-sided tape.

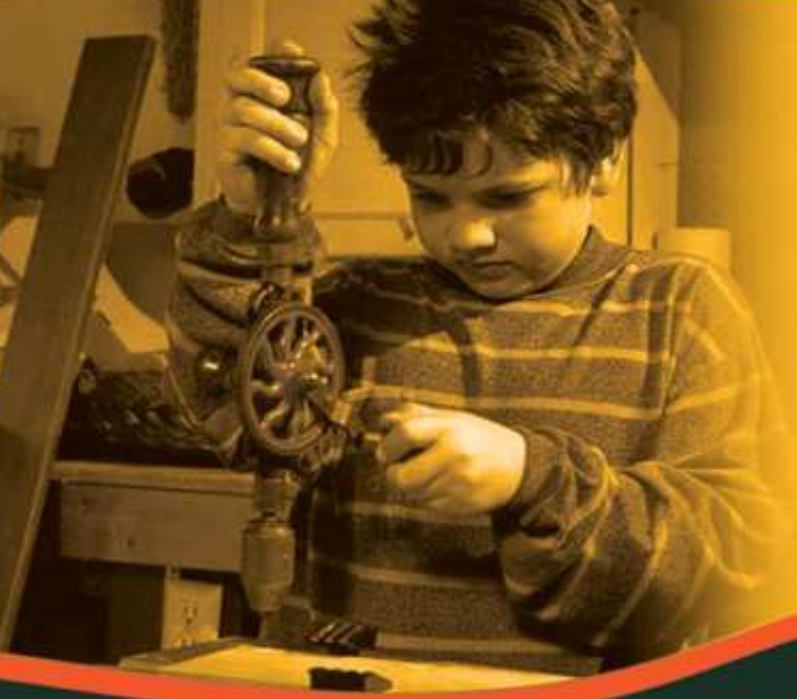
—SERGE DUCLOS, Delson, Que., Canada



Quick Tip

I sometimes put a rare-earth magnet in my shirt pocket when I have to drive a bunch of screws. It allows me to keep a small handful of screws clinging to the outside of the pocket, and that makes it easy to grab one screw at a time.

—MARK A. FETTER, Fort Collins, Colo.



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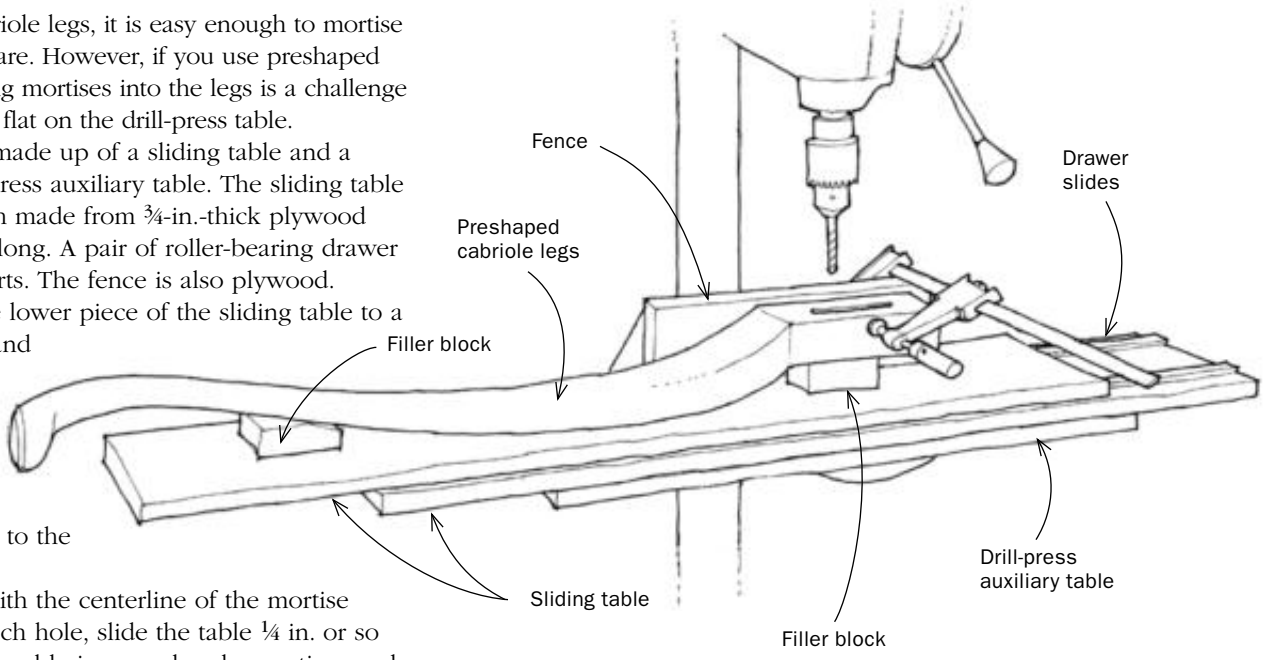
Mortising preshaped cabriole legs

If you make your own cabriole legs, it is easy enough to mortise them while they're still square. However, if you use preshaped cabriole legs, as I do, cutting mortises into the legs is a challenge because the leg doesn't lay flat on the drill-press table.

My solution is a fixture, made up of a sliding table and a fence, mounted to a drill-press auxiliary table. The sliding table has a top and bottom, each made from ¾-in.-thick plywood about 8 in. wide by 36 in. long. A pair of roller-bearing drawer slides connects the two parts. The fence is also plywood.

To use, clamp or bolt the lower piece of the sliding table to a drill-press auxiliary table, and then clamp the leg to the fence. Add filler blocks under the leg where necessary to lift and support the leg at both ends and to square the leg to the drill bit.



Next, align the drill bit with the centerline of the mortise and begin drilling. After each hole, slide the table ¼ in. or so and repeat. Moving the assembly is a one-hand operation, and there's no need to reset the leg square to the bit.

—JIM YARDLEY, Rhinebeck, N.Y.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Yale offers close study of 1,000 classic pieces

Unprecedented numbers. *Comparisons are easy at the Yale Art Gallery Furniture Study, where hundreds of pieces are stored side by side in tight ranks, including an army of ball-and-claw feet (right).*

The atmosphere is more warehouse than showroom, but this basement in New Haven, Conn., is where many scholars and craftsmen head for up-close viewing of classic furniture.

Yale Art Gallery's Furniture Study offers visitors a rare opportunity to examine more than 1,000 pieces ranging from early Chippendale to contemporary.

The emphasis is on teaching, with the pieces arranged chronologically by form. Curator Patricia E. Kane said this lets visitors see how artisans of different periods solved common furniture problems. "It's really great to be able to walk along and compare and contrast one set of solutions to another," she said.

Total access. *Visitors can get a close look at construction details. Curator Patricia Kane displays a drawer among a row of tall chests.*

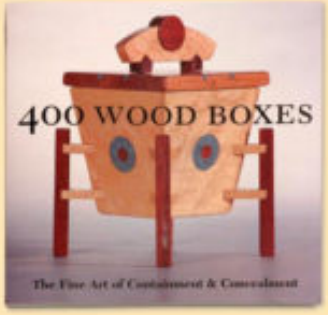
The low-key atmosphere, the sheer number of pieces, and their unique arrangement help students learn in ways that would be impossible in the distant and pristine setting of a traditional museum.

Individuals and small groups can explore the collection by appointment. It's also possible to take measurements of some pieces if you arrange to do so when making the appointment.

The collection features early colonial work and plenty of ornate Chippendale and Queen Anne pieces. It is a resource for contemporary builders, with chairs by Gustav Stickley, Art Carpenter, and Hans Wegner; turnings by Mark Sfirri; and marquetry by Silas Kopf. There is also a large stash of old hand tools.

—Gina Eide, assistant web editor

Book Review



400 Wood Boxes: The Fine Art of Containment & Concealment, edited by Veronika Alice Gunter. Lark Books, 2004. 352 pp. $24.95.

ASPIRING BOX-MAKERS WILL FIND A WEALTH of inspiration in this coffee-table volume, which features more than 400 works from 181 artists. With a minimum of text, this isn't a shop manual by any means, but a source of ideas. Page upon page of eye-popping variety and ingenuity is displayed in richly detailed color photos.

Some readers might feel there is too much artsy work among the selections, and some of it is very avant-garde, but there also are plenty of beautifully crafted traditional and contemporary boxes. Buy the book and dress up a coffee table, then build a few of the boxes and dress up several more.

—Steve Scott, associate editor

Photos, this page: Lorien Crow; p. 26: Timothy Clark

Ample seating. *Timothy Clark's settee is a tasteful stretch-limo version of similar pieces he makes in his Waltham, Vt., shop.*

Vermont maker builds stretch settee

The Windsor chair has been around for nearly three centuries and has been made in scores of variations—from sack-back to comb-back and from writing arm to continuous arm. There have been Windsor high chairs and Windsor miniatures, Windsor daybeds and Windsor cradles, Windsor rockers, settees, and rocking settees. But has there ever been a Windsor settee long enough to seat 16 with ease? There is now. Timothy Clark, a Windsor chairmaker in Waltham, Vt., built his 29-ft.-long, 203-spindle stretch settee early in 2006 for a restaurant at the Park Hyatt hotel in Washington, D.C.

To simplify assembly and delivery, Clark built the settee in three sections, each just over 9 ft. long. The seat planks meet in butt joints secured underneath with wooden cleats. To join the crest-rail sections he used a custom-made turnbuckle system, and for the arm-rail sections he used barrel bolts. The spindles are through-mortised top and bottom and each of those 406 joints is wedged. For a closer look at the process, see his Web site: www.timothyclark.com.

—Jonathan Binzen

With so many spindles, consistency was crucial. *A jig helped Clark space the holes and drill them at the proper angle.*

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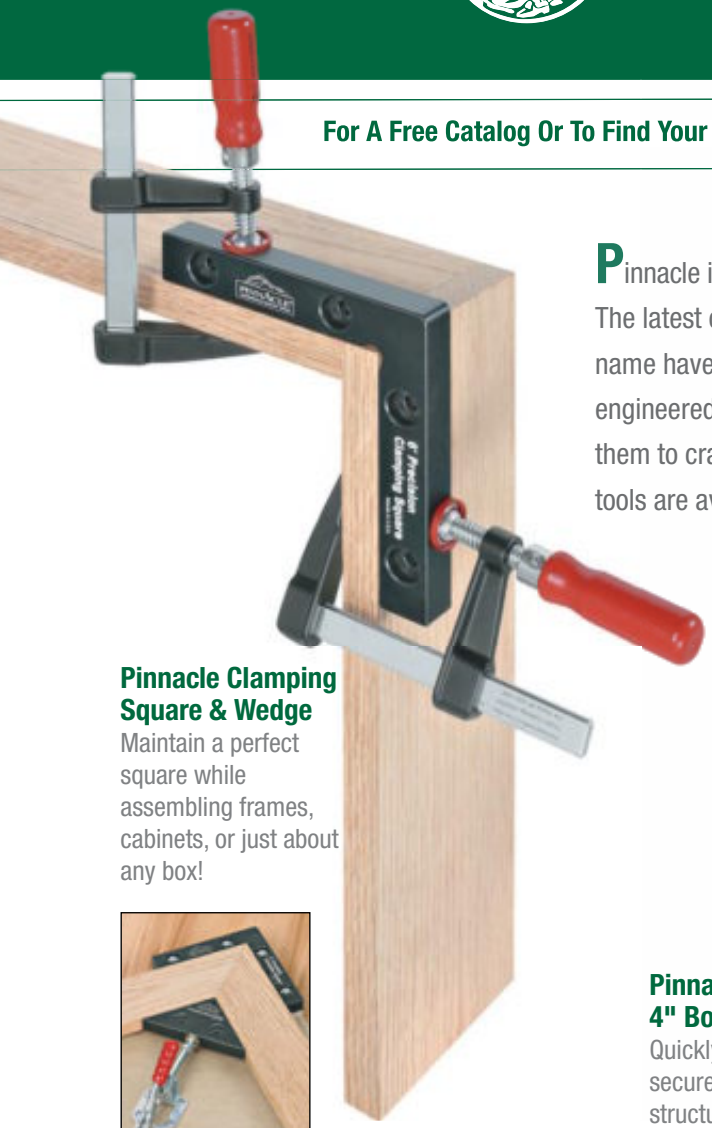

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TABLESAWS

Hitachi's first cabinet saw is strong, precise

Hitachi has stepped into the cabinet-saw market with a 10-in., left-tilting hybrid (model C10LA). Rated at 1½ hp, the 110v/15-amp motor has the power to rip 4/4 hardwood stock with ease, and 8/4 just fine if you feed it slowly. But the construction of the tool is what impressed me the most. The cast-iron tabletop is large (27⅛ in. by 40⅛ in.) and dead flat. There was no runout on the arbor or arbor flange. A beefy cast-iron trunnion assembly tilts easily to 45° and provides a solid mount for the motor and V-belt-driven arbor.

Dust control is excellent, aided by a 4-in.-dia. dust port and an enclosed cabinet. The T-square-style rip fence is solid, locks easily, and is fitted with replaceable melamine faces.

The saw offers a 30-in. rip capacity to the right of the blade, 18 in. to the left, and 13 in. of table support in front of the blade. A small outfeed extension table is included to help support long stock.

Also included is a 36-tooth carbide blade, an adjustable-stop T-slot miter gauge, a dado insert, and a plastic push stick. With its effective dust collection and solid construction, this tool would make a good buy for a woodworker looking to upgrade from a benchtop or contractor saw. It retails for $1,000. To locate retailers or get more information, visit www.hitachipowertools.com.

—Roland Johnson is a contributing editor.

Handy features. *A bevel scale in the saw table (top) makes blade-angle adjustments easy to see. The Hitachi also has excellent dust collection (bottom). Dust is shepherded to the hose via a tapered chute inside the cabinet.*

CORDLESS TOOLS

FESTOOL CORDLESS DRILL IS A WONDER

THE C12 CORDLESS DRILL FROM FESTOOL has a brushless motor (a first in the cordless market) that runs silky-smooth, with lots of power and easily controlled torque throughout the two speed settings. At 3 lb. 6.8 oz., it's one of the lightest 12v drills available and the 1.3-amp/hour battery provides extended drilling and driving abilities. The solid-state trigger is very sensitive yet easily modulated, and the 24-position clutch reduces the chances of stripping or over-driving screws. The drill is perfectly balanced and has quickly become a favorite of mine, whether drilling holes or driving screws. The kit comes with a keyless chuck, a short hex chuck that accepts screwdriver bits for close work, a right-angle chuck, and an eccentric chuck for working at odd angles. It also includes a charger and spare battery. It sells for $345 direct from Festool. For more information, go to www.festoolusa.com.

—R.J.

■ ACCESSORIES

PRECISE, AFFORDABLE JIG FOR DRILLING POCKET HOLES

Pocket holes are a fast and efficient method of joinery, which is important to a professional like me. I use a lot of plywood in my custom cabinetry, and I often incorporate pocket-hole joinery in the solid-wood face frames. Kreg's new Model R3 pocket-hole jig adjusts easily, without tools, to drill stock from ½ in. to 1½ in. thick in ⅛-in. increments. You can attach the jig to a workpiece with a C-clamp, or you can use the included face-frame adapter to connect the jig using Kreg's Face Clamps (not included). These clamps have handles like a pair of locking pliers, but they have wide jaws with a deep reach. These accessories speed up the process of drilling multiple holes.

An affordable way to make fast and efficient joinery, the R3 from Kreg would be a solid addition to a shop. The kit sells for $45 and includes the jig, the Fast Clamp adapter, a bit with stop collar, an extralong square drive, five packs of screws, and a small pack of angled dowel plugs. Face Clamps range in price from $15 to $35. For information, go to www.kregtool.com.

—Mark Edmundson is a woodworker and teacher in Idaho.

Pocket holes in a jiffy. *The R3 jig attaches easily to the workpiece with almost any bar or C-clamp. The lip on the end references the edge of the workpiece.*

■ SHOP SAFETY

SNAKE-ARM TASK LIGHTS AND SAFETY SHIELDS ARE INDUSTRIAL-QUALITY

EVEN IN WELL-LIT SHOPS, task lights come in handy for bandsaws, drill presses, and workbench areas. Danray Products in Rockford, Ill., has been making adjustable snake-arm lamps and safety shields for the woodworking and metalworking industries for more than 40 years, and now the company is selling directly to the consumer. Danray offers products to fit just about any application, and the stiff snake arms work well. Lampshades, rated to take up to a 100-watt bulb, are made of high-impact polycarbonate. They're double-walled and well-vented to keep the outer shade from getting hot. The safety shields also are made of unbreakable polycarbonate, 3⁄16 in. thick, and come in a variety of sizes. I tried a light on a magnetic base ($63 as shown) on my bandsaw and a safety shield ($55) on a fixed base on one of my grinders, and I was impressed with the quality of both. To buy Danray products directly, go to www.danrayproducts.com or call 815-262-6667.

—William Duckworth is a contributing editor.

Snake arms won't slither out of position. *They can be mounted directly to a surface (right), on a C-clamp assembly, or on a magnetic base (left).*

Photos, except where noted: Thomas McKenna; this page (top right and left): Kelly J. Dunton

■ HEAD TO HEAD

Small, quiet compressors for in or out of the shop

EMGLO

Manufacturer: DeWalt
Web site: www.dewalt.com
Street price: $200
Weight: 30 lb.
Volume: 2 cfm at 90 psi
Pump: oilless
Tank: 2 gal.

TRIM AIR

Manufacturer: Bostitch
Web site: www.bostitch.com
Street price: $160
Weight: 19½ lb.
Volume: 2.7 cfm at 40 psi; 1.8 cfm at 90 psi
Pump: oilless
Tank: 1.6 gal.

Judging by new offerings from Bostitch and DeWalt, shop compressors are getting smaller, quieter, and more efficient. These tools handle the workload of finish nailing without the bulk and noise often associated with larger compressors, and I was pleasantly surprised at how well they both performed.

The Bostitch Trim Air (model CAP1516) is the quieter of the two, and its featherlight weight and convenient handle make it easy to carry. The tool features a quick-connect hose fitting on the side; however, to avoid the hose recoiling, you'll need to use two hands to disconnect it. The 1.6-gal. tank recharges in around 45 seconds and refills completely in around 15. The Trim Air has only a line-pressure gauge; a tank gauge would make it easier to tell how long the compressor will take to fill.

The DeWalt Emglo (model D55141) is heavier than the Bostitch and has easy-to-read line and tank gauges. The tank fills in around 1 minute and 20 seconds, but recharges quickly in around 15 seconds. Unlike the Trim Air, the DeWalt has two quick-connect fittings to accommodate two finish nailers. And the danger of hose recoil is eliminated due to a rubber gasket inside the quick connect.

With a full tank, each compressor was able to drive about 15, 1¼-in. finish nails or 22, 1-in. brad nails before recharging. With performance nearly equal, I chose the DeWalt as the winner based on its features. For purchasing information, visit the manufacturers' Web sites.

—M.E.

■ BANDSAWS

STEEL CITY'S 18-IN. BANDSAW HAS SOME FLAWS

ALTHOUGH INITIALLY IMPRESSED by the price of Steel City Toolworks' 18-in. bandsaw and its five-year warranty, I was disappointed with the tool I tested. Resaw capacity and power are adequate, but the upper guide post flexed enough to allow the thrust bearings to flex out of alignment, which caused the blade to twist during resawing. The table rides on aluminum trunnions, and the cast-iron trunnion supports lock securely. But the saw I looked at had a 0.012-in. crown in the middle of the table and a 0.024-in. disparity in table surfaces at the blade slot with the alignment pin removed. The upper blade guides mount to a rack-and-pinion guide post by means of a 90° steel bracket. Unfortunately, the bracket on the saw I tested was bent more than 90°, which created a twist in the blade between the upper and lower guides. The eccentric-adjustable roller-bearing blade guides are relatively easy to adjust, although the thumbscrews securing them are absurdly tiny.

A 4-in.-dia. dust port located below the lower blade guides does a commendable job of dust collection, and a paddle-style power switch is conveniently sized and located.

—R.J.

MODEL 50250

www.steelcitytoolworks.com
Phone: 615-225-9001
Street price: $1,280
Motor: 2 hp, 230v, TEFC
Resaw capacity: 12 in.
Ripping capacity: 15½ in. to left of blade; 10 in. to right
Table: cast iron, 20 in. by 20 in.

A mallet is a must-have

THIS ONE TAKES AN AFTERNOON TO MAKE, BUT YEARS TO WEAR OUT

BY PHILIP C. LOWE

The driving force. *A well-built mallet delivers a solid blow that powers chisels for chopping dovetails, mortises, and other joinery.*

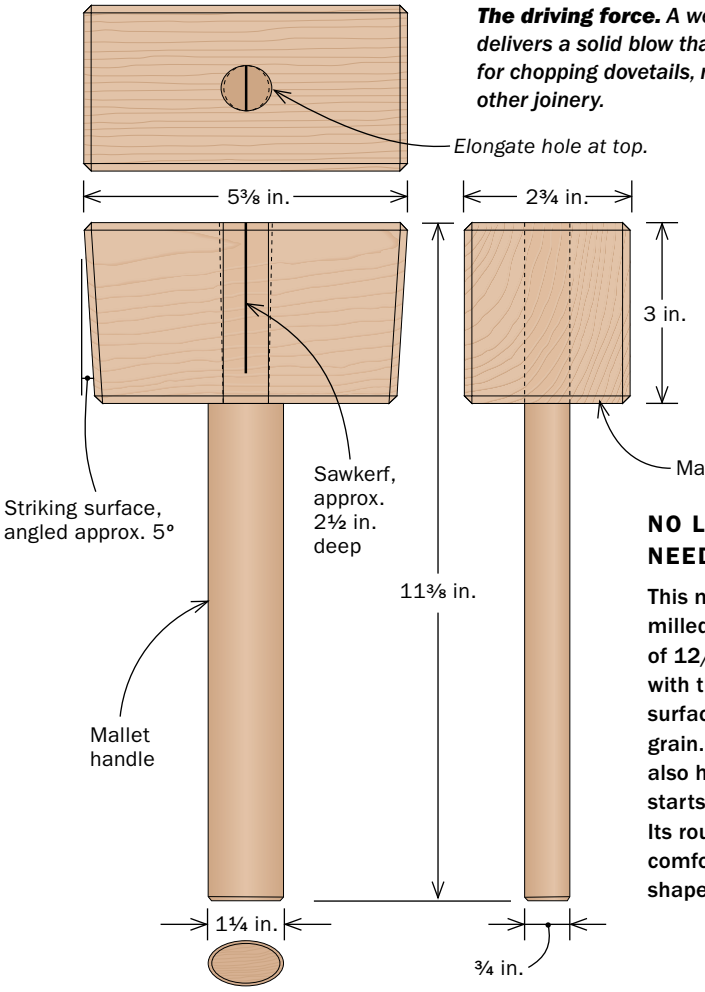
Some folks like to joke that the best tool for any job is a bigger hammer. A woodworker's joinery mallet, with its massive square head, fits that description, but there's more to it than that.

A well-designed mallet is light enough to control comfortably but heavy enough to deliver useful power without requiring a wild, roundhouse swing. A mallet also offers a broader striking surface than a hammer, and one that is tailored to the nature of the work. While a carver's slender mallet allows pinpoint control and a much lighter touch, the joinery mallet's broad, flat striking surface is ideal for other tasks that require more force and less flexibility.

A square-headed mallet excels at driving chisels to chop joinery, especially when cutting across the grain for dovetails or mortises. It's also great for project assembly and other tasks that require a firm rap or two. Another great thing is that a mallet is easy to make.

Make the head from a solid block

Start with a blank of splinter-resistant hardwood such as hard maple. A block about 3 in. sq.



NO LATHE NEEDED

This mallet's head is milled from one piece of 12/4 hard maple, with the striking surfaces on the end grain. The handle, also hard maple, starts as a rectangle. Its round tenon and comfortable grip are shaped by hand.

Start at the top

Drill the mortise. *Be sure to back the bit out frequently to clear the waste as the mortise deepens.*

Rasp out a wider opening at the top. *A driven wedge will expand the handle to fit this space tightly.*

Bandsaw the angled striking faces. *Plane or sand the surfaces flat—a rounded surface is more likely to deliver a glancing blow.*

Photos: Steve Scott; drawings: Kelly J. Dunton

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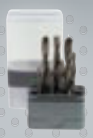
ETS 150/5 EQ Sander



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Jigsaw blades
35-blade assortment pack

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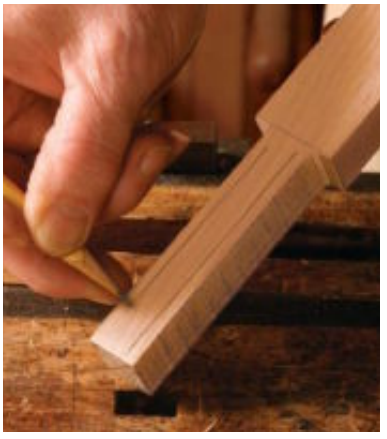
Shape the tenon

Start the handle by cutting a long tenon, *¾ in. sq. Mark the shoulder so that the tenon will protrude ½ in. beyond the top of the mallet head.*



Turn a square tenon into a round one. *First mark out a ¾-in.-dia. circle on the end grain, then use a combination square with a 45° head to mark chamfers that just touch the circle. Carry lines from the corners of these chamfers down the sides of the tenon. Next, use a flat rasp to create the chamfers, stopping when you reach the layout lines. A second pass with the rasp removes the secondary corners and makes the tenon nearly round.*

by 4½ in. to 5 in. long will make a mallet head that is massive and heavy enough to deliver a blow with great force when needed. You can glue up such a block if you don't have 12/4 stock available, but be aware that the glue joint might fail eventually.

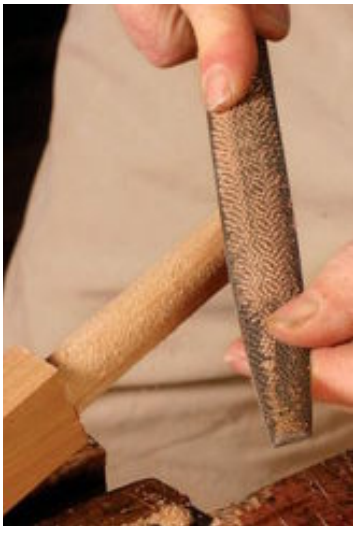
A through-mortise in the mallet head provides an attachment point for the handle. To make it, find and mark the center in the top of the blank. Then, using a drill press or a handheld drill with a spade bit, bore a ¾-in.-dia. hole through the blank, top to bottom. Use a rat-tail (round tapering) rasp to elongate the hole on the top of the mallet head by 1⁄16 in. to ⅛ in. toward the end grain in each direction. The wider opening should taper down about halfway through the mortise. If you don't have a rasp or file, a ½-in. dowel and some coarse sandpaper will do a decent job.

Next, mark the striking surfaces of the mallet for cutting at a slight angle from top to bottom. An angled surface will strike the butt of a tool handle more squarely because the mallet itself typically will be angled slightly upward when the blow lands. Cutting the ends is simplest on the bandsaw. Plane or sand away the sawmarks. It's also a good idea to bevel the edges and corners of the block to prevent splintering.

Start the tenon on the bandsaw

The handle also should be of a sturdy, straight-grained hardwood such as maple, birch, hickory, or oak. Start with a 12-in. length that is ¾ in. thick by 1¼ in. wide.

Begin by marking the layout for the tenon that will connect the handle to the head. At one end, mark a centerline to bisect the width of the piece. Use this line to lay out a ¾-in. square. Next, mark out a shoulder line 3½ in. from the end of the piece and then cut away the waste on the bandsaw to create the square tenon. The extra ½ in. of tenon length will allow the



Do the final shaping by eye. *Use a rasp, smooth file, or scraper for final cleanup, checking the fit frequently. A chisel cleans up the shoulder.*

Fit and assemble

Chamfer the corners with a handplane. *A simple ellipse layout is transferred to the handle's length with the same tangent method used for the tenon.*

Finish shaping. *Blend the contours and smooth the surface. Next, saw a kerf about 2 in. deep through the center of the tenon. The kerf should be parallel with the striking faces in the assembled mallet.*

tenon to protrude from the mallet head so it can be trimmed flush after glue-up.

Shape the tenon with a rasp

Making a square tenon round is relatively easy if you follow the steps shown in the photos on p. 34. (Of course, if you have a lathe, you can turn the entire handle. Once you have a true cylinder, use a scraper, sandpaper, or a smooth file to finish shaping the tenon, testing and fitting until it goes into the mortise. The handle should fit snugly, but you shouldn't have to strike it to drive the tenon all the way into the mortise.

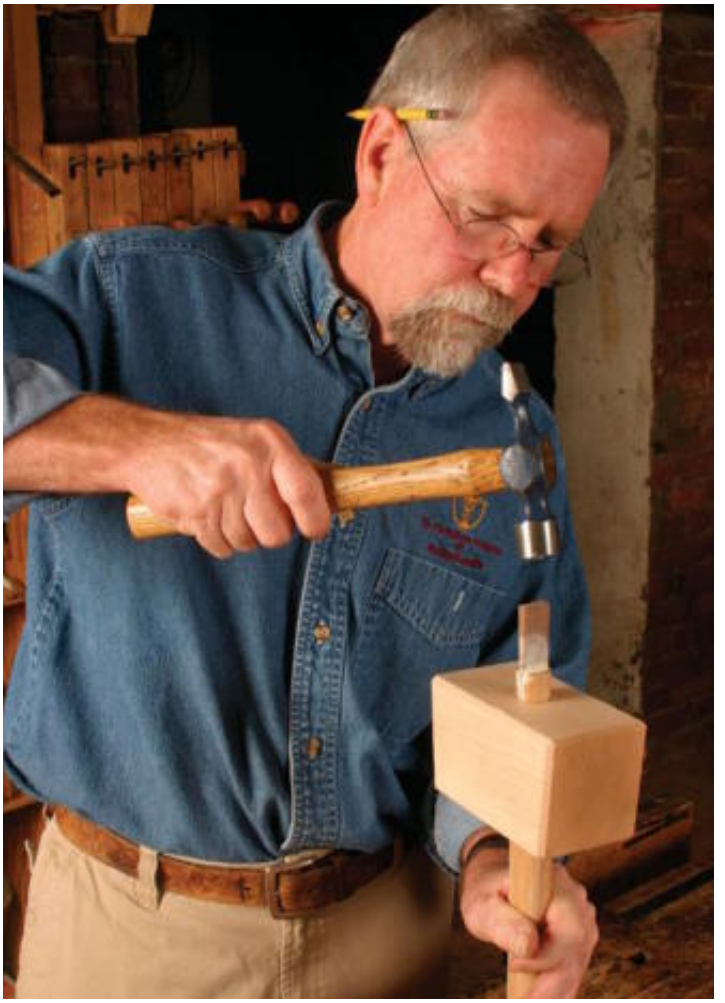
Next, use a bandsaw or a handsaw to cut a sawkerf about 2½ in. deep down through the center of the tenon and perpendicular to the 1¼-in. dimension. This kerf will hold the wedge that secures the handle to the mallet head. You want the wedge parallel to the striking surfaces. If it were parallel to the long grain, it could split the mallet head. Before assembling the mallet, shape the handle for a comfortable grip.

Wedge the tenon for a secure fit

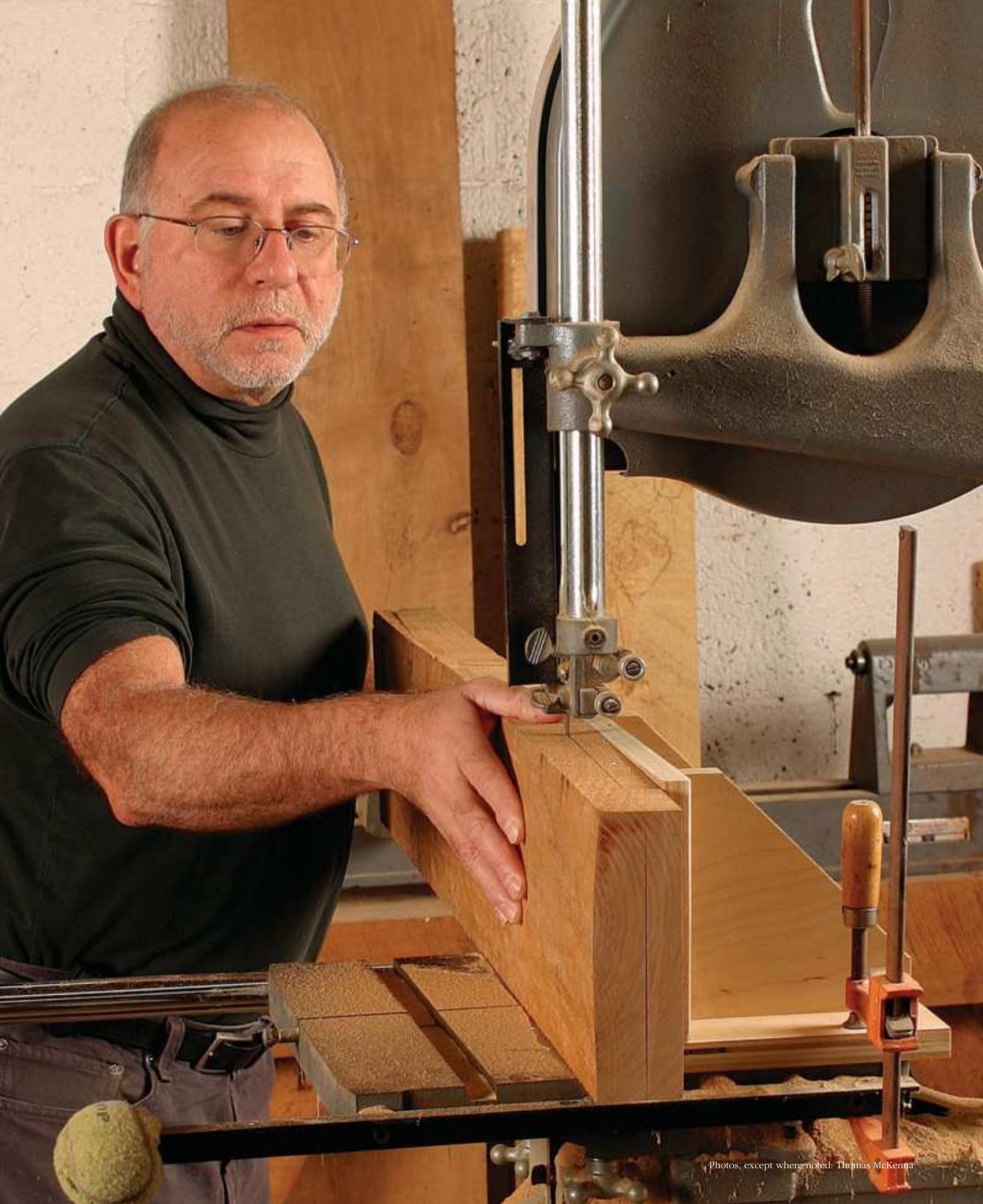
To keep a solid connection between mallet and handle, I drive a glued wedge into the kerf in the top of the handle. This expands the handle against the walls of the mortise and tightens the fit. Bandsaw the wedge from the edge of a ¾-in.-thick board. Make the wedge 2 in. to 3 in. long, no thicker than ¼ in. to ⅜ in.

To assemble the mallet, put a little glue on the inside of the mortise and push the handle into place, making sure it's oriented correctly to the striking surfaces. Next, apply some glue to the wedge and hammer it into the sawkerf. When the glue dries, saw off the wedge and the excess length of handle, then chisel or plane the top smooth.

Wipe on a little Watco or linseed oil for an optional finish. Avoid wax—too much will make the grip slippery. □



Drive the wedge until it stops. *When the glue dries, use a handsaw and chisel to trim the handle and wedge flush with the top of the mallet.*



Photos, except where noted: Thomas McKenna

Resawing on the Bandsaw

Make thin boards safely, easily, and with little waste

BY LONNIE BIRD

Resawing thick stock on the bandsaw to create thinner lumber or veneer offers a variety of benefits to woodworkers. It not only allows you to move beyond the standard lumber dimensions available at lumberyards and home centers, but it also opens all sorts of design options. For instance, you can slice a board in half to create book-matched panels; you can slice extrathin stock for dividers and delicate boxes; and you can cut your own veneers to get the most from a prized plank of figured wood.

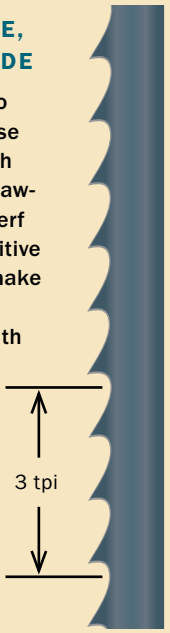
Yet, with all the benefits resawing offers, few machine techniques seem as difficult to master. Because the blade is embedded along the width of the wood, resawing places a lot of demands on both the bandsaw and the blade. If the saw isn't powerful enough or the blade isn't sharp enough, the blade can buckle and bow, the motor can bog down and stall, or the blade can wander out of the cut and spoil the workpiece. But with the right setup, you'll overcome these obstacles and achieve uniform, flat cuts every time.

Probably no factor affects your success as much as blade selection. I find a coarse, narrow blade with a positive rake angle (the angle at the front of the tooth) works best. For most resawing, I'd use a hook-tooth blade with 2 tpi to 3 tpi, ⅜ in. to ½ in. wide and 0.025 in. thick. This coarse blade effectively pulls sawdust out of the kerf, allowing the blade to run cooler and thus cut faster. The positive rake angle pulls the wood forward, making it easy to feed with a light touch. The only downside of such a coarse blade is that the cut

START WITH THE RIGHT BLADE AND TENSION

USE A COARSE, NARROW BLADE

A narrow (⅜ in. to ½ in. wide), coarse (3-tpi), hook-tooth blade will clear sawdust out of the kerf easily, and a positive rake angle will make it easy to feed a board through with a light touch.



Two ways to check blade tension. *A simple method is to set the tension one mark higher on the tension scale of your bandsaw (for instance, set it to the ½-in. mark for a ⅜-in.-wide blade). You also can check the tension by pressing your finger against the side of the blade (right); if it deflects more than ¼ in., crank up the tension.*

ADJUST THE TABLE AND GUIDES

Make sure the blade is perpendicular to the table. *Place a square against the side of the blade, and adjust the table until the sawblade is flush against the blade of the square.*

will be somewhat rough and prone to vibration, so it may not be suitable for resawing thin veneers, which are spoiled easily. If you plan to resaw veneers from thicker stock, you may want to use a variable-tooth, hook-type blade. The teeth on this blade are the same shape but vary in size, which results in less vibration.

Ready the bandsaw for resawing

Not only does resawing require the proper blade, but for consistent results and smooth cuts, it's also critical to adjust the bandsaw. These adjustments must be made in the proper sequence. First mount, track, and tension the blade; then square the table to the blade and adjust the guides. Finally, if the fence on the machine is too short to support wide stock, build an auxiliary fence. Because resawing generates a lot of dust, use dust collection at the source as well as an ambient air cleaner.

Increased blade tension produces flatter cuts—Resawing places a greater burden on a bandsaw blade because of the increased forces and the heat generated during the process. As the stock is fed into the blade, it places the front of the blade in compression and the back in tension. The combination of these opposing forces can cause the blade to buckle and spoil the workpiece. The best way to avoid this scenario and ensure smooth cuts of uniform thickness is to place the blade under lots of tension (15,000 psi is a good target) and employ a steady feed rate; don't force the stock.

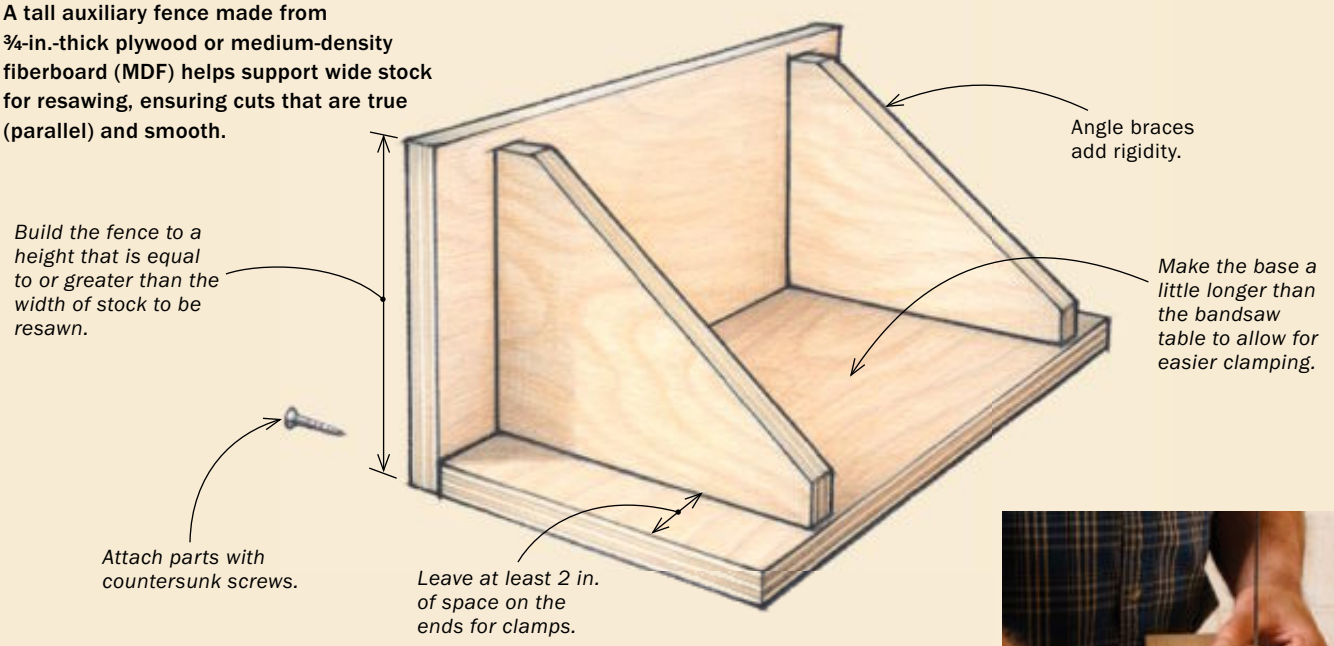
The most accurate method for measuring tension is with a tension gauge, but this device costs around $300. If you don't want to shell out that kind of cash, you'll have to rely on your saw's built-in tension scale. Unfortunately, most of these scales tend to provide a low reading, so I came up with a low-tech solution. Simply adjust the blade tension to the next mark on the scale; for instance, if you are using a ⅜-in.-wide blade, adjust the tension

Adjust the guides. *Guides should be 0.002 in. to 0.003 in. from the blade and should not touch the teeth. You have the right spacing if you can just slide a slip of paper between the guides and the blade (right). The same goes for the thrust bearing (far right), which shouldn't spin until you begin to feed stock into the blade.*

Photos, this page (bottom): Kelly J. Dunton; drawings: Christopher Mills

ADD A TALL FENCE TO SUPPORT WIDE STOCK

A tall auxiliary fence made from ¾-in.-thick plywood or medium-density fiberboard (MDF) helps support wide stock for resawing, ensuring cuts that are true (parallel) and smooth.



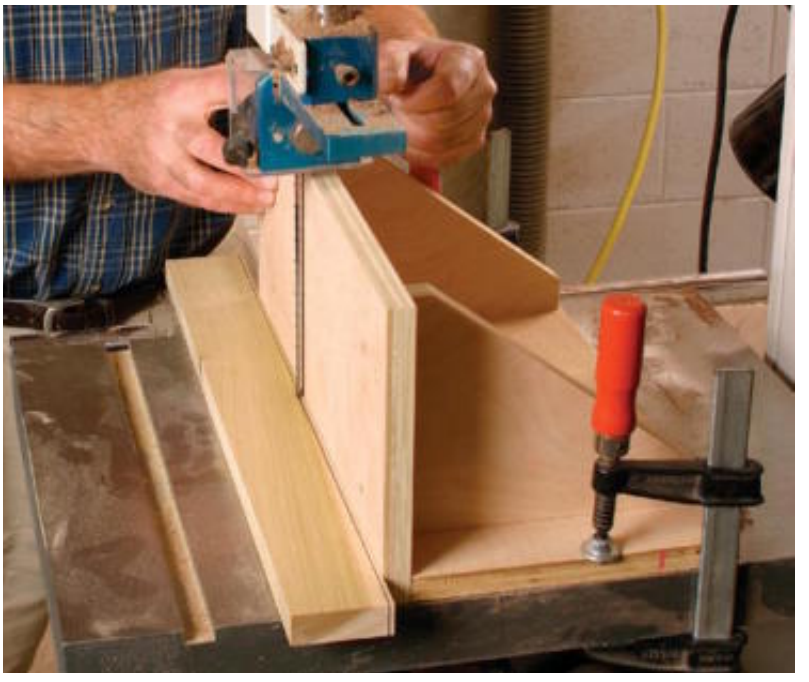
for a ½-in.-wide blade. To reduce strain on the saw, I reduce the tension when I'm finished resawing.

Setting up the table and guides—With the blade tension set, make sure that the table is square to the blade. Next, position the guide blocks and thrust bearing about 0.002 in. to 0.003 in. from the blade (about the thickness of a piece of paper). Be sure that the guide blocks do not contact the teeth. Then, adjust the upper guides so that they're no more than ⅛ in. above the workpiece.

Tall fence adds support and can be adjusted for drift—If you're sawing just a few drawer parts from inexpensive stock, you can use the fence that came with your bandsaw. But for precise, uniform cuts, it's better to build a taller auxiliary fence (see drawing, above).

Before resawing, it's important to determine and adjust for blade drift, the tendency of the thin blade to begin cutting out of parallel with the fence. One way to reduce drift is to track the blade so that it's in the exact center of the tire, which can be difficult to do with the flat tires on many European bandsaws. I find it easier to adjust the fence for drift (see photos, right).

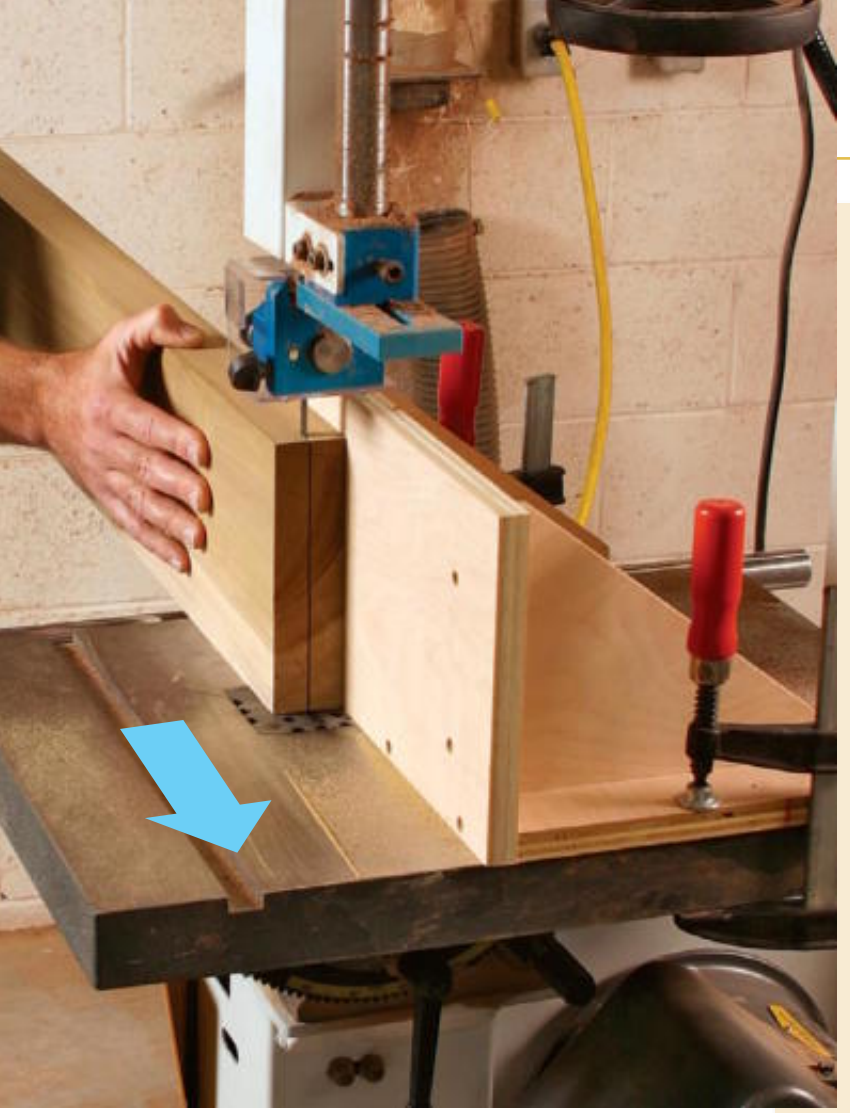
Adjust for blade drift when installing the fence. *Raise the guides and cut along a scribed line freehand (right). Stop midway through the cut, hold the test piece in place, and clamp the auxiliary fence against it (below). This ensures that the blade won't wander during the cut.*



Listen to the machine as you cut

The process of resawing is straightforward. It starts with stock that is flat and square so that you have a flat surface to register against the fence.

As you resaw down the thickness of a board, you typically eliminate the tension in the wood that was keeping it square and flat. With that tension unleashed, the natural side effect is that the resawn stock can tend to twist, cup, or bow. Resawing parts a bit oversize allows you to straighten and flatten them later. For thicker stock, such as that used for drawer fronts or sides, I cut boards about 1/16 in. to ⅛ in. thicker than I need (factoring in the



sawkerf). I cut veneer sheets only about 1/32 in. thicker than necessary, just enough to allow for easy removal of sawmarks.

As you cut, listen for the sounds of overfeeding. If you push the saw too hard, the motor may bog down, or the blade may twist or bow and ruin the cut. At about 6 in. from the end of the cut, replace your pushing hand with a push stick for safety. If you're resawing a long board, pull the last length of the workpiece through.

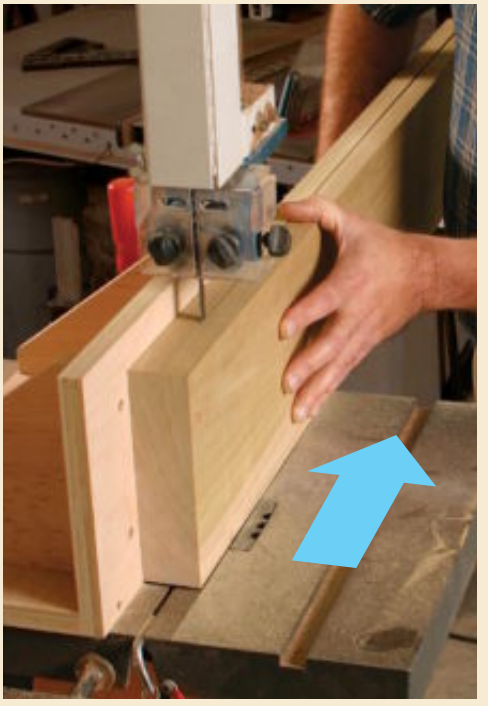
When resawing veneer, run the workpiece lightly over the jointer after each cut, removing only about 1/64 in. of material. This gives you one flat face to glue to the substrate, allowing you to smooth the rough outer face easily without fear of spoiling the veneer. Then place the jointed face against the bandsaw fence, and continue cutting. If you plan to book-match the resawn boards, stack them in the order that you cut them so that it will be easier to find good matches. □

Lonnie Bird is a contributing editor.

Tips for better resawing

SLICING THICK, LONG STOCK

Keep the workpiece flat against the fence. *To ensure a true (parallel) cut, use one hand to push the board and the other to hold it flat against the fence throughout the cut.*



Pull long stock through at the end of the cut. *Before the board starts to fall off the table on the back side, walk around to the other side of the saw and pull the board through. Support the board with one hand while using the other to hold it flat against the fence. This method also keeps your hands away from the blade.*

SLICING THIN VENEER

For consistent results, hold the flat face of the workpiece against the fence. *As you near the end of the cut, push the stock through with a push stick to keep your fingers clear of the blade.*

Joint after each cut. *Run the just-cut face of the workpiece lightly over the jointer (removing about 1/64 in. of material) before slicing the next sheet.*

When to Stop Sanding?

Depending on the finish, probably earlier than you think

BY ARI TUCKMAN

Sanding is most woodworkers' least-favorite activity. It's dusty, boring, and time-consuming—the sooner done, the better. But what is the right stopping point? When does moving to a finer grit no longer yield appreciable improvements in the finished surface? To find out, I did a semi-scientific study. I took boards of cherry, white oak, and tiger maple, cut each into six pieces, and sanded them to six different grits. I then divided each piece into thirds and applied a different finish to each section, because what really matters is not how the bare boards look, but their appearance with a finish. The results were both interesting and reassuring.

Six grits tested on three woods

I used a random-orbit sander for the majority of the sanding, progressing through the grits. This was followed by hand-sanding with a sanding block, with the grain, at the same final grit. I changed the disks when they began to wear out, but I used fresh paper on each board's final grit for both the random-orbit and the hand-sanding.

These three woods were chosen to see if wood grain or figure would

Standard grits tested

Tuckman chose aluminum-oxide sandpaper graded to the FEPA scale (recognizable by the P prefix to the number) because it is the standard abrasive for sanding bare wood. He tested P120, P150, P220, P320, P400, and P600 grits because he previously had done most of his final sanding with either P220-grit or P320-grit and he wanted to see if either coarser or finer grits would make a noticeable change in the finished appearance of the wood.

Three different woods

Tuckman chose white oak, cherry, and tiger maple as test woods, not only because they are familiar furniture woods, but also to see if tight or open grain and figure would influence the best final grit.

WHITE OAK

Would the open grain pattern on oak conceal the scratches left by coarser grits?

CHERRY

As a blotch-prone wood, does cherry respond best to finer-grit sanding?

TIGER MAPLE

Would the stripes be enhanced by a coarse final grit, or would they be left blotchy?

make any difference. I cut one long board of each species into six 17½-in. by 8-in. sections and machine-planed them flat. Once the 18 sections were sanded to the appropriate final grit, I removed the dust using a clean paintbrush and a vacuum.

Three types of finish applied

After sanding, I used masking tape to separate each board into three sections. This allowed me to apply three different finishes to see if some are more sensitive to the final grit than others. I chose Danish oil for a minimal build, in-the-wood finish; shellac rubbed out with steel wool and then waxed for a medium-luster, thin film finish; and an oil-based polyurethane to give a more protective, high-gloss finish.

I used natural Watco Danish Oil, wiping on the first coat with a cotton cloth, and then wiping off the surplus. When dry, I applied a second coat and then wet-sanded using P400-grit wet/dry sandpaper and a sanding block. Then I wiped it dry to remove the surplus sawdust and oil. The next day, I applied a final coat in the same way as the first.

On the next section, I rubbed on Zinsser SealCoat shellac with a cotton cloth. I applied eight coats over two days, sanded lightly with P320-grit sandpaper on a sanding block, and then added two more coats. When dry, I rubbed the surface with 0000 steel wool, and applied a thin coat of paste wax, polishing with a cotton cloth.

Three different finishes

OIL

A natural look. *On one end of each sample board, Tuckman wiped on three coats of Danish oil to give a lower-luster, in-the-wood finish.*

SHELLAC

A medium-luster finish. *After building up a thin film of shellac, Tuckman dulled the surface with 0000 steel wool and then polished it with paste wax.*

Photos: Mark Schofield

I brushed three coats of Zar oil-based, high-gloss, interior polyurethane on the final section, sanding between coats with P320-grit paper. The third coat was left untouched.

Results: 220 or less in most cases

This test set out to answer the question of how much sanding is too much. Based on these results, I can feel confident putting the sandpaper down after using P150-grit if I'm using a film finish, P220-grit for an oil finish on non-blotchy wood, and probably P400-grit on blotch-prone boards.

I used clear finishes only. If you regularly stain your wood, you may want to do your own test. In general, wood sanded with higher grits tends to absorb less stain than wood sanded to a coarser grit. I also didn't test soft woods or very hard tropical woods, but most furniture woods fall in the hardness range of my three test species.

You also should sand correctly, even if you stop at a lower grit. When using the coarsest grit, make sure to remove all the telltale ripple marks left by the jointer and the planer. After power-sanding at final grit, make sure that you remove any swirls left by the random-orbit sander by thoroughly hand-sanding with the grain.

I am thrilled by the results; as a weekend warrior, I already spend too little time in the shop. I have better things to do with that time than listen to my sander. □

Ari Tuckman lives in West Chester, Pa.

VARNISH

High-gloss protection. *Three coats of oil-based polyurethane left a high-gloss film finish typical of a kitchen tabletop.*

Results

Each sample board was sanded and had three finishes applied. The difference, or lack thereof, between the highest and lowest sanded grits is depicted in the photographs below.

WHITE OAK

HIGHER GRITS MAKE LITTLE DIFFERENCE

The oak boards showed the least difference over the range of grits. Under the shellac and polyurethane finishes, all six boards were identical. The Danish-oiled panels were slightly lower in luster with the coarsest two grades of grit than with the finest two grits.

CHERRY

HIGHER GRIT FOR BLOTCHY BOARDS

There was a slightly lower luster on the oil-finished P120-grit board compared to the P400- and P600-grit boards. Tuckman had expected to see some blotchy cherry, but the sample board behaved fairly well. However, from previous experience he would still sand cherry up to at least P400-grit if he were going to use an oil finish.

TIGER MAPLE

FIGURE IS NOT A FACTOR

Tuckman had expected the coarser grits to leave the stripes more porous, resulting in more finish penetration and more pronounced figure. Instead, the degree of figure was equal on the extremes of grit with all three finishes. As with the other woods, higher grits brought out a higher luster under an oil finish.

Build a Country Hutch

Router-bit set makes short work of traditional glass doors

BY MARTIN MILKOVITS

Being self-employed as a furniture maker, it's always tough to find time to build a piece for my own use. But my wife and I had always wanted a cupboard to store our collection of dinnerware, so I relented and spent what little spare time I had building a cupboard that fits not only the space available in our dining room but also the overall décor.

The design of this piece germinated while I was building a large cupboard for a client. That piece was twice as wide as this version, and was made of maple with a rather plain frame-and-panel façade. I wanted something a little smaller, with more flair. So I scaled down the size and revised a few details to enliven the piece.

This version is made mostly of cherry, stained to a deep reddish-brown for an aged look. You can leave the cherry natural, and it will darken over time. The glass doors showcase our prized plates and glassware, and are easy to make on the router table. The beaded, painted back slats add texture and contrast, while the custom hand-forged door hinges contribute to the classic feel.

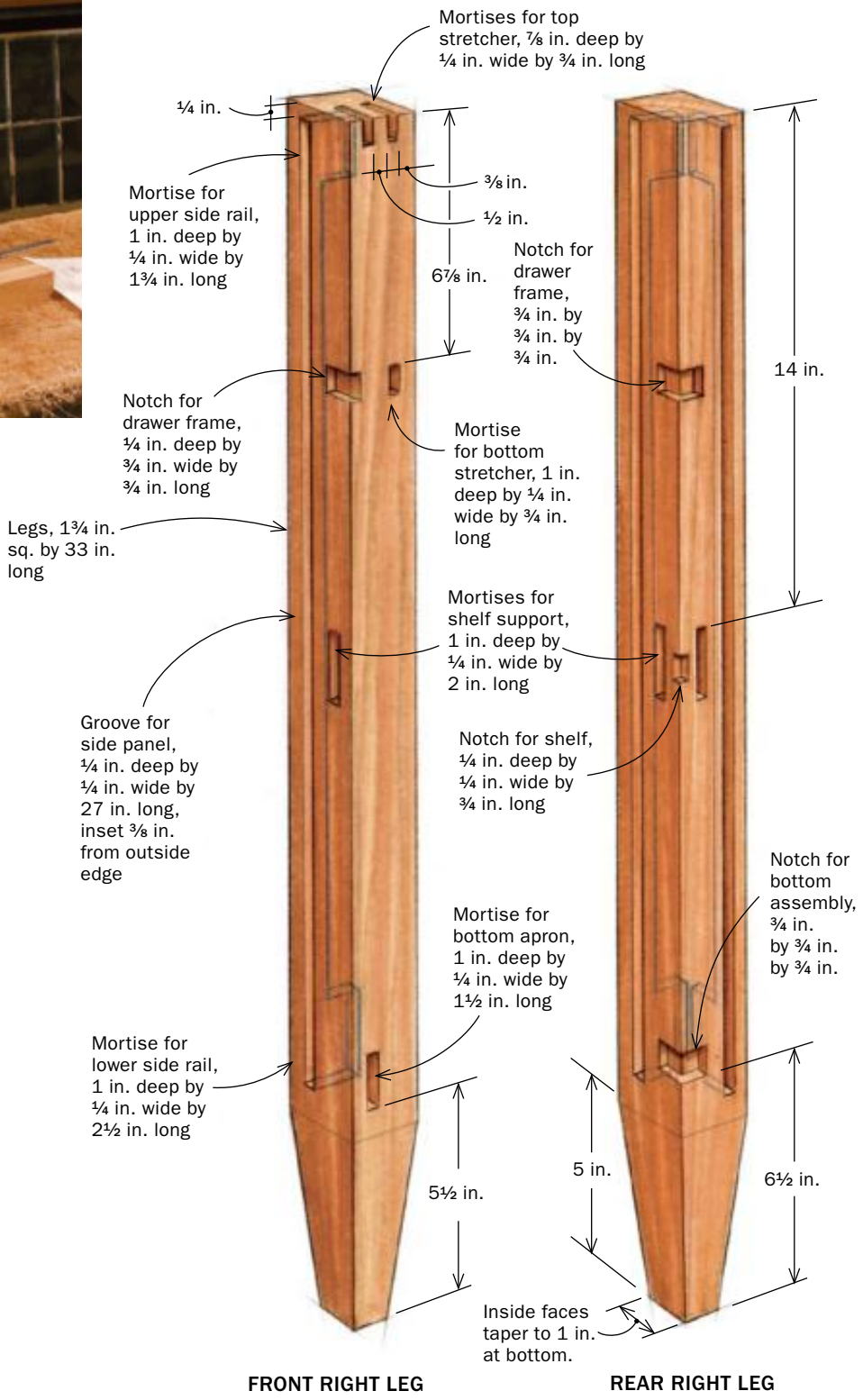
Lower case is a complex assembly

The lower case of the cupboard consists of a frame-and-panel bottom, back, and sides. The legs do double duty as the stiles of the frame-and-panel assemblies. As such, there are a number of mortises and

Photos: Thomas McKenna; drawings: Bob La Pointe

LAYOUT BEGINS WITH THE LEGS

The legs of the lower case also work as the stiles of the frame-and-panel sides and back, so there are a number of joints that need to be laid out. You'll also have to mark out notches for the bottom, the shelf, and the drawer guides.



grooves to be cut into each leg, as well as mortises for the front stretchers. The legs also are notched for the bottom and the drawer guides. For strength, the shelf sits in grooves in support members that also are mortised into the legs.

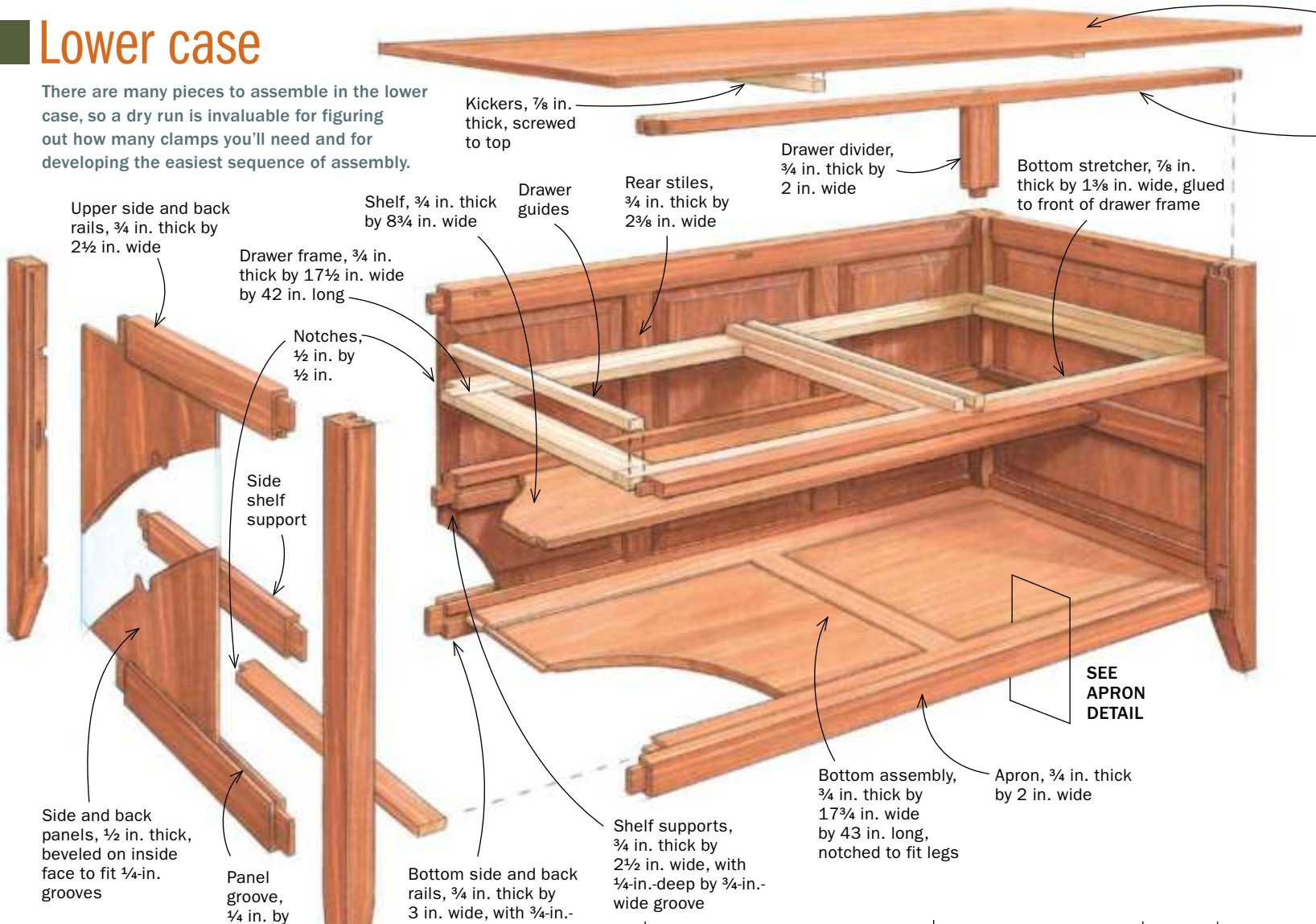
Taken individually, the lower case assemblies are relatively simple to construct. After dry-fitting everything together, begin assembling the back of the lower case. Don't forget to add the rear shelf support before gluing on the last leg. Set it aside to dry, then glue up the bottom frame-and panel assembly. Put together the front top and bottom stretchers and the drawer divider, and attach them and the lower front apron to the front legs. Check frequently for square.

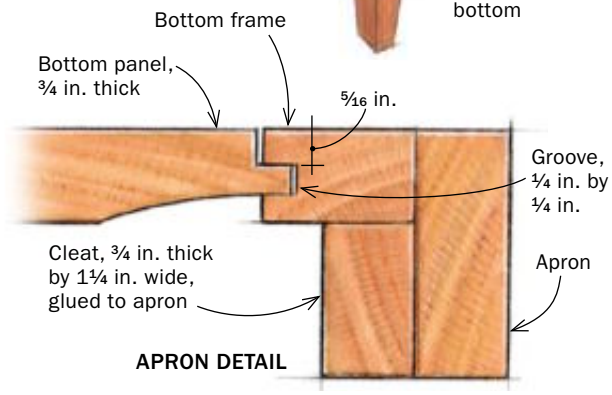
After the glue in the front, back, and bottom assemblies is dry, make up the drawer-guide assembly and glue it to the bottom stretcher. Glue the case bottom to the apron. Place the back assembly on the bench, add the shelf and its side supports (glue the shelf to the rear support only), then glue in the top and bottom side rails and slide in the side panels. When these two assemblies are dry, drop the case front and bottom assembly onto the rear assembly using the dadoes in the bottom side rails as guides. Drive the parts home with a mallet, then lift the case onto its legs and add clamps.

When the glue has dried, finish building the drawer system and cut the slots

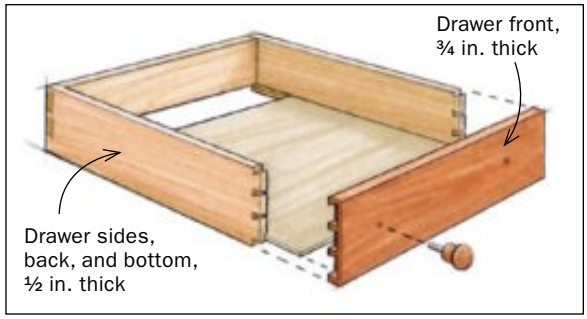
Lower case

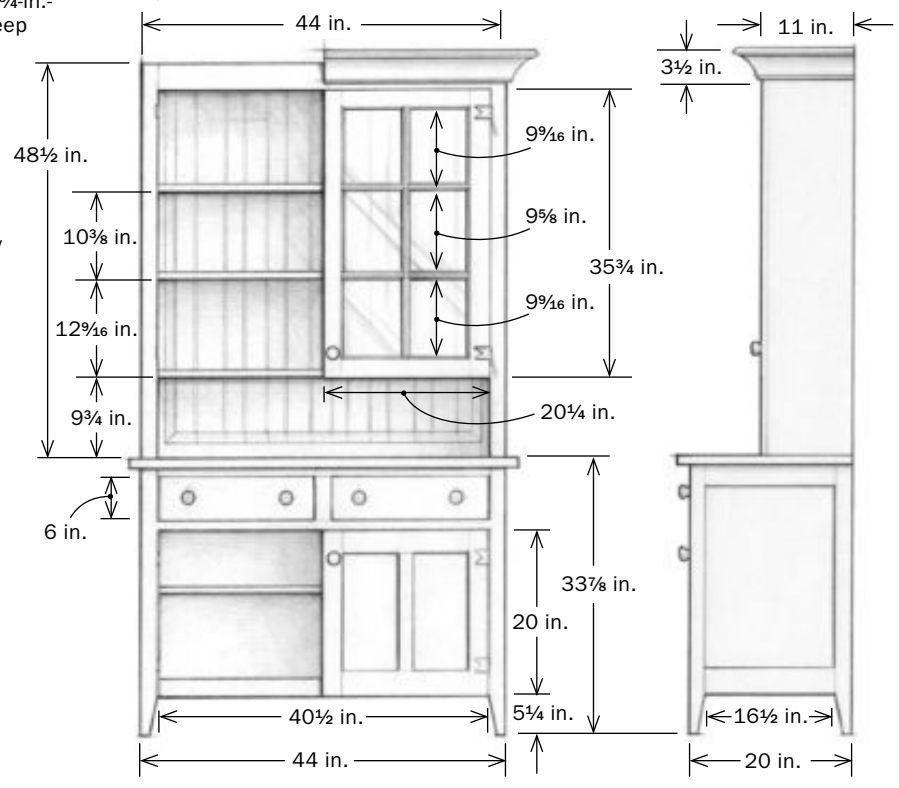
There are many pieces to assemble in the lower case, so a dry run is invaluable for figuring out how many clamps you'll need and for developing the easiest sequence of assembly.

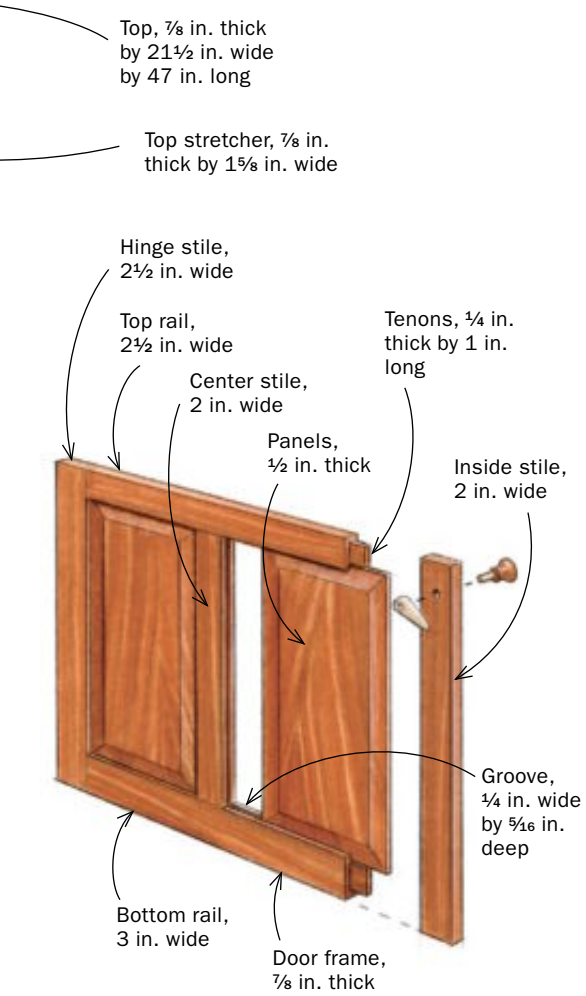




APRON DETAIL







for the buttons that will secure the top to the lower case. Once that's done, you can make and install the doors and drawers and cut and fit the top.

Upper case is dovetailed together

A cupboard is designed to hold stacks of plates and other dinnerware, which can put great demands on the structure. For maximum strength, the top and sides of the upper case are dovetailed together, and the shelves mate with the sides via tapered sliding dovetails. The tapered pins and slots add strength through the wedging action and make it easy to slide the shelves home without binding during glue-up.

After cutting the dovetail joint that connects the top to the sides, rout rabbets in the top and sides for the back panel frame and the front face frame. Stop the cuts short of the ends on the top piece to prevent an unsightly gap in the corners when the pieces are put together. Square up the corners after the case has been glued up.

Now lay out the shelf locations so that they will line up with the horizontal muntins in the glass doors. Set up a fence

ASSEMBLE THE CASE IN STAGES

1. *After gluing up the bottom assembly, attach it to the front legs. Put together the stretchers and the vertical drawer divider, and then attach them and the lower front rail to the front legs. Check frequently for square.*

2. *Glue the rear panels and stiles into the rails. Attach one leg (remember, the panels are not glued to the legs), slide in the rear shelf support, then attach the other leg. Glue in one side shelf support, slide the shelf into place (glue it to the rear support only), then install the other side support.*

3. *Glue the front to the back. Place the back assembly on the bench. Install the side panels, then hoist the case front and drop it down on the rear assembly.*

Upper case

The top case is a bit simpler to glue up than the lower case. The top and sides are dovetailed together first, then the front face frame is added. The shelves mate with the sides via tapered sliding dovetails, and the back assembly sits in a rabbet.

Connect the top to the sides. *To ensure that the assembly remains square, the author clamps square sections of plywood into each corner.*

Add the front face frame. *For a good fit, rip the rail and stiles so that they're a hair proud of the case, then plane the frame flush to the sides after the glue dries.*

FineWoodworking.com

Take a tour of the finished project with Milkovits, and learn how to produce the tapered sliding dovetails.

Slide in the shelves. *Flip the case onto its front to install the shelves. You should be able to drive each shelf home with only a few light blows of a mallet.*

Drop the back panel in place. *Remember to rout the rabbet on the bottom of the frame to mate with the groove in the top of the lower case.*

for the router to cut the dovetail slots and adjust the fence so that the slot tapers toward the front of the case. Cut the tapered pins on the shelves using a router table, working one shelf at a time to allow for any differences in the slot widths.

After cutting the pins on the shelves, rout a stopped groove in each one for a plate rail, which is handy if you simply want to display fancy plateware. Now glue up the top and sides of the upper case and slide in the shelves (see the sequence in the photos above).

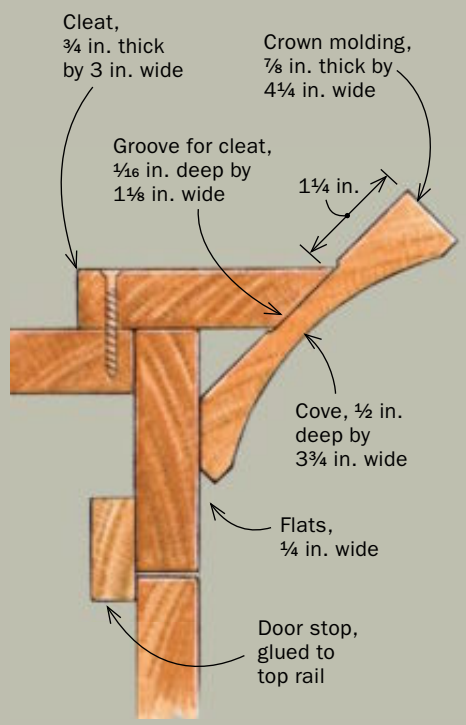
Once that is complete, build the front face frame, which will hold the glass doors, and the back assembly, which is basically a series of shiplapped boards that float in a frame to allow for expansion and contraction.

The case is topped off with a simple crown molding cut on the tablesaw. (For a detailed explanation of how to make crown molding, see *FWW* #168, pp. 68-73.)

Glass doors add interest and elegance

To simplify construction, the frame of the glass doors in the upper case is assembled with loose mortise-and-tenon joints. Mill the rails and stiles to size, cut the mortises

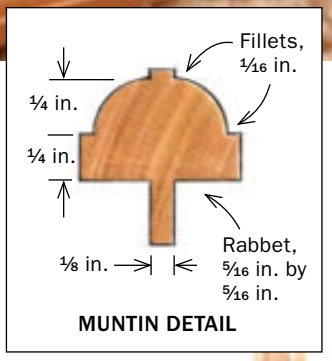
A SIMPLE WAY TO ATTACH THE CROWN



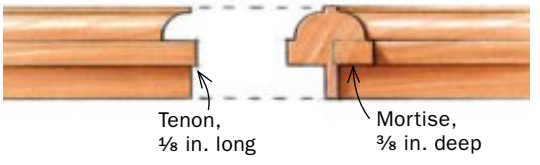
Install the crown molding. *Screw and glue the side pieces. Then scribe and fit the front section for a perfect miter.*

Glass doors

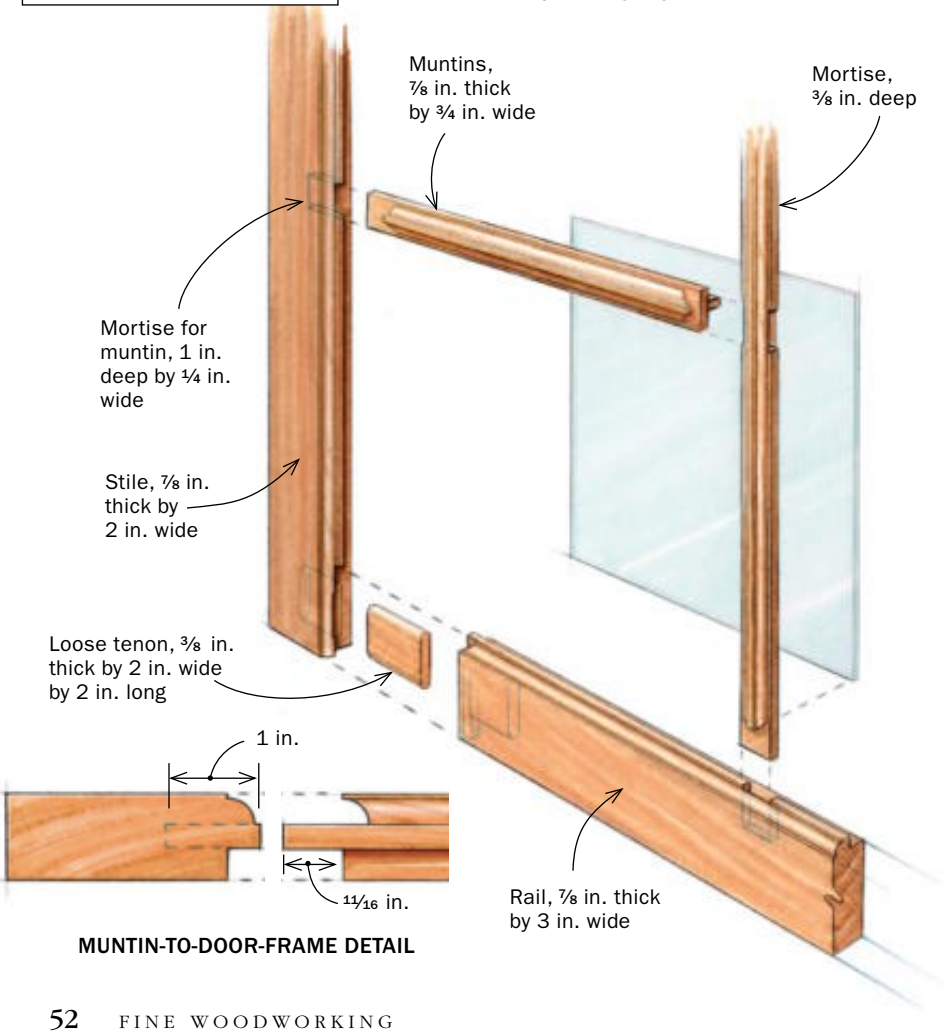
To ease construction, the door frames are assembled with loose mortise-and-tenon joints. The muntin stock and the inside edges of the frame can be completed quickly using a router-bit set consisting of a sticking bit, a cope bit, and a rabbeting bit.



MUNTIN DETAIL



MUNTIN-TO-MUNTIN DETAIL

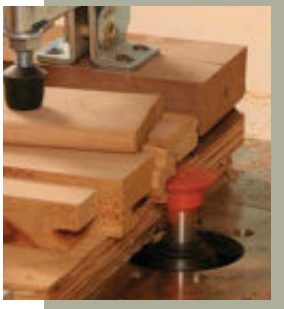


MUNTIN-TO-DOOR-FRAME DETAIL

SHAPE THE MUNTINS

Safe way to profile the thin muntins. *Rout the ovolo profile on a wide piece of stock (top), then rip to width on the tablesaw. To keep your hands clear of the bit while cutting the rabbets, mount the pieces in a wide cradle profiled to fit the muntin (bottom).*

COPE THE ENDS



For a clean cope, use a jig and backer board. *Place the stock in a sled that rides in the miter slot of the router table (above). Clamp the muntin between a fence and a backer block to prevent blowout. (left).*

and tenons, then rout the profile on the inside edges.

To shape the profile on the frame and the muntins, I used a divided-light door router-bit set from CMT (item No. 800.525.11). The set has a sticking bit to cut the profile, a cope bit to shape the mating profile on the muntin and rail ends, and a rabbeting bit to cut the recesses for the glass panes.

To make routing the narrow muntin stock safer, I did a few things. First, I routed the ovolo profile on wider stock, then ripped the pieces to width. To rout the rabbets on the back of the thin muntins, I mounted the pieces in a cradle, simply a 3½-in.-wide piece the same thickness as the muntin stock, with one edge shaped in the negative image of the ovolo profile. The cradle holds the piece securely and keeps my fingers clear of the rabbeting bit.

To hold the thin stock for coping, I used a sled that rides in the miter slot of the router table. The muntin is clamped between a fence and a backer board to prevent tearout as the bit exits the cut.

Once you have completed all the profiling, chop the mortises in the stiles and rails and the vertical muntin using a hollow-chisel mortiser or chisels. When the frame is glued together and the door is fitted to the opening, add the glass panes, securing them with brads and glazing putty.

I used hand-forged iron butterfly hinges, which can be a bit tricky to install. I align the bottom edge of the hinge with the inside edge of the top or bottom rail. Lay the hinge backward on the stile with the back flap on the edge of the stile and the back side of the butterfly flap facing out on the face side of the stile. Locate the center hole and install a screw, making sure that the butterfly flap is still flat on the stile. Remove the screw, and place the hinge in the normal position, reinstall the screw, and then scribe around the back flap. Chop in the hinge mortise and install the rest of the screws. If done correctly, the back side of the butterfly flap should be in the same plane as the door and stile face.

Finish gives an aged appearance

For final sanding, first wet the piece to raise minor dents that happened during construction. Power-sand to P180-grit, wet the piece again to raise the grain, then hand-sand with P150 and P180 grits.

To add an antique patina, I used 100 drops of TransTint dark walnut #6005 dye per 1 pint of denatured alcohol as a wash-coat, followed by General Finishes candlelight stain and several coats of Minwax Antique Oil and wax. The back panel and upper case interior are painted an ivory color. □

Martin Milkovits is a custom furniture maker in Mason, N.H. Full-size plans for this and other projects can be purchased at www.FineWoodworking.com/PlanStore.

Assemble the door frame. *Drive the horizontal muntins into the stile mortises, then install the vertical muntins in the rails (above). Elevate the frame so you can get clamps underneath, then bring all the parts together (right).*

TOOL TEST

Routers for Router Tables

New-breed models spare you the expense of a router lift

BY ROLAND JOHNSON

ABOVE-TABLE ADJUSTMENTS MAKE THE DIFFERENCE

A table-mounted router can be very versatile. But it's important to choose a router that's designed expressly for that purpose. The best allow both bit-height adjustments and bit changes from above the table. A router that makes you reach underneath for these routine adjustments will quickly become annoying to use.

Photo, this page (right): Michael Pekovich

Routers are among the most versatile tools in the shop—the go-to gear when you want molded edges on lumber, dadoes in sheet stock, mortises for loose tenons, or multiple curved pieces that match a template.

Routers are no longer just handheld tools. More and more woodworkers keep one mounted in a table. That gives more precise control over a variety of work, using bits that otherwise would be too big to use safely. A table allows the use of featherboards, hold-downs, a miter gauge, and other aids that won't work with a handheld router. With a table-mounted router, you can create moldings on large or small stock, make raised panels using large bits, cut sliding dovetails, and much more.

Until recently, the best way to marry router and table was with a router lift, an expensive device that holds the router and allows you to change bits and adjust cutting height from above the table.

Now, a new generation of routers with a specialized base threatens to make the router lift obsolete. They promise the same convenient above-the-table bit adjustment without the expense of a separate lift.

After testing seven of these new routers, looking mainly at how handy they are to use, I found that at least one delivers fully on the promise of convenience.

The tools I tested range in price from about $175 to $300. They have ½-in. and ¼-in. collets, and most have a 12-amp motor for about 2¼ hp; the Milwaukee claims 3¼ hp. Most are fixed-base models; as the table on p. 58 notes, some come with a separate plunge base for handheld use. (The Triton is different: It does everything with its plunge base.) A majority have 1⅛ in. to 1⅜ in. of bit travel with the crank, a typical and adequate amount for above-table bit changes. The Ridgid and the Triton have 1 13⁄16 in. and 2¼ in. of travel, respectively.

Height adjustment

Crank it up. *All the tools for adjusting bit height worked well. Graduated dials on the Porter-Cable and the Triton are not very useful.*

Unclamping the motor. *To adjust the height of the router bit on most of the models, the motor clamp must first be loosened. On the Porter-Cable (left) and the Freud, you can set or release the motor lock from above the table. The rod engages a cam that moves the locking lever. But you have to reach under the tabletop to get to the lock for the Milwaukee (above), the Bosch, the Craftsman, and the Ridgid. The Triton's clever design means you can skip the locking step altogether.*

Adjustability varies widely

When the router is attached upside down to the router table and is out of easy reach, simple, secure, and easy bit-height adjustments from above the tabletop are crucial. That's the most important feature in this router type because you'll use it most often. I quickly found significant differences.

The Triton has the best design. Its plunge base moves on a rack-and-pinion assembly. You make coarse and fine adjustments to the bit height with an easily turned crank handle. The height adjuster also has a ratchet mechanism that comes into play when the bit is extended or retracted fully. It's a nice feature, which keeps you from cranking the bit too far and helps reduce stress on the rack-and-pinion assembly.

Like other routers, the Triton has a motor lock. But unlike most other routers, you don't have to tighten it to maintain the cutting height in use. I found that the rack-and-pinion assembly stayed put. For the record, the owner's manual recommends using the motor lock for heavy cuts.

On the other routers, you need to unlock the motor in order to move the bit up or down, then lock the motor again.

On the Porter-Cable and the Freud, you can lock or unlock the motor from above the table, using the same handle used to change the bit height. Motor clamps on the

Bit-changing: one wrench or two?

Easiest bit-changing. *The Triton (above) has a well-designed spindle lock, and it lifts the collet above the table so you need only one wrench for bit changes. The Porter-Cable (left) is one of several routers that need two wrenches for bit changes; but at least you can do it from above the table.*

Bosch, Craftsman, Milwaukee, and Ridgid routers can be worked only by reaching under the table. That's inconvenient, especially if your router table has an enclosed base.

Two offer quick bit changes

You might think that a router meant for a router table would be designed so you could change bits without having to reach under the table or lift the router free. You often would be wrong.

Bit changes are the biggest chore on the Bosch, the Craftsman, and the Milwaukee. Their collets don't extend above the table and they don't have spindle locks. You have to reach under the table with two wrenches or remove the router from the table.

The other routers are better. The handiest are the Freud and the Triton. Both have collets that extend above the table and easy-to-reach spindle locks. You need only one wrench to change bits on those two.

The Porter-Cable falls somewhere in between: It's a good basic system but has some inconvenient details. It has a collet lock, but you can reach it only from below the table. To compensate, it comes with a pair of wrenches, one of which is cranked for use from above. But a plastic chip guard/dust deflector gets in the way of the wrenches and won't let the collet extend above the table. Fortunately, you can remove the guard.

There are two ways to change bits on the Ridgid, both inconvenient. You can crank the collet nut above the table and use one wrench. But to do that, you must reach under the table to press the spindle lock. Or you can use two wrenches. But to do that easily, you must take the router out of the table.

Collet runout can affect performance

A router bit needs to be as concentric as possible while running, to create as smooth a surface as possible. Too much collet runout can mean the difference between a router that produces a clean, smooth profile in one pass and one that needs multiple passes to do a decent job.

To check runout, I mounted a ½-in.-dia. bit in the collet and turned it by hand while measuring with a dial indicator. I remounted the rod and ran the test several times with each router, then discarded the highest readings, to account for anomalies caused by bit position or chucking.

The Triton had less than 0.001 in. of runout, with Milwaukee and Ridgid very close behind, at 0.001 in. exactly. Bosch and Porter-Cable had runout of 0.003 in. Craftsman and Freud had 0.005 in., an amount I normally consider unsatisfactory.

To gauge what those measurements might mean in use, I ran the best and one of the worst with a large, tall molding bit and a fast feed rate. That would accentuate any differences runout might make in the smoothness of cut. Both the Triton, with almost no runout, and the high-runout Freud left chatter marks after one heavy pass. A

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Visit our Web site for free, downloadable plans for a stow-and-go router table.

Photos, except where noted: David Heim; p. 55 (top) and this page (top): Roland Johnson

second pass, taking a lighter cut and slowing the feed rate, cleaned up the molding from both routers. It was hard to tell which router produced which molding.

I had to conclude that actual performance minimized differences in the raw runout measurements. Any of these routers is capable of producing smooth moldings if you pay close attention to the feed rate and don't try to hog out the profile in one pass.

Switch placement and safety interlocks

The Porter-Cable and the Triton have a safety feature I appreciate: an interlock for the power switch that prevents the router from starting when the spindle lock is in place. I use a foot switch with a router table, so the router's switch is always in the on position. The interlock means that the router won't start if I'm changing bits and hit the foot pedal by accident.

The Triton is the only router in this bunch with good dust-collection capabilities. It has a clear plastic shroud surrounding the entire area around the plunge base, and it accepts a 1⅜-in. vacuum hose. With the rest of the routers, be sure the router table has a good dust-collection system.

One clear winner

The Triton came out ahead in every important consideration. It has the easiest bit-changing design, an accurate and easy-to-use height adjuster, and an integrated spindle lock/power-switch lockout. It had the lowest bit runout measured, and it's the only one with good dust control. My only quibble: The base has a 3⅛-in. opening, which is slightly smaller than the opening on the other routers; my 3⅜-in. panel-raising bit won't fit the Triton. I've made the Triton my choice as best overall. Its $200 street price also makes it the best value.

If you want (or can afford) only one router, the Triton is my first recommendation. Whenever you want to use it as a handheld router, you have to remove it from the table and replace the large rectangular table insert with the standard round base.

The Freud FT1700 is a more convenient alternative if you buy its optional plunge base (Freud said it planned to begin offering one in late 2006). You can leave the fixed base attached to the router table and drop the motor into the other base for handheld routing.

Roland Johnson is a contributing editor.

Other features to consider

Dust collection. *A plastic shroud around the Triton's base does a good job of directing dust to a shop-vac hose. None of the other routers has a good dust-collection design.*

Switch styles. *The Freud's large slide switch (left) is slightly easier to reach and use than a small rocker switch such as the one on the Milwaukee (above).*

Routers for router tables

TESTING THE ROUTERS

Slow turn. *Johnson tested runout manually, spinning a bit while checking readings on a dial indicator. Test runs with the best and worst for runout, using a tall molding bit, produced some chatter marks on the first pass, but a second pass cleaned up the profiles.*

MODEL	SOURCE	STREET PRICE	WEIGHT (lb.)
Bosch 1617EVS	www.boschtools.com 877-267-2499	$180	9.1
Craftsman 1617-12	www.craftsman.com 800-349-4358	$220	9.1
Freud FT1700VCEK	www.freudtools.com 800-334-4107	$175	9.5
Milwaukee 5625-20	www.milwaukeetool.com 800-729-3878	$300	11
Porter-Cable 891	www.porter-cable.com 800-487-8665	$230	9.2
Ridgid R2930	www.ridgid.com 800-474-3443	$200	9.3
Triton MOF001KC	www.tritonwoodworking.com 888-874-8661	$200	10.25

AMPS	SPEED RANGE (rpm)	MAX. BIT TRAVEL (in.)	MAX. BIT DIA. (in.)	COLLET RUNOUT (in.)	BIT CHANGE	BASE	COMMENTS
12	8,000–25,000	1⅜	3 11⁄16	0.003	Double wrench	Fixed	Nearly identical to Craftsman. Bit-changing and height adjustment inconvenient. Plunge base included, but lacks above-table adjustment.
12	8,000–25,000	1⅜	3 11⁄16	0.005	Double wrench	Fixed	Nearly identical to Bosch. Bit-changing and height adjustment inconvenient. Plunge base included, but lacks above-table adjustment.
13	10,000–23,000	1⅛	3 11⁄16	0.005	Single wrench	Fixed	Very easy to change bits. Height adjuster also operates motor clamp. Company has announced a 3¼-hp model with similar features.
15	10,000–22,000	1⅜	4	0.001	Double wrench	Fixed	Bit-changing and height adjustment inconvenient. Small on/off switch can be awkward to use.
12	10,000–23,000	1¼	3¾	0.003	Double wrench	Fixed	Above-table bit-changing, but with two wrenches. Separate plunge base included.
12	10,000–23,000	1 13⁄16	3⅝	0.001	Single wrench	Fixed	Bit-changing is inconvenient. Separate plunge base included.
12	8,000–20,000	2¼	3⅛	0.0007	Single wrench	Plunge	Easiest bit-changing and height adjustment. Templates, edge- and circle-cutting guide included.

An Introduction to Veneering

Simple techniques and common tools produce stunning panels for doors, box lids, and more

BY THOMAS R. SCHRUNK

Veneering has an image problem: Woodworkers see it as difficult; non-woodworkers consider it inferior to "solid wood." Both perceptions are untrue. As with many woodworking procedures, the steps of veneering are easy to master and, with practice, you can produce beautiful results. Veneering opens up a world of exotic and beautiful woods such as burls and crotches, many of which would be difficult and prohibitively expensive to use as thicker lumber.

As an introductory project, we'll veneer a plywood panel that can be inserted in a frame to form the door to a cupboard or bedside cabinet, or the lid for a box. The frame means there is no need to veneer the panel edges. And because it is not solid wood, the panel can be glued into its groove, strengthening the assembly. This is especially helpful with router-made cope-and-stick joinery, which has limited strength on its own.

Select and prepare the veneer

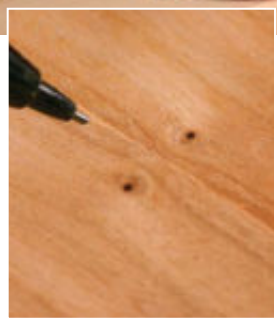
Start with a core of 3⁄16-in.-thick birch plywood an inch wider and longer than the final size. After it is veneered and cut to size, it will fit into a ¼-in.-wide groove.

If you don't have a local supplier, try mail-order and online veneer sources (see p. 65). For this project, I selected some attractive cathedral-grain cherry for the outside, or face, of the panel, and quartersawn cherry veneer for the back side. You must veneer both sides to prevent the plywood from warping. The back veneer need not be the same species, but the grain direction should be the same as the face veneer.

Book-matching shows off figure—You could use a single piece to veneer the panel, but a more interesting

Photos: Mark Schofield

Veneer opens the door to many species of exotic woods. *Many decorative and exotic woods are prohibitively expensive or difficult to find as solid lumber.*



A perfect match. *When orienting veneer for a book-matched panel, overlap the two sheets (above) until you find the best place to make the joint. Identifying marks on the wood (right) are a great help in achieving perfect vertical alignment.*

Wavy veneers are easy to flatten

The unique figure of burls and crotches puts them among the most sought-after veneers, but a drawback is that they often arrive wrinkled and curled. Before you can use them, you must flatten them.

LARGE PIECES ARE DAMPENED AND CLAMPED

If the veneer is highly contorted and brittle, lightly spray the front and back with a flattening solution. I use three parts water, two parts white glue, one part glycerin (available at drug stores), and one part denatured alcohol. This solution keeps the veneer flatter for longer than water alone, but it fills the pores, which will color differently from the wood if a stain is applied (so use water if you plan to stain the wood). After wetting the surface, place the veneer between paper towels and clamp between ¾-in.-thick particleboard or MDF cauls. Change the towels after 10 minutes, after 30 minutes, then every few hours until the veneer is dry.

SMALL PIECES CAN BE IRONED

A household iron can be used to flatten small pieces and works well on burls. Place the veneer on a nonporous surface such as melamine. Beginning at one end, move the iron slowly up the veneer, covering the heated veneer with another piece of melamine to prevent water vapor from escaping. The lignin in the wood plasticizes at around 180° and the layers of melamine keep it flat as it cools.

With both methods, keep the veneer clamped until use.

Wet the veneer. *Lightly mist both sides of the wrinkled crotch veneer and sandwich it between paper towels and MDF cauls. Stack these sandwiches and clamp the whole package.*

Iron the veneer. *Slowly move a medium-hot iron (no steam) across the veneer to temporarily plasticize the wood. Immediately cover it with a piece of melamine to keep it flat as it cools.*

Create an invisible seam

1. Cut veneer carefully

With the veneer secured under a sandpaper-backed ruler, make a series of light cuts until the waste is separated.

2. Sand the cut edges

Sanding ensures a perfectly straight surface and impedes finish entering open pores in the wood and creating a dark line when finish is applied. Square aluminum tubing makes a good sanding block.

TOOLS OF THE TRADE

STRAIGHTEDGE
A long, thick straightedge is needed to cut the veneer for seaming pieces together.

BLUE 14-DAY TAPE
This tape has a stronger adhesive than the 60-day kind.

VENEER TAPE
This moisture-activated adhesive tape is very thin so as not to telegraph into the wood when the veneer is pressed.

UTILITY KNIFE
A knife with a sharp, non-retractable blade works best for cutting thin veneers.

way to present some veneers is to take sequential leaves from the same log, and flip one piece over like the page of a book to form a mirror image, a process known as book-matching.

Compare the two pieces of veneer to find the location of the best match, and then lightly mark the cut line with a No. 2 pencil on the first piece. When cutting veneer, a self-healing mat used for fabric works well, but you also can cut on a piece of medium-density fiberboard (MDF). For most veneer I use a utility knife with a fixed blade (it is less wobbly than a retractable-blade knife) and I change blades frequently. I hold down the veneer with a 2-in.-wide aluminum rule with P80-grit sandpaper stuck to the back to prevent slipping. Make a light scoring cut, then four or five cuts of moderately increasing pressure until the cut is complete. Lay the freshly cut piece over the second piece of veneer, mark the exact matching line, and cut it, too.

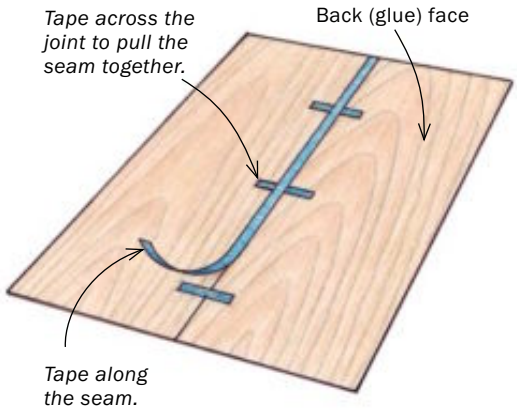
The next step is to sand the mating edges of the pieces. Place one piece on the workbench with the cut edge hanging over the bench by about ⅛ in. Place a metal straightedge on top of the veneer, even with the edge of the workbench. Sand the cut edge with a sanding block, gently moving it with even, horizontal strokes. I use a square section of dead-flat aluminum with P180-grit sandpaper stuck to one side, but you could use two bits of plywood glued into a T. Stop when you see sawdust all along the cut. Repeat with the mating half.

Sanding the cut has a second benefit: On many book-matches, the joint shows up as a dark line called the “glueline.” It is the result of liquid finish getting into open pores. When the cut is sanded, however, the pores tend to become plugged with fine dust that the finish has trouble penetrating. With practice, the glueline will be almost invisible.

Tape the matching veneers together—The side of the veneer that will be visible is referred to as the show face, while the back

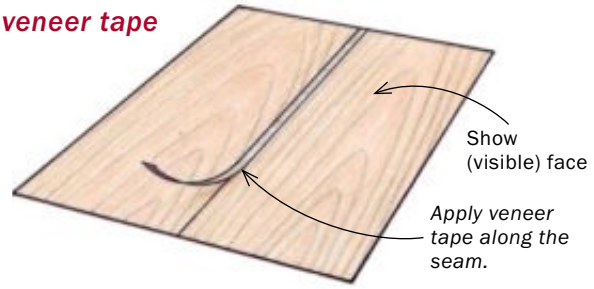
3. Tape both sides with blue tape

Apply blue tape to the visible side of the veneer to temporarily hold the pieces together, then flip the veneer over and tape the back (below).



4. Retape the show face with veneer tape

Flip the veneer and remove the blue tape from the show face only. Then apply a single strip of veneer tape.



side is the glue face. To lock in a symmetrical alignment, place the veneers together, show face up, and join them with pieces of blue tape. Flip the veneer over and put 3-in. to 4-in.-long strips of blue tape across the joint spaced every 3 in. to 5 in., pulling and stretching the tape so that it acts like a clamp. Then place an additional piece all along the joint and press it down firmly. Now turn the veneer over to the show face again and remove the blue tape used for alignment. The veneer tape you are about to apply is thin enough not to imprint the veneer when it is in the press. Its adhesive is moisture activated. You can use a wetted sponge or you can simply lick the tape, but practice first on a piece of scrap veneer. Too little or too much moisture and the tape won't stick. Put veneer tape all along the joint. When the tape is dry (about 5 minutes) you can place the core on top of the veneer and cut the veneer to size with a utility knife. Finally, remove the blue tape from the back side.

5. Trim veneer to size and remove the blue tape

Place the plywood core on the taped pieces of veneer and cut around the core. Before pressing the veneer, remove the temporary blue tape from the glue face of the veneer.

Veneer both sides of the panel at the same time

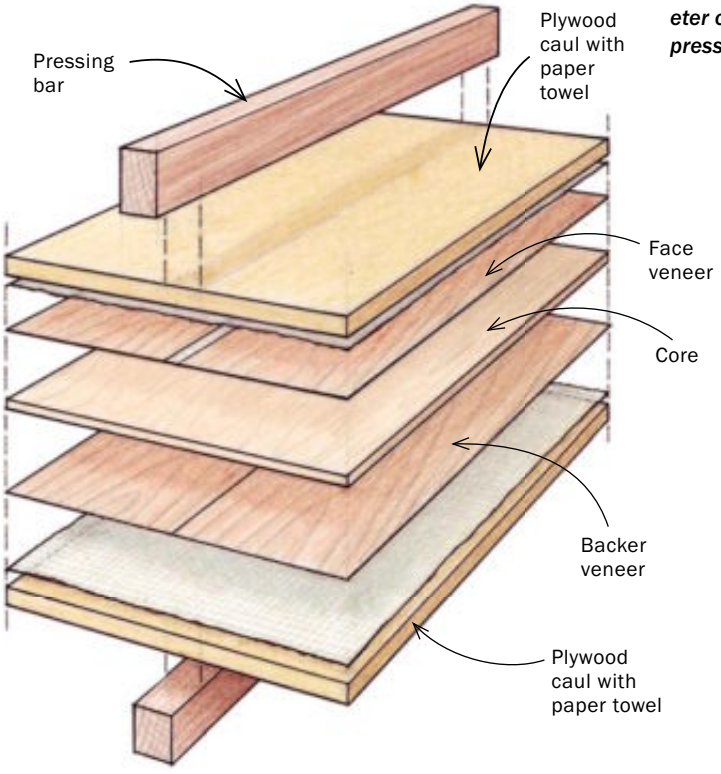
Because the veneer will begin to curl as soon as the glue makes it wet, you should have the clamping method prearranged to allow you to work quickly. If you're new to veneering, I'll assume

Glue and trim the panel

Glue the veneer. *With clamps and cauls ready to go, apply yellow glue to one side of the plywood core and spread it with a short-nap roller.*

Glue-face down. *When you place the veneer on the glued core, make sure that the show face with the veneer tape is face up. The back-side veneer also is applied now.*

Clamping press. *Schrunk spaces clamps around the perimeter of the panel, and then uses a pair of pressing bars to add pressure at the center where the clamps can't reach.*



that you don't have a vacuum pressing bag, but for panels like these, C-clamps, pressing bars, and plywood work just as well. I begin by placing a couple of 4-in.- to 5-in.-tall support blocks on the bench to support the workpiece and allow clamps and bars to pass underneath. On this I place a caul of ¾-in.-thick plywood or particleboard and a single layer of paper towels, both cut to the same size as the panel. These towels will absorb moisture as the glue evaporates and will prevent the cauls from bonding to any glue squeeze-out. If the towels stick to the panel, any residue can be sanded away later.

There are a number of specialty veneer glues available, but I use standard yellow glue for most work. It's important to coat the entire surface evenly. I pour the glue onto the core, never the veneer, and spread it with a short-nap roller, 3 in. to 4 in. wide. This type of roller should apply the proper amount of glue, leaving the surface lightly wetted and evenly glistening. Starting out, one usually applies a bit too much glue; try a practice piece first.

Glue one side of the core and place it onto the backer veneer, then apply glue to the front of the core. Set it on the lower caul and paper towel, and place the face veneer over it, glue face

Drawings: Vince Babak

Tape tames tearout when cutting the panel. *Apply masking tape to the back face along the line that will be cut on the tablesaw (above). Cut the panel to fit the frame with the show face up (above right).*

down. Add the paper towel and the upper caul, and you're ready to press. You may want to put blue tape over the edge of the veneer near the corners to prevent "squirm" or slippage of the veneer as it is clamped.

I use clamps spaced every 3 in. to 4 in. around the perimeter, which exert good pressure in a 4-in.-dia. to 5-in.-dia. circle. If the workpiece is wider than about 9 in., you should add one or more pairs of pressing bars to apply pressure where the clamps can't. The bars are 2-in. to 3-in.-wide boards with convex profile of around ⅛ in. per foot on the contact edge. Leave the veneer clamped for at least six hours, preferably overnight.

Cut the panel to size, then sand it

With the veneer dry, the next step is to cut the panel to the frame. To minimize tearout, I cut the panel show-face up with blue tape applied to the back along the lines to be cut.

Some like to remove the veneer tape with a scraper or to lightly moisten it and peel it off. I prefer to begin sanding with P120-grit paper on a random-orbit sander until the tape is sanded away, and then move up the grits until I get to P220. Be sure to sand the back panel in the same way; you will finish it identically so that you'll have an equal moisture barrier on both sides to prevent warping. Use caution near the edges to avoid sanding through the thin veneers. Wet the surface with mineral spirits to see that no veneer tape or adhesive is left, then glue the panel into the frame and apply a clear finish. □

Tom Schrunk works with exotic veneers in Minneapolis, Minn.

Sources of Supply

CERTAINLY WOOD
www.certainlywood.com
716-655-0206

CONSTANTINE'S
www.constantines.com
800-443-9667

ROCKLER
www.rockler.com
800-279-4441

Sand away the tape. *Use a random-orbit sander to remove the veneer tape and to prepare the surface for finishing.*

Strong and beautiful. *Because it is not solid wood, the veneered panel can be glued into the frame to strengthen the assembly.*

Sound Advice

Smart new plugs and muffs leave you no excuse for unprotected ears

BY DAVID HEIM

Hearing protectors are the workshop equivalent of the galoshes your mother nagged you to wear.

If you obeyed your mother then, chances are you're pretty diligent now about using hearing protectors whenever you turn on noisy shop machines. But if you didn't listen to Mom, you probably forgo ear protectors, thinking they're too uncomfortable, you'll get used to the noise, or you needn't bother because you'll be working for only a few minutes. And you probably still wreck your dress shoes in the rain.

We recently posted a poll on FineWoodworking.com asking what type of hearing protection people used most often. More than 6 in 10 of the 1,018 respondents said they used earmuff-style protectors. Disposable foam plugs came in a distant second. But 1 in 10 said they usually don't wear hearing protection.

In fact, hearing protectors are as essential to a well-equipped, safe shop as good lighting, safety glasses, and an effective dust collector. Sounds that are too loud will damage your hearing, even if they only last a short time. The louder the sound, the faster it can cause harm. And you don't get used to loudness—you lose your hearing and/or end up with tinnitus, a permanent ringing in the ears. The problem is that hearing damage builds up in tiny increments over the course of a lifetime, and before you know it, it's too late.

You probably need to wear hearing protectors more often than you think, but that no longer has to mean using plugs that seem as form-fitting as a tapered 2x4 or wearing muffs that make you feel as if you're in a soundproof room.

A wave of new technology

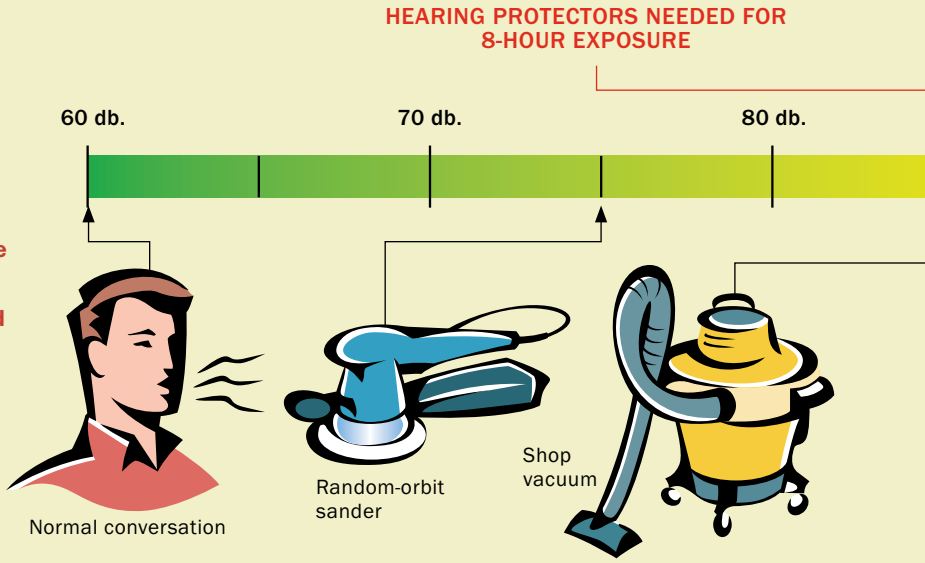
The simplest, least expensive earplugs and muffs reduce sound levels uniformly. They're designed to absorb some of the energy

NOISE LEVELS, TOOL BY TOOL

Sound is measured in decibels, a unit named for Alexander Graham Bell, who was known for his research into acoustics and deafness before he invented the telephone. The decibel scale is logarithmic, not linear. Every 3-db. increase means a doubling of the sound energy hitting the ear.

We can safely tolerate sounds up to about 85 db. But as the graph at right shows, many shop machines emit much more sound. Past that 85-db. threshold, you must limit exposure and don hearing protectors to avoid long-term damage.

The National Institute for Occupational Safety and Health maintains an online database that lists the loudness of 120 popular tools from 14 manufacturers (www.cdc.gov/niosh/topics/noise/workplacesolutions/toolsDatabase.html). You also can play a 5-second-long audio file for each tool.



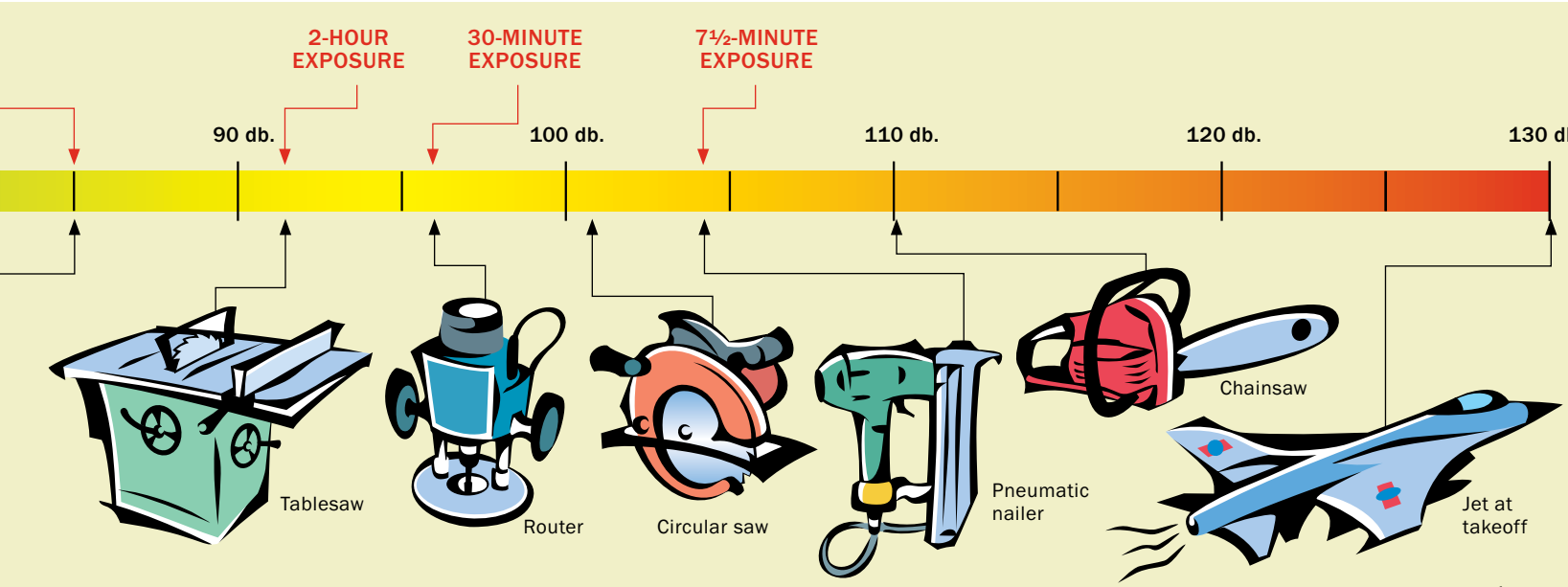
Source: NIOSH data, author measurements

Drawings: Stephen Hutchings

in the sound waves hitting our ears, cutting it by, say, 20 db. Many newer products are smarter, providing variable protection. Some plugs have pinholes that allow you to hear sounds at safe levels but reduce louder, harmful noises. Others have various kinds of acoustic baffles. Many promise improved comfort. Newer ear-muff-style protectors come with electronics to help minimize the plugged-up and isolated feeling you can get from conventional muffs. Some have a microphone that picks up nearby sounds. Others have an FM/AM radio. Still others combine the microphone and the radio. What all these smart muffs have in common is the

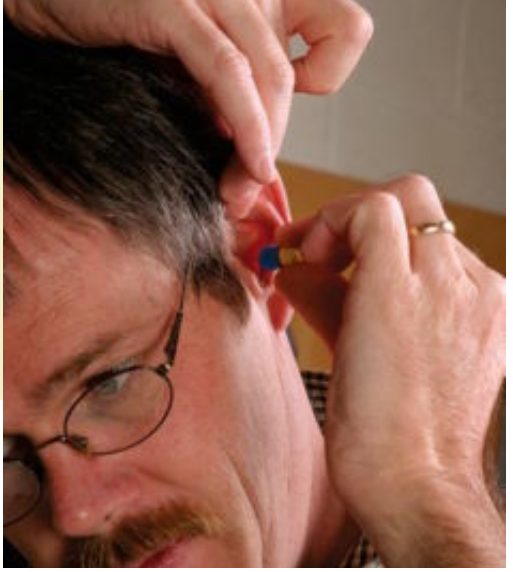
SHORT BANG, LONG DRONE: BOTH BAD

Pneumatic nailers emit what's known as impulse noises. They last only a fraction of a second, too short for our brains to register the sound as loud. In fact, a nailer can be louder than other shop machines, such as a jointer or a tablesaw.



Earplugs

Simple and inexpensive, plugs can provide ample hearing protection. The ones shown here typify new designs that let normal sounds through but block harmful ones. The plug's biggest drawback is difficulty of use. Most are tricky to insert in the ear properly.



AOSAFETY RANGE E.A.R. PLUGS $13

What it does: Provides two kinds of protection. Yellow end gives variable protection for impulse noises. Olive end gives constant noise reduction.

Panelists' comments: Lets voices through.

Source: www.aosafety.com

BLASTBUSTERS SHOOTER'S EAR PLUGS $18

What it does: Reduces ambient noise levels by about 75%, but limits impact noise to 80-85 db.

Panelists' comments: Easy to use if wearing eye protection.

Source: www.earplugstore.com

HOCKS NOISE BRAKERS $20

What it does: Reduces all sound approximately to the volume of normal speech. Designed so that escaping sound waves cancel dangerous noises.

Panelists' comments: Lets voices through.

Source: www.hocksproducts.com

QUIETEAR $6

What it does: Reduces sound volume by half, with additional protection above 85 db.

Panelists' comments: Couldn't get them to fit.

Source: www.heartech.co.il

ZEM BY SENSGARD $20

What it does: Uses specially designed headband to direct sounds away from ears; filters out the most damaging frequencies.

Panelists' comments: Picked up too much ambient noise ("I could hear myself chewing my own gum.") Hard to adjust.

Source: www.zemzone.com

ability to cap the noise level hitting your ears at 80 to 82 db.

Noise-canceling headphones may be the most sophisticated type of hearing protector, but they may not be the best for woodworkers. Sold mainly to travelers seeking relief from the drone of jet engines, these headphones generate an inverted version of the sound wave coming toward your ear, which effectively cancels the sound. Some researchers said that noise-canceling headphones work best with steady, constant sounds but are less effective with the relatively short bursts from shop machines.

All plugs and muffs can do the job...

Any hearing protector on the market will cut sound by 10 db. or more. Some claim to reduce sound by 25 db. or more. They're more than adequate for muffling the noise from machines in a home woodshop. In fact, it's pointless to try to figure out which specific hearing protector might actually offer a higher level of protection. Turns out, there's no way to know for sure.

Most hearing protectors carry a Noise Reduction Rating, or NRR. The number, derived from lab tests under ideal conditions, is supposed to indicate how many decibels of protection the product provides. But the lab tests don't track with real-world conditions. Each manufacturer does its own testing under somewhat different conditions, so the NRR can't be used to compare brands. It wasn't surprising that one government audiologist I spoke with joked that NRR actually means "not really relevant."

... so comfort and convenience are key

Hearing protectors range from disposable foam plugs that cost about a dollar a pair to electronics-laden earmuffs that sell for close to $200. What's best? Every expert I spoke with offered the same piece of advice: The best hearing protectors are the ones you'll wear regularly. That means you want something comfortable and easy to use.

To gauge the comfort and convenience of some new protectors, I asked several *Fine Woodworking* and *Fine Homebuilding* editors to make informal comparisons. Each person tried four hearing protectors—two earmuffs with built-in radios, microphones, or both, and two sets of earplugs. I chose the products based on advice from experts and my own research.

Photos, except where noted: David Heim; opening spread (top): Kelly J. Dunton

People compared two products at a time, using noisy shop machines for 10-minute stretches. They had to decide whether they preferred one product, based on factors including ease of use, comfort, and whether the wearer still could hear normal sounds. I also asked if they would use the product regularly.

The panelists' favorites

Overall, people preferred earmuffs to plugs. It's simply easier to pop a set of muffs over your ears than to insert plugs every few minutes.

Most of the negative comments about earplugs concerned difficulty with fitting them into the ear. These plugs are only slightly easier to fit than older foam plugs. Yet nearly everyone said they liked a favorite plug or muff well enough to use it regularly.

Peltor Worktunes, a muff with a built-in radio, was the overall favorite. Comfortable, with an easy-to-use radio and a moderate price tag, it would make a good first choice. If the radio becomes a distraction, you can always turn it off.

Three other muffs were a close second: The Bilsom Radio (similar to the Peltor but costlier), the Bilsom Electo (pricey muffs with both microphone and radio), and microphone-enhanced muffs from Lee Valley Tools. The Elvex QuieTunes were least preferred; several people complained that the radio picked up static from shop machines.

Among earplugs, people said the AOSafety and Noise Brakers allowed them to hear normal conversation. The AOSafety is a double-ended plug: One end delivers a constant level of protection; the other muffles impulsive sounds. Those would be good for anyone who uses a pneumatic nailer. At least one person favored the QuietEar and BlastBusters plugs; others called them hard to put on. One tester preferred the unique Zem by Sensgard, designed to direct sounds away from the ear. □

David Heim is an associate editor.

Muffs

Sophisticated new muffs, like those shown here, don't just cover your ears to block noise. Some contain electronics that let you hear some normal sounds but keep the noise at a safe level. Some offer built-in radios for entertainment and to reduce the sense of isolation.

BILSOM ELECTO $185

What it does: Uses microphone to pick up ambient noise, and has built-in FM/AM radio. Sounds from mic or radio limited to 82 db.

Panelists' comments: Lightweight.

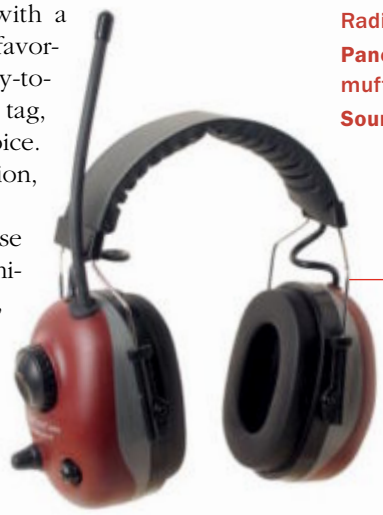
Source: www.hearingportal.com

BILSOM RADIO $85

What it does: Has built-in FM/AM radio. Radio's loudness limited to 82 db.

Panelists' comments: Good radio, but muffs not as comfortable as some others.

Source: www.hearingportal.com



ELVEX QUIETUNES COM-660 $70

What it does: Has built-in FM/AM radio. Radio's loudness limited to 82-85 db.

Panelists' comments: Radio picked up static from shop machines.

Source: www.elvex.com

LEE VALLEY ELECTRONIC HEARING PROTECTORS $30

What it does: Uses microphone to pick up ambient noise. Sounds from mic limited to 85 db.

Panelists' comments: Liked ambient noise through microphone. Easy to use with eyeglasses.

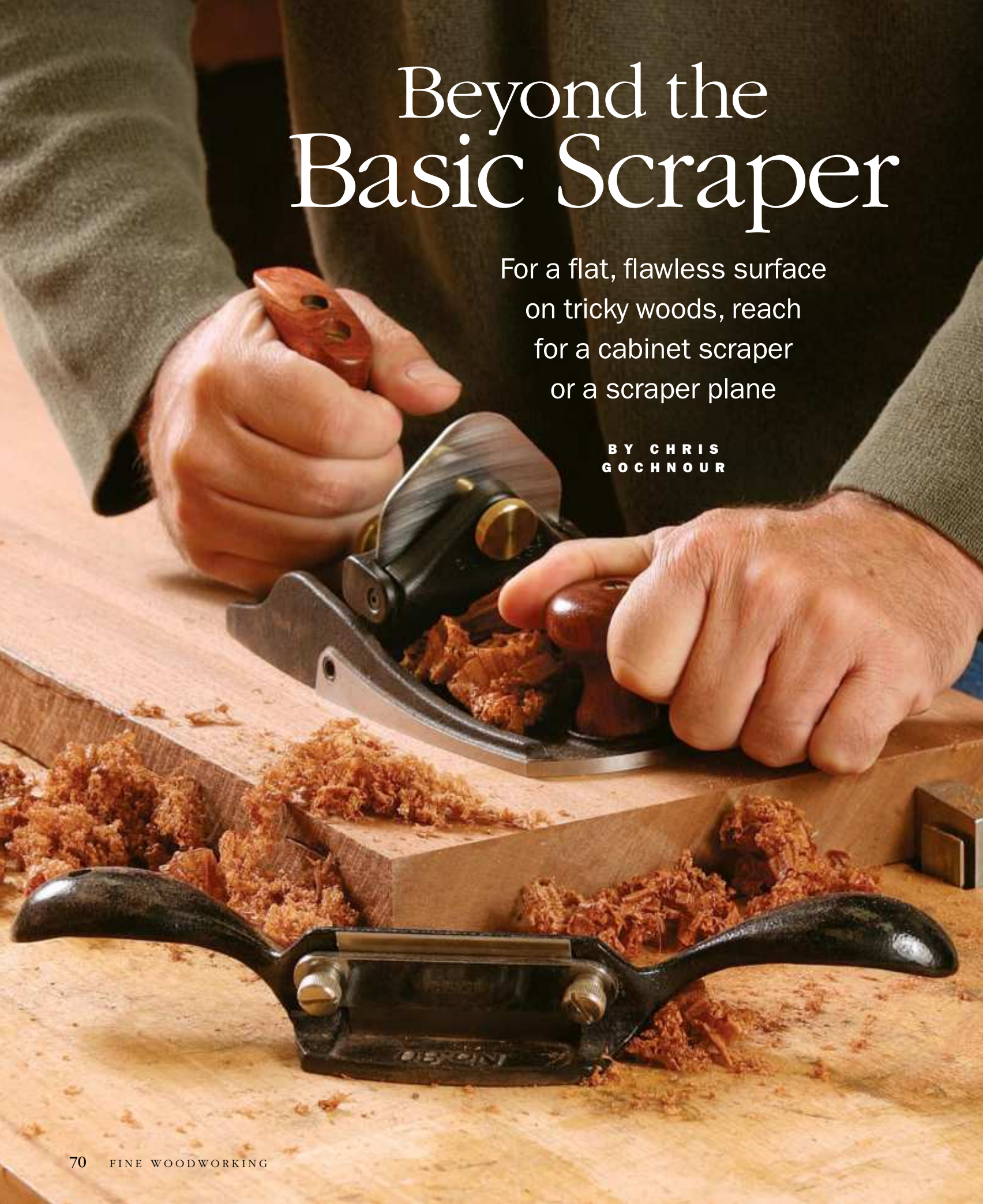
Source: www.leevalley.com

PELTOR WORKTUNES-22 $49

What it does: Has built-in FM/AM radio. Radio limited to 82 db.

Panelists' comments: Fit better than others over safety glasses. Controls easy to use.

Source: www.peltor.com



Beyond the Basic Scraper

For a flat, flawless surface on tricky woods, reach for a cabinet scraper or a scraper plane

BY CHRIS GOCHNOUR

When bench planes begin to tear out tricky grain or balk at tough woods, many woodworkers reach for a card scraper. But that isn't always the best choice. Often, especially on large, flat surfaces, the job can be done easier, faster, and better by using one of the card scraper's bigger, lesser-known brothers: the cabinet scraper and the scraper plane.

I use all three scrapers in my shop, because each one has its place. Once you understand what they can do for you, what they cost, and how to use them, you can decide for yourself whether to add one or more to your tool cabinet.

Basic card scraper is best on smaller surfaces

Because it's held in both hands with finger pressure slightly flexing the steel, a card scraper lets you make light to moderate cuts depending on how it is held and engaged with the wood surface. The scraper can be pushed or pulled. To make cutting easier, I sometimes create a shearing cut by holding the scraper about 30° to the direction of travel.

As useful as a card scraper is, though, it has significant limitations. It is not an aggressive tool, so it won't remove a lot of material quickly. It cuts with a lot of resistance and, consequently, the cutting edge dulls fairly rapidly. Mainly, though, the card scraper is uncomfortable to hold because your hands are always in contact with sharp corners. Then, too, it creates a lot of friction as it cuts, so the steel can get hot to the touch within minutes. And because it lacks a flat sole to maintain a consistent cutting depth, you have to work carefully to avoid creating shallow dips and valleys.

So, I use a card scraper mostly to smooth smaller surfaces, typically under 18 in. sq. By the time my fingers are hot and my hands are tiring, the work is done. (For more on tuning and using a card scraper, including sharpening at 90°, see "Sharpening and using card scrapers," *FWW* #172, pp. 26-30.)

Cabinet scraper is better for everything else

Compared to the card scraper, the cabinet scraper is considerably more comfortable to use, even over extended time periods. The handles provide a place for the hands, and because fingers never touch the blade, heat is a nonissue. Plus, a cabinet scraper is more likely to maintain a flat, even surface because its sole helps regulate and control the depth of cut. The sole also makes it easy to start and finish cuts on the edges of panels. And a thumbscrew at the center of the scraper keeps the blade flexed for you.

Versatile and easy to use—The cabinet scraper excels at removing mill marks from board edges. Its sole provides the control needed to ensure that a board edge stays true as it is worked.

I typically use a cabinet scraper when the surface gets into the 18-in.-sq. to 36-in.-sq. range, such as a tabletop or panel. You can use one on even larger surfaces

When to plane and when to scrape

Whenever I'm working to smooth a relatively straight-grained wood, my tool of choice is a handplane. In my opinion, there's no better way to prepare a wood surface for a finish. But wood is not always straight-grained. Sometimes grain is wavy, curly, bird's eye, or has some other form of general nonconformity. I often use such wood for panels and tabletops, as it's a sure way to add a dramatic look to a furniture piece. As you might expect, wild grain—with wood fibers going up, down, and sideways at all angles—can be difficult to smooth. No matter how well the blade is sharpened, or how light a cut you make, a handplane tends to tear grain that runs helter-skelter. That's when I skip the plane and use a scraper.

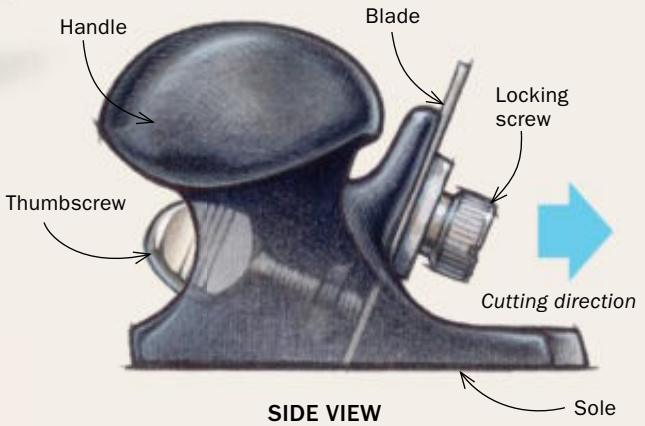
Contrary to the names, card scrapers, cabinet scrapers, and scraper blades don't scrape—they cut. Sharpened and properly tuned, they can produce a pile of shavings. A couple of factors enable them to smooth wood without tearing the wood fiber. First, scrapers meet the wood at a steep cutting angle. That means it's almost impossible for the steel to get under the wood and lift and pry the fibers. Second, as a scraper cuts, the wood chip breaks immediately. That way, a long chip can't peel back, only to ultimately break and create a noticeable tear.

Figured grain begs a scraper. *When smoothing wood with irregular grain, as in curly maple (top) and sapele (bottom), a scraper is less likely to create tearout than even a finely tuned handplane.*

Photos, this page (bottom) and facing page: Kelly J. Dunton; this page (right): Michael Pekovich

Cabinet scraper

The Stanley No. 80 (available from toolsforworkingwood.com), a tool that hasn't changed significantly in more than a century, is Gochnour's favorite cabinet scraper. Well-designed, lightweight, and comfortable, it produces excellent results.

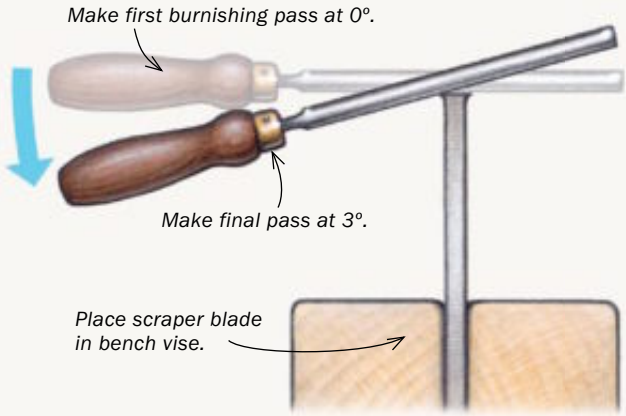


SIDE VIEW

Create shavings, not sawdust. *Properly sharpened and tuned, a cabinet scraper produces long, thin shavings, much like a plane. A typical stroke ranges from 12 in. to 24 in.*

CREATING THE CUTTING BURR

A cabinet-scraper blade can be honed to either 90° or 45°. Of the two options, a 90° angle produces a smoother finish. Plus, you get two cutting burrs along one edge of the blade. See p. 74 to find out how to sharpen a blade to 45°.

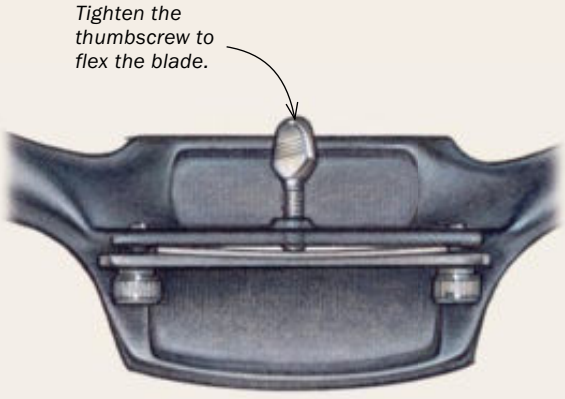


Form the burr. *Hold the blade on the bench and burnish the face, keeping the burnisher flat against the blade (1). Clamp the blade in a vise and create the burr, starting the burnisher at 0° to the edge. Tilt the burnisher 3° and make a few more passes (2).*

TIPS FOR SETUP AND USE

Set the cutting depth. *A sheet of paper and a flat surface are all you need to set the depth of cut.*

Set the blade flex. *Tighten the thumbscrew to flex the blade about 0.002 in. to 0.003 in.*



TOP VIEW

Photos, except where noted: Tom Begnal; this page (top): Kelly J. Dunton; drawings: Christopher Mills

with good results, though that is where I turn to the scraper plane, which I'll cover shortly.

In use, I normally push the tool, but it cuts just as well when pulled. Like a card scraper, a cabinet scraper generally cuts better when skewed to about 30°.

Two ways to sharpen the blade—You have two options when it comes to sharpening a cabinet scraper. You can sharpen it as you would a card scraper, with its edges filed at a right angle to its face and a small burr, or hook, burnished onto each of its cutting edges. I find that cabinet scrapers work very well with this configuration. They are easy to sharpen, and, like on a card scraper, you get two working burrs along each edge.

To sharpen a blade to 90°, I start by securing it in a vise. Then, I use an 8-in. bastard file to create a flat, straight edge. As I push the file, I try to keep it at a right angle to the face surfaces of the blade. Three or four strokes usually are enough to get the job done. Then, with the blade still in the vise, I use a fine-grit, flat slipstone to smooth each side of the scraper at the filed edge. Once the edge is prepared, I'm ready to use a burnisher to form the cutting burr (see drawing, facing page).

The second approach is to sharpen the scraper edge with a 45° bevel. This method produces a more aggressive cutting edge, useful if you want to remove material faster. For example, if a thickness planer produced some fairly heavy tearout, I'd use the 45° edge to speed up the process of thinning the stock until the tearout disappeared (see "Forming the burr," p. 74).

Setting up a cabinet scraper—Place the freshly sharpened blade into the body of the scraper. To establish the blade extension, place one or two pieces of paper on a flat surface. Then, to elevate the sole ever so slightly, place the front of the sole on the paper. Press the blade down against the flat surface while tightening the thumbscrews to secure the blade. This step sets the blade extension to match the thickness of the paper, typically about 0.004 in. per sheet.

Next, turn the scraper over and sight down the bottom of the sole. The cutting edge of the blade should be parallel to the sole.

TIP

WORKS ON THE PULL STROKE, TOO

Although Gochnour normally pushes a cabinet scraper, there are occasions when it's easier to pull the tool. Either way, it works equally well.

If it isn't, lightly tap the side of the blade with a hammer until it is. Finally, turn the thumbscrews that flex the blade until the blade has a very slight (about 0.002 in. to 0.003 in.) crown. The scraper is now ready to go to work.

Scraper plane: best choice for large surfaces

All the scraper planes on the market are patterned after the Stanley No. 112, a tool that was developed in 1874. Like the original 112, the new scraper planes have a pivoting lever-cap and thumbscrew that clamp the blade to the frog. The frog is adjustable from zero to 25°, making it easy to dial in the cutting angle of the plane. This adjustment is critical, as the scraper's cutting angle needs to work in harmony with the angle of the burr on the scraper's edge. The pivoting frog also regulates the depth of cut.

Use it like a handplane—Handle the tool just as you would a bench plane. I find that a light touch, with a smooth, steady stroke, produces the best results. Just as with a bench plane, start the cut with pressure on the front knob. As the cut proceeds, equalize the

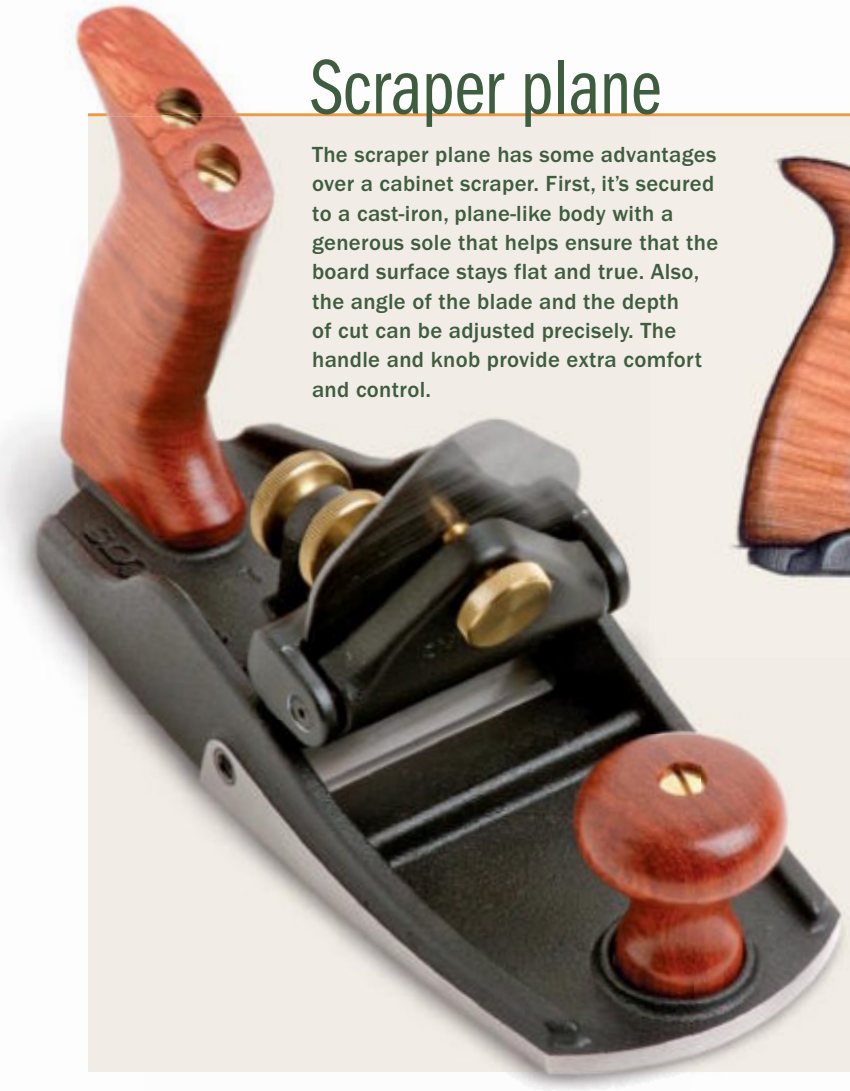
Start flat. *The scraper cuts with less effort when at about 30° to the direction of travel. To start a cut at an edge, add pressure to the forward handle so that extra force is applied to the front of the sole. As the sole slides onto the stock, shift the hand pressure so that both handles end up with downward force.*

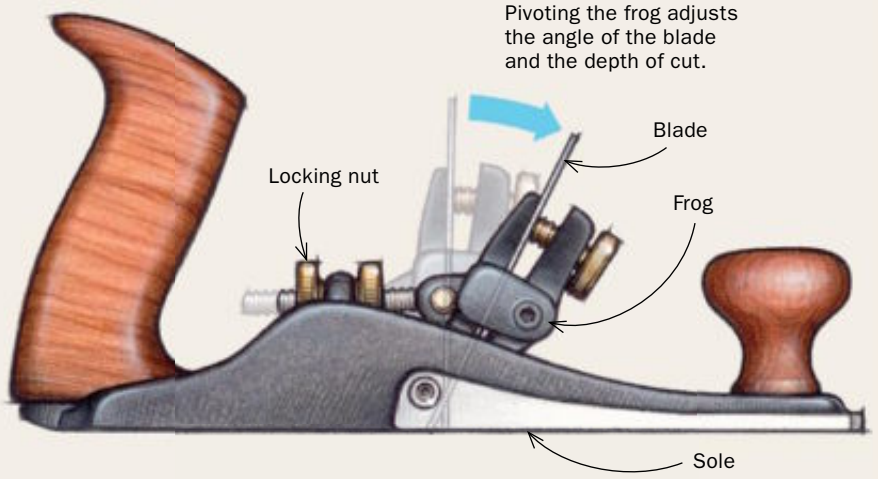
Finish flat. *As the sole of the cabinet scraper begins to extend over the end of the board, reduce pressure on the forward handle while maintaining pressure on the trailing handle. Finish the cut with full pressure on the back handle.*

Keep the edges flat. *When scraping close to the edge of a board, allow the sole to overhang only slightly, keeping most of it on the board. That way the cabinet scraper can't tip and give the surface an unwanted taper.*

Scraper plane

The scraper plane has some advantages over a cabinet scraper. First, it's secured to a cast-iron, plane-like body with a generous sole that helps ensure that the board surface stays flat and true. Also, the angle of the blade and the depth of cut can be adjusted precisely. The handle and knob provide extra comfort and control.



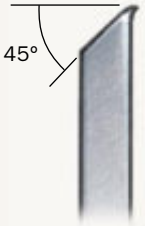


pressure on the knob and the rear handle. Then, upon completing the pass, shift your weight to the rear handle.

Choosing a scraper plane—Of the scraper planes on the market, the one made by Veritas (www.leevalley.com) is the only one with an adjustment screw that lets you flex the 0.055-in.-thick blade to produce a slight camber, a feature that makes it less likely that you'll dig into the wood and also gives a very smooth cutting action. On the other models, I keep dig-ins under control by rounding the corners of the blade to about a 1⁄16-in. radius.

Sharpening a scraper plane—The 45° bevel can be created with a file, but I get the best results by "grinding" the edge with sandpaper. First I use spray adhesive to mount 120-grit sandpaper to a flat surface such as a chunk of granite or a piece of plate glass. Then I mount the blade in a Veritas Mark II honing guide (the only guide I've found that can hold a thin, wide scraper blade without causing distortion). With the guide set to create a 45° bevel, I roll it back and forth until the bevel is formed. With the blade still in the jig, I hone the beveled edge on a 1,000-grit waterstone. Then I use a 6,000-grit stone to polish the edge. After honing the edge, I form the cutting burr using a burnisher.

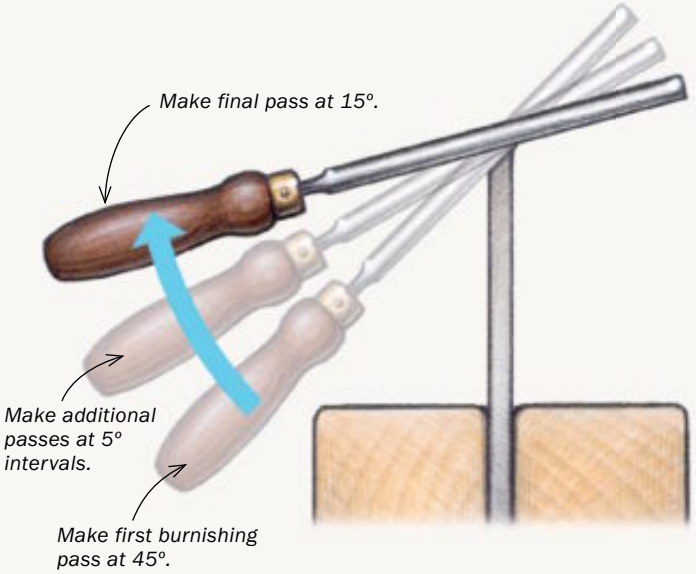
Setup is easy—When setting up a scraper plane, the first thing to do is tilt the adjustable frog 15° forward. Then set the plane on a flat benchtop and insert the blade into the plane with its bevel facing toward the back. With the blade resting on the benchtop,



FORMING THE BURR

Gochnour prefers to sharpen the scraper-plane blade at a 45° angle because it produces a more aggressive cut. On the downside, you get one working edge and it can't be burnished as often between sharpenings.

Form the burr on a 45° angle. *Make the first pass along the bevel using a burnisher held at 45° (left). Then make a series of passes flattening the angle by about 5°, with the last pass at 15°. A board with a 15° line provides guidance for the final pass (right).*



Photo, this page (top): Kelly J. Dunton

TIPS FOR SETUP AND USE

Load and lock. *With the frog of the scraper plane set to a 15° angle (see illustration), and with the plane on a flat surface, slip the blade (bevel facing back) into the plane until the burred edge bottoms out on the flat surface. Then turn the locking nut to secure the blade.*

Set the depth of cut. *To set the depth of cut, pivot the frog forward 15°. When the blade begins to dull, pivot the frog farther forward to improve the cutting action.*

Skew the plane for easier cuts. *Like a cabinet scraper, a scraper plane cuts more easily when angled about 30° to the direction of travel.*

clamp the blade in place by tensioning the thumbscrew. Next, to extend the blade slightly from the sole, move the frog forward slightly. This is done by backing the rear locking nut a quarter-turn off the post and tightening the front nut up against the post.

Test the cut on a flat piece of wood and make depth adjustments accordingly. If the blade isn't parallel to the sole, you will feel the plane turning sideways as it cuts. If this occurs, make lateral adjustments by tapping the side of the blade with a hammer.

A scraper plane works best when set for a light cut. That said, it should produce a nice, wide shaving, not dust. If your scraper is not cutting shavings, adjust the frog angle so that it is working in harmony with the burr you have created on the blade's edge.

To find the best angle, remove the blade from the plane and make a pass or two while holding it like a card scraper. Find the angle at which the blade best engages the stock, then adjust the scraper frog to that angle, reinstall the blade, advance it slightly, and take another test cut. After using the scraper plane for a while, the blade will dull and the cut will be lighter and less efficient. Tilt the frog forward a degree or so to reengage the blade.

Wood with uneven grain is an inevitable part of woodworking. Short of sanding forever, the next best option is to use a tool from the scraper family. You'll end up with a smoother board, in less time, with less dust. That's a rare win-win situation. □

Scraper plane has the edge when doing edges. *When an edge requires scraping, the scraper plane has the best balance and control, so you're less likely to tip the scraper and create an out-of-square edge.*

Chris Gochnour builds furniture and teaches woodworking in Murray, Utah.

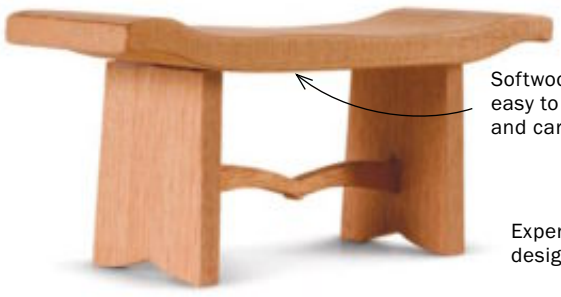
Fine-Tune Designs Before You Build

Follow drawings with mock-ups to give your furniture ideas shape and substance

BY GARY ROGOWSKI

SEE IT BEFORE YOU BUILD IT

Models can help you work out design ideas for all types of pieces. They don't require much time or material to build, but they can save a lot of both in the construction of your furniture.



Softwoods are easy to shape and carve.

Experiment with design details.

Photocopied contents can fill out an interior.

Photos: Steve Scott

Woodworkers, as we all know, love to roar into a weekend project. They can then spend weeks or months on it, as we also know, only to find out one sad day that the finished piece doesn't look quite right. It may in fact be a bit homely or ungainly. But didn't those plans look promising? Didn't that drawing seem right? You can avoid this dilemma with a simple and rewarding exercise: Build a scale model first. This is the advice I give my students; those who latch on to this technique never again build without it.

Don't get me wrong: Drawings and plans, whether full- or partial-scale, are very useful. But adding a three-dimensional model made with ordinary shop tools and available materials will help you learn more. The model will show you form, help you fix proportions, balance, and symmetry, even help you think about the best way to build a piece. In the end, you can save a load of time and money building the right design instead of one that may never feel quite right.

A drawing is only the start. *A model lets you see a piece in three dimensions and answer questions about its form and proportions.*

Start by drawing ideas in a sketchbook

Building a model will help you visualize and refine a new design, but it's best to launch the project on paper first. How do you get from an idea you saw once in a magazine or at someone's house to the point where you can build a model? I find it easiest to begin by sketching or doodling, without censoring my ideas. I do this in a notebook that I keep for future reference. You never know how the germ of one idea may give life to a totally new design later on.

This process usually yields several ideas that appeal to me for my current project. At this point, I establish basic outside dimensions and draw a box that represents the proportions of the piece. With this visual key, I now can sketch to general proportions so I don't end up with a great-looking cabinet design in my notebook and a squashed-looking shoebox in reality.

I narrow down my notebook sketches to three ideas and work up more detailed ideas on drawing paper. Then I let these ideas percolate for awhile. Finally I boil down the best elements in each to a single design and do a final sketch.

Once a design is sketched and I like its elements, I make my elevation and plan drawings to scale. Afterward, if I'm confident

Full-size or scale model? *Both are easy to make. Larger models give a greater sense of how the finished piece will occupy space; small mock-ups in wood can show remarkable detail while being portable and easy to store.*

MATERIALS ARE INEXPENSIVE

CARDBOARD

Commonly available and inexpensive, it's best for full-scale or half-scale models, and great for modeling full-size tabletops. Cardboard cuts easily with a bandsaw, a tablesaw, or a knife and straightedge, holds with yellow glue or hot-melt glue, and is sturdy enough for simple tenon joints. Details can be drawn or painted on the surface.

FOAMCORE

Sold at art-supply houses in ⅛-in., 3⁄16-in., and ½-in. thicknesses, its higher price makes it a better choice for small-scale models or full-size mock-ups of small pieces. Any saw or sharp knife will cut it. Use pins, glue, or even packing tape to hold it together. Advantages are its stiffness, light weight, and white color, which forces you to concentrate on the shape of the piece. Its surfaces can be painted, inked, stenciled, you name it.

WOOD

Material can come from the shop scrap barrel, typically ⅛-in. or ¼-in. resawing offcuts or other scraps. Working in small scale makes parts easier to handle and the design easier to see. Wood scraps can be cut with saws and joined with a variety of glues.

The process starts with a sketch. *Rogowski keeps his design doodles in a notebook for future reference. That way, the germ of one idea can give life to a totally new one later on.*

For safety, use a zero-clearance insert when cutting small parts at the tablesaw. *A piece of scrap (below) can be fashioned as a tapering jig for bandsawing model table legs.*

WORKING SMALL

Small-scale models are easy to build and transport, and they take up little space. They also can be made from the same stock as the full-scale piece. Nothing beats a wooden model for selling a furniture design to a client or spouse.

First, mill the stock to whatever thickness you need. Cut lengths using a tablesaw crosscut sled or chopsaw. Be cautious in cutting these smaller parts. Sometimes a pencil eraser end is a better and safer grip than your fingertip for holding things in place. Simple joints can be made on this scale, but most pieces are just butt-jointed together and glued. Strengthen where needed with gussets and corner blocks.

about the elements of the piece, I can do full-scale drawings. But if I still have questions about the form or proportions, I might want another level of information. That's when I make a model.

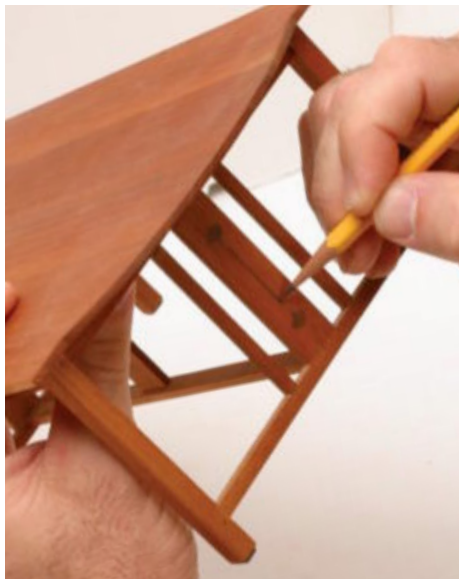
From sketchbook to model

First, decide on scale. Are your questions about the design primarily about the rightness of its basic proportions? Do you need to transport the model and show it to clients? A small-scale model will probably answer. Or do you need to live with the piece for a while, to see how it casts shadows and fits into its intended space? If so, full-scale is probably your best bet.

When I built library tables for the Oregon State Archives project, I made a ⅛-scale model for several reasons. One was to impress the selection jury with my design, giving them something tangible to see and discuss. I built the model in cherry, the same as the tables would be, but I sketched in the inlay details with a pen. The other advantage? It forced me to walk through the stages of building the piece and led me to resolve key questions about construction. Which parts would I put together first? What steps had to be completed before moving to the next phase? Would this design hold up over time, or did I need to modify the structure?

For my Greene and Greene table (see *FWW* #171, pp. 36-41), I worked full-scale

Glue-up is easy. *Be sure to reinforce joinery. Hot-melt glue works, but it can be messy with a lot of squeeze-out. Yellow glue works if your gluing surfaces are clean and flat. Cyanoacrylate works well, too.*



Try out inlay ideas. *Working in small scale makes it convenient to draw—and erase—decorative details directly on the model's surface.*

with cardboard. I made up hollow table legs that were 1½ in. thick by 2½ in. wide by slicing up parts on the saw and hot-gluing them into elongated boxes. Having a leg that doesn't collapse when you walk by is great. I cut apron pieces to length and made up a top with drawn-in breadboard ends. I made simple mortise-and-tenon joints and used corner blocks on the inside corners for strength. Now here was something to walk around and examine.

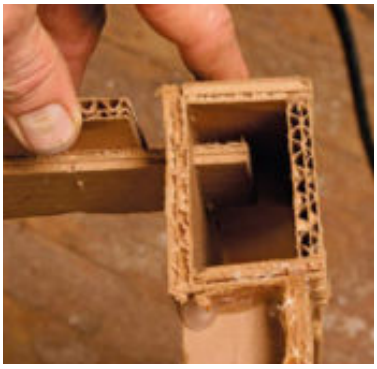
At this point in the process, you can congratulate yourself for building the model, but then let it rest for a couple of days. Let it sit in a corner of your shop or in the place where the finished piece will finally live. Then come back to it and see how it feels. Your gut will tell you a lot about whether you got it right. If it's not right, then you'll need to start figuring out where to cut and where to add. I tell my students that planning at this stage may feel like it's slowing you down, but in the end it can save you time as you build with confidence, knowing you have a design that works, fits the space, and looks great. □

Gary Rogowski, a contributing editor, runs The Northwest Woodworking Studio in Portland, Ore.

WORKING BIG

When you want to see how a piece will take up space and work with other furniture around it, build a full-scale model. Cardboard works best for full-scale or half-scale models. In just a few hours, Rogowski can create models as large as 2 ft. by 7 ft. with moving parts to help clients see how something might fit or look. Draw in door stiles and rails, or stack one layer of cardboard on another to create depth and texture. Use a sheet of single-wall cardboard and glue on an edge to give it thickness. Spray-paint the cardboard if you want to look at another color besides tan. Use white if you simply want to concentrate on the form of the piece.

The material cuts easily. *Components for a full-scale table model can be made in minutes. Just slice up cardboard parts on the tablesaw and glue them together.*



Cardboard is sturdy enough for mocked-up joinery. *Rogowski glues a loose tenon to the inside of a rail and knifes a mortise into a cardboard leg.*

Hot-melt glue works great on cardboard. *With the base constructed, it's easy to experiment with a variety of tabletop sizes and designs.*

Keeping Tools Sharp

Avoid dirt and other hazards to get more mileage from bits, blades, and chisels

BY ROLAND JOHNSON

One of the most time-consuming tasks in a woodworking shop is sharpening, whether that means grinding and honing chisels, running to the store for a new cutter, or sending planer blades out to be sharpened. Although it's a chore that can't be avoided, it can be delayed. A variety of hazards will dull cutting edges prematurely. Steering clear of them will let you work more and sharpen less.

Among the worst of these is dirt. Cleaning debris off rough lumber before machining can help maintain a sharp edge on jointer and planer knives and sawblades. Removing pitch and sawdust to prevent buildup helps prevent cutters from dulling too soon. It's also important to protect your tools from collisions with other metal or hard surfaces that can mar a sharp edge.

Roland Johnson is a contributing editor.

Compressed air removes the bulk of surface dirt. *Clean boards outside, away from machinery, tools, and workbenches.*

Clean lumber before milling

Roughsawn lumber holds lots of dust and debris, which can act like sandpaper on cutting tools. A light brushing will not always get it out of the surface pores. The best way to clean the surface is to use compressed air and a wire brush. A quick blast will remove the bulk of dirt and debris, and a good brushing will dislodge the remaining grit. It's best to clean lumber outdoors so as not to spread dust on nearby material, tools, or workbenches. Although it cleans a bit more slowly than compressed air, a good shop vacuum can be used indoors because it will not spread dust around the shop. Used lumber poses different hazards. I use a metal detector to find embedded nails or screws that can dull or damage tool edges and remove them before proceeding with the cut.

Hand-scraping or chemical removal will take care of old paint, which will dull a cutting edge quickly and leave a residue on tools. But the wood has to be pretty valuable to go through all that hassle. The best bet is to avoid painted lumber altogether.

Use a wire brush to dislodge the rest. *Scrub in the direction of the grain to remove debris.*

Recycled lumber may contain nails. *Use a metal detector to find hidden fasteners that can ruin a cutter.*

Photos: Marcia Ryan

Scrub and lubricate cutters

Toothed cutting blades on bandsaws, tablesaws, and chopsaws rely on clearance immediately alongside the sawteeth to help eliminate drag, and on gullets behind the cutter to remove the freshly cut wood fibers. If the teeth have pitch baked on their sides or if the gullets have crud built up on their edges, the blade will heat up and dull quickly. I clean my tablesaw blade frequently with a blade cleaner such as OxiSolv Blade & Bit Cleaner or CMT Formula 2050 Blade and Bit Cleaner. I am careful to keep the gullets clean on my bandsaw blade, especially when resawing—a brass brush can clear blocked bandsaw gullets quickly without dulling the edges. In addition, a regular waxing or dry lubricant coating on the blade will minimize buildup and reduce friction in the cut. I find that paraffin wax or DriCote works well. Before applying DriCote, clean the blade with a solvent because this product needs to adhere to bare metal.

Drill bits, especially twist bits, suffer when chips build up in the flutes and can't be extracted from the bore hole. This is an especially big problem with bits used in hollow-chisel mortisers. The friction from the compacted chips can create enough heat to turn the metal of the chisel and the bit blue, effectively ruining the temper, or hardness, in both. Once steel loses its hardness, the cutting edge won't stay sharp for long. To improve the ability of bits to eject chips, I coat bits with DriCote.

Specialized lubricants can significantly enhance the operation of tools that rely on metal tables to support work being sawn, edged, or molded. Products such as Empire's TopSaver will keep a steel or cast-iron top slick, resulting in less effort needed to push material past a blade or cutter. Constant feed rates, essential to producing a consistent knife-mark pattern on molded edges, are easier to maintain when the table's friction is low.

REMOVE PITCH AND SAWDUST

Use a blade-and-bit cleaner on tablesaw blades. *Spray it on the buildup and let it sit before scrubbing with a brass brush.*

Clean bandsaw gullets. *With the machine turned off, rotate the upper wheel by hand as you pass a brass brush over the blade.*

LUBRICATION SLOWS DULLING, RUST

Apply a dry lubricant on chisel mortisers. *The lubricant helps prevent buildup and keeps bits from dulling prematurely.*

Wax bandsaw blades to reduce friction. *With the blade running, hold a piece of paraffin wax on the table and against the blade.*

Protect sharp tool edges from hard knocks

I have an ongoing debate with a friend about the proper way to set a sharp handplane on a benchtop. I always set mine on the sole with the blade resting on a fairly clean wooden benchtop surface. I reason that there is less chance of damaging the blade, or myself, when the blade is covered. Resting the plane on its side exposes the blade, increasing the chances that I'll get a flesh wound or my plane will be damaged by another metallic tool.

Chisels laid on a benchtop should always point away from the woodworker, the project, and the other tools on the bench. Be careful to avoid clutter on a workbench; it is too easy to bump sharp cutting edges against metal.

Debris in tool trays, and the trays themselves, can nick and dull cutting edges. Keep trays clean and organized. Put a divider between each tool in a toolbox and if the toolbox is metal, line the interior with wood or heavy card stock.

Provide a safe haven for all cutting edges. I have a rack for my chisels; dowels on the wall for my files, rasps, and planes; trays for my router and drill bits that keep the sharp sides up and separated from one another; individual shelves for my tablesaw blades; and a separate dowel for hanging each of my bandsaw blades.

CARVING TOOLS

Lesser-used tools can be stored in drawers. *Custom-made drawer dividers will help keep carving tools sharp.*

DRILL BITS

Bit rack clamps directly to drill press. *This two-tiered rack easily holds most commonly used bits.*

ROUTER BITS

Make portable racks for your router bits. *A small rack is portable and easy to make from scrap lumber.*

Touch up that edge before it's gone

It is faster and easier to hone a slightly dull tool than to regrind a really dull tool. As soon as the performance drops in any cutting device, it is time to give it a touchup. Sometimes honing is as simple as running the flat face of a bit over the edge of a diamond stone to restore full performance.

Steel cutters such as plane blades and chisels also should be honed frequently during use and ground only occasionally. Carvers are seldom far from their honing system, whether it is a leather strop and diamond paste or a buffing system.

The same goes for scrapers. The burr that does the cutting on a scraper is relatively fragile and can start to lose its sharpness within a few strokes. But a quick once-over with a burnishing tool will restore the edge.

There's nothing like seeing fine shavings roll off the cutting edge of a tool. Protecting those edges and touching them up often will extend your working time between full sharpenings.

Sharpen router bits with a small diamond stone. *Run the flat face of a bit over the stone, using the same number of strokes for each edge.*

Hone plane irons regularly. *Diamond paste on a piece of leather quickly renews an edge.*

Build racks for your chisels. *Wall-mounted tools protect edges and allow for quick access.*

Keep tablesaw blades separated. *Cut dadoes into a simple case to accommodate ¼-in. plywood shelves, set 1 in. apart. Leave the shelves loose so they can slide out for easy blade access.*

SOURCES OF SUPPLY

SOLVENTS

OxiSolv Blade & Bit Cleaner
www.woodworker.com

CMT Formula 2050 Blade & Bit Cleaner
http://tool-corral.com

HONING ACCESSORIES

Diamond paste
www.japanwoodworker.com

Diamond stones
www.leevalley.com

LUBRICANTS

DriCote
www.woodworker.com

LPS1 Greaseless Lubricant
www.marvgolden.com

Kurobara Camellia Oil
www.japanwoodworker.com

Empire Top Saver and other dry tool lubricants
www.woodcraft.com

readers gallery

PAT MEGOWAN
Corvallis, Ore.

While building this sideboard during a 12-week intensive course at The Center for Furniture Craftsmanship in Maine, Megowan grew so frustrated that he twice thought about busting out a chainsaw and making some kindling. “I went in way over my head,” he says about the design and construction of the piece. Fortunately, instructors Tim Rousseau and Kevin Rodel guided him through the process. The sideboard (16 in. deep by 56 in. wide by 32 in. tall) is made of Honduras mahogany, with secondary woods of maple, rosewood, Sitka spruce, and poplar. It is finished with Danish oil, shellac, Waterlox Original, and wax.

BOB CAMERON
Drumheller, Alta., Canada

Cameron built these two boxes for a doctor and a nurse who took care of his mother while she was at the Tom Baker Cancer Center in Calgary. The keepsake box (left), made of English sycamore and African blackwood, is 7 in. deep by 11 in. wide by 6½ in. tall; the stationery box, made of American cherry and black walnut, is 11 in. deep by 13 in. wide by 3¼ in. tall. Both are finished with sprayed, water-based polyurethane.

DAVID HURWITZ
Randolph, Vt.

Hurwitz began carving kitchen utensils about 13 years ago as a way to use the scraps accumulating in his shop. Seeing them as an exploration in form, he considers each one a small, functional sculpture for the kitchen. To add appeal, Hurwitz combined contrasting woods, such as (from left) walnut and curly maple, rhododendron and cherry, mulberry and cherry, mahogany and maple, and walnut and ash. The spatulas are approximately 2 in. thick by 3 in. wide by 15–17 in. long and are finished with mineral oil and beeswax.

T.R. FISHER
East Yorkshire, England

Fisher is a retired cabinetmaker who has had a longtime interest in carving. That interest has developed into well-honed skills, as evidenced by this whimsical carving of musical instruments. It is based on a section of carving done ca. 1692 by Grinling Gibbons (1648–1721) in Petworth House, Sussex. Fisher carved the sections separately, then assembled them one by one. The carving is 21 in. wide by 32 in. tall and is finished with wax.

ANDREW J. RITCHIE
Toronto, Ont., Canada

This chest on chest was Ritchie's second try at veneered furniture. Although the form is based on an original seen at Colonial Williamsburg, the chest elegantly incorporates design elements from other periods. The piece stands 17 in. deep by 34 in. wide by 71 in. tall, and is made of curly maple, with veneers of curly and bird's-eye maple. The secondary woods are pine, cherry, and maple. The chest took approximately 400 hours to build. The finish is linseed oil and beeswax.

DOUGLAS W. JONES
Los Lunas, N.M.

The 2006 winner in the Custom/Studio Furniture category of the Vermont Fine Furniture and Wood Products Design Competition, this bench was designed for a large, circular sitting area in a private residence that overlooks spectacular Lake Champlain. The lines of this bench were intended both to complement the curving architecture and to evoke nautical themes brought to mind by the view of the lake. Measuring 23 in. deep by 51 in. wide by 28 in. tall, the bench is constructed with mahogany slats over a bent-plywood armature sandwiched between solid frames; Jones turned the four legs and hand-carved the armrests. He finished the piece with an oil/varnish combination.

PHOTOS: SUSAN TEARE

FRED WILSON
Longmont, Colo.

Wilson's experience as a canoe builder influenced the design of this walnut-and-ash chair. He wanted to make a lightweight, comfortable "wooden cushion" that would conform to the shape of its user the way a canoe seat does. Toward that end, he installed thin ash strips that float in pockets in the curved, laminated frame. The strips deflect about ½ in. on the seat and about 1 in. on the back. The chair weighs only 12 lb. and is 36 in. deep by 21 in. wide by 43 in. tall. It is finished with wipe-on polyurethane.

TERRY R. CANDEE
Columbia, S.C.

Candee's chest of drawers (22 in. deep by 32 in. wide by 40 in. tall) is a reproduction of a 1775 piece he saw in *The Furniture of Charleston, 1680-1820*, by Bradford L. Rauschenberg and John Bivins Jr. The chest is made of Honduras mahogany, with crotch-mahogany veneer on the drawers, secondary woods of oak and maple, and 80 ft. of satinwood stringing. To finish the piece, Candee stained it with potassium dichromate, filled the grain, sealed it with garnet shellac, and topcoated it with lacquer.

BIRDIE MILLER
Stockton, N.J.

Miller unveiled this pool table at the 2006 Philadelphia Furniture & Furnishings Show to showcase his design and building skills. He also had another reason: He likes to play pool (though he claims he's no shark). A pool table must support the slate top (about 450 lb.) 29 in. off the floor while remaining flat and stiff. It also must come apart for transport. Miller chose an exposed post-and-beam construction for the base, with beefy wedges that allow the frame to be disassembled. The table is made mostly of walnut, with red-oak beams and stretchers. The butterfly keys and wedges are rosewood. The table is 56 in. wide by 100 in. long by 29 in. tall, and the finish is oil and lacquer.

CARL GLASSMAN
Centreville, Del.

While building this reproduction Goddard-Townsend fall-front secretary, Glassman, an 83-year-old retired surgeon, received both inspiration and guidance from John McAlister, an amateur woodworker whose fall-front secretary was featured on the back cover of *Fine Woodworking* #129. Made of quilted Central American mahogany, the massive piece stands more than 9 ft. tall to the top of the center finial. The piece is finished with oil, shellac, and wax.

ANTHONY HAYZEN
Knoxville, Tenn.

Hayzen's pedestal table (40 in. dia. by 32 in. tall) serves as a canvas for his decorative veneer work. The six-sided pedestal is made of poplar, while the tabletop and base are made of medium-density fiberboard with solid mahogany edge-bandings. The base veneer is maple, and the colored veneers were dyed before they were cut to shape and inlaid. Overall, it took Hayzen about 300 hours to make the table. He chose lacquer as the topcoat because it provides a long-lasting, wear-resistant finish.

SEAN CONNIN
Rainbow Lake, N.Y.

Connin built this table while participating in the New Hampshire Institute of Furniture Making's Studio-Based Learning Program. He says the design was a collaborative effort between him and his instructor, Jon Brooks. Connin cut the legs as live green-ash saplings, air-dried them, and then refined their shapes using rasps, scrapers, and sandpaper. Fitting the legs to the table was an exercise in improvisation, requiring a number of mock-ups. The table is 21⅜ in. wide by 32⅞ in. long by 36 in. tall and is made of red maple and black walnut. The legs are finished with acrylics and varnish, and the top is finished with a mix of tung oil, spar varnish, and mineral spirits. The topcoat is wax.

Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For consideration, send entry forms (available at www.FineWoodworking.com) and photos (unaltered digital images, prints with negatives, or slides) to Readers Gallery, *Fine Woodworking,* 63 S. Main St., Newtown, CT 06470, or email fwgallery@taunton.com. If you want materials returned, you must include a self-addressed envelope with appropriate postage.

Q&A

A shopmade slicing gauge

Q: In Steve Latta's recent article on applying cock bead to a drawer (*FWW* #183, p. 44-49), one photo showed a slicing gauge, an interesting and useful tool. Where can I get one, or better, how can I make one?

—JACK BARNES, Midlothian, Va.

A marking gauge that cuts. *This shopmade gauge works like a regular marking gauge, except that it uses the tip of a craft-knife blade as a cutter, allowing it to scribe a deep, clean line.*

A: MY SLICING GAUGE IS SHOPMADE FROM MAPLE, with a brass wearplate and thumbscrew. Dimensions are typical (see drawing), so don't be afraid to customize them. I buy the hardware from Rockler (www.rockler.com); you can pick up a sheet of 1/16-in.-thick brass at any good hobby shop.

Begin by roughing out the head block. As the drawing shows, drill a hole in the bottom for the thumbscrew. Cut the slot for the bar by drilling a pair of holes and cutting away the waste between them. Use a router or tablesaw to make the recess for the brass wearplate.

Fit a piece of brass in the recess and hold it with clear tape. Punch centers for the screws that hold the brass in place, then drill and countersink the holes. Attach the plate with epoxy, then drive the screws.

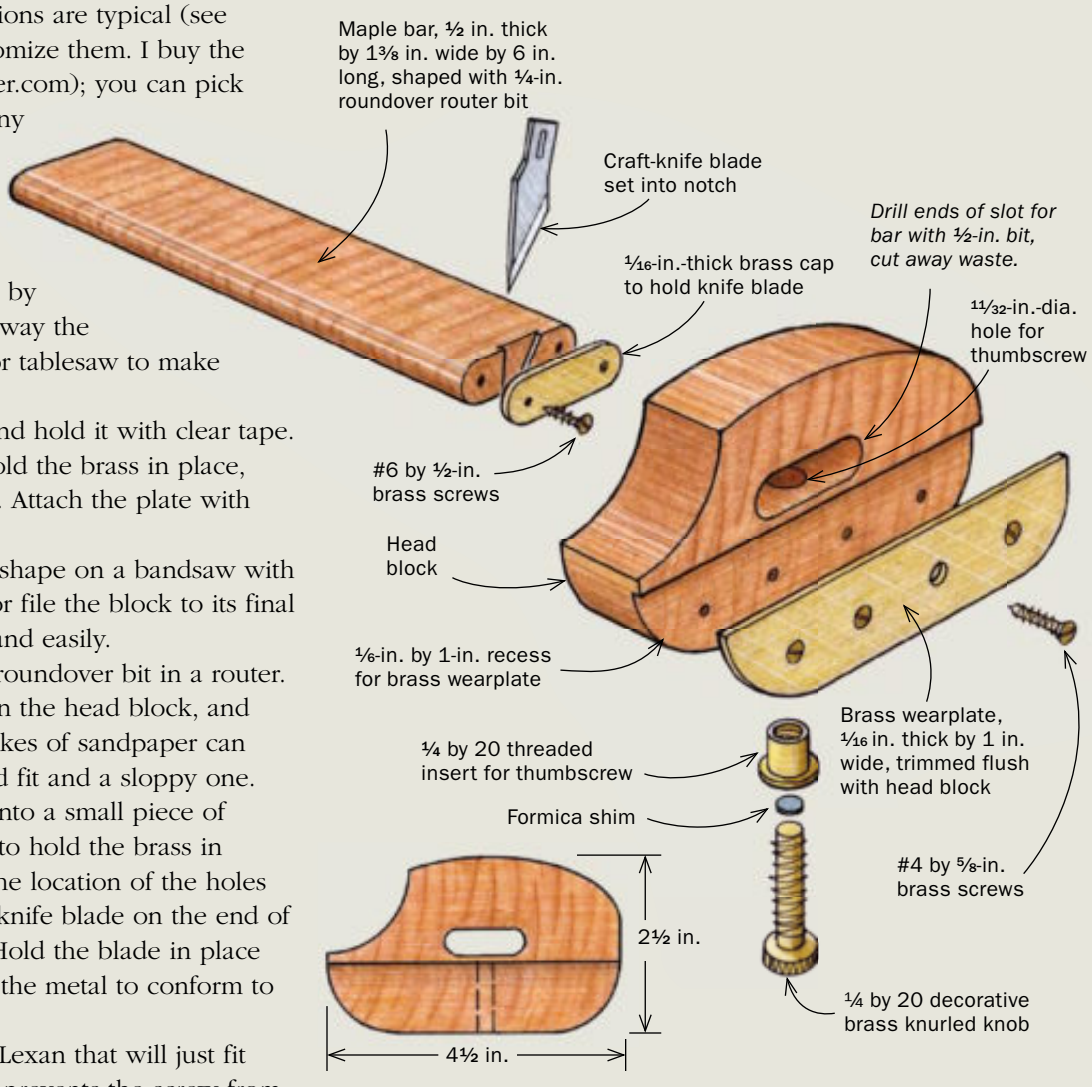
Cut the head block to the desired shape on a bandsaw with a 3/16-in. or 1/4-in. blade. Then sand or file the block to its final shape. The soft brass will cut and sand easily.

Next, make the bar, using a 1/4-in. roundover bit in a router. Make it a hair thicker than the slot in the head block, and sand it until it fits snugly. A few strokes of sandpaper can make the difference between a good fit and a sloppy one.

Trace the shape of the bar's end onto a small piece of brass. Punch centers for the screws to hold the brass in place, and drill the holes. Transfer the location of the holes to the bar and drill. Position a craft-knife blade on the end of the bar and cut a recess to hold it. Hold the blade in place by screwing on the brass, and sand the metal to conform to the shape of the bar.

Cut a small shim from Formica or Lexan that will just fit into the hole for the thumbscrew. It prevents the screw from gouging the bar. Drive a threaded insert into the head block, then fit in the shim and screw in the thumbscrew.

—Steve Latta is an instructor at Thaddeus Stevens College of Technology in Lancaster, Pa.



Ask a question

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

Photo, this page: Mark Schofield; drawing: Vince Babak

Hollow-chisel mortisers: How clean are their cuts?

Q: I want to buy a hollow-chisel mortiser, but I'd first like to know if this type of machine will cut a finished mortise consistently. Or will some handwork be necessary?

—DANIEL MONTGOMERY, Hinsdale, Ill.

A: IF YOU SET UP THE MACHINE properly and use a well-tuned chisel, a hollow-chisel mortiser can cut accurate mortises of furniture quality. The only handwork needed may be some slight trimming. Make sure that the chisel is sharp and perfectly square to the fence, and that the drill bit extends ⅛ in. below the tip of the chisel for smooth cutting action.

—Roland Johnson is a contributing editor.

Clean cuts. *A hollow-chisel mortiser is designed to make sharp, smooth cuts that need little, if any, handwork.*

Another use for a panel-raising bit

Q: I'm making a bench seat with a gentle curve on the front and a 25-in. radius on the ends. I want to put a 20° to 25° bevel on the bottom, to match an existing piece of furniture. How can I do that without buying a custom router bit?

—HILTON HALE, Prescott, Ariz.

A: THE TABLETOP SHOWN BELOW, built for "An Exercise in Design" (*FWW* #184, p. 63), has gently curved sides and a bevel on its underside.

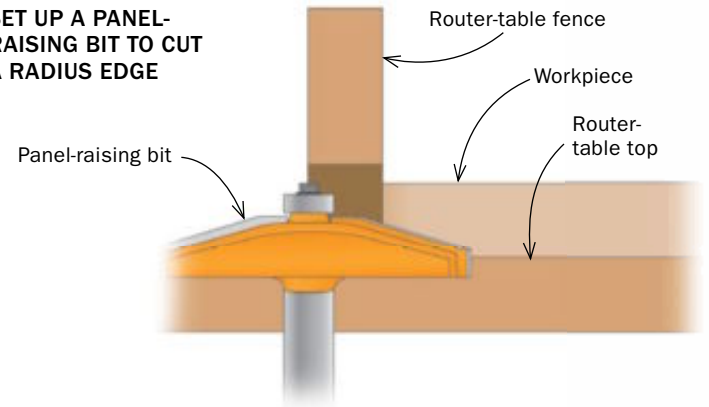
Create that profile with a 3¼-in.-dia. panel-raising bit in a router table, set up with a minimal gap between the fence and the bit. Use a stand to support the opposite end of the tabletop. That way, one end of the work bears against the fence and the other end rests on the stand, giving you a solid and safe setup.

I'd strongly suggest doing a dry run first and taking several light passes to make the profile. If you aren't comfortable using a router, you can scribe a depth line on the stock and cut the bevel with a handplane.

—Mark Schofield is managing editor.

Support two ends. *When you use a router table to profile the edge of a large workpiece, keep the opposite end supported.*

SET UP A PANEL-RAISING BIT TO CUT A RADIUS EDGE



Photos, this page: Tom Begnal (top); Mark Schofield (bottom left); drawing and photo (bottom right): Kelly J. Dunton

Centering an insert in a turned knob

Q: I'm making knobs for a tool cabinet, and I want to put a small decorative insert in the center of each one. How do I do that?

—L. CLIFT, Albany, N.Y.

A: FIRST, TURN A SHORT LENGTH of ebony or walnut to a thin cylinder. A finished diameter of ⅛ in. to 1¼ in. works for most knobs, but choose a size that's well proportioned for the knobs you plan.

Chuck a knob in the lathe and put a small dimple in the face with the point of a skew chisel. This will ensure that the hole you drill for the insert will be dead center.

Measure the diameter of the ebony cylinder and select a drill bit that's a hair smaller. Use a drill chuck in the tailstock of the lathe to hold the bit.

Finally, chamfer the cylinder you've turned, so it slips easily into the hole in the knob. Glue it in place and cut it slightly proud. Use a small gouge to trim the insert flush as you turn the knob to its final contour.

—Ernie Conover teaches woodworking at his workshop in Parkman, Ohio.

Dead center. *Mount a drill bit in the tailstock of a lathe to center a recess for a decorative insert in a turned knob.*

Furniture from framing lumber

Q: A local coffeehouse hired me to build tables that can serve as workstations for artists and students. I wanted to mill 2x12 Douglas-fir framing lumber for the legs. You've cautioned against using this kind of wood for furniture, but I wonder if this is an exception.

—CALEB BERRY, Chicago, Ill.

A: I WOULDN'T MAKE AN EXCEPTION for these workstations. Even if the lumber is dried to construction-lumber standards, it may contain pockets of pitch or sweat small beads of pitch if exposed to heat or sunlight. So-called old-growth wood, which has the tightest growth rings, is the most likely to contain pitch.

—John White is FWW *shop manager.*

Deep pockets. *The pitch pockets in Douglas fir make it a poor choice for furniture.*

What caused the pits in a varnished tabletop?

Q: I've been spraying McCloskey Heirloom Varnish for several years. From time to time, it develops small pits. It happened most recently on a mahogany desk. After sanding and applying wood filler and two coats of sealer, I built up coats of thinned varnish. The pits show across the entire top.

—RICHARD EVERETT, Columbus, Ohio

A: I SUSPECT THAT THE WOOD FILLER is the cause of the problem. Most likely, it wasn't completely dry before you moved on to varnishing.

The filler shrank as it dried, pulling the varnish down into the wood pores and creating those small pits. Subsequent topcoats weren't sanded flush, the filler continued to shrink, and each new coat of varnish magnified the problem. Your only recourse is to sand off the finish, let the filler dry completely, sand it, and start over.

Like you, I learned the hard way that oil-based fillers take a long time to dry. I give them four or five days to cure and shrink before I move on to other finishing steps.

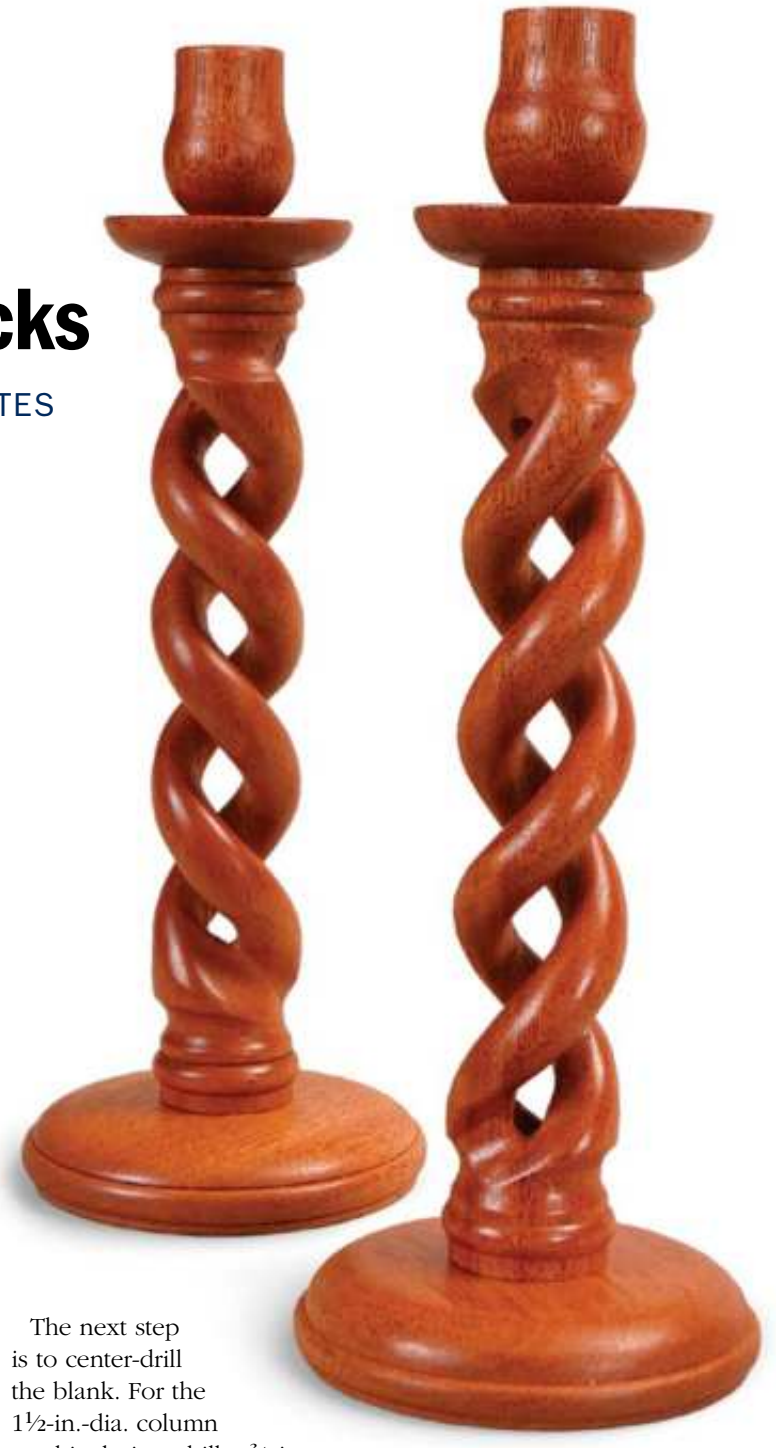
—Chris A. Minick is a consulting editor.

Photos, this page: David Heim (top); Kelly J. Dunton (bottom)

Barley-twist candlesticks

CENTURIES-OLD HAND-TOOL SEQUENCE CREATES A GOOD CONVERSATION STARTER

BY ERNIE CONOVER



Of all the things I make on the lathe, one of the most eye-grabbing is the barley-twist candlestick, which owes its name to a type of English candy traditionally made with a twist. Whether on a dining-room or a kitchen table, the candlesticks, usually made in right- and left-twist pairs, never fail to be the center of conversation, with woodworkers and non-woodworkers alike wondering how they are made. Although one would think that such work must require a router and complicated jigs, the design predates the router by at least 300 years. A lathe and a few simple tools are all you need.

This is a good project for novice turners, as the only turning is where you bring the blank to shape. The spirals are cut entirely by hand, with the lathe used as a vise to hold the work.

Besides a lathe you need some sharp gouges: I use a #9-7mm (#9 sweep, 7mm wide), a #9-15mm, a #7-20mm, and a #8-18mm. Gouges close to these in sweep and size would work as well.

Choose wood that is easy to carve. Mahogany (shown) is a good choice for your first try; walnut is durable and looks good on a dining table; basswood is easiest to carve and looks fine in a less-formal setting; and oak was a common choice in 17th-century England.

Prepare the blank and lay out the twists

Before you turn the blank to the cylindrical pattern and drill out the center, be sure to imprint drive-center marks on both ends so that you can chuck the work in the same exact position at either end for carving. When creating the turning, put a gentle cove just inside the bead at each end to allow an easy start and finish with the gouges when carving the threads.

The next task is the layout lines. If your lathe has indexing, then use it to draw the four horizontal lines, but you can also use dividers or the lines drawn earlier on the end grain to find the center. Now divide the shaft into ¾-in.-long segments, holding a pencil against the work to create a series of circles.

Although our forefathers would have used a piece of string to lay out the spiral, masking tape does a better job. Wind the tape in a left or right spiral so that one edge crosses each intersection of the 90° lines and circles. Repeat for the other spiral.

The next step is to center-drill the blank. For the 1½-in.-dia. column on this design, drill a ⅜-in. hole. Drill from both ends to ensure better centering of the bore.

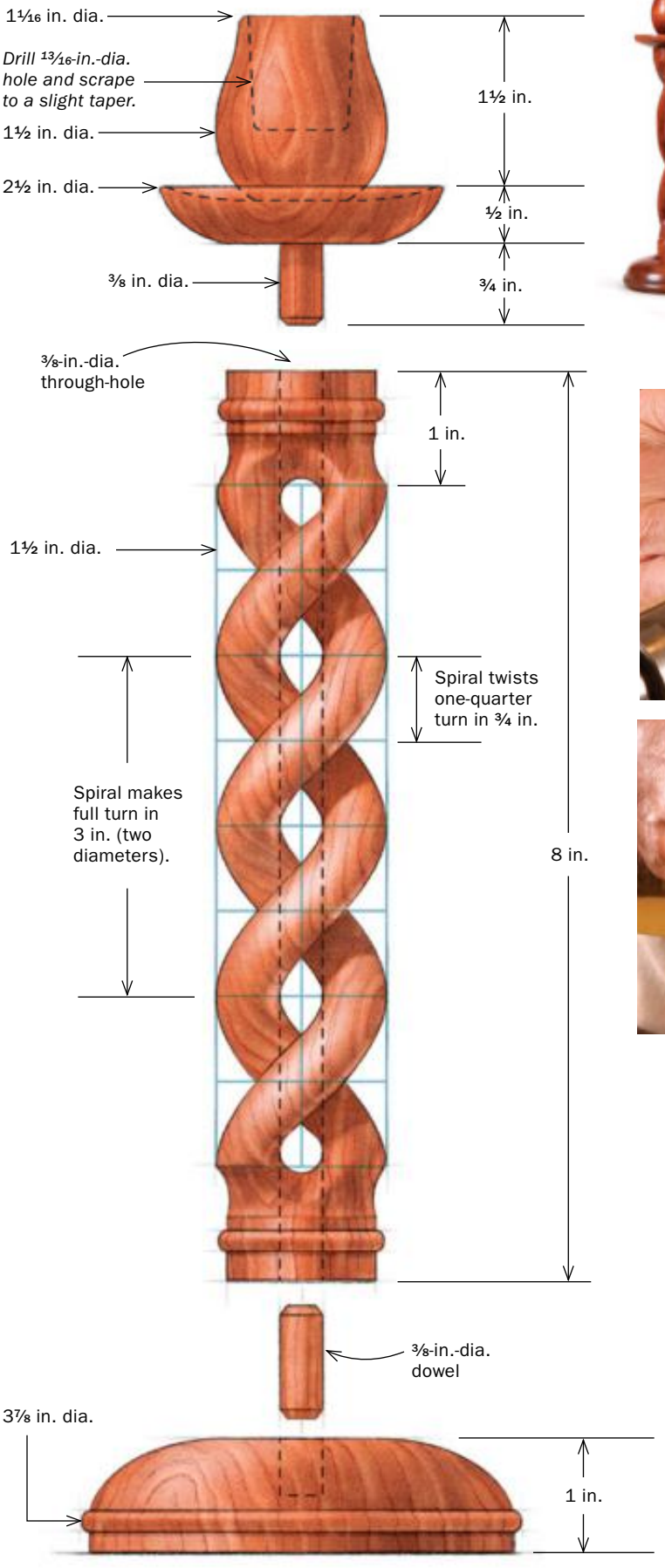
Saw, carve, and sand the spirals

Use a backsaw to cut a ¼-in.-deep kerf following the curve of the cylinder on the spiral lines you just laid out. Place the #9-7mm gouge on the tool rest, just as if you were going to make a sheer cut with a turning tool, but skewed to follow the line of the kerf. You want to cut to the right side of the sawkerf to be cutting downhill with the grain. Now turn the work with the lathe's handwheel or an auxiliary wheel (see drawing, p. 98). If you have the tool at the correct angle, you'll automatically follow the spiral, but if not, simply correct on the fly.

Now reverse the piece end-over-end on the lathe and carve the other side of the kerf, blending in the middle as much as

Photos: Mark Schofield; drawings: John Hartman

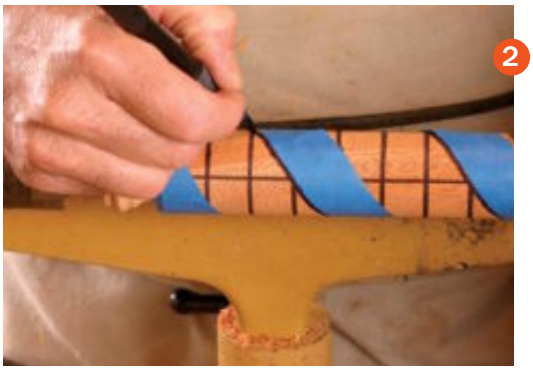
Turn a cylinder and lay out the spirals



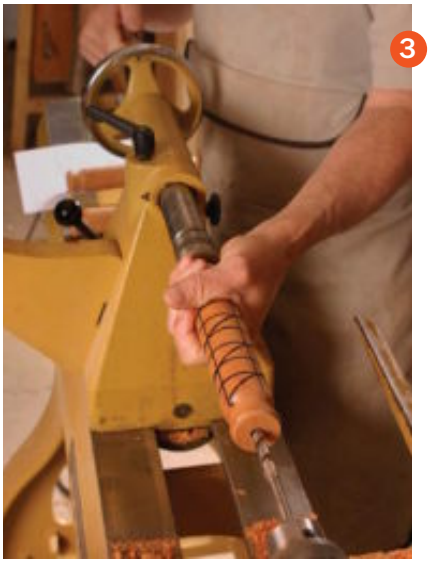
TWIST: NOT TOO LOOSE, NOT TOO TIGHT

This barley twist consists of two threads cut into a cylinder. The tightness or looseness of the twist is determined by the length of cylinder covered by each revolution of the spiral. I have found that a spiral that completes one turn in two outside diameters works best. With these three candlesticks, the one on the right has too much twist; the one on the left has too little, while the center one looks about right.

1 *Lay out the lines.* *Divide the blank into quarters, marking two opposite lines with a dot to designate where the spirals will start. Then draw lines ¾ in. apart around the cylinder.*



2 *Draw the spirals.* *Wrap masking tape around the cylinder, connecting the intersections of the horizontal and circular lines, and mark the line. Do this for both spirals.*



3 *Center-drill the cylinder.* *Drill the blank from each end to keep the hole centered.*

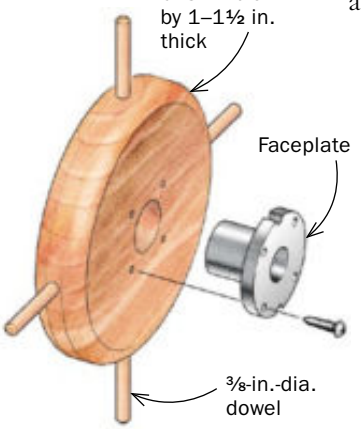
Saw and carve the spirals

Saw the layout line. *Use a backsaw to cut a kerf roughly ¼ in. deep along the spiral lines. Gradually spin the piece by hand as you cut.*

possible. Come back and repeat both cuts using a #9-15mm gouge to widen the channel.

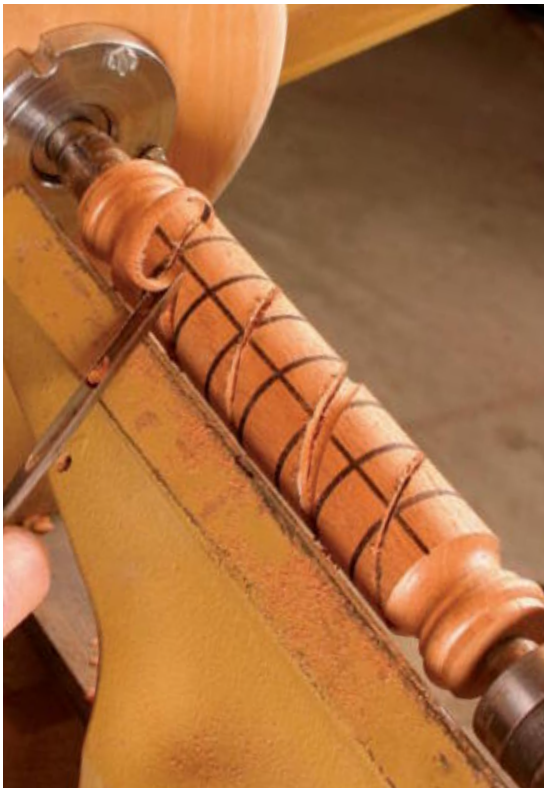
When you have cut to the bottom of the kerf, deepen the sawkerf and repeat the process. Before you break through to the drill hole and weaken the workpiece, use a #7-20mm or #8-18mm gouge inverted to round over the top edges of the grooves.

The breakthrough to the drill hole presents the greatest danger of cracking one of the twists. It is easy for the gouge to become a wedge along the grain line. Reduce this risk in three ways: Clear enough wood from both sides of the groove to keep clearance for your gouge; make only light cuts; and use a rasp when breaking through. If all else fails, a bottle of medium-viscosity super glue is a good standby.

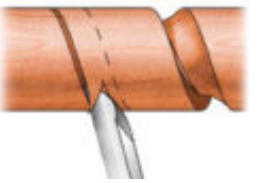


An auxiliary wheel makes hand-turning easier.

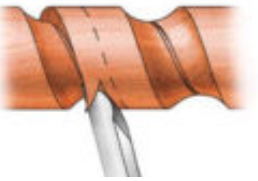
Once you have a good gap between the spirals, use a gouge on its side or upside down on the tool rest and carve the inside of the spiral by halves to avoid carving against the grain. If you'll be making a lot of these barley twists, use an in-cannel gouge; having the bevel on the inside of the flute gives



Carve the channel. *Use a narrow gouge to carve a channel along each spiral. Stay to the right of the sawkerf so that you are cutting downhill and not against the grain. Flip the workpiece to carve the second half.*



1. Stay to the right of the sawkerf.



2. Flip the blank to carve the other side.

Widen the channel. *Come back with a wider gouge to enlarge the channel. Again, always cut on the right side of the kerf. When complete, saw down another ¼ in. and repeat the carving with the narrow and wide gouges.*

Round over the spiral. *Use an inverted gouge to shape the outside of the spirals.*

Shape the inside of the spirals

Reveal the center hole and refine the spirals. *The workpiece becomes much weaker once you break into the drill hole. To reduce the risks of cracking a spiral, use a rasp when breaking through (above). Taking light cuts, delicately shape the insides of the spirals (right).*

TIP: WORK ON BOTH SIDES OF THE LATHE

When cutting a left-hand spiral or certain sections of a right-hand spiral, it is easiest to move the tool rest and work from the back of the lathe.

greater control. You can find them at old tool sales, or regrind an old gouge. You'll need one whose sweep is slightly greater than the diameter of the spiral you're carving.

With the spirals roughly cut to shape, it's time to sand. Because you will not turn the lathe on, it's safe to use cloth-backed abrasive cut into strips. Start with P80-grit and work up to P180-grit paper.

Turn the other parts and apply a finish

Once everything is sanded to final smoothness, faceplate-turn the base, and spindle-turn the candle holder/wax cup. I turn a ⅜-in. tenon on the bottom of the wax cup to glue into the main shaft. I attach the base with a spindle-turned ⅜-in. dowel of the same wood I used for everything else.

Apply a coat of Minwax Antique Oil Finish and sand it in with P220-grit sandpaper. Sanding the wet oil ensures good bonding between coats and forms a slurry of wood dust and oil that fills the pores. When the finish is slightly tacky, wipe it with a clean cloth until almost dry. Repeat the steps with P320-grit, and finish with P400-grit. Aim for a very smooth, glossy surface but not a shiny, plastic look. □

Sand and finish on the lathe. *With the lathe off, begin sanding the spirals with cloth-backed P80-grit sandpaper. The best method is to tear the abrasive into strips known as shoelaces (above). Wipe on an oil/varnish mix and sand it into the wood to create a smooth, medium-luster finish (below).*

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finish line

Finishing a drawer

BY JEFF JEWITT

When it comes to finishing, drawers seem to cause more problems than any other part of a workpiece. Pitfalls include internal corners that either avoid finish or collect a puddle of it; the drawer's transition from the visible outside of the piece to the less-visible inside; and the need for the drawer to slide smoothly in a tight space. However, if you follow a series of logical steps, applying finish becomes straightforward.

Finish the drawer front first

Most drawer fronts are made from a primary wood, with the sides, back, and bottom made from secondary woods. The stain (if applicable) and the clear coat on the drawer fronts should match the rest of the cabinet. The other parts of the drawer should get a minimal finish. This leads to the problem of how to make a clean transition, particularly if the sides are attached to the front with half-blind dovetails.

Selective staining

When staining the drawer front only, apply the stain with a small piece of cloth. Then use an artist's brush to apply stain just to the dovetail pins and the thin strip of drawer front beside them.

Staining? Isolate it—If the primary wood needs to be stained, do that before anything else. Apply stain first to the front and the top edge of the drawer front using a small piece of cotton cloth. For an even release of stain, dampen the cloth first with a liquid compatible with the dye's solvent, in this case water. Be careful to keep the stain from creeping onto the inside of the drawer front or the tops of the drawer sides.

The next step is to stain the dovetail pins on the drawer front. Don't run masking tape down the drawer sides and stain both the pins and the tails. This time-saving method looks awful. The best way is to use a #2 or #4 artist's brush (available at art-supply stores).

With a steady hand, apply the stain to the pins and the narrow strip at the front, staying just away from the tails. Avoid overloading the brush; this increases the risk of stain spilling over onto the secondary wood.

Applying the clear coat—If you are using a fast-drying finish such as shellac, lacquer, or waterborne finish, apply the finish to the drawer front with a brush or a pad. Using a small brush, apply the finish to the top edge of the drawer front and the thin strip in front of the pins. These may be slightly visible even when the drawer is closed.

If you prefer an oil-based finish, apply it in the same way, but you may have trouble isolating it to the pins because of oil's tendency to flow. If this happens, wipe or brush the finish along the whole side of the drawer. If you don't want a strong smell of finish inside the cabinet, wipe a sealer coat of shellac onto the drawer side when the oil-based finish has dried.

Never try to finish a drawer front with the pull attached—whether wooden or metal. It is a recipe for runs. Instead, drill any necessary holes after the finish is applied, and attach the hardware. If you are

Photos: Mark Schofield

Finish one section at a time

1. FINISH THE DRAWER FRONT AND PULL

The face, top edge, and strip on the sides of the drawer front receive a finish that matches the rest of the workpiece (left). Pulls should be finished before being attached to the drawer front (below).

turning a knob, the easiest way to finish it is while it is still on the lathe.

A thin finish for the less-visible parts of the drawer

I like a minimalist approach to finishing the sides, back, and bottom of a drawer, particularly those used for clothes and linens where durability isn't an issue. I apply one coat of a 2-lb. cut of shellac, let it dry a couple of hours, and then lightly sand the surface with P600-grit sandpaper. I apply this finish everywhere but the parts of the drawer front just finished, and the sliding surfaces. I'll treat them later.

There are two ways to make this step easier. Finish the drawer bottom separately, as this avoids those difficult-to-finish, three-plane internal corners. And use a larger artist's wash brush with a very sharp, chiseled edge that is great for getting into corners without getting finish on an adjacent edge.

If this is a kitchen drawer, you'll need to apply several coats of a tough film finish such as lacquer or polyurethane to all of the interior surfaces. The procedure is the same.

Two types of wax complete the finish

Apply paste wax to all the drawer surfaces, including the drawer front if appropriate, and buff them with a clean cloth. If you prefer a fragrant wax, Antiquax and Liberon's Black Bison wax have a pleasant scent.

On the sliding surfaces left free of finish, rub a chunk of beeswax or a candle to keep friction to a minimum.

The last steps are to attach the handle, slide the drawer smoothly into place, and admire your handiwork. □

2. SEAL THE REST OF THE DRAWER WITH SHELLAC

Inside the corners. *Use an artist's wash brush with a chiseled edge to get the right amount of finish into the corners. Avoid finishing the bottom of the drawer sides.*

Finish the bottom separately. *It is much easier to finish the bottom before it is inserted into the drawer because you don't have to contend with inside corners.*

3. APPLY TWO TYPES OF WAX

Wax the surface. *After sanding, apply and buff off a coat of paste wax. This will leave the surface feeling smooth. Rub a block of beeswax or a candle on the bottom of the drawer sides for smooth sliding.*

FLUSH SANDING

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West Meets East

For centuries, while China was closed to foreigners, Chinese forms found their way into Western furniture. From the frothy fretwork of Chinese Chippendale to the cabriole legs on Queen Anne tables and the bamboo-style turnings on Windsor chairs, China has been with us whether we knew it or not. *Inspired by China,* an extraordinary show at the Peabody Essex Museum in Salem, Mass., asked 22 American, Canadian, and Chinese makers to participate in a three-day workshop on Chinese furniture at the museum. Then each maker built a piece in response to that experience. The inspiring new pieces are on view alongside a selection of the antique Chinese furniture that inspired them. Those who miss the show will be consoled by the superb catalog (www.pem.org).

—Jonathan Binzen

Pro Portfolio Visit FineWoodworking.com for more of the exhibit, with audio commentary from curators and artists.

Photo: Dean Powell

MICHAEL HURWITZ'S display cabinet (24 in. deep by 36 in. wide by 78 in. tall), one of a pair, folds materials and methods of Chinese furniture making into his Japanese-tinged aesthetic. The traditional Chinese "cracked-ice" pattern in the small sliding doors is balanced by his own squiggly, bent-laminated latticework on the left. The carcase is bamboo veneer, and the solid-panel door is made from a prized plank of zelkova Hurwitz bought years ago in Japan.

J.M. SYRON AND BONNIE BISHOFF drew on details of Chinese furniture for their altar coffer's raised ends and exuberantly scrolled skirt and corbels. A Chinese tapestry inspired the seascape on the panels. Syron built the mahogany cabinet (18 in. deep by 32 in. wide by 26 in. tall) and Bishoff pieced together the stylized seascapes in marquetry fashion, using "veneers" of polymer clay. She also used polymer to create the illusion of "cracked ice" latticework over the seascape.

Photo: Dean Powell

Photo: Dennis Helmar

BRIAN NEWELL, an American who lives outside Tokyo, was so inspired by China that he traveled there after the museum workshop. His Cicada Cabinet (12 in. deep by 42 in. wide by 37½ in. tall) in zitan and boxwood found its impetus in a carved jade pendant of a cicada that he received as a gift while in Beijing. The cabinet's pierced carving is based on a pattern Newell saw in China on 3,000-year-old bronzes and stonework.