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Fine WoodWorking

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October 2002
No. 158

Gel stain user's guide

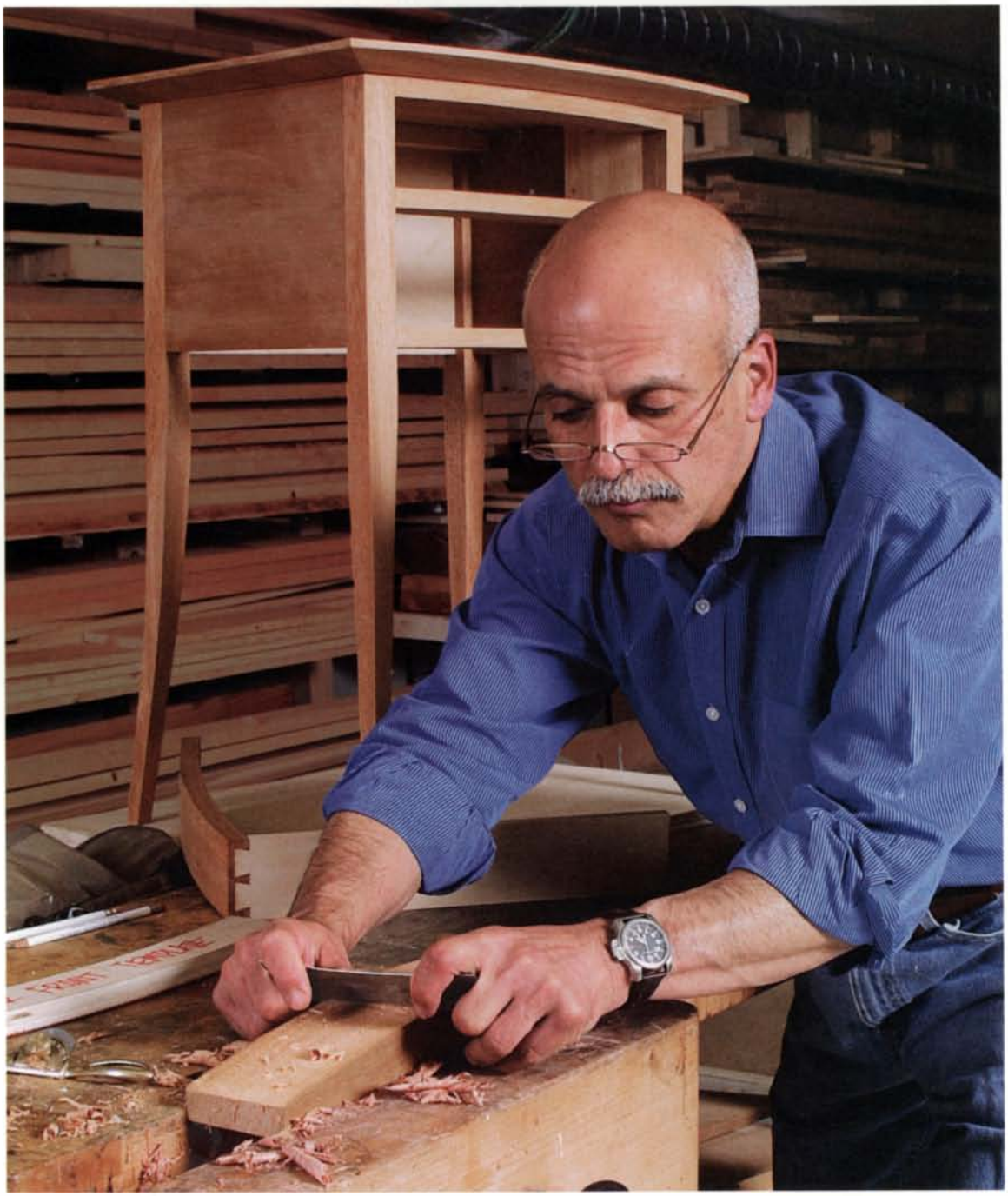
Router jig for floating-tenon joinery

Installing a bench vise

Compound-angle joinery without math

New midi-lathes make turning affordable

Top 10 rules of woodworking



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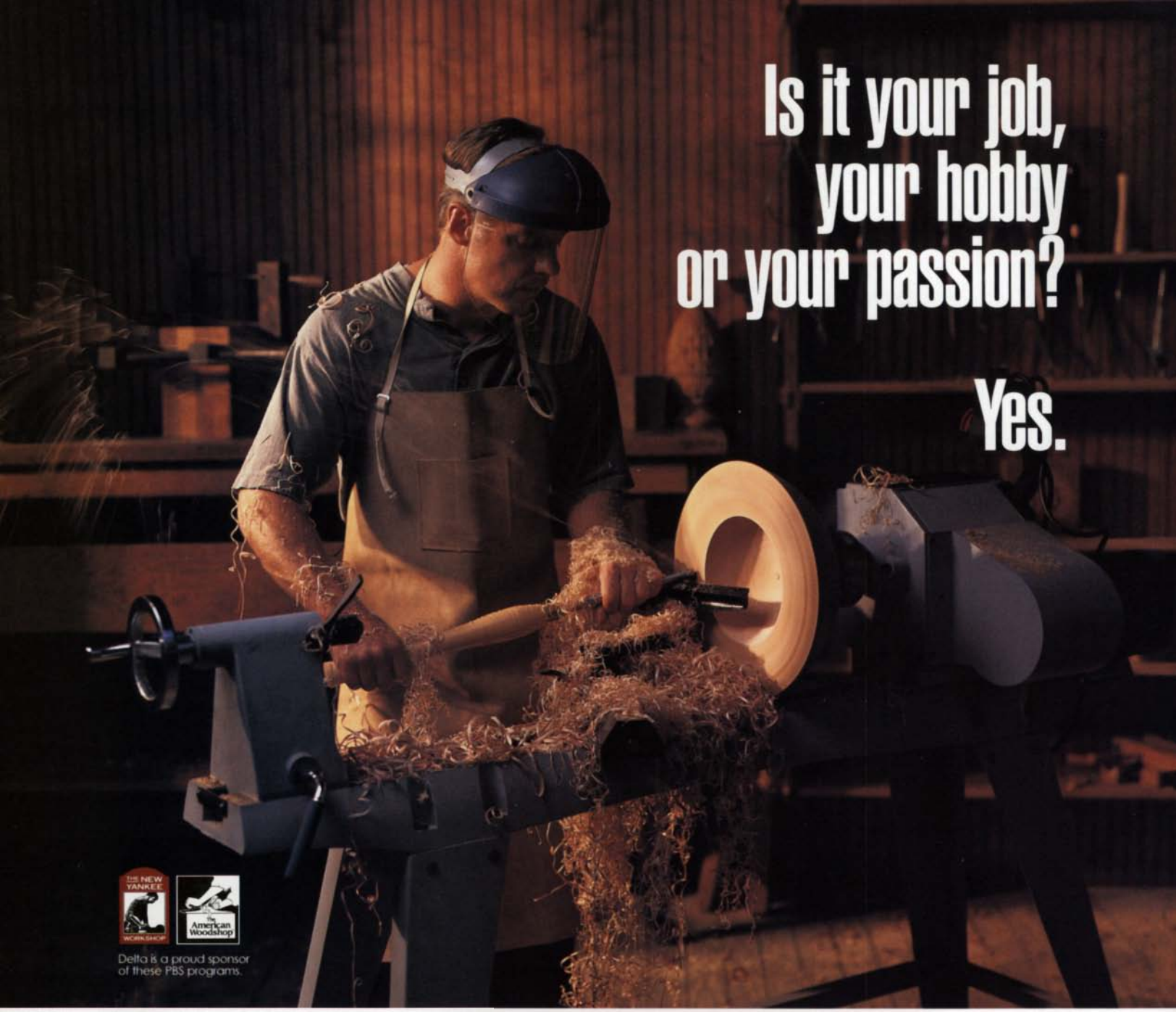

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Fine WoodWorking®

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On the Cover: *Contributing editor Mario Rodriguez smooths a curved drawer front made using one of his two methods.* *See p. 40*
Photo: Erika Marks

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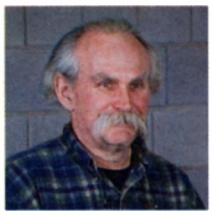
Installing a cast-iron vise, p. 56

Contributors

Raised on a farm in Kentucky, David Salisbury (Finish Line) originally wanted to be a farmer, but when his father sold the farm, that plan fell through and he turned to woodworking. Hired by Colonial Williamsburg 27 years ago, he completed his apprenticeship and has worked in the cabinetmaker's shop ever since. Salisbury finds it deeply ironic that his grandfather was a cabinetmaker in Germany, but when he came to this country he couldn't earn a living in that profession and so became a farmer. When not woodworking, Salisbury enjoys saltwater fishing, except between December and March, when his Kentucky Wildcats college basketball team takes priority.



Andy Barnum ("Midi-lathes") lives with his wife and two daughters in Carmel, N.Y., where he maintains an active woodworking business. He also teaches wood-turning classes at the School of Art and Design at Purchase College in Purchase, N.Y., and at the Brookfield (Conn.) Craft Center. Barnum makes many of his own hand tools and finds it especially satisfying when he uses them to build furniture. Now, however, after accumulating hand tools for several decades, he is thinking that it might be time to downsize his collection. Anyone need 200 planes?

Brian Boggs ("Soup Up Your Spokeshave") makes chairs and rockers in Berea, Ky. While he is always working to refine the Appalachian chair style, he's just as interested in refining his production processes. His curiosity and inventiveness extend from the jigs and tools he uses to the process of harvesting and milling hickory bark for chair seats. His latest engineering venture is an improved version of his original bark machine. The new machine will gang-rip, split and surface rough material into uniform strips, then wind them into coils. This time he's using a system of aluminum extrusions called "The Industrial Erector Set" manufactured by 80/20 and an array of bolt-on mechanical components from McMaster-Carr. These modular, adjustable parts allow him to design and debug his machine as he builds it. But more importantly, he said, "They're a blast."

Scott Gibson ("Wine-Glass Cabinet") does what many of our readers wish they could do: make furniture and write about it. He is a career journalist who has spent the last 10 years writing and editing magazine articles about furniture making and home building. A former staff editor at *Fine Homebuilding*, *Fine Woodworking* and *Home Furniture*, he is now a contributing editor to *Fine Homebuilding* and writes for several other publications. Gibson and his wife, Susan, returned to Maine last year, where they are renovating a house near the Saco River.

Steve Brown ("Compound Angles Without Math," Master Class) is the head of the cabinet- and furniture-making program at Boston's North Bennet Street School. After graduating from the same program in 1990, he worked as a furniture maker with Philip C. Lowe for almost nine years before returning to North Bennet Street School as an instructor. Since 2001, when he was tapped to run the program, Brown has been working on reshaping the two-year course. The challenge is to provide students with a solid foundation in the basics while offering them the experience of building high-end period pieces. For more information on the program, go to: www.nbss.org.

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Fine Woodworking: (ISSN: 0361-3453) is published bimonthly, with a special seventh issue in the winter, by The Taunton Press, Inc., Newtown, CT 06470-5506. Telephone (203) 426-8171. Periodicals postage paid at Newtown, CT 06470 and at additional mailing offices. GST paid registration #123210981. U.S. distribution by Curtis Circulation Company, 730 River Road, New Milford, NJ 07646-3048 and Eastern News Distributors, Inc., One Media Way, 12406 Route 250, Milan, OH 44846-9705.

Subscription Rates: U.S and Canada, $34.95 for one year, $59.95 for two years, $83.95 for three years (in U.S. dollars, please). Canadian GST included. Outside U.S and Canada, $41.95 for one year, $73.95 for two years, $104.95 for three years (in U.S. dollars, please). Single copy, $7.99. Single copies outside the U.S. and possessions, $8.99.

Postmaster: Send address changes to *Fine Woodworking*, The Taunton Press, Inc., 63 South Main St., P.O. Box 5506, Newtown, CT 06470-5506.

Printed in the USA

HOW TO CONTACT US:

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www.finewoodworking.com

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Letters

Practical use for faux finishing— Peter Gedrys' Finish Line "The art of faux graining" (*FWW* #157, pp. 114-116) doesn't mention one very practical use for faux finishing, one I discovered on a trip to Paris.

To list all the pleasures of walking around that glorious city would take pages; but as a woodworker, I zeroed in on the many heavy, oak, raised-panel doors that are used at street level in older buildings. Light colors seem to prevail, yellows and oranges mostly. Though many are set deep in masonry walls, most get some direct sunlight each day. Some get baked all day. The thing that struck me was that, in general, these light finishes were in great condition. As someone who has worked on boats, I know the short life of clear finishes in UV light. As a New Yorker, I've been heartbroken to watch thousands of dollars of excellent woodworking and material on Madison Avenue storefronts turn shabby in a year or so.

So I was particularly interested in these Parisian doors. Though the work was uniformly at a high level, many of the best-looking doors were faux bois—there was usually some small chipping at an edge—and often many years old. The trick was, as far as I could tell, that the job was done entirely in pigmented paint: no glazing and no clear topcoat.

It seems to me that this insight could be highly valuable to woodworkers who do outdoor jobs like storefronts and signs. If you skip the expensive woods and don't labor the joinery, you can give a client a project that costs less and lasts longer with a false wood finish. Faux bois, by its nature, can cover a lot of problems.

—Robert Braczyk, New York, N.Y.

Diamond stones deserve mention— The comparison and evaluations of nine different honing systems ("Sharp and Sharper," *FWW* #157, pp. 36-41) were well done and nicely written. We here at Diamond Machining Technology were pleased to see the DMT DuoSharp included in your evaluation.

More directly to the point of my letter, there seems to be widespread mention of virtually every manufacturer of each product that was used in your article; however, Diamond Machining Technology is conspicuously absent. Now, I would anticipate that the readership of *Fine Woodworking* is able to correlate the distinctive polka-dot interrupted cut pattern pictured and be able to say unequivocally that product was made by Diamond Machining Technology; however, an editorial mention would have been appropriate. In this way, the readership could be assured that the "diamond stone" was truly of the highest-quality flatness with precisely micronized monocrystalline diamond and not a cheap imitation.

Thanks again for a thoughtful, well-written article on what we base each and every day of operations on at Diamond Machining Technology: "Sharp and Sharper"!

—Stanley A. Watson, technical director, Diamond Machining Technology

Plywood instead of MDF?—In reading the Methods of Work "Replaceable insert for radial-arm saw" (*FWW* #156, p. 22), I was surprised to see plywood used as a top for a radial-arm saw.

Over 30 years I have used two radial-arm saws, and both saws came with 1-in.-thick medium-density fiberboard (MDF) tops. When I replaced my original saw, the only part that I was able to salvage from the earlier saw was the top because when I bought that earlier saw, I put a piece of ¼-in.-thick fiberboard on the top and let that piece take all the

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Nov. 21-22: Publisher Tim Schreiner and executive editor Anatole Burkin will be in the *Fine Woodworking* booth at the Mid-America Industrial Woodworking Expo in Columbus, Ohio. The show takes place at the Greater Columbus Convention Center. For more information on the show, visit their web site at www.tsishows.com.

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cuts. Not only do I crosscut, but I also perform a lot of cutting at different angles and frequent dado cutting on my radial-arm saw. *—Paul Jacklin, Corona, Calif.*

Manufacturer warning—*Fine Woodworking* published a quick tip in its Methods of Work department that suggested using Rain-X on glasses to prevent fog and dust buildup (*FWW* #156, p. 18).

Rain-X is designed for external automobile glass only. When used on plastic surfaces, such as safety glasses or goggles, damage may occur. Our product directions clearly state: "Do not use on plastics unless preapproved by the manufacturer of the plastic to be treated."

—Mike Maddox, national manager, technical service, Pennzoil-Quaker State Co.

Cyber satisfaction—Several years ago, when I was introduced to the World Wide Web, I surfed right to your web site. I was sorely disappointed and quit visiting until several weeks ago.

What a difference! I really like the format that you have now. It is clear and well laid out. Keep up the good work staying in touch with your readers. I'll stay in touch with *FWW*.

—Steve Shank, Bend, Ore.

PVC pipe dangers not debunked—In the article "PVC Pipe Dangers Debunked" (*FWW* #153, pp. 48-49), Rod Cole surmises that PVC pipe for home-shop dust-collection systems is safe. I feel strongly that metal pipe is safer than PVC.

Historically, plastic pipe has been taboo in the woodworking industry. Panels and committees composed of scientists, engineers and industry experts who work in insurance, human safety and woodworking and equipment manufacturing consistently agree that plastic pipe should not be used in material conveying wood waste.

Some of the reasoning is as follows:

Static sparks arcing internally or externally can ignite combustible mixtures inside or outside the pipe, not limited to wood dust mixtures.

Static sparks arcing from the pipe can jolt, injure or startle personnel working on dangerous equipment.

The danger of duct fires: Plastic pipe itself is combustible. It cannot contain a fire starting in a duct. It's easy enough to check your dust bin or bags for smoldering material, but sparks or embers can also ignite residual sap coating or dust anywhere in your ductwork. Running the collector for a few minutes before shutdown can help, but not all ducts are designed efficiently, and some material may remain in the duct. Smoldering materials inside the pipe are out of sight and inaccessible.

Limited choices of pipe size: PVC fittings are not designed for pneumatic conveying, compromising efficiency and good design.

The above incidents do occur in the woodworking industry. Fire loss is much less likely in a small woodworking shop, but the hazards are still present. Rod Cole's research is impressive and relevant. It provides much needed additional information in risk assessment, precisely because many woodworkers use PVC drainpipe for air handling applications. However, the research is limited in scope and done by one person working outside his field of expertise. Although generally more expensive, metal pipe is still a far better choice for woodworking applications.

—Robert Witter, Oneida Air Systems Inc.

Another household cleaner for shop use—A number of readers suggested oven cleaner as an alternative to the blade cleaners reviewed recently in the Tools & Materials department (*FWW* #154, pp. 30-31). We conferred with Tony Ferrato, a 30-year veteran at Forrest, who said that oven cleaner is okay to use and won't harm the carbide teeth. Limit exposure to 20 minutes, and use either a brass or nylon brush to scrub the blade. Oven cleaner, however, may cause the body of the blade to tarnish and may remove writing and labeling information.

—Tom Begnal, associate editor

Addendum—Some readers asked us how to get in touch with instructor Peter Gedrys, author of last issue's Finish Line. He may be reached at Architectural Finishes, 112 Mt. Parnassus Road, East Haddam, CT 06423; arcfinishes@msn.com.

Corrections—Because of an editing error, the origin and current home of the Shaker clock reproduced in issue #157 were incorrect. Isaac Newton Youngs lived in the Mount Lebanon, N.Y., community and built this clock as part of a group of 22. An original is now housed in the Hancock, Mass., dwelling house.

Also, the article on honing systems, "Sharp and Sharper" (*FWW* #157, pp. 36-41) had a reference to ceramic stones, which in the published version were eliminated due to space constraints. We apologize for any confusion this may have caused.

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.

—Anatole Burkin, executive editor

Writing an article

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

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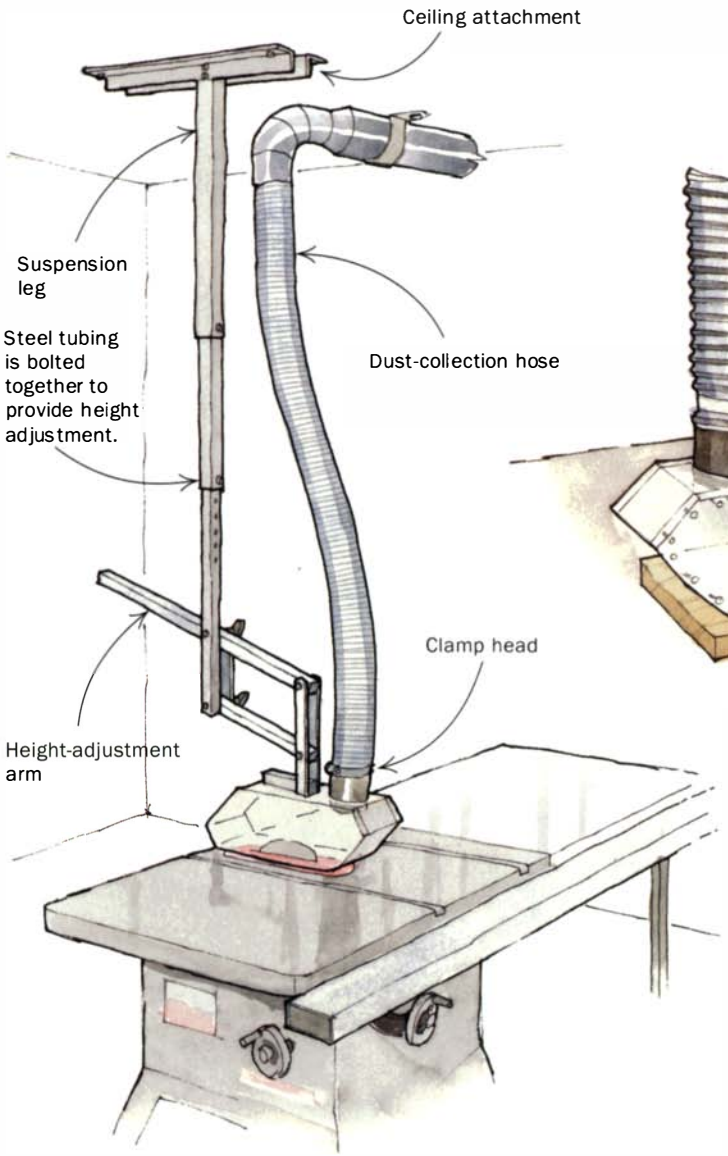
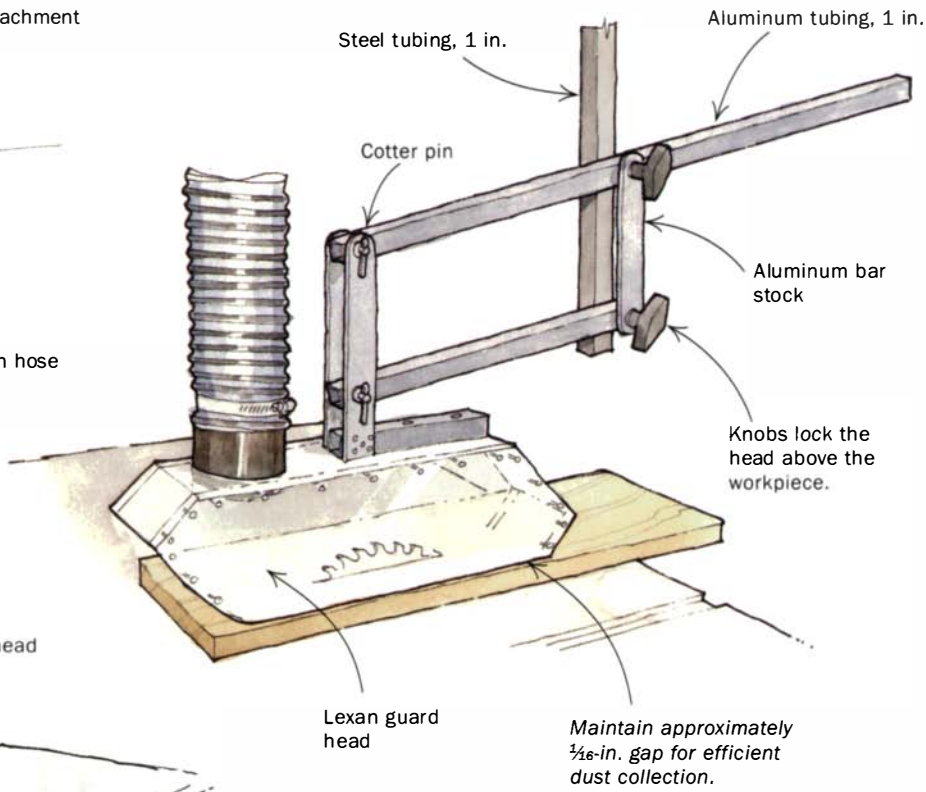
EDITED AND DRAWN BY JIM RICHEY

Adjustable overarm blade guard with dust collection





When I decided to build a blade guard for my tablesaw, I wanted one that not only would protect my fingers but also would provide excellent dust collection. I believe I achieved this in the design shown above, and for a cost of less than $100. One important safety feature is that during use the guard head is locked into position just 1/16 in. above the workpiece. In my opinion, this feature provides more protection than a guard head that can be lifted by the workpiece during the cut. The dust-collection component works so well that there is virtually no dust generated when ripping a board and very little when making crosscuts.

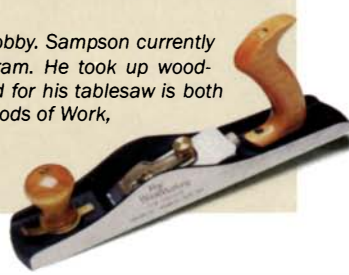
The blade guard consists of three main parts: the head, the height-adjustment arm and the suspension leg. For the guard head, I chose 3/8-in.-thick Lexan plastic because I wanted a clear material that would be almost bulletproof. I cut the Lexan pieces on my tablesaw and assembled them with screws, which allows me to replace one piece at a time if it gets damaged.

I made the height-adjustment arm with 1-in.-square aluminum tubing and 1-in.-wide aluminum bar stock. The arm locks in place with T-knobs to hold the head at the right height over the sawblade. The parallelogram-shaped mechanism keeps the head level with the table at any height, and it easily can be raised several inches when changing blades or cleaning the tabletop. To remove the head from the adjustment arm, I simply have to remove a couple of cotter pins.

I made the suspension leg from 1½-in., 1¼-in. and 1-in.-square steel tubing. These sizes fit inside each other, telescoping to allow gross height adjustments and quick removal of the entire unit, if

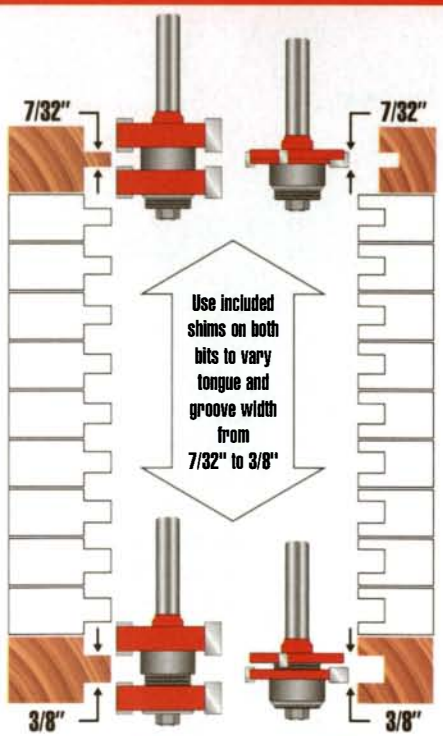
A reward for the best tip

Woodworking is not rocket science, but Gordon J. Sampson brings the talents of that discipline to his hobby. Sampson currently works at NASA in Houston, Texas, as an electrical engineer on the International Space Station program. He took up woodworking as a serious leisure pursuit only three years ago. Sampson's design for an overhead blade guard for his tablesaw is both sturdy and elegant. Send us your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470-5506.



How many different projects will this set create?

How high can you count?



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The exclusive design enables one bit to cut grooves as wide as 3/8" and as narrow as 7/32", ideal for 1/4" plywood. The second adjustable bit produces the mating tongues, and features opposing shears for silky smooth cross-grain cuts without splintering.

The set includes shims, so you can customize the fit by .002" increments for a tight glue joint or a loose slide.

The Adjustable Tongue & Groove Bit Set (item #99-036) produces perfectly fitted joints in stock from 1/2" to 1-1/4" thick for a multitude of projects, from classic Shaker style cabinet doors to breadboard ends, drawer glides and glued-up panels. You can even create arch topped doors, since the bits are bearing guided.

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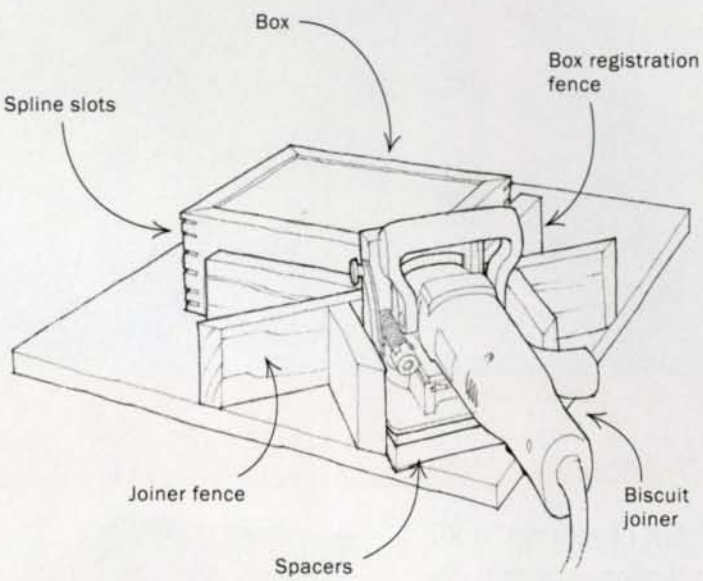
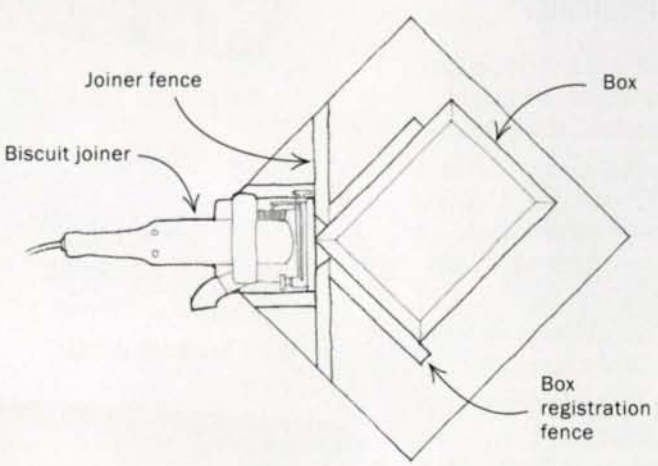
necessary. I bolted the top of the suspension leg between two heavy angle irons that are in turn lag-bolted into the ceiling joists. A sturdy connection to the ceiling is important, so you may have to improvise, depending on the particulars of your shop. In my case, I also was able to bolt the suspension leg to a garage-door support for additional stability.

Once I had the unit supported and ready to use, I attached a 3-in. plastic splice to a length of 3-in.-dia. plastic dust-collection hose and inserted the splice into the hole in the top of the blade guard. Now my tablesaw is safer and dust-free (well, almost dust-free).

—Gordon J. Sampson, Pearland, Texas

Cutting spline slots with a biscuit joiner





TOP VIEW

This technique for cutting spline slots in the corners of small boxes is safer and faster than using a sliding 45° jig on the tablesaw. The splines not only add strength to the corner joint, but they also are quite attractive.

To make this jig, start with a base of ¾-in.-thick plywood and add two sets of fences to the top—one to register the box and another to register the biscuit joiner 45° to the box corner. Adjust the biscuit-joiner fences high enough that you can raise the joiner with spacers to cut splines at different heights off the bottom. I use spacers that are ¼ in., ½ in. and ¾ in. thick to produce several height combinations.

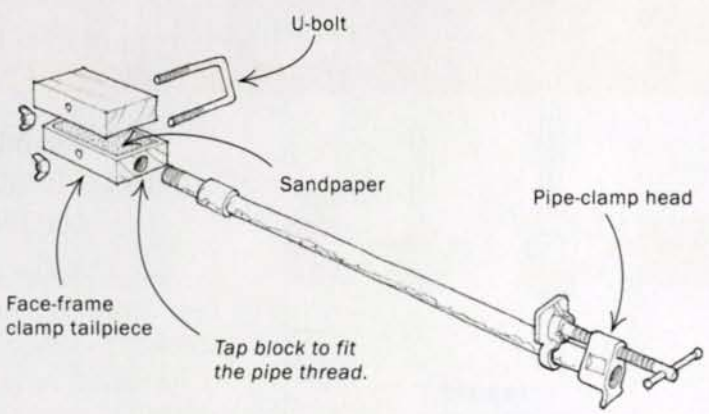
To use the jig, place the box into the corner, against the registration fence, and bring the biscuit joiner into position at the height for cutting the first slot. This may require a spacer. You want the spline slot to be as deep as possible without cutting through to the inside of the box. Set the depth (by varying the biscuit-size setting) and then cut the slot by plunging the joiner into the box. Rotate the box to cut slots in all four corners at that setting, then flip the box and repeat the process. Raise the joiner again with a spacer and repeat the process as many times as needed to cut the desired number of spline slots in all four corners.

Cut the spline material from a contrasting wood and glue it in the slots. After the glue dries, you can trim and sand the splines flush with the box sides. *—Walter E. Erck, Mount Prospect, Ill.*

Quick tip: Broken baseball bats are a good source for turning replacement chisel handles. Most teams just throw away the bats. One bat will yield three or four clear, straight-grained ash handles.

—Randy Lee, Fairfield, Ohio

Shopmade face-frame clamp



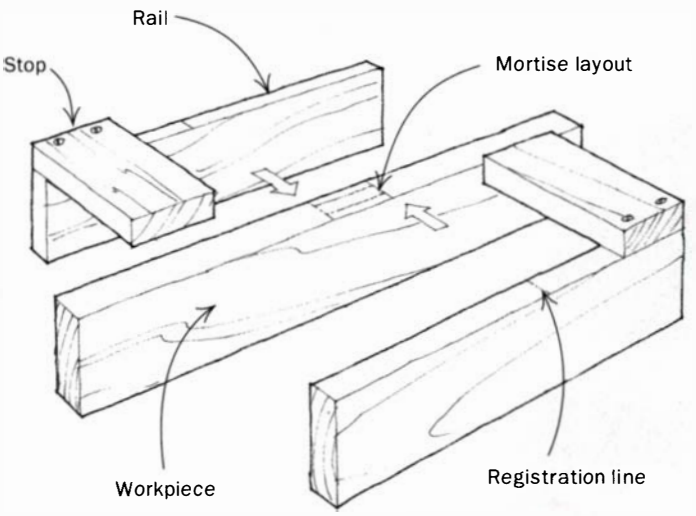
When I had to assemble a large face frame, I realized my bar clamps were not long enough and were so heavy that they would probably distort such a light framework. So I made several of the clamps shown above based on a commercial clamp designed for face-frame assembly. The clamp uses a common pipe-clamp head to apply pressure and a tailpiece that grips the stock between two offset, cantilevered hardwood blocks faced with 100-grit sandpaper. A square U-bolt provides the pivot that joins the blocks.

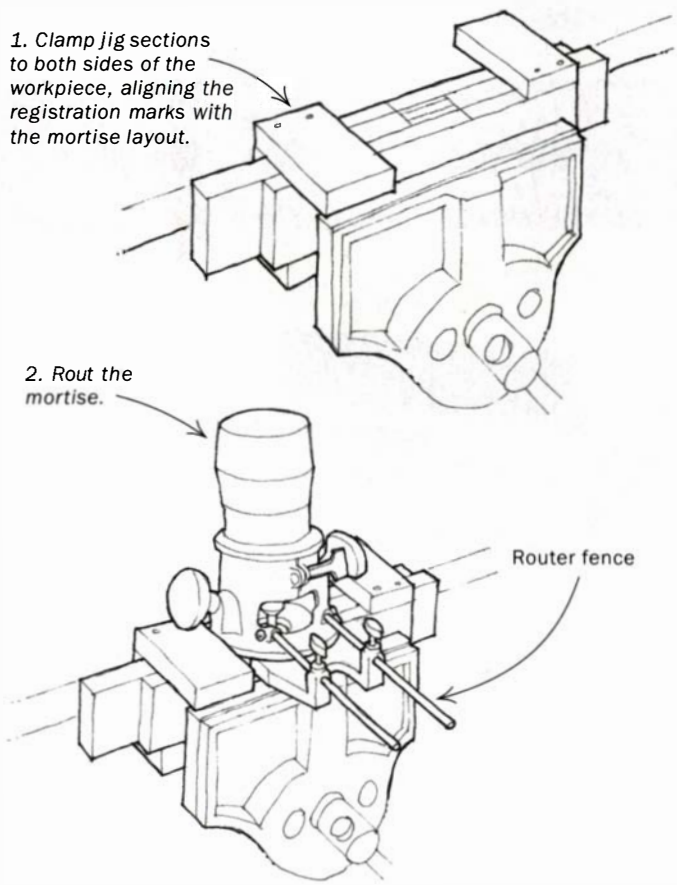
Because I own a pipe tap, I was able to attach the tailpiece by drilling and tapping the end of the bottom block. Alternatively, you could drill a slightly oversized hole in the block and pin the pipe in the hole with a small bolt. A little flex in the joint is good because it allows the assembly to be somewhat self-aligning.

Wing nuts on the ends of the U-bolt allow it to be reversed to the other side to accommodate left- or right-hand application on a

frame. The maximum opening between the blocks (determined by the location of the pivot holes) should be a little more than the thickness of the stock to be joined. A 7/8-in. opening is about right for 3/4-in.-thick stock. *—Jeffrey P. Gyving, Point Arena, Calif.*

Router mortising jig





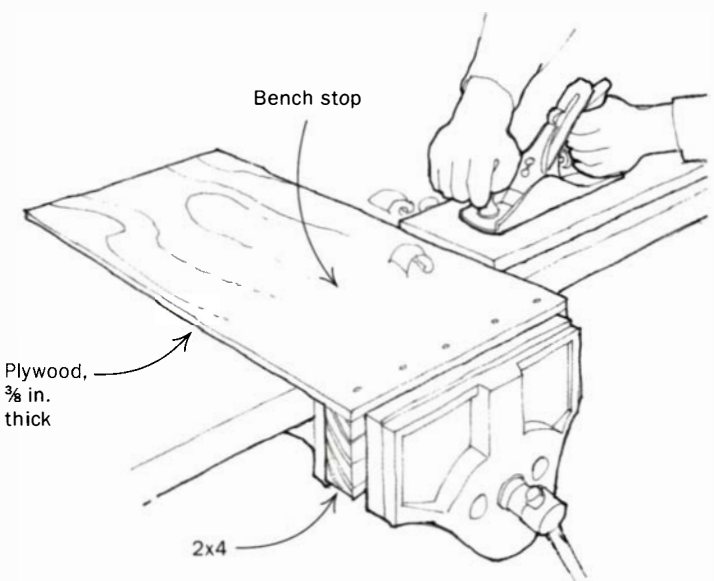
This simple router-mortising jig has two sections that are clamped to both sides of the workpiece to provide a wide, stable routing platform and to control the length of the mortise cut. The jig, which is used with a fence on the router, can be set to make just about any length of mortise on any thickness of wood. Best of all, you can put it together from scraps in no time.

Each jig section consists of a stop screwed at a right angle to the top edge of a rail. For smaller mortises, 3/4-in.-thick by 3-in.-wide stock will work fine for both the rails and the stops. You may want to scale up the jig for larger mortises or use thicker stock to provide a wider platform for mortising thinner workpieces. When sizing the jig, just be sure the rails are long enough so that the stops overlap when the rails are clamped to the workpiece. You also can chamfer the bottom edge of the stops to aid in clearing debris.

Before using the jig, clamp it to a piece of scrap and rout a short mortise by bumping the base of the router against each stop. Use the ends of the mortise to mark a square pencil line across the top of each rail. This line will register the distance from the router baseplate to the outside edge of the bit, and you can use it to align the jig quickly with your mortise layout lines. The registration lines work only for one size of router bit, but the jig is so easy to make that I have a separate one for each bit that I use to cut mortises.

To use this jig, mark out your mortise on the workpiece. Align the registration marks on each jig section with the mortise-length layout lines and clamp the two jig sections to the workpiece, making sure that the rails are flush along the top. Set the router fence to locate the mortise laterally and rout the mortise to depth. If the mortise is near the end of a workpiece, it's a good idea to add a piece of scrap the same thickness as the workpiece to provide a longer clamping base. *—Rob Sterling, Boise, Idaho*

Bench stop for planing



My bench has no dogs or other accessories for securing a workpiece to the top of the bench for planing or scraping. So I came up with a modified bench stop that performs this function quite well. To make one, screw a generously sized piece of 3/8-in.-thick plywood (mine is 14 in. wide by 18 in. long) to a 2x4 scrap. The 3/8-in.

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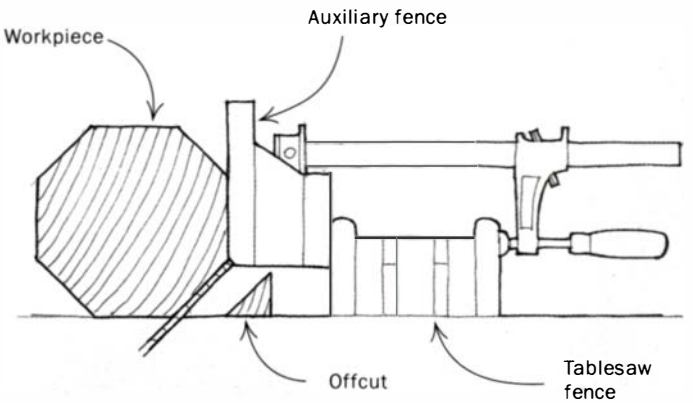
plywood is thin enough that it won't interfere with a plane coming off the end of a ¾-in.-thick workpiece. The jig is wide and long enough to keep the board from moving sideways when planing at an angle to the board's grain. Pressure from the plane usually will keep the workpiece firmly against the jig.

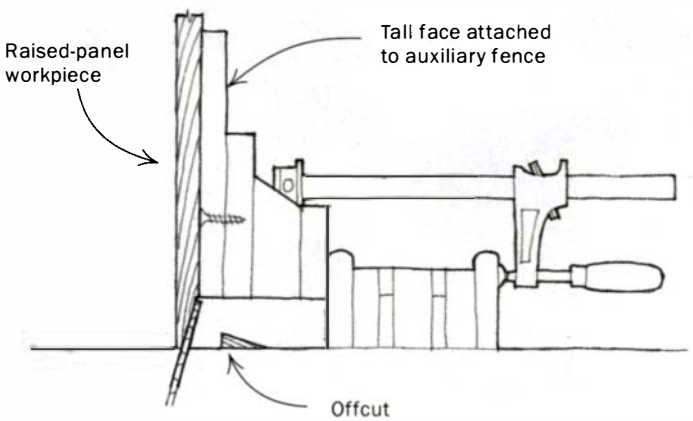
—Justin Smith, Gustavus, Alaska

Quick tip: To compress a biscuit swollen with moisture, lay it on a solid surface and strike it a few times with a carpenter's claw hammer. Test it in the slot and strike again, if necessary. The biscuit will swell for a tight fit as soon as glue is applied.

—Jim Miller, Milan, Ill.

Safer bevel cuts on the tablesaw





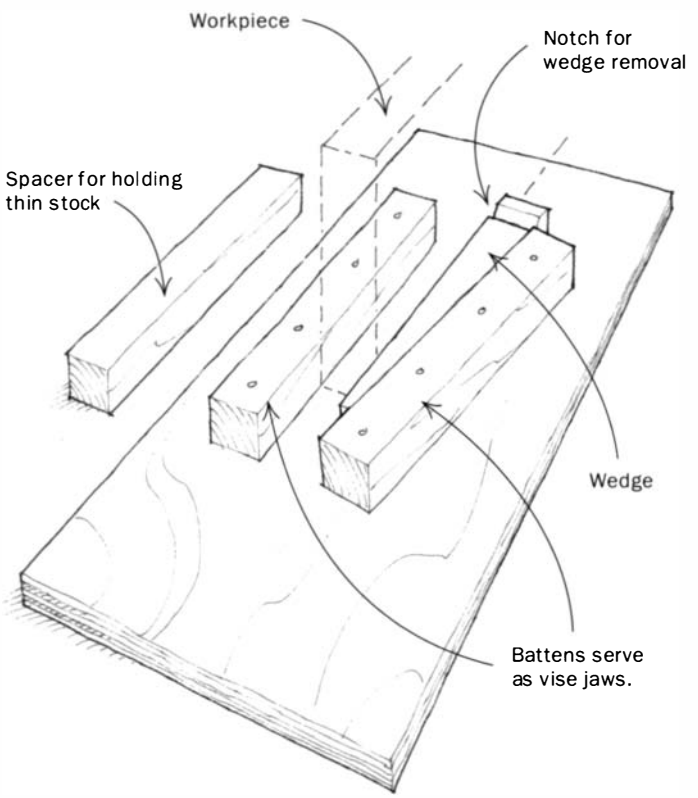
All references to cutting bevels on the tablesaw that I've seen have the sawblade tilted away from the fence with the workpiece between the fence and the blade. I think this arrangement not only increases the possibility of burning or gouging the work, but it also poses a risk of kickback.

To avoid those problems, I moved the rip fence to the other side of the blade, made an auxiliary fence as shown above and began cutting bevels in a different way. There are several advantages to this setup: First, it is safer. The offcut falls into the large space under the auxiliary fence where it cannot bind and kick back. Second, any wayward movement of the workpiece during the cut produces not a gouge but a high spot. This can be corrected by running the piece through again. It is not possible to cut too deeply because the fence keeps the workpiece a fixed distance from the blade. It's easy to creep up on a perfect cut with this method.

The method works especially well at beveling long workpieces lying flat on the saw table, such as cutting octagonal posts from square blanks. But by adding a tall fence you can easily and safely use this setup for raising panels. When shaping raised panels, it is best to define the panel field with a scoring cut before making the bevel cut to produce neater edges.

—Tom Lathrop, Oriental, N.C.

Fifteen-minute vise



Here is a handy little device that is beyond simple to make. I originally made it to hold a door upright so that I could plane the edges. Since then I've used it in practically any way you might use a vise. The device is portable, and it's a great tool to have on installations. If you lose it, you can make another with scrap in only 15 minutes.

To make the vise, rip two 2x4s to make four 2x2 battens about 12 in. long. Choose the best of the four battens and cut it into a 3° or 4° wedge shape with a notch in the top of the thick end as shown. Choose two of the other battens as the jaws of the vise. Affix one of the jaws to a ¾-in.-thick plywood base with glue and screws. Use the fourth piece as a temporary spacer and set the wedge next to it. Place the second jaw against the wedge, and glue and screw it to the base as you did the first one.

To use the jig, place the workpiece between the jaws and tap the wedge into place. To release, tap the notch on the thick end of the wedge. If you need to hold a thin workpiece, just add another spacer, sized as needed. *—Albert Kauslick, Burlington, N.C.*

Notes & Comment

Awards from coast to coast

Fine Woodworking. *This chair was made by Robert Ortiz of Chestertown, Md., who won the award for best newcomer in woodworking at the Philadelphia show.*

Maryland woodworker wins *FWW* award

Robert Ortiz, a Chestertown, Md., furniture maker, won the Best New Artist in Wood award at the 2002 Philadelphia Furniture and Furnishings Show. The award is sponsored by *Fine Woodworking* and includes a check for $1,000. Woodworkers in their first or second year of exhibiting at the show are eligible for the award.

Ortiz, whose furniture combines Shaker and Asian influences, was drawn to woodworking in 1984, when he came across a copy of George Nakashima's book, *Soul of a Tree*.

Having been a musician, Ortiz finds that building a piece of furniture is not unlike making music. "Measure upon measure, one builds a piece, one note, one joint at a time," he said. "With patience and dedication, the goal is to achieve a well-arranged and orchestrated piece, perhaps even a work of art."

—Tim Schreiner, publisher

Marquetry table wins Best in Show at San Diego

A round tilt-top table with traditional marquetry, a sculpted base and cast bronze feet won the Best in Show award at this year's Design in Wood competition at the San Diego County Fair. *Fine Woodworking* sponsors the award, which is the top prize at the show and includes a $1,000 check and a plaque for the winner.

Paul Schürch of Santa Barbara, Calif., won for his "Charles X" breakfast table, which is made of Pollard ash and is graced with intricate purpleheart inlay, and bronze, three-toed griffin feet that Schürch cast himself. The table is 42 in. dia. by 30 in. high and is finished with oil and varnish.

Best in show. *Paul Schürch's table features Pollard ash inlaid with purpleheart and cast-bronze, three-toed griffin feet.*

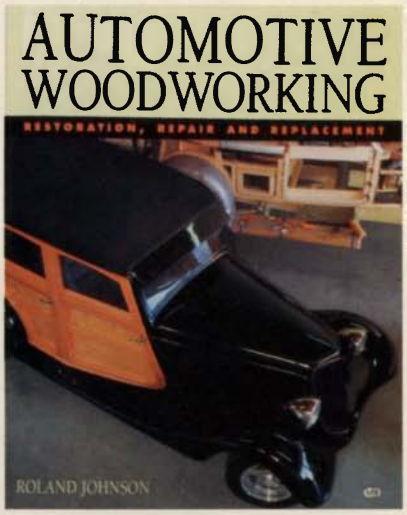
A woodworker for more than three decades, Schürch has been working professionally since 1980 and has been featured in many magazines, including *Fine Woodworking* and *Architectural Digest*.

He has trained in Switzerland, England and Italy, and he returns annually to Remonti Intarsiatori in Italy where he learned advanced inlay and marquetry techniques.

The Design in Wood exhibition is held annually in conjunction with the San Diego County Fair. It attracts more than 360 woodworking pieces from around the nation and several foreign countries.

—T.S.

Book review



Automotive Woodworking: Restoration, Repair and Replacement *by Roland Johnson. MBI Publishing Co., St. Paul, Minn., 2001. $24.95 paperback; 160 pp.*

Roland Johnson describes himself as a professional woodworker and a hot-rodder at heart. Two dozen articles for *Fine Woodworking* confirm the former, and I can certainly attest to the latter, having been whipped around the back roads of Minnesota by Johnson in his half-finished hot rod.

This book is aimed at the car enthusiast who has limited knowledge of woodworking. It gives a good introduction to the hand and power tools you'll need to work on your "woody," plus a guide, including color photographs, to different solid woods and veneers suitable for use in or on a car. The book covers refinishing and restoring wood, as well as bending and shaping the complex replacement parts needed on cars.

Most of the photographs are black and white, and although chiefly taken by the author, they clearly convey the information. My only quibble is with his method of applying a finish: Get a good natural bristle brush, Rollie, and toss those foam ones!

—Mark Schofield, associate editor

Photos, except where noted: Mark Schofield; this page, top left: Michael Wooten, courtesy of Robert Ortiz; bottom left: Lynn Rybarczyk and Andrew Patterson, courtesy of the San Diego Fine Woodworkers Association

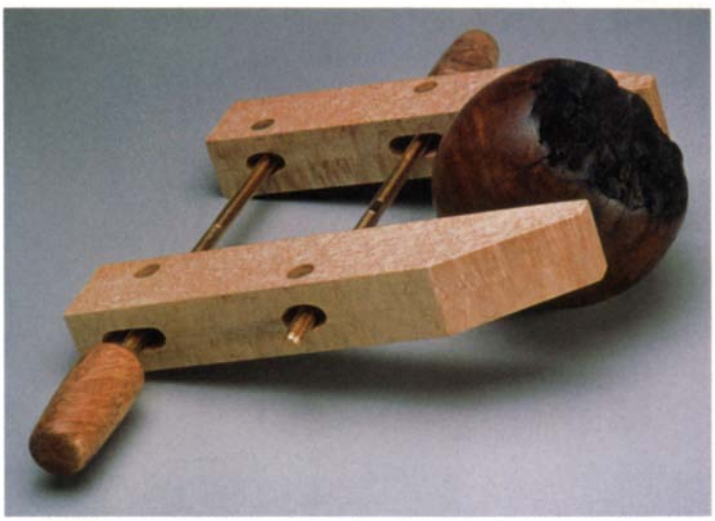
Turning trends

Two major exhibitions of turning are currently visiting U.S. museums. The Challenge VI exhibition, touring until the end of 2003, presents the results of the Wood Turning Center's challenge to established and emerging international lathe artists to seek new areas of exploration. Wood Turning in North America since 1930 features more than 130 items covering the last 70 years. To mark these exhibits, *Fine Woodworking* asked the executive director of the Wood Turning Center in Philadelphia, Albert LeCoff, for his thoughts on the current state of turning and the directions it is heading.

Our boundaries are melting

The previous boundary between turning and other arts is being swept away. Outside critics write about us, help to jury exhibits and teach us to put our field in context with a larger world. This is making some turners uncomfortable because we are used to being insular, but if we look outward and skyward, we can continue opening the world of turning to new audiences.

At recent exhibits, viewers were asking "Is this turning?" Hugh McKay's latest work looks as if it has not even been near a lathe. Many artists are exploring; their work may start by rough turning and finish with carving or unique finishes, or even end up cast into other materials.



Under pressure. *Steve Bishop expresses the pressures of making a living. This piece, called "Portrait of the Artist as a Middle-Aged Man, 2000," is 3½ in. deep by 19 in. wide by 5½ in. high. It's made of bird's-eye maple, redwood and maple burl and has gold-plated hardware.*

Breaking the wooden mold. *Hugh McKay executes forms that incorporate glass and metal. "Ruuach 2000" (left) is made from cast-leaded crystal. "Ruuach 2001" (right) is made from nickel-plated bronze and cast-leaded crystal. Both pieces are 18 in. dia. by 14 in. high.*

In the last couple of years, wood turning has been featured in a bounty of museum exhibits, coffee-table books and critical articles and has commanded fantastic prices. This is causing a frenzy in the world of turning.

Let's enjoy this adrenaline, but let's also be inclusive. Let's keep inviting the general public to participate in our events and discover turning. But let's be careful not to self-destruct. As Rude Osolnik once asked a fellow turner, "Do you want to trade your $10,000 bowl for my $10,000 bowl?"

For more information on the tour schedule for both of these exhibitions, log onto www.woodturningcenter.org/events.html.

—Albert LeCoff

"Rushmore 2000." *Not content turning profiles of heads, Gene Kangas sculpts them, cuts them about, and reassembles the parts to create political and humorous statements.*

A woodworker's tour of Eastern Europe

For those interested in fine European furniture and restoration techniques, Eva Frank, daughter of the late George Frank, a restoration and finishing expert, is organizing a visit to Prague, Vienna and Budapest, scheduled for April 28 to May 8 of 2003. The trip will be led by David Larson, a longtime friend of George and a career finisher and restorer. The tour will include behind-the-scenes visits to experts at museums, select factories and restoration workrooms—areas otherwise inaccessible to the public. This tour follows two similar trips organized by Eva and led by her father, a consulting and contributing editor to *Fine Woodworking* for its first 15 years. The first, in 1984, was to China, while the second trip visited England and France.

The cost of next year's trip, including airfare from New York, is $2,899 per person, double occupancy. For more information, contact Eva at (610) 894-9664 or evatfrank@aol.com. The group is limited to 25 people. *—Asa Christiana, senior editor*

Photos, this page: Courtesy of the Wood Turning Center

Learning from a master

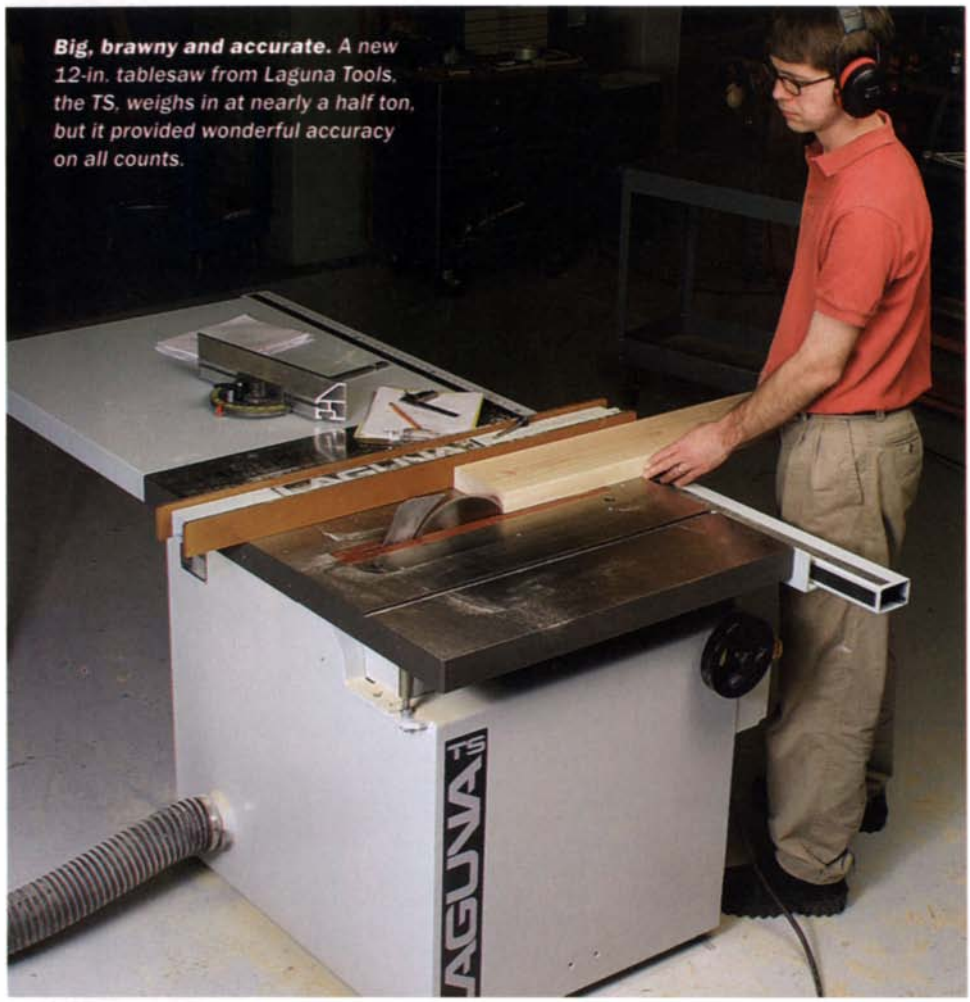
Last year, several students and I were privileged to spend five days in Rockport, Maine, developing our woodcarving skills with the help of cabinetmaker Philip C. Lowe at the Center for Furniture Craftsmanship. Our experience ranged from the quite accomplished to those who had never held a carving tool. To cater to our varying talents, Lowe started with the basics—sharpening tools, reading the wood and getting a feel for carving with, against and diagonal to the grain.

The learning curve was steep: On the third day we carved a fan; on the fourth day we carved and reeded a Sheraton-style leg; our pièces de résistance were some acanthus leaves and scrolls.

After hours, we found time for the center's weekly barbecue and a futile attempt to beat Peter Korn, the center's director, at croquet with his home field (not a lawn) advantage. I may not be ready to tackle a Newport secretary, but I think a lowboy is within reach.

For more information, contact The Center for Furniture Craftsmanship at (207) 594-5611 or visit the school's web site (www.woodschool.com). —*M.S.*

Lowe and his students. *Above, Phil Lowe demonstrates classic ornamental carving to a student at the Center for Furniture Craftsmanship. At left, his students show off their work.*



Big, brawny and accurate. *A new 12-in. tablesaw from Laguna Tools, the TS, weighs in at nearly a half ton, but it provided wonderful accuracy on all counts.*

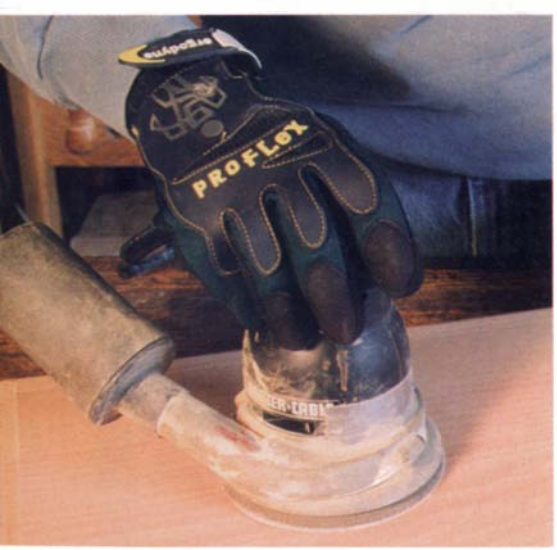
Laguna 12-in. tablesaw is beefy and well made

From a distance, the new European-made Laguna TS tablesaw looks like an American cabinet saw on steroids. The Laguna is big, with a 31½-in. by 38-in. top and a shipping weight of 998 lbs. The power plant is a 3½-hp, 220-volt motor. The saw accepts both 12-in. and 10-in. blades.

I recently put the Laguna through its paces and discovered several impressive features. The trunnions and the top are fitted to the case with roll pins, so the top can't move in relationship to the blade. As long as the manufacturer has set the parts properly, you'll never have to realign the top with the blade. I also like that height-adjusting screws can level the two-part top as well as align the extension table with the top. In addition, the saw includes a splitter that raises and lowers with the sawblade. And the splitter is fully adjustable in all three axes, so it can be aligned perfectly with the blade.

The saw was designed to take an Altendorf-style short-stroke sliding table and a scoring blade attachment. The Laguna's top is split down the middle, and one half can be removed to make room for the slid-

Shop Test Antivibration gloves



Padded gloves keep bad vibes at bay. *Tools that generate a lot of vibration can permanently damage your hands. Antivibration gloves can help keep hands healthy.*

As I've recently learned, my years of using palm sanders, routers and other high-vibration tools have resulted in permanent damage to the nerves in the tips of my fingers, causing a constant tingling sensation and slight numbness.

Better late than never, I decided to research vibration-reducing gloves. They're padded with gels, air bladders, elastic polymers or various types of high-density foams to reduce the effects of vibration.

Although there are a number of manufacturers, I looked at three gloves: the Ergodyne ProFlex 9015, the Impacto Air Glove AIR473 and the Valeo GAFS. Each is full-fingered and padded with antivibration material in the fingers and thumb, vital for protection to the fingertips.

All of the gloves offered good dexterity, but the ProFlex gloves were a bit more flexible and easier to manipulate. The ProFlex and the Valeo gloves stop the padding in the fingers just short of the tips to increase dexterity and offer more sensitivity at the fingertips. But the Air Gloves, with padding all the way to the fingertips, might offer better vibration protection. Another consideration when purchasing gloves is to make sure they are snug; a loose-fitting glove hampers dexterity.

Although there are scientific methods for checking the performance of the antivibration material, I used a fly-by-the-seat-of-the-pants method—my tingling fingers. And as I operated all of the high-vibration tools in my shop, I found a significant reduction in tingle with all of the gloves. Of the three, though, the Air

Photos, except where noted: Tom Begnal; this page (bottom left): Roland Johnson

Splitter adds safety. *To help prevent kickback, the Laguna TS includes a splitter that effectively covers much of the back of the blade. Plus, the splitter adjusts in three planes, making it easier to get the splitter and blade properly aligned.*

ing table. They may not be options most amateur woodworkers want to pay for, but it's nice to have upgrade options.

The quality of this Bulgarian-made saw was both outstanding and lacking. The arbor assembly "beam" is a huge 30-in.-long, ½-in.-thick iron casting with ¾-in.-thick ribs. Amusingly, the case on the tool I looked at was assembled while the paint was still wet, embedding many washers and nut heads. According to a Laguna representative, the company is taking steps to bring the fit and finish up to snuff.

On the other hand, all of the important tolerances were amazingly dead on. Right out of the box, the TS was tuned almost to perfection. Arbor runout was a miniscule 0.001 in., even with an extension collar (to use dado blades, you must remove the extension collar). The miter-gauge slots were perfectly parallel to one another and essentially parallel to the blade, out by only 0.003 in. over a 24-in. length. The tops and the throat plate also were flat.

The miter gauge fit perfectly into the slots. There was no side play, yet it moved easily. Whether by design or accident, it's the first one I've seen that didn't need extensive tune-up to work.

The fence is a functional Biesemeyer copy. And the dust collection worked fine.

All things considered, the Laguna TS tablesaw looks to be exceptionally well made, though a little rough on the edges. And it has some neat features. If the price and quality hold steady and the saw earns a reputation for holding up under long-term use, Laguna could give major American saw makers a run for their money.

The TS currently sells for $2,295; add $1,200 for the sliding table and another $500 for the scoring blade attachment. For more information, contact Laguna (800-234-1976; www.lagunatools.com).

—Strother Purdy

Coffee-can storage bins

Walk into any workshop, and you're likely to find a few coffee cans filled with an assortment of odd parts, which means that coffee-can storage scores pretty low on the convenience meter.

But long-suffering connoisseurs of coffee-can storage can now perk up. McFeely's is offering circular plastic bins, divided into four compartments. Three bins fit into a can, one on top of another, so you end up with a dozen compartments per can. Add the plastic coffee-can lid, and the entire package is just about spill-proof.

The bins are sold in sets of three. Two sizes are available: one for 26-oz. and 28-oz. cans, and the other for 34-oz. and 39-oz containers. Sets sell for $6.95. For more information, contact McFeely's (800-443-7937; www.mcfeelys.com).

—Tom Begnal

Gloves seemed to demonstrate a bit more vibration absorption.

By the way, don't wear these gloves, or any other type of glove for that matter, while operating tablesaws, jointers, radial-arm saws or other tools where the glove could easily become entangled with the blade or the cutter.

The Ergodyne ProFlex 9015 gloves sell for about $40 a pair; the Impacto Air Gloves (AIR473) sell for about $34 per glove; and the Valeo GAFS gloves sell for about $20 per glove. For more information, contact Ergodyne (800-225-8238; www.ergodyne.com), Impacto (888-232-0031; www.2protect.com) or Valeo (800-634-2704; www.valeoinc.com).

—Roland Johnson

Getting a grip on vibration control. *Johnson tried three top-of-the-line antivibration gloves, giving each one a hands-on test in search of a favorite.*

Photo, this page (bottom right): Michael Pekovich

Low-angle smoothing plane from Veritas Tools

I have long considered a low-angle smoothing plane to be a specialized tool. So when I received the new Veritas low-angle smoothing plane, I expected it to be limited to working end grain and miters. However, it showed amazing versatility, handling miters, end grain and long grain with ease. Plus, it converts to a shooting plane.

This is a solid tool. The body is cast from durable ductile iron. It has a substantial bed machined at a 12° angle, a sturdy A2 steel blade and a stout, well-designed lever cap.

A simple blade-adjustment mechanism, similar to vintage Norris planes, regulates the vertical (depth of cut) and lateral (alignment with sole) movement. The throat can be opened quickly for coarse work or closed up tightly for fine work.

Low-angle plane gets high marks. *The latest offering from Veritas Tools provides lots of versatility.*

I tested the Veritas to see how it would perform cleaning up mill marks on end grain and miters. With its low-angle design, I was able to take continuous shavings on mahogany and cherry end grain. However, when subjected to the harsh test of planing 1¾-in.-thick white-oak end grain, the blade dulled more quickly than I expected. Skewing the plane and taking a very light cut improved performance.

The Veritas smoothed large surfaces well. The low angle helped it cut with minimal effort. When working on well-behaved wood or planing diagonally across the grain, it left a smooth, blemish-free surface. On stubborn woods, the low angle tended to lift the wood fibers, tearing the grain. Tearout can be minimized by closing the throat and taking a lighter cut or by sharpening the blade with a steeper bevel.

This plane worked surprisingly well as a shooting plane—something I hadn't anticipated. The broad side-wing of the plane is machined square to the sole, providing good stability.

Veritas is on to something with this carefully designed and well-built plane. What might be perceived as a specialized tool can actually do just fine serving multiple purposes. That's the type of resourcefulness I look for in my shop.

The plane sells for about $140. For more information, contact Veritas Tools (800-267-8735; www.leevalley.com).

—Chris Gochnour

A smooth smoother. *The plane was comfortable in most assignments, whether working end grain, long grain or miters.*

Clamps with a deeper reach

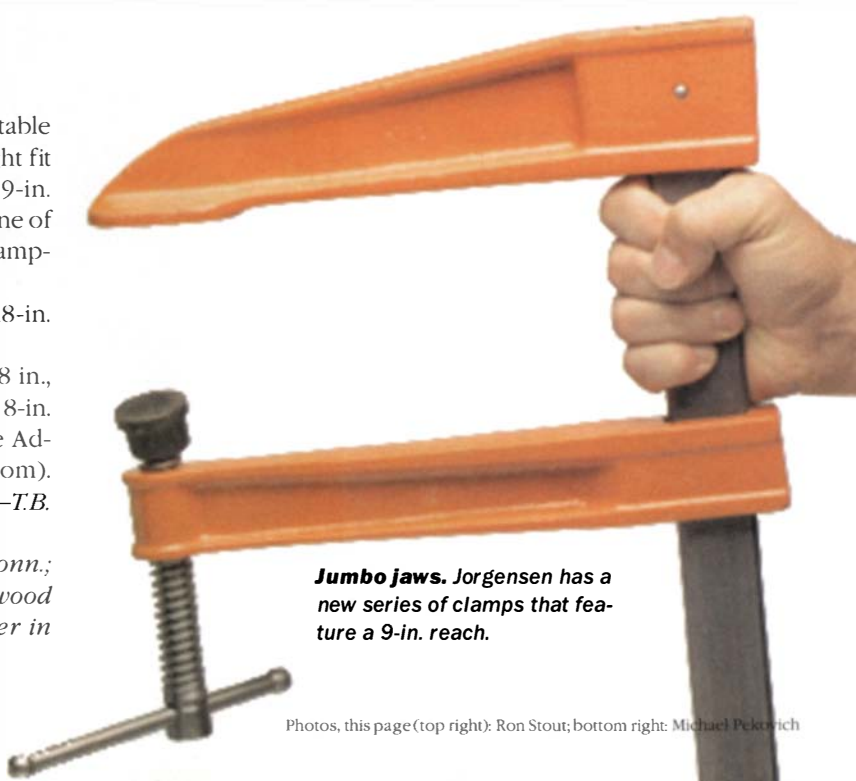
When you need a clamp with an extradeep reach, the Adjustable Clamp Co., maker of Jorgensen clamps, has one that just might fit your needs. The 4900 series steel clamp has an impressive 9-in. reach (measured from the inside edge of the bar to the centerline of the Acme screwthread). And it can apply up to 1,200 lbs. of clamping pressure.

Be careful, though, not to drop one on your toes. The 18-in. clamp I tested weighed about 12 lbs.

The 4900 series is available in seven lengths: 8 in., 12 in., 18 in., 24 in., 36 in., 48 in. and 60 in. Expect to pay about $70 for an 8-in. clamp and $105 for a 60-in. one. To learn more, contact the Adjustable Clamp Co. (312-666-0640; www.adjustableclamp.com).

—T.B.

Strother Purdy builds custom furniture in Bridgewater, Conn.; Tom Begnal is an associate editor; Roland Johnson works wood in Sauk Rapids, Minn.; Chris Gochnour is a furniture maker in Murray, Utah.



Jumbo jaws. *Jorgensen has a new series of clamps that feature a 9-in. reach.*

Photos, this page (top right): Ron Stout; bottom right: Michael Pekovich

FIRST WE RAISED THE BAR. THEN WE LOWERED THE PRICE.

Due to heavy demand, quantities are limited. Check with your distributor for availability.

Introducing the innovative JET 10" SuperSaw.®

It's the attention to detail that sets this saw apart, so let's cut to the chase. Compared to the competition, the JET 10" SuperSaw features two solid cast-iron wings instead of stamped steel giving it twice the cast-iron work surface of other saws. Its optional sliding table boasts a miter gauge with 4 T-slots for jigs and a handy angle reference guide. It has a brand-new fence with magnified cursor and micro adjustment. And it's heavier than the competition, with a fully enclosed cabinet, larger dust port, and wider stance that makes it far more stable. The SuperSaw is also the only saw on the planet that includes an on/off switch that can be positioned anywhere along the fence rail, plus thoughtful details like a reset button and power indicator light.

So to review, the JET 10" SuperSaw has better specs, more features, and a warranty that's twice as long. Oh, and did we mention it costs hundreds less? Yes, hundreds. Visit your JET distributor for more details.

For a free 23-minute video showing everything the SuperSaw can do, call 1-800-274-6848 or visit jettools.com.

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Fine WoodWorking

Bookshelves in a Day

BY STEVE LATTA

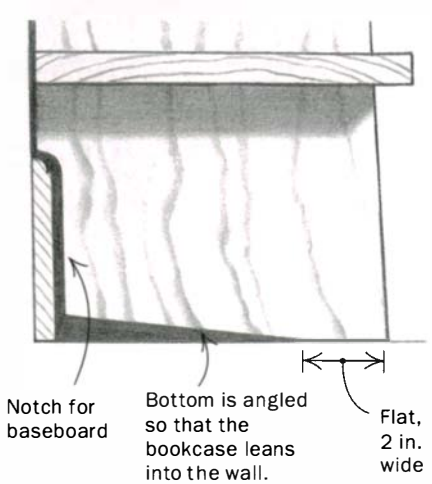
I get the most pure enjoyment from reproducing 18th-century furniture, but every now and then it's nice to break out of that mode and dive into a project that I can knock out in a day or two. This set of bookshelves is just such a beast, and it will cover a lot of wall in the little amount of time required to build it. I've made three versions of this design since I built the first one about 10 years ago. The first has lived in three separate homes, but now it fits the dining room in our new home.

There are some nice features about this design. When you combine the simplicity of the joinery with the absence of hardware, you have a bookcase that can be taken apart and reassembled in minutes. The angle on the bottom of each vertical makes the case lean toward the wall, so the more weight that you put on it, the more secure it is. In most cases, there is no need to tie it to the wall. Although, if you have kids, you may want to add a few fasteners as a precaution. A couple of corner braces attached under the bottom shelf and along the top shelf should do the trick.

Choose your wood and size the joints

This is a great project for using up old scraps. For these units, I used some less than perfectly clear leftovers of walnut for the verticals and dimensioned #2 white pine 1x12s for the shelves. If you don't have boards wide enough to make the verticals (mine are 10 in. wide at the bottom), you can glue them up from smaller boards, but make sure the front piece is wide enough that you won't expose a glueline when you cut the taper on the front edge. For the pine shelves, I bought more width than I needed so that I could cut around knots and defects to end up with clear front edges on all of them.

BOTTOM DETAIL



The shelves and the verticals lock together with what I call a housed lap joint (see the drawing on p. 34). The shelves are notched wherever they meet a vertical, and the verticals are notched and dadoed on both sides so that the shelves sit firmly on the shoulders of the dadoes. I cut the dadoes slightly wider (1/32 in. or so) than the shelf material is thick. That way, the pieces slide together fairly easily, even after a finish has been applied to them. Don't be obsessive about getting a microfine fit. The joy of this design is lost if you end up having to put together the unit by beating it with a block of wood and a hammer.

In figuring sizes and spacing for the shelves, I kept it simple. The bottom shelf

Knockdown unit is engineered for stability and speedy assembly

sits high enough off the floor (7 in.) to clear the tallest baseboard in an old house where we used to live. The spacing between shelves decreases in 1-in. increments from the bottom to the top.

Cut the dadoes before tapering the verticals

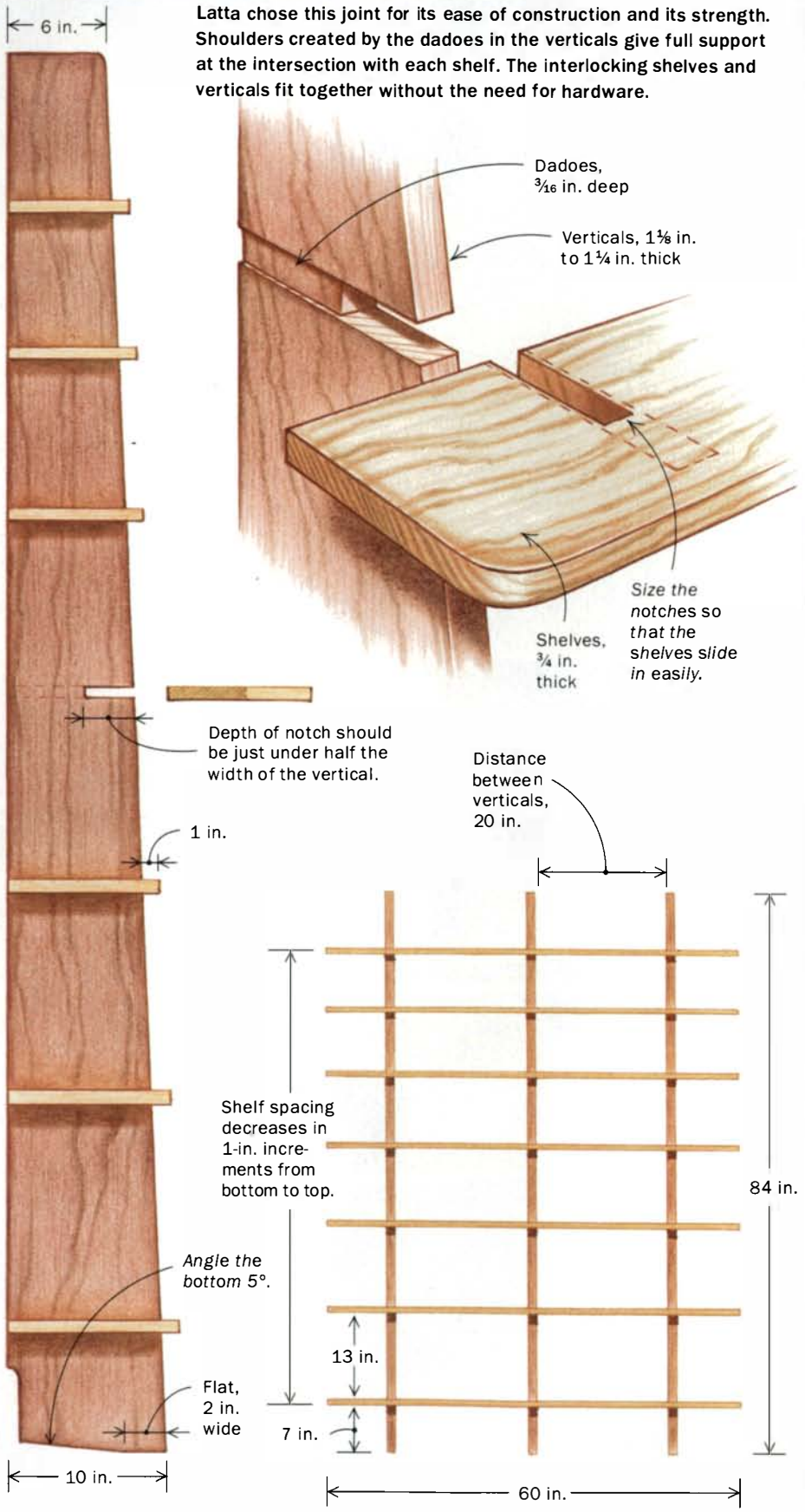
Shoot for a thickness on the verticals of around 1⅛ in. to 1¼ in. (Make sure you leave some extra scrap pieces to use in setting up the joinery cuts.) You can cut the joinery using a router, a radial-arm saw or a tablesaw with a carriage jig like the one I used (see the photos on pp. 34-35). If you use a tablesaw, you'll need a long auxiliary fence to keep the stock steady. You'll also need to support the weight of the stock that hangs out over the end of the saw table.

Before cutting the joints in the verticals, make a practice cut halfway through a scrap piece of shelf stock. Use this sample to set the depth of the dadoes in the verticals. To be sure all of the verticals are dadoed correctly, first cut them all to length and then use a story stick to mark the loca-

Photos: William Duckworth

A HOUSED LAP JOINT CONNECTS THE PARTS

Latta chose this joint for its ease of construction and its strength. Shoulders created by the dadoes in the verticals give full support at the intersection with each shelf. The interlocking shelves and verticals fit together without the need for hardware.



Dado one side at a time. *After setting the blades to the right height, make all of the dado cuts on one side of the verticals. Transfer the cut lines for the dadoes on the second side with a square and a sharp pencil.*

tions of the dadoes on the front edges of the verticals. A pencil line provides a reference to cut to, and a blue chalkline indicates on which side of the line to cut.

To set the depth of the dadoes, take a scrap from one of the verticals and set it against a stop block on the carriage. Raise the dado blades, make a cut, flip over the scrap and make another cut opposite the first. Adjust the height of the dado blades until the notched shelf sample slides easily onto the dadoed sample without excessive play. Now begin making the dadoes on only one side of each vertical. Then use a small square and a sharp pencil to mark the dado cuts across the front edges of all the verticals. Flip over the verticals and, lining up the pencil lines with the kerf in the carriage, cut the dadoes on the other sides of the verticals. Hold-down clamps keep the boards from sliding out of position.

After cutting the dadoes, lay out the taper on one of the verticals and mark each dado for where a chunk of waste needs to be taken out to receive the shelf. Use a sabersaw to cut away most of the waste. Stay about 1/16 in. from the edges of the dado and clean up using a router with a bearing-guided, flush-trimming bit.

Cut the taper on one vertical using the bandsaw and then, with a jointer or a handplane, clean up that edge. Use the first ver-

Drawings: Michael Gellatly

Cut away the wood you don't need. *Housed lap joints require you to remove some wood from all of the pieces being joined. In the verticals, remove most of the waste with a sabersaw.*

Clean up the sabersaw cut. *Use a router equipped with a bearing-guided, flush-trimming bit.*

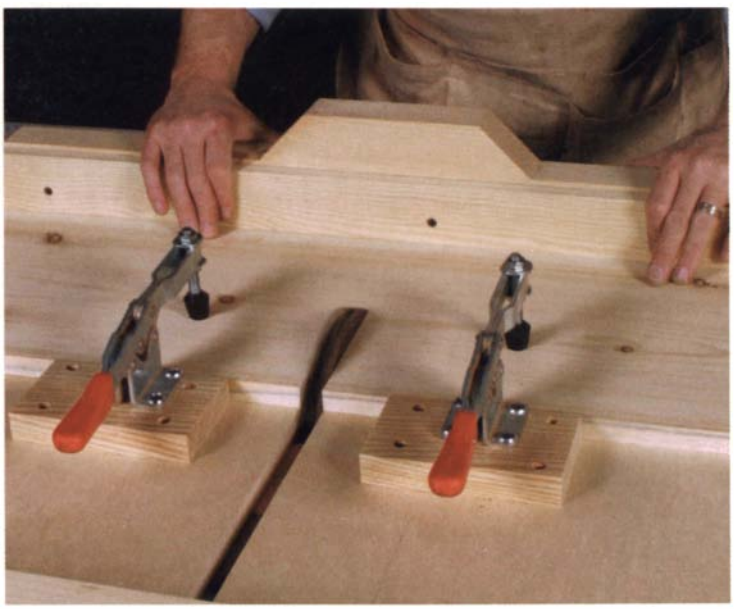
tical as a pattern to mark and cut the others. The radius on the top front corners of the verticals (and on the ends of the shelves) can be cut a number of ways. If I'm doing lots of shelves and supports, I make a template out of medium-density fiberboard (MDF) and flush-cut the pieces using a router. Once the verticals have been cut to shape, soften the outside edges with a ⅛-in. roundover bit. Finally, notch the bottom back edge of each of the verticals to clear any baseboard on the wall where they will live. Now use a sliding compound-miter saw to make a 5° angled cut on the back edge of the bottom of each vertical, leaving a 2-in.-wide flat at the front.

Notch the shelves to fit

After ripping the shelves to width, mark out the notches from the back edge. Cut the notches for the shelves using the same dado setup you used for the verticals, and set up the carriage with a stop block. Use the hold-down clamps on blocks to grip the shelves firmly. Raise the dado blades as high as possible to get the flattest cut on the downward arc. Setting the dado blades at full height is dangerous, so keep your hands completely away from the cut. After cutting all of the shelves at one setting, reset the stop block and repeat the process until all of the notches have been cut. Make any necessary adjustments in the length of the notches so that the shelves line up with the back edge of the verticals. When you are done notching, radius the ends of the shelves and round over the front top and bottom edges. If your layout and machining have been accurate, all of the pieces should slide together easily. At this point they're ready for a final sanding and finish.

You can assemble this bookcase by yourself, but it never hurts to have a second pair of hands to help out. Lean the verticals against the wall and slide the bottom shelf into place. One by one, work your way up to the top. This process should take only a few minutes. Use small shims with double-sided carpet tape to level the case. If the unit is installed on a slippery wood or tile floor, you can mount a few small metal corner braces beneath the bottom shelf. □

Steve Latta teaches woodworking at the Thaddeus Stevens College of Technology in Lancaster, Pa.



Notch cuts require clamps. *While plowing out the notches for all of the shelves, Latta clamps the workpiece in place for each cut, being careful to keep his hands well clear of the exposed dado blades.*

Floating-Tenon Joinery

BY LON SCHLEINING

Simple jig works with a plunge router to make quick, strong joints

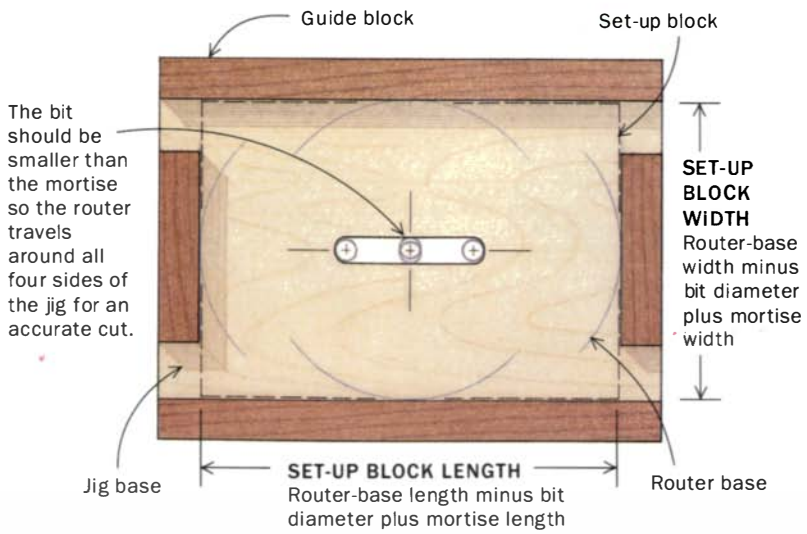
Mortise-and-tenon joints are the building blocks of furniture making. Once you have a simple and reliable system for making them, joinery on tables, chairs and case goods is straightforward, fast and consistent, even when there are compound angles.

The distance between the shoulders is critical in the case of something like a table apron or a chair stretcher. One day I had cut a big pile of pieces to length, only to discover that I'd made one teensy mistake: I had forgotten to allow for the extra tenon length on both ends of the pieces. That's when I began to rethink my resistance to using floating tenons. With floating tenons, you simply cut the piece to exact length, and it's done. The shoulders fit perfectly, eliminating one of the most frustrating parts of mortise-and-tenon joinery.

Set-up blocks are the key to making an accurate jig

1 ATTACH THE GUIDE BLOCKS

This mortising jig relies on guide blocks to limit the travel of the router. Make a set-up block, which represents the overall travel of the router base, for gluing the guide blocks to the jig base squarely and accurately.



The guide blocks are glued to the base of the jig. *Clamp the guide blocks both to the set-up block (center) and to the top face of the jig. Thin packing tape on the set-up block makes it easier to remove after glue-up.*

Drawings: Vince Babak

Watch it on the web

To see the author demonstrate this jig, go to www.finewoodworking.com.

In a joint-strength test last year (*FWW* #148, pp. 74-79), floating tenons compared favorably to traditional mortise-and-tenon joints, putting to rest common doubts about their performance.

A floating tenon is a separate piece inserted into matching mortises in two mating pieces. Similar to biscuit joinery, you cut a mortise into each of the pieces to be joined—leg and apron, rail and stile. Then you mill tenon stock to fit the mortises, cut it to length and assemble the joint.

Make a router jig for this joinery

There are many ways to cut mortises, but this router jig is my favorite for floating-tenon joinery. It will create precise, matching mortises in both the sides and ends of workpieces, and it's easy to make using birch plywood, screws, glue and a few hardwood blocks..

The jig shown here will cut a mortise 1 in. from the clamping fence, meaning the mortise will be centered in 2-in.-thick stock. This large capacity adapts well to a variety of projects and joints. If your workpieces are thinner, for example, or you'd like a reveal with a thinner member centered on a leg, post or stile, or even if you want an angled mortise, the jig is easily adapted with a few shims.

You can change the starting dimensions of this jig to suit the mortise you cut most often, or you can build several variations, as I have, each with a specific purpose.

Build it accurately or suffer later

This jig is designed to last—turning out lots of accurate joints. So take your time.

The first step in the assembly is to glue four blocks to the base of the jig. These blocks guide the router base. Note: Even round-based routers tend to be off center slightly, so it's important to keep the router facing in a single direction when you use the jig.

The easiest way to keep the guide blocks square and parallel during glue-up is to cut a set-up block the size of the area inside the guide blocks. Clamp the guide blocks to the set-up block before clamping and gluing them to the plywood base.

Once the glue cures, remove the set-up block and use a router and ⅜-in. bit to plunge-cut the mortise slot into the base. Next, draw the centerlines on both the top and bottom of the base. These lines must be drawn carefully because they'll be the reference lines for every cut you make.

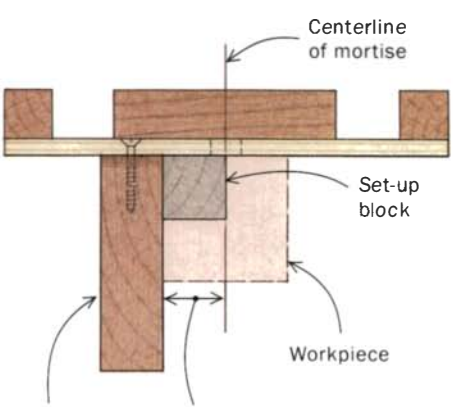
Attaching the clamping fence is the other important part of the assembly. If the fence is misaligned or out of parallel even slightly, the mortise-and-tenon joint won't come together as it should.

To lock in the distance between the fence and the mortise's centerline, make another

2 ATTACH THE FENCE TO THE BOTTOM

A fence on the underside of the base locates the workpiece. Use another set-up block to locate the fence accurately.

First, rout the mortise slot in the base. *The blue tape on the handle and the jig records the correct orientation of the router.*



Make a set-up block equal to the distance between the edge of the workpiece and the center of the mortise. Use the block to attach the fence (right).

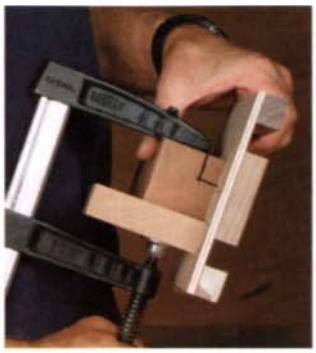
Carefully mark the centerline of the mortise and clamp the set-up block in place. *Clamp the fence to both the block and the jig when gluing it down. Add screws from above the jig base.*

Photos: Asa Christiana

USING THE JIG

Schleining sized this jig to handle the thickest workpiece—a 2-in.-thick table leg—that he commonly mortises. To mortise the thinner rail, add a shim to the jig (see bottom of page).

Lay out the workpieces carefully. *Mark the outer reference faces of each piece, and transfer the centerline of the desired mortise from one piece to the other.*



Align the centerline with center marks on the jig. *Then clamp the workpiece in place. The mark on the end grain (right) signifies the mortised sides of this table leg.*

set-up block (1 in. thick for this jig). Clamp the block to the base, aligning its edge with the mortise slot's center, then clamp the fence to the block and the base and drill the pilot and clearance holes for the screws. Use 1½-in.-long screws, countersinking them so that they sit flush in the base.

Remove the fence temporarily and spread on some glue. Then clamp up everything again and tighten the screws.

Cut matching mortises

As always for mortise-and-tenon joinery, start by marking the reference faces of your workpieces—for example, the front side of stiles and the corresponding faces of rails. Whether the mortises are in a table, a chair or a frame, corresponding faces should go against the clamping fence of the jig to make sure they line up correctly later.

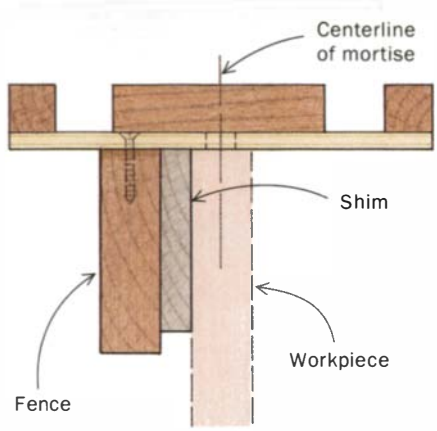
To lay out the mortises themselves, all you need to do is mark their centerlines.

Rout in several passes—It's a good idea to cut the 1-in.-deep mortises in at least two or three passes. It puts too much strain on the bit and the machine to cut it all at once. If your router has a stepped depth adjustment, now's the time to use it.

Because this jig guides the base of the router, accumulated chips and dust can change the path of the bit. If your router doesn't have dust collection built in, cut the mortise, vacuum out the jig and the mortise, then take a final pass.

Use a straight bit with a ½-in. shank, designed for plunge cutting, with a cutting

ADD A SHIM FOR THINNER STOCK



Thinner workpieces are no problem. *This shim is sized to center the mortise in the rails, creating a ½-in. reveal between rail and leg.*

diameter slightly smaller than the desired mortise. By making a pass around all four sides of the jig, you can better control the width of the mortise. Otherwise, the guide blocks would have to fit the router base exactly with absolutely no slop, a notion I find unrealistic.

One caution: The mortise routed into the end grain may come out at a slightly different width than the one made in the face grain. If you find a difference, add a layer or two of masking tape to the jig's guide blocks to cut one or the other.

Make tenon stock to fit

It's straightforward to mill tenon stock once you've established the size of the mortises. First, use the same material that the mortised workpieces are made of, with the grain running the same direction as it does in the rail. This will help at least one side of the floating-tenon joint expand and contract similarly. Cut the tenon board long enough to cut all of the tenons with plenty left over to trim planer snipe from the ends.

Rip the tenon board 1/16 in. smaller than the length of the mortise. This does three important things: It allows a little leeway for aligning the rails and stiles during glue-up, gives excess glue a way to escape and allows for the uneven expansion and contraction of the tenon and the mortise in the leg or stile.

Using a planer, reduce the board to the thickness of the mortise. When you get close, test-fit the corner of the tenon board in the mortise, then crank down the planer a little at a time until you get a snug fit. Beware of the snipe that most planers leave on the ends of boards. Chop off this area before each test fitting.

Next, using a 3/16-in. roundover bit, round each edge of the tenon stock. This radius will match the one left by the 3/8-in.-dia. router bit used to cut the mortises. The tenon should fit into the mortises snugly—without having to be forced in and without falling out when held upside down. Last, cut the tenons to length, about 1/8 in. shy of the combined depths of the mortises: for example, 1 7/8 in. long for two 1-in.-deep mortises. Test the fit, then glue up the joint. That's all there is to it.

Jig can be adapted to many mortises

If your workpieces are narrower than the ones this jig is set up for—maybe you're joining 3/4-in.-thick rails and stiles—simply add a shim between the workpiece and the clamping fence (see the bottom photo and drawing on the facing page).

Another frequent adaptation you'll make is to change the mortise length. Let's say the rail on a chair is 2 in. tall; obviously, the 2 3/4-in.-tall mortise would be too large. But adding blocks to the guides at each end of the jig shorten the mortise. You should adjust both ends equally, because the jig uses centerlines to position the workpiece.

If the mortise is too short for your project—let's say a table with a tall apron or a breadboard end—you can slide the jig along the workpiece to cut two or more mortises in a row. This jig even makes angled joints easier (see the photos below).

Once you get the hang of it, this is the sort of jig you'll use all the time. □

Lon Schleining, a contributing editor, teaches about woodworking throughout the country.

MILLING TENONS

Plane the tenon stock to thickness. *Test often for fit, then round the edges with a roundover bit on the router table.*

As always, dry-fit before glue-up. *The tenons should fit snugly but not require excessive force to fit.*

Angled joinery made easy

Cut the rail at the desired angle where it meets the post. When using the router jig to cut the mortise in the rail, just add an angled shim. Add an identical shim on the other side of the fence to keep the clamping force square. The post is mortised without angled shims.

Two Ways to Make Curved Drawer Fronts

Choose a technique that fits your tooling and work habits

BY MARIO RODRIGUEZ

SOLID WOOD OR LAMINATED?

Faced with building curved drawer fronts, you need to decide which technique to use. A solid block of wood cut to shape (top) takes less time than it does to cut and glue multiple parts into a curved shape. A laminated drawer (bottom), however, is less bulky and does not require a piece of thick lumber.

Faced with any woodworking task, you'll typically find that there's more than one way to get the job done. You can cut joinery by hand or with a dedicated machine. You can lay up veneer with a hammer or a vacuum press. And you can apply a finish with a brush or a spray gun. Making a curved drawer front is no different: How you go about it is often determined by the equipment and tooling you have, the dimensioned lumber you have access to and the radius of the curve you need to build.

I've done a lot of steam-bending, but I'd never build a curved drawer front that way because the end result would be too difficult to control. You'd have to steam a blank much longer than necessary for the finished piece, and the springback would severely limit the reliability of the outcome. In this article, I'll illustrate two dependable techniques: cutting thick stock to shape and gluing up a bent lamination. □

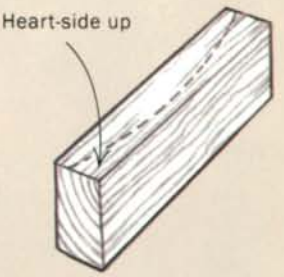
Mario Rodriguez is a contributing editor to Fine Woodworking. *He teaches woodworking to students in a furniture-restoration program at the Fashion Institute of Technology in New York City.*

STEP 1: LAY OUT AND CUT

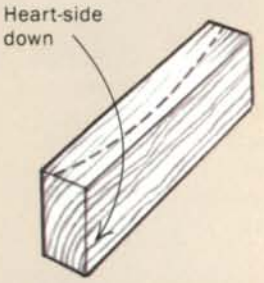
Work from a template. *A scrap of plywood, marked and cut to align with the front face of the table the drawer fits into, is used to mark the 12/4 block of mahogany that will become a drawer front. Make the cuts on the bandsaw (below right).*

PAY ATTENTION TO THE END GRAIN DURING LAYOUT

When you cut a curve through the face of a board, the grain will read differently than it does flat. A look at the end grain will indicate the pattern that will emerge.



With the heart side of the board facing up and to the front, a curved cut will result in a drooping grain pattern.



By orienting the heart-side of the board down for a curved cut, you achieve a more pleasing arched effect.

Compared with gluing up a bent lamination for a curved drawer front (see p. 43), cutting the curve on the bandsaw is easier, provided the drawer front is small enough that you can cut the whole thing from a single block of wood. When you use this method, the grain patterns in the wood will change as you cut the curve, and you'll expose some end grain. Using one thick block of lumber works especially well with some woods but not so well with others. It's a lot easier to find a good, clear piece of 12/4 or even 16/4 mahogany (if you need that much thickness for your radius) than it is to find the same thickness in a wood like red oak, which might be full of small splits and checks.

If you're designing the piece of furniture from scratch, decide how you're going to treat the back face of the drawer front. The more sophisticated choice is to cut the back face to a curve as well, but you don't have to. Whether the front face is convex or concave, you can leave the back face flat. One big advantage is that the flat face simplifies the joinery, no matter what type of joint you use to fasten the face to the drawer sides and the bottom to

continued on p. 42

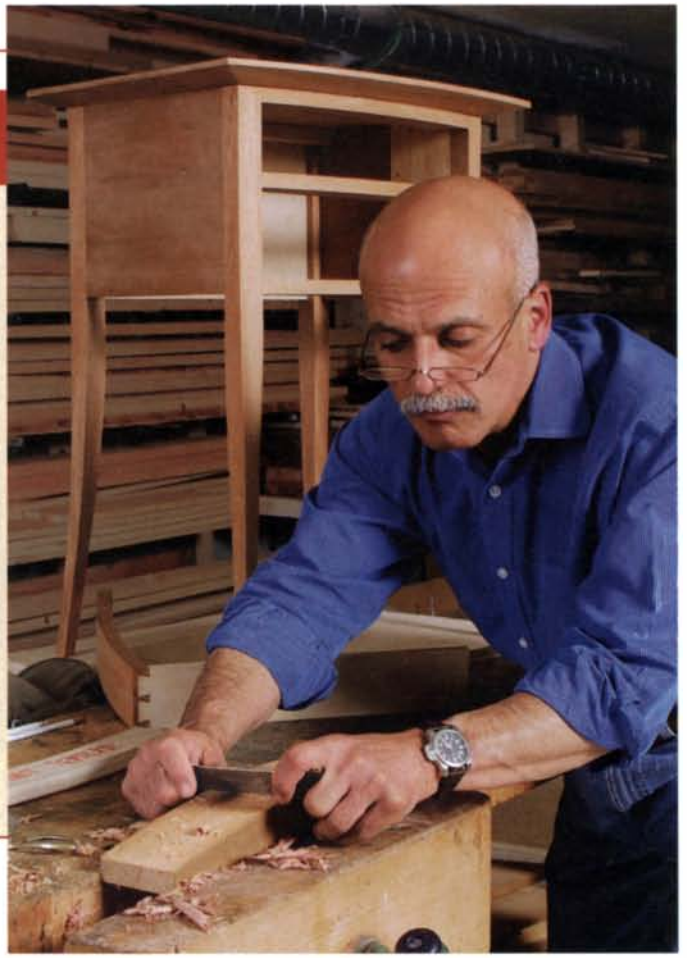
Photos: William Duckworth

the front and sides. Cut all curves slightly oversized—for cutting curves in solid lumber, you'll need a bandsaw with a sharp, fairly narrow blade, depending on the radius you have to cut. If you don't have a bandsaw, you can certainly cut curved faces with a coping saw, though it will take a lot longer.

No saw is going to cut curves without leaving some blade marks. So when you lay out and cut your curves, assume you'll need to do some planing or scraping and sanding to smooth down the finished surface. I used a spokeshave and a scraper for the solid drawer shown here. Cut the curves fat of the line and smooth out the faces as necessary, depending on whether or not you plan to add a layer of veneer on the front.

STEP 2: REFINE AND SMOOTH THE FACE

Curves can be a pleasure. *Using a spokeshave and a scraper, Rodriguez smooths the face of a drawer to remove marks left by the bandsaw.*



A lot like masonry. *Bricklaid cores are aptly named: Small scraps are glued together in a running-bond pattern. This kind of core is especially well suited for large drawers or those with curved shapes going in two directions.*

Bricklaid cores are another alternative

If you can't buy lumber that's thick enough, if the drawer face is large or if the drawer calls for a serpentine veneered front (curving in two directions), you can glue up solid blocks of smaller pieces of wood in a bricklaid pattern. Any clear lumber will work, but pine and poplar are two common choices.

This technique is good only if you plan to veneer the face of the drawer front. Done right, with plenty of glue, the blank will be strong and stable. This method requires more time and effort than cutting a blank from one thick board, but if the design calls for a core thicker than you can get in solid lumber, it's the only alternative.

I lay the wood bricks the same way a mason builds a wall, buttering each block with glue and staggering the joints. I place the glued blocks on a plywood template with the desired shape drawn on it. The plywood has to be waxed to keep the glue from sticking to it. The suction created by the glue is enough to get a good bond; clamps aren't necessary. Then I cut the curve on the bandsaw.

Just another form of solid lumber. *Bricklaid cores tend to be strong and stable, once the glue has set. For the most part, you can shape them just as you would a solid block of lumber.*

LAMINATED DRAWER FRONTS

There are many advantages of resawing thin slices from one board and gluing them back together in a bent lamination. If done correctly with a caul or form made to the right size and shape, you end up with a curved board that's strong and stable, with seams that are virtually invisible. You can use the laminated piece as a finished front, or you can add a layer of veneer.

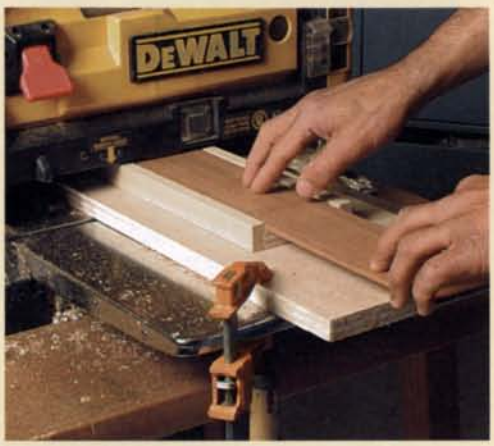
Different woodworkers have different opinions on how best to resaw the lumber for a curved drawer front. Whatever the technique, one truth is immutable: You have to start with lumber that is considerably thicker than what you need as a finished thickness, because with every bandsaw kerf that you cut, you lose some material. For resawing, a sharp blade is especially critical, and it's important to make the first cut with a face that's been jointed flat riding against the fence and an edge that's been squared to that flat face riding on the saw tabletop. Clean up all bandsawn laminates with a pass through the planer.

How thick do you cut each laminate and how many do you need for a drawer front? The answer depends on how tight the radius and how large the drawer will be. On average, I'd

continued on *p. 44*

STEP 1: RESAW THE STOCK

Slice bent laminations from the same board. *To get a premium match for color and grain, resaw all of the laminates from the same stock. Use a board thick enough to include waste lost to sawkerfs.*



Dressed faces make neater joints. *Rodriguez removes bandsaw marks from the laminate pieces by running them through the planer, set to make a light pass. Thin stock should be supported with a sled clamped to the bed of the planer.*

STEP 2: LAMINATE THE DRAWER FRONT

A good caul won't call for many clamps. These male and female cauls hold the bent laminations together until the glue sets. The cauls are thick enough to distribute the pressure evenly throughout the form.

STEP 3: TRIM TO SIZE AFTER GLUE-UP

Dressing the laminated workpiece. *Clean and square up one edge on the jointer (left), rip the drawer front to width slightly oversized (center), then clean up that ripped edge on the jointer. Cut the angled ends to length on the bandsaw (right).*

recommend cutting separate laminates to between ⅛ in. and ¼ in. thick. I think one mistake beginning woodworkers often make is constructing drawers from stock that is thicker than necessary. Drawer components should be kept as thin as structurally possible. For the table shown here, the top and bottom drawer faces are 3 in. and 4 in. wide; the radius of the curved faces is about 5 ft. The laminated drawer front is ¾ in. thick and the sides are ½ in. thick. The drawers are sturdy, but the delicate proportions keep them from looking clunky.

Glue-ups are a cinch if you're well prepared before the glue goes on. For curved components, if you don't have a vacuum press, you have to make a set of gluing forms, or cauls, with the curves cut to the inside and outside radius of the drawer face. A few hand clamps provide sufficient pressure. With a vacuum press, you only need to use a male form; the curved piece will stay put once the glue sets.

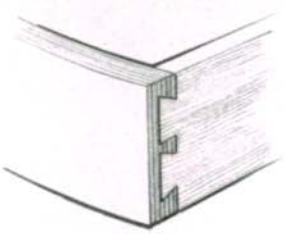
For really large drawers, regular white and yellow (polyvinyl acetate) glues are not the best choice for curved components because they allow the wood to move more with changes in humidity. Large curved drawer fronts can change shape enough that they'll cease to fit well into the carcase in which they're mounted. Several other glues, such as hide glue, urea resin, resorcinol and epoxy glues, are better candidates for gluing up the core of large, curved components. With that said, for curved pieces that are less than 6 in. wide, I do use yellow glue for cores and face veneers.

Dovetailing solid drawer fronts. *The layout and joinery are the same as for square drawers.*

Plan the joinery early on

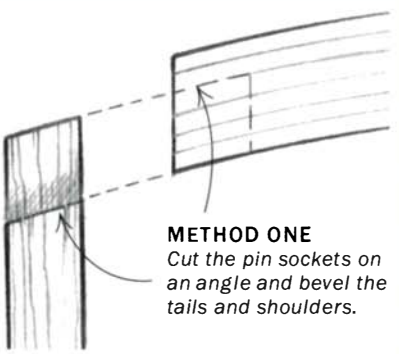
For these drawers I used half-blind dovetails to join the fronts to the sides. You may prefer some other joint, such as a sliding dovetail, a tongue and dado or even a doweled rabbet joint. Whatever your preference, the type of joint you use and whether the drawer face is inset or overlay to the carcase frame will affect the length of the drawer fronts and how you join them to the drawer sides.

Keeping the back face of the solid-lumber drawer front flat really simplifies cutting the half-blind dovetail—the technique is the same as cutting one from straight stock. But the curve of a bent-laminated drawer front offers some complications. Either you have to relieve the back corners of the drawer front to provide a flat surface where it meets the shoulders of the tails cut on the drawer sides, or you have to angle the pins cut into the ends of the drawer front and bevel the shoulders at the tails to fit that angle.

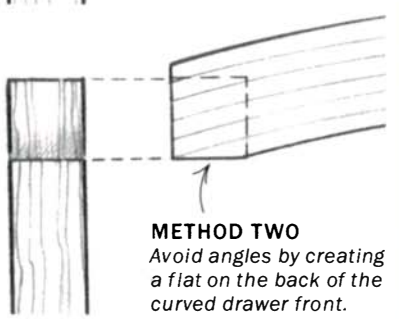


DOVETAILING CURVED DRAWER FRONTS

Cutting a half-blind dovetail into the edge of a curved drawer front can be done one of two ways.



METHOD ONE
Cut the pin sockets on an angle and bevel the tails and shoulders.



METHOD TWO
Avoid angles by creating a flat on the back of the curved drawer front.

Drawings: Heather Lambert

Soup Up Your Spokeshave

BY BRIAN BOGGS

The tool's name suggests that the spokeshave is for shaving wheel spokes, but chair makers and cabinetmakers have been using the spokeshave for generations in myriad wood-shaping situations. Basically, a spokeshave is a very nimble plane, with a short sole that can follow convex and concave surfaces. A good shave can follow an S-curve and leave a surface that needs little further attention.

Any time you have a part that you can't plane evenly because of its shape, there is probably a spokeshave that will help.

Think of all of the parts that you have bandsawn a curve into: a table apron, a leg for a hall table, parts for a music stand. While a template setup for a router or a sander will smooth the curves, it takes time to make the template and the setup. I recently sold my inflatable sanding drum because I could almost always spokeshave a part to smoothness more evenly and quickly. Even when I template-rout bandsawn parts, I finish them with a shave.

Start with a metal-bodied, flat-bottomed shave

I have been using shaves to shape my chair parts for 18 years and have about a dozen or so, each with its own purpose. If you don't own a shave, you have a lot to choose from. There are flat and round-bottomed shaves, and you can buy a shave that is concave

Photos, except where noted: Asa Christiana; this page: Michael Pekovich

across its width, which leaves softer facets on round parts. Then there's the whole group of wooden shaves, in which the blade rests directly on the wood for the lowest possible cutting angle. But a metal-bodied, flat-bottomed spokeshave is the most versatile and gives the greatest chip control.

This standard spokeshave is inexpensive, but it requires a tune-up. The tuning process has the obvious benefit of improving the tool's performance, but it has an even more important role in developing your understanding of the tool. You'll quickly identify problems in your shaving work, and I bet you'll keep the blade sharper after you've so lovingly refined the tool.

Although there are a number of metal shaves on the market, their tune-up checklists are the same. The metal shave that shows up most often in my students' toolboxes is the Record No. 151, so for simplicity, I'll use this one as a demonstration.

I break down a major tune-up into three manageable tasks, most of which can be accomplished quickly. You don't have to go through all three steps to improve your tool; the first two will make a big difference. But once you see how much better the tool performs, I think you'll want to go all the way.

Step 1: Changing the blade is easy and effective

Sharpening any edge tool is basic to getting it to work properly, but if the blade won't take an edge well or hold it for long, you are going to be frustrated.

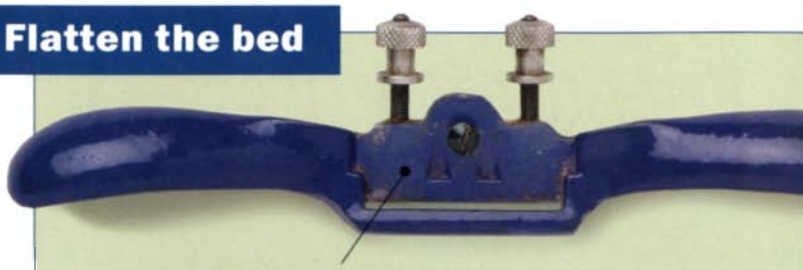
Spare yourself some agony and purchase a good blade. Typically, the original blades are so warped that by the time you flatten both sides and get them to rest solidly in the bed, you'll wish you had bought a good blade to start with. I have used replacement blades from Hock Tools (888-282-5233; www.hocktools.com) as well as from Glaser Engineering (write to Jerry Glaser, P.O. Box 95, El Segundo, CA 90245). You will get a Hock blade ($32) more quickly, but you'll save yourself some lapping time with a Glaser blade ($28). The latter is lapped flat with the edges finely ground and honed by hand.

1. Replace the blade

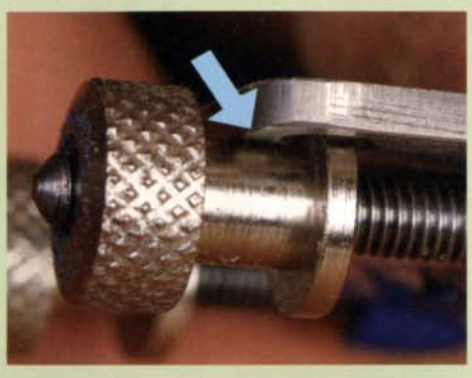
Aftermarket blades are beefier, providing a solid feel and less chatter. They are also made with better steel; even long-wearing A-2 is available.

A thicker blade requires a bigger throat. *File the front edge of the opening until there is an even, 1/64-in. gap or less in front of the blade.*

2. Flatten the bed



A bumpy bed and crooked adjustment screws prevent a solid connection between the blade and the tool.



The blade should not ride on any part of the adjustment knob. *If it does, it is being lifted off the bed of the tool.*

Find the culprit and apply a bit of tape. *Before putting down epoxy and clamping the blade in place, add two layers of masking tape to the highest knob so that the blade will clear it later.*

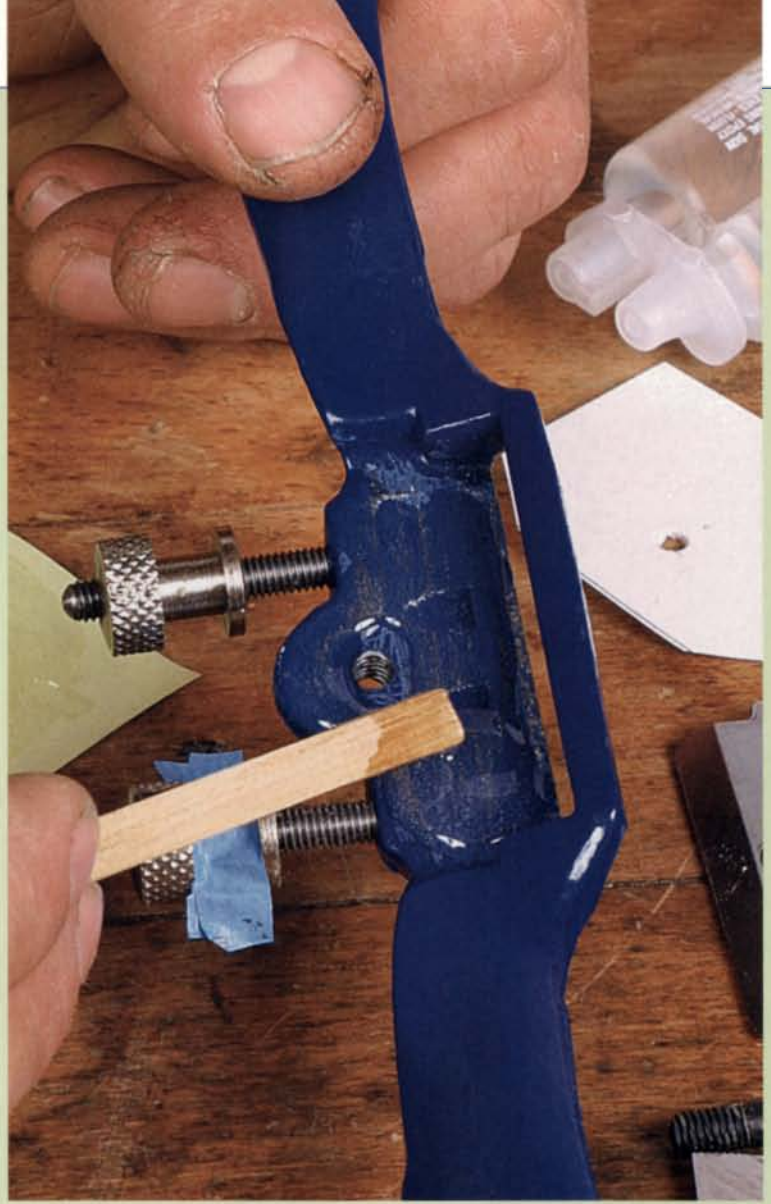
Both replacement blades are available in A-2 steel, which holds an edge beautifully. In my shop tests it holds an edge six to eight times longer than regular carbon steel but takes a very fine edge almost as quickly with the same honing techniques.

You may find that the new blades are a bit thick and won't quite pass through the throat. That's okay because it forces you to open the throat by filing it, and you can true it up in the process. This opening should be less than 1/64 in. wider than the blade, just enough for a shaving to squeeze through.

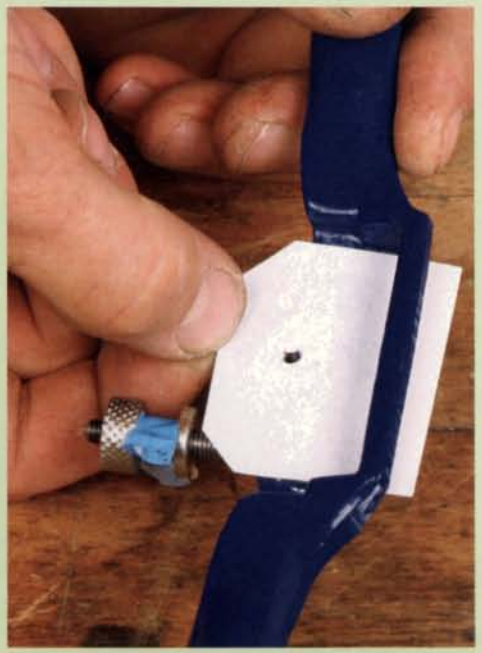
Step 2: A level bed eliminates chatter

The bed, or frog, on most shaves is a painted metal surface that can be filed. But filing an area that you can't see well or hold firmly with a clamp is a fine art. I prefer to be practical here and save the art for woodworking. I simply level the bed with epoxy, using the blade itself to mold the new bed.

This method will work for any blade, but if you start with a dead-flat replacement blade you'll make a flat bed, which then will work



Apply a layer of epoxy to the bed. *If the masking tape and the high knob are lifting the blade off the bed considerably, add a thicker layer of epoxy and allow it to firm up slightly before clamping down the blade.*



Add a sheet of paper to provide a smooth surface for the blade. *Have this strip cut to size beforehand, with a hole punched out for the center screw.*

Use the stock cap iron to clamp the blade in place. *The blade will create a flat bed to support it completely. Use the center screw to apply even pressure.*

Remove excess epoxy. *Some epoxy will squeeze out around the paper, but it's easy to trim and pare cleanly.*

for any other flat blade you use. (Hopefully, you'll enjoy using your shave enough to wear out blades.)

Often the blade-adjustment screws aren't perpendicular to the bed, and the knobs, instead of turning freely in the slots in the blade, hold the blade off the bed. Also, if the holes in the knobs aren't centered, the knobs will lift the blade in some positions but not others. Find the high spot (if there is one) on the highest knob, and wrap that spot with two layers of masking tape. The tape will hold the blade clear of the adjustment knobs.

Molding a new bed in epoxy—To start, apply a thin but complete coat of wax to the back of the blade as well as to the center (hold-down) screw. Allow that to dry, then buff. Now clean any oil off the bed with mineral spirits and dry carefully. Scratch the paint with heavy sandpaper or a file for a good bond with the epoxy.

Next, cut a strip of paper to go on top of the epoxy, making a better sliding surface for the blade. Also, before applying the epoxy, place two layers of masking tape over the front edge of the blade

3. Remake the cap iron

The underside of the stock cap iron is the problem. Because its leading edge is rounded, it has a tendency to catch shavings. So much metal would have to be removed to flatten the bottom that it simply is easier to make a new cap iron.

to maintain an even throat opening as you clamp down the blade onto the soft epoxy.

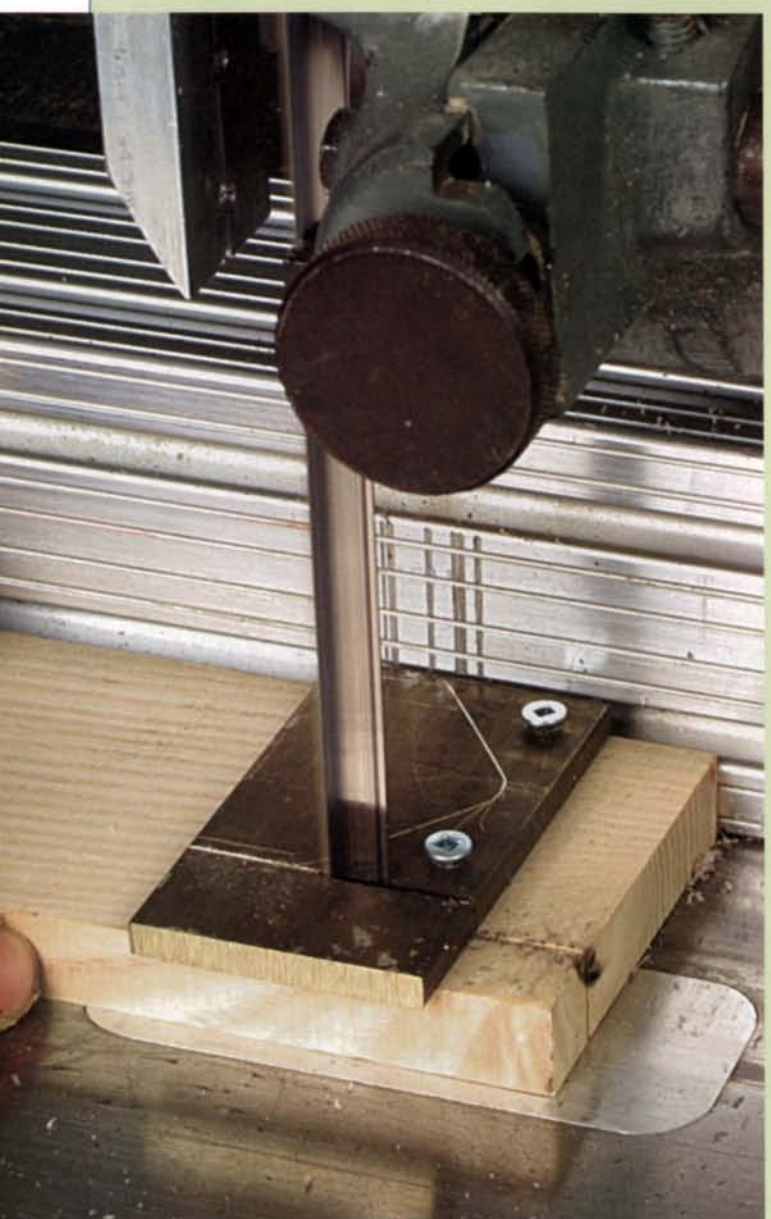
Whip up a batch of epoxy with a working time of 20 minutes or more, and apply an even layer to the bed. You could use auto-body filler here, too. Use just enough epoxy to fill the voids, unless you have crooked adjustment screws and need to raise the blade off the bed. For a thicker bed, wait until the epoxy firms up slightly before inserting the blade and clamping it down.

Place the paper carefully over the bed, centering the hole for the cap screw. Now assemble the shave, using just the center screw to hold down the blade. Use only enough screw pressure to hold things in place while the epoxy dries. Too much pressure might flex the blade and create a bowed bed. Also, if you have one high adjustment screw, be careful to lay the blade in level. Don't let it droop over the other adjustment screw. And make sure the blade is extended through the throat so that the bevel clears the bed area.

If in the first step you filed open the throat too much, use a piece of veneer or card stock instead of paper. The veneer also can be added later, glued to the paper.

Let the epoxy set up overnight. Then take apart the tool and trim the paper and any epoxy squeeze-out. Lap the bottom flat using a diamond plate or simply sandpaper glued on glass. Then file a 1/32-in. chamfer on the front edge of the bed and on the leading edge of the sole. Sharp edges here will scrape your wood.

Done well, these first two steps will yield a fine cutting tool that will take most straight-grained woods to a beautiful finish. You might want to stop here and enjoy some woodworking for a while, but eventually you will encounter difficult areas that don't want to shave clean no matter which direction you cut. Skewing the blade will help, but to get a perfect finish all of the time, you need perfect chip control. When you're tired of sand-



If the teeth are fine, a wood-cutting bandsaw blade will cut brass. *Screw the brass stock to a wood scrap for safer and easier handling. Put the screws through the waste areas. Grind an even bevel along the front edge.*

The side notches must be flied to the correct depth. *Use a wood guide block to keep the file level. When fully seated, the cap iron should stop about 1/64 in. from the front edge of the throat.*

ing *almost*-perfect finishes, you're ready to replace the cap iron.

Step 3: Shopmade cap iron reduces tearout

On most spokeshaves the cap iron is just a crude hold-down that keeps the blade in place. But it can do more. A flat, correctly positioned cap iron can act as a chipbreaker for finer cuts with less tearout, just like the chipbreaker on a smoothing plane.

The manufacturing process used on a cap iron leaves the bottom edges rounded. But without a machinist's surface grinder, it is difficult and time-consuming to get a stock cap iron dead-flat. I think it is far quicker and easier simply to start over. A quick cap iron can be made from ¼-in.-thick brass bar stock. A steel cap is fine too, but brass is much easier to work and can be cut at the bandsaw with a fine-toothed wood-cutting blade. Of course, you also can use a hacksaw. The best place to get a scrap of brass bar stock is a local machine shop.

You can form the back edge of your new cap iron to the shape of the stock cap iron, or you can just leave it long. The important areas are the beveled chipbreaker edge and the small ears that rest in the notches in the body. These locate the chipbreaker edge.

Before sawing the stock to width, mount it on a flat scrap of wood, as shown on the facing page. This will make it easier and safer to hold the stock for sawing, grinding and drilling. Use a 6-tpi (or finer) blade at least ⅜ in. wide, if possible, to handle the added pressure of cutting metal. Cut the notches only roughly to size because you're going to do the final fitting with a file.

The well-tuned spokeshave. *Outfitted with an aftermarket blade, a flat bed and a shopmade cap iron, a spokeshave—either pushed or pulled—will plane curved surfaces glassy smooth.*

Watch it on the web

For video tips on using a spokeshave, go to www.finewoodworking.com.

Next, grind an even bevel along the front edge. For this I clamp the stock in a vise and pivot a belt sander on its back edge. Check for square and make any necessary adjustments.

Check your fit and file the notches as needed. You won't need the slotted hole the original has; just drill a slightly oversized clearance hole.

When the cap iron is close to the edge of the blade and acting as a chipbreaker, a good seal is critical. To help this I burnish the leading edge of the cap iron just as I would a scraper, throwing a burr toward the blade. A little lapping evens out the burr.

When you assemble the tool for use, apply just enough screw pressure to keep the tool from falling apart while you use it. Tighten it only when the blade slips out of adjustment.

You should know that even a well-tuned shave requires practice to master. However, with your souped-up shave, practice should be a lot more fun. □

Brian Boggs is a chair maker and chair-making instructor in Berea, Ky.

Next, mark for the center hole. *This simply is a clearance hole for the center screw, which threads into the body of the tool.*

Mount the cap back onto the wood block for drilling. *A screw clamp makes a good vise. Next, use the bandsaw to cut the corners off the back edge.*

Last, burnish a very fine burr on the front edge. *This will create a tight seal against the blade, preventing chips from slipping underneath. Flatten the hook slightly on a bench stone.*

Wine-Glass Cabinet

Tapered stiles and glass panels lighten an ash cabinet

BY SCOTT GIBSON

Wall cabinets are relatively small. That's one of their beauties. They can be used in many spaces that would be too cramped for larger pieces of furniture, and their scale makes them familiar and approachable. A wall cabinet also can be made from scraps and offcuts of prized lumber that would be unusable elsewhere.

Wall cabinets lend themselves to many variations in design, depending on where they will be installed and what they will be used for. This cabinet is made of quartersawn white ash. It is for wine glasses and is intended for a dining room. It is less than 7 in. deep. With the exceptions of the cornice and the matching base, the cabinet is rectilinear. Door stiles are tapered slightly on the inside edge to help the cabinet appear lighter at the top. A coved cornice gives the top of the case some heft, and small windows at the tops of the doors give you a peek inside. There's minimal hardware, so the wood is really what's on display.

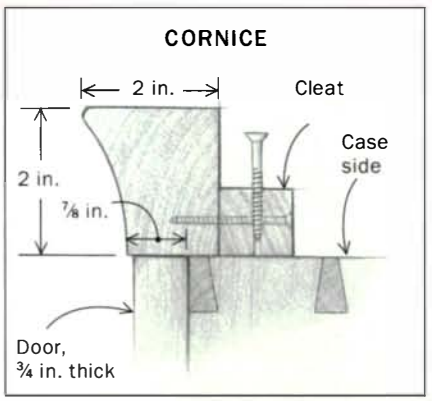
Size the cabinet to fit the glasses

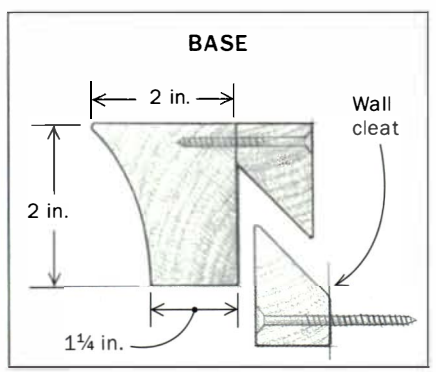
Unless the cabinet has no specific use, it makes sense to size it carefully for the things that are to be stored there. Wine glasses

Photos: Timothy Sams

BASE MOLDING SUPPORTS THE CABINET

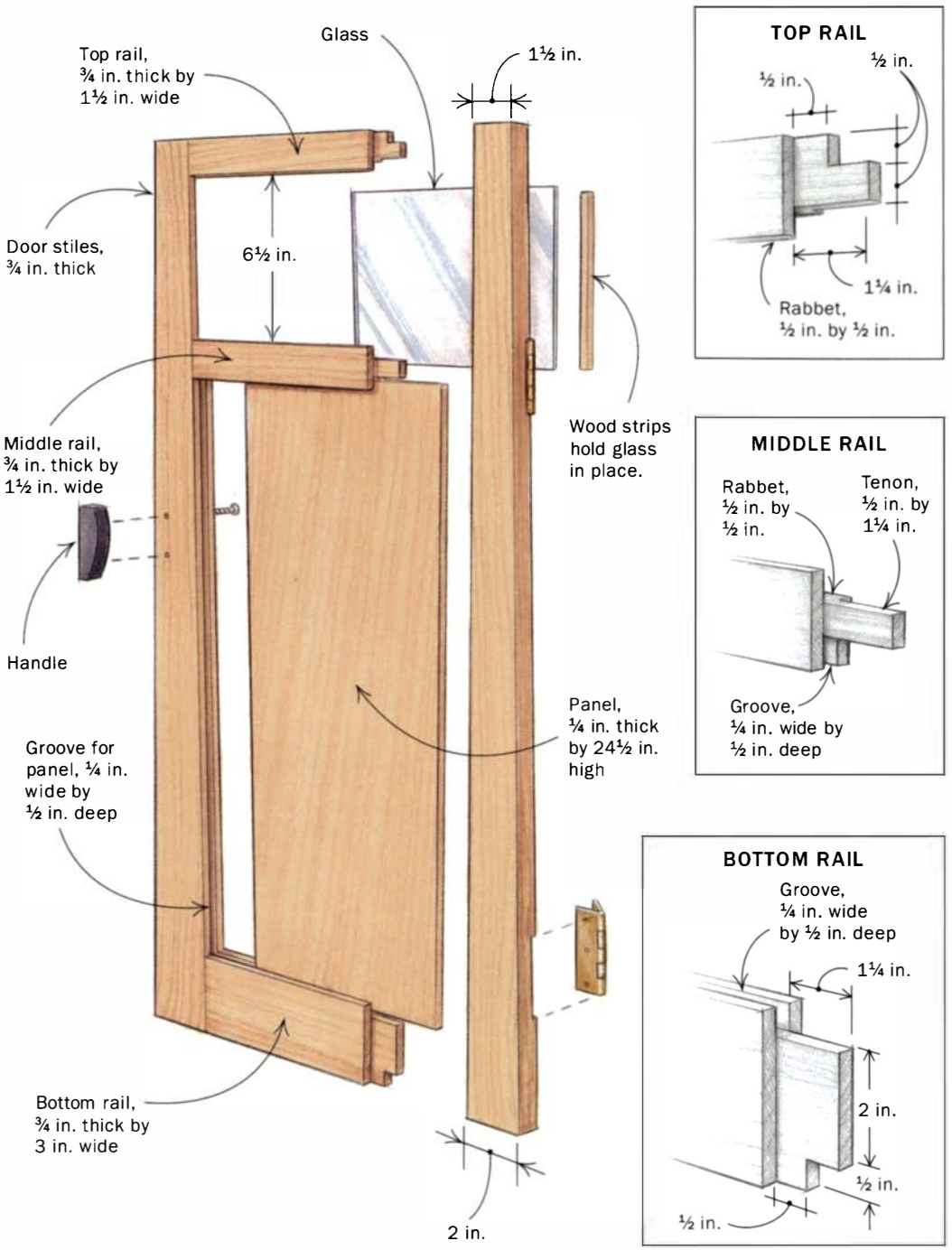
This simple box is accented by doors with tapered stiles, which gives the illusion that the piece has a slight V-shape. The cornice and the matching base also provide some weight to the piece and reinforce the tapered appearance.





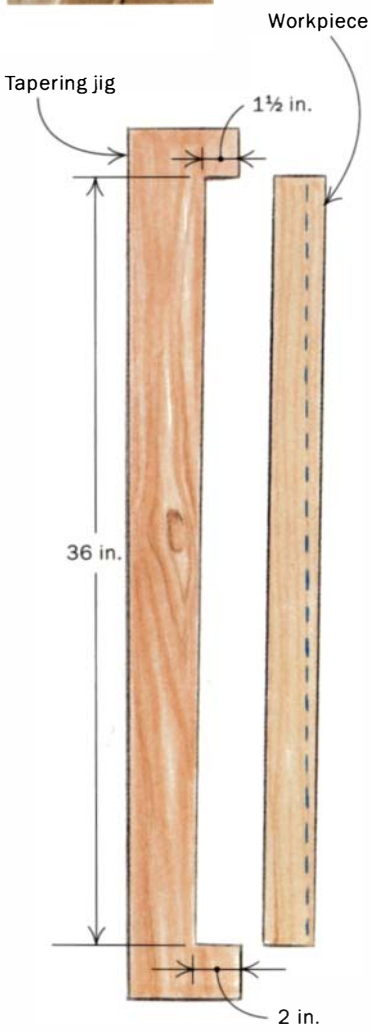
Drawings: Bob La Pointe

DOORS WITH TAPERED STILES REQUIRE CAREFUL PLANNING



1 TAPER THE STILES

Use a jig to cut the 1° taper. Save the offcuts because you'll need them to help cut the rails.



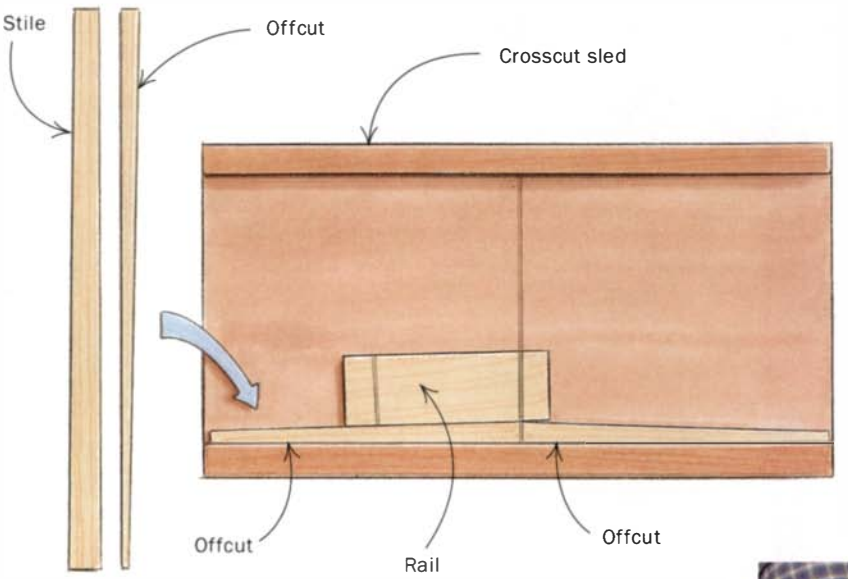
come in many sizes and shapes, but those in the mixed collection my wife and I own are about 3½ in. wide and about 7 in. tall. Those dimensions became the rough guide for laying out the cabinet. Although adjustable shelves allow some flexibility in height, there is no way to fudge a cabinet that is too shallow.

There are two other considerations: the thickness of the back, which is set into rabbets in the back of the case, and whether the doors will be inset or overlay. The back of this cabinet was made from four shiplapped boards. A frame-and-panel back was another good option, but shiplapping these boards was the best way to present the bands of browns and creams in the wood. Because the boards were set into the back of the case, the overall depth of the cabinet had to be increased by at least that much. I added a safety margin of another ½ in. in case we ever get slightly larger glasses.

If you choose inset doors—those that fit inside the case—they also must be factored into the depth of the case. Doors should be a full ¾ in. thick, so the sides of the case must be that much wider if this is the door style you choose. I chose overlay doors, which are attached to the outside edges of the case. One visual advantage of overlay doors is that they give the case a cleaner, less cluttered look—from the front, you see the doors, not the edges of the case. Another option is to make the top and bottom of the case wider

2 TENON THE RAILS

Tack portions of offcuts from the stiles onto a crosscut sled for your tablesaw. Place the thicker ends near the blade.



Trim the tapered shoulders on a sled. *Nail offcuts from the stiles to a tablesaw sled or miter gauge. The offcuts will provide the correct shoulder angle.*

Fit the middle rail. *Dry-fit the door frame and fit the middle rail to the piece, using a full-sized drawing as a guide.*

than the sides by the thickness of the door. This allows the doors to cover the edges of the cabinet sides but fit inside the top and bottom pieces.

As for width, I wanted to fit five or six glasses side by side on each shelf. A little extra room here also is a good idea.

The carcase is just a four-sided box, dovetailed at the corners. The sides are ¾ in. thick, and the top and the bottom are ⅞ in. thick. Although using half-blind dovetails would have kept the sides of the case cleaner, I'm still a sucker for at least some exposed joinery, so I used through-dovetails. I made the top a little thicker to allow slightly longer pins (these are cut with a 1:8 angle).

Doors are the focal point

This cabinet is almost all door, so it pays to use the best wood you have for the panels and the door parts. I liked the idea of a cabinet that was tapered—slightly narrower at the top than at the bottom. But that seemed to create more problems than were worth solving, so I opted instead to taper the inside edges of the door stiles. The taper is gentle—about 1°—going from 2 in. wide at the bottom of each stile to 1½ in. wide at the top. A more severe taper would have made the stile too wide at the bottom or too narrow at the top to accommodate a tenon. Each door also was fitted with a trapezoidal window roughly 7 in. on a side.

The easiest way to lay out the mortise-and-tenon joints for the door was to use a full-sized drawing on a piece of paper or scrap of plywood. The length of each of the three rails was taken directly from the drawing. I just had to add an allowance for the tenons.

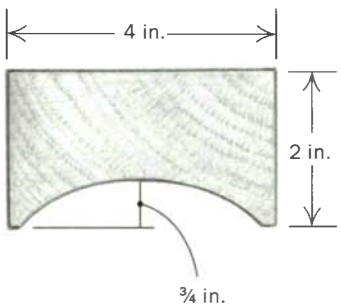
After cutting the rails to size, I made the cheek cuts on the tablesaw using a simple jig. Then I finished the tenons with the rails flat on a tablesaw sled. To get the right angle, I took the offcuts left over from tapering the door stiles and tacked them to the tablesaw sled. If the joints didn't fit perfectly, I adjusted them with a shoulder plane or put them back on the jig to remove a little more wood with the tablesaw. Making the door parts and dry-fitting them directly on the full-sized template simplified the process. But it did take some fussing to get three unequally sized rails into place while keeping the stiles parallel and the door square.

The little windows fit in a rabbet cut in the back of the middle rail, the top rail and the two stiles. This was a good place for a router. The rabbet can be created using a bearing-guided rabbet-

COVED CORNICE

1 CUT THE COVE ON THE TABLESAW

Make a ¾-in.-deep cove by taking very light cuts across the blade. It should take about 6 to 10 passes.



Set your guide 2 in. from the crown of the blade. *This cut will be made at 45°.*

Cut the cove. *Move the stock over the blade at a slow but steady pace. Don't remove too much with each cut.*

ing bit after the door has been glued up. Small strips of wood hold the glass in place. They can be secured either with brads or with hot-melt glue.

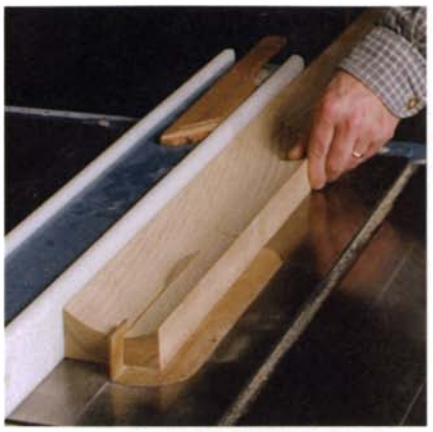
Coved cornice can be cut on a tablesaw

I don't own a shaper, but by passing the stock at an angle over the tablesaw blade, I was able to produce the coved cornices for this cabinet with ease. By varying the angle of the approach and the angle of the blade, this technique allows you to make profiles of amazing variety—from plain semicircular cuts to dramatic shapes that look like waves about to break. The trick is to clamp guides to the tablesaw so that the stock won't wander and to take 1/16-in. or smaller bites.

The stock for the cornice was 2 in. thick, giving me plenty of material in which to cut the profile. After cutting the cove in the center of the material, I ripped one edge to give the cornice its finished shape. The pieces were mitered and glued together as a unit before they were attached to the case. By hot-gluing triangular-shaped blocks on the two outside corners, I was able to use spring clamps to close the miter tightly. When gluing up the assembly, a spacer block can be inserted between the two short legs, if necessary, to keep the assembly in shape. I cleaned up the saw marks on the pieces before gluing them together.

Once the glue dried, I sanded the corners to remove any traces of squeeze-out and screwed the assembly to the top of the case. The front edge of the assembly overhangs the front of the case by about ⅞ in. The overhang covers the tops of the doors and allows for a small lip. A cleat attached to the back of the front cornice was screwed to the top of the case; on the two short legs of the cornice, tabletop buttons made a tight connection while allowing for cross-

2 RIP, MITER AND ATTACH THE CORNICE



Rip to size. *Determine the height you want the cornice to be and rip it to width.*

Triangular blocks add bite to spring-clamp jaws to close up miters. *Attach the blocks with hot-melt glue, and chisel them off after the cornice is dry.*

Attach the cornice to the case. *The front cornice piece is screwed through the cleat. The side pieces are attached with buttons, which allow for wood movement.*

grain seasonal movement in the case top. Attached this way, the front of the cornice won't move.

There is one other component made with the same material—the base that supports the cabinet on the wall. It is only 2⅞ in. deep, enough to give the cabinet a sturdy shelf but shallow enough that it doesn't make the cabinet look bottom-heavy. It is 4 in. narrower than the cabinet. After the three sides of the base piece were joined, I added a base cleat that meshes with a corresponding cleat screwed to the wall. Called a French cleat, this hanging system hides any fasteners, and it is simple to install and remove.

Hang the doors and apply a finish

Depending on how the case is built, knife hinges would be a good choice for this cabinet. They are unobtrusive and strong. I've also used crank hinges (Whitechapel Hardware; 307-739-9478), which allow doors to be folded open all the way. I decided on good-quality extruded brass butt hinges.

Because the cabinet has overlay doors, the stops are already built in. To keep the doors closed, I used small, powerful magnets sold by Lee Valley (800-871-8158). They are less difficult to install than conventional bullet catches and will be unaffected by small seasonal changes in the doors.

Fitting overlay doors is not as finicky as fitting inset doors, but the outside edge of each door still should line up exactly with the edge of the case. Planing a bevel of a degree or two on the mating edges of the center stiles makes it easier to open and close the doors without having them bind.

For finish, a coat of Watco oil brings out the wood's color, and three or four coats of blond shellac or lacquer protect it. □

A French cleat bears the weight. *The base engages with the wall cleat, and the cabinet sits atop the base. The case requires only a single screw at the top to hold it securely to the wall.*

Scott Gibson is a freelance writer living in Maine.

Installing a Cast-Iron Vise

It's hard to imagine working in a shop that lacks a good bench-mounted vise. After all, woodworkers come from the factory with just two hands, and we need both of them to use most tools. So it usually takes some help to keep a workpiece fixed firmly in place.

The cast-iron style of vise has long been a staple in woodworkers' shops, and for good reason. A cast-iron vise that's well maintained can last several generations, and a workpiece locked in its grip won't easily budge.

A cast-iron vise has another plus: It generally installs without much fuss. But that doesn't mean the procedure is foolproof. To minimize the fussiness factor, there are a few worthwhile points to keep in mind—including a little preinstallation planning.

Where to put it

At first glance, a workbench seems to offer a number of places to locate a vise. But a few spots can be eliminated quickly. Any vise centered on the front, back or end of a bench is sure to be in your way, so the vise almost always ends up installed near a corner to make it as unobtrusive as possible. Your options narrow even further when you consider the bench location, its design and you—or more specifically, your handedness.

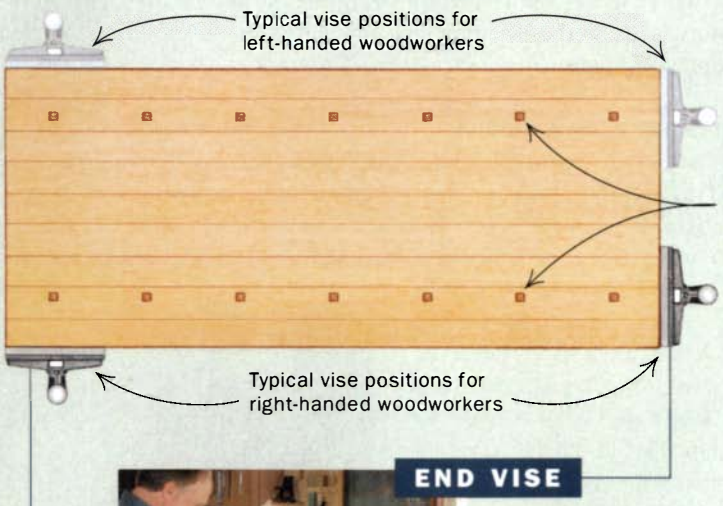
Bench location and design—When a bench is positioned well away from the walls, allowing all-around access, the vise can be installed adjacent to any of the corners. But if the bench butts against a wall, both corners of that side of the bench are eliminated as options. If the bench has to go in a corner, the options become fewer. So it's best not to finalize the vise location until you've considered where the bench is going to go.

Determine the best location

Before installing a vise, consider where on the benchtop it's going to work best for you. Right-handers generally prefer the front vise on the left end of the benchtop, with the end vise on the right, near the front corner. Reverse the locations if you're a southpaw.

FRONT VISE

If you're going to mount only one vise, a front vise offers the most useful clamping options. A board clamped horizontally in a front vise is perfectly positioned for edge-planing. Clamp it vertically, and the end of the board can be planed or sawed easily.



END VISE

Used with a benchdog, an end vise allows a longer board to be clamped quickly face-down on the bench for planing, scraping or sanding.

Photos: Michael Pekovich

There's more to it than sinking a few lag screws

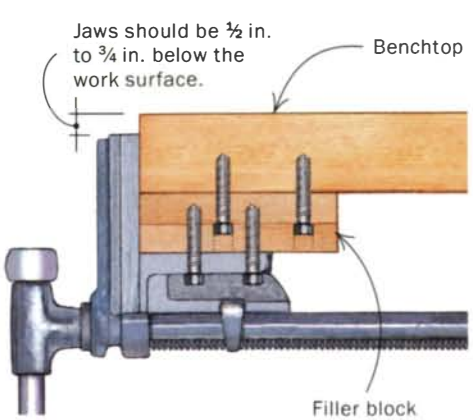
BY TOM BEGNAL

Most cast-iron vises have a metal dog built into the front jaw. When the vise dog is used with a benchdog, the vise offers additional clamping advantages. Keep in mind, though, that the holes for the benchdog must be in line with the vise dog. So before you settle on a vise location, make sure the benchdog you use can be placed into all of the holes without interfering with the vise, the bench legs or anything else under the top.

Front or end vise?—A vise can be mounted to the front or end of a bench. Because each location has its advantages, many

MOUNTING THE VISE

Figure out the filler-block thickness. *With both the vise and benchtop upside down to make the job easier, measure the distance from the benchtop to the top edge of the vise jaws and then add ½ in. to ¾ in.*



Attach the filler block, then the vise, using lag screws. *You might think that about does it, but to get the most out of the vise, you should cover the metal jaws and edge of the table next.*

Drawings: Melanie Powell

A long face. *A mortise in the back face accepts the back jaw. The face extends the full length of the benchtop, which will make it easier to clamp long boards.*

Measure, mark and cut out the mortise. *On many vises, the face of the back jaw isn't square to the benchtop. To make sure the mortise ends up deep enough, measure the depth from the thickest part of the jaw. Use a drill bit to remove most of the waste stock before using a router to clean out the waste that remains.*

benches include both front and end vises. If a bench is limited to having just one vise, it's best to install it as a front vise, because most of us naturally gravitate toward the front of the bench.

Think right or left—More than anything else, your handedness determines the best vise location. Right-handers usually like a front vise on the left of the bench. That way, when crosscutting a board with a handsaw, the cutoff end can be held by the left hand.

When the front vise is installed on the left, you'll want the end vise added to the right, near the front corner. Reverse the locations if you're a lefty.

How to mount it

There are several ways to install a cast-iron vise; your best option depends on the benchtop's design. The procedure outlined here covers the most common installation, one where the back jaw of the vise simply butts against the edge of a top that's about 1½ in. thick.

Cast-iron vises, especially large ones, are heavy and awkward to hold. So try to work with the benchtop turned upside down, as shown here. If flipping the top isn't an option, you can make the vise easier to handle by removing the front jaw along with the screw and guide bars.

Include a filler block—Ideally, when the vise is installed, the top edge of the jaws should be ½ in. to ¾ in. below the top of the bench. The extra space allows room for the wood face, added later, to cover the top of the jaw.

Also, on some vises, the dog extends almost ½ in. above the jaws, even when the dog is fully lowered. Unless the jaws are well below the benchtop, the dog will always stick above the work surface.

To get that extra space, you're likely to need a wood filler block between the underside of the benchtop and the mounting bracket portion of the vise. The block should be wide and long enough to cover the bracket and thick enough to produce the intended spacing.

Install the filler block and vise—Before securing the block to the underside of the top, drill and counterbore it for four lag screws. Position the block on the benchtop and drill the pilot holes. Add glue, then slip the lag screws into the holes and thread them home.

Now position the vise on the block, with the back jaw firmly against the edge of the bench. Then drill the pilot holes and add the lag screws. If you've been working with the benchtop upside down, now's the time to flip it right-side up.

Make the faces—A workpiece secured in the vise is less likely to dent if the cast-iron jaws have wood faces. The faces can be installed several ways.

A quick method is simply to screw a rectangular piece of hardwood stock to the jaws of the vise. Most jaws have predrilled holes, making the job an easy one.

I prefer to mortise the back face to accept the back jaw. Also, I like to extend the back face the full length of the bench. Effectively then, the back face becomes part of the edge of the benchtop. So when a long board is clamped on edge in the vise, the

Attach the back face to the edge of the benchtop. *To fill in the gap between the back face and the back jaw of the vise, add a couple of strips of epoxy putty to the mortise just before applying the face to the bench (left). After coating the jaw with paste wax, attach the face with a few wood screws driven into counterbored holes (right).*

Plane the top edge of the face. *A sharp handplane is all it takes to get the face flush with the top of the bench.*

board remains in contact with the back face the full length of the bench. That makes it easier to clamp the end of the board to the benchtop.

To create the mortise, first mark its length, width and depth on the back of the back face. When measuring the depth, keep in mind that most jaws taper in thickness, meaning the back jaw usually isn't square to the benchtop. So to make sure the jaw can fit fully into the mortise, measure the depth dimension at the bottom of the jaw at its thickest point.

Once the mortise has been marked, use a drill press and a Forstner bit to remove most of the waste. Clean up the rest with a router.

Mount the faces—At this point, there's just one more detail to attend to before the back face can be attached. Because the back jaw is tapered, it doesn't fit fully against the mortise. As a result, there's a gap that widens as it nears the top of the jaw. Thus, the jaw loses some support provided by the back face.

To fill in the gap, use a bit of epoxy in putty form. You can find this stuff at most hardware or home-improvement stores. To prevent the epoxy from sticking to the jaw, add a heavy coat of paste wax to the area of the jaw that meets the epoxy.

Next, attach the back face, using the vise to clamp one end. The top edge of the face should stand proud of the benchtop by 1/16 in. Now add a bar clamp to the other end of the face. Secure the face with screws driven into counterbored holes, and add wood plugs to the holes.

The front face is just rectangular stock that's attached by driving screws through holes in the front jaw. Because the front jaw has a taper, like the back jaw, the front face cants toward the back face. That's actually a plus because it helps the vise grip more tightly along the full width of the jaws. But if there's too much cant, it can be reduced quickly by handplaning a bevel on the entire inside surface of the front face.

For the final step, add a finish to the two faces, preferably one that matches the finish on the original benchtop. □

Tom Begnal is an associate editor.

Add the front face. *Like the back jaw of the vise, the front jaw is tapered. To minimize the effect of the taper, you can bevel the outside surface of the front face slightly. Then attach the face by driving two screws through predrilled holes in the jaw.*

Gel Stain User's Guide

Easy to apply, these stains are forgiving, even on blotch-prone woods

BY TERI MASASCHI

Wipe-on stains have become enormously popular in the last few years, and none more so than the gel versions. Sold as one-step, foolproof finishes that need only a rag as an applicator, gel stains appeal to that large group of woodworkers who dislike finishing. While many serious finishers spurn these stains assuming they have few good qualities, others find ideal uses for them.

Gel stains are forgiving, but they won't hide the sins of bad sanding marks, spots of filler or glue smudges. Contrary to popular belief, these combination finishes still need a clear topcoat in most circumstances. Different brands of gel stains also vary both in their handling characteristics and in their color rendition of the same named stain (see p. 63). However, for those projects made of difficult, blotch-prone woods, such as cherry and pine, gel stains may be the best solution. Their ability to layer color makes them easy to use as glazes. For these reasons and others I will demonstrate, these small cans of thick color deserve a spot on everyone's shelf.

Where gel stains prove their value

One of the strongest selling points of a gel stain is its ease of application. There is no need for a spray gun, a specialty brush or even a spotless shop—only a nice, soft cloth, such as an old T-shirt. Gel stains are all wipe-on/wipe-off products, which results in very little wet surface (tacky at most). A gel stain is not like a traditional thin pigment stain that never gets deeper in color no matter how many coats are applied. Rather, a gel stain builds up color with each application, so don't apply a heavy first coat for a darker color. Simply apply a second one.

Gel stains work well on blotch-prone woods—The end grain on tabletops and raised panels often absorbs regular stains in dark, ugly contrast to the straight grain around it. Likewise, some cherry and pine boards turn blotchy when a stain has been applied. One solution is to use a stain controller (see *FWW* #156, pp. 113-114), such as a thin coat of clear gel varnish or dewaxed shellac, but using a gel stain may negate the need for this step.

Gel stains color in increments—Woodworkers often combine solid wood and plywood in the construction of cabinets. It is a common struggle to make these components blend together when it comes to staining them. A gel stain is an ideal solution for this problem. If one component is

What puts the "gel" in gel stains?

The Bartley Collection Ltd. has been making gel stains and varnishes for 30 years. These products start life much the same as their liquid counterparts. A powdery thickening agent is added to the liquid mix of resins, pigments and mineral spirits. In a process known as thixotropy, 100-gal. batches are put in a machine resembling a large milkshake maker. As the ingredients are stirred for at least an hour, the chemicals react together and heat up to around 150°F. Once this temperature has been reached, the mixture must be canned quickly before it cools and becomes the thick mixture known as a gel stain.

A tale of two stains. *The gel stain on the left imparts an even color over the whole piece of wood. The dye stain on the right creates a blotchy finish on the face grain and an ugly, dark end grain.*

Photos: Mark Schofield

WIPE ON, WIPE OFF

One of the main appeals of gel stains is their ease of use. They can be applied to raw wood straight from the can using only a small rag. Apply the stain in a circular motion, working it into the wood. Avoid leaving large amounts of surplus gel on the wood. Before the gel has a chance to become tacky, wipe the surface with a clean rag, leaving only a thin layer of finish on the wood.

lighter than the other, a second application on the lighter area pulls in the tones nicely.

Sapwood sometimes can be concealed by applications of gel stain on the light stripes. Usually two coats will successfully blend the light with the dark, but if necessary, you can alter the tone of the gel stain by adding concentrated pigment such as Japan colors or artist's colors.

Gel stains are a nifty medium for glazing—Start by applying a base stain either with a dye or a pigment stain. Seal this with a clear gel varnish or a thin coat of dewaxed shellac. Scuff-sand with 320- or 400-grit paper and then apply a thin glaze of gel stain. This imparts a small amount of tone to the wood without being heavy and creates a deeper look from the layers of color.

You also can use two different gel stains to match the color of another finished piece. To match a tabletop to its base, for instance, I used an initial coat of Clearwater stain, followed by an application of Bartley gel stain.

Gel stains have a downside

For everything good about gel stains, there are a few drawbacks. Lack of clarity is certainly a common complaint. A gel stain on a figured wood, such as tiger or bird's-eye maple, is a crime. The resulting appearance is muted and lacks intensity. Even on straight-grained wood, application of multiple coats of gel stain risks muddying up the wood.

Topcoats receive special consideration—Most gel stains remain on the surface—especially on hardwood—rather than penetrating the wood as dye stains do. Unless they are well protected with a durable topcoat, heavy-use areas such as tabletops are at risk of the color wearing through. With the exception of Clearwater, topcoat options are limited with these gels. Bartley, Wood-Kote and Olympic all recommend a gel varnish or liquid polyurethane. Because gel varnish is actually gelled polyurethane, which is softer than its liquid counterparts, it is not a good choice for tabletops.

Care should be taken when topcoating oil-based gel stains with solvent-based lacquer. These stains have a resin binder that, if left on too thick or still curing, may cause the lacquer to crinkle.

Gel stains can be the answer to challenging staining situations. For those unwilling to take chances with the unfamiliar world of dye stains, spraying stains, prestain conditioners, presealing or presizing, these gels will work beautifully as a one-step staining process. □

Teri Masaschi is a woodworker, finisher and restorer in Albuquerque, N.M.

DEEPEN COLOR WITH ADDITIONAL COATS

Plywood and solid wood react differently to the same stain, resulting in uneven color. Gel stains build color in increments, so it's easy to match the colors.

Another layer of color. *Gel stains increase the degree of color with each application. Two thin coats are better than one heavy one.*

A perfect match. *A second coat of stain on the hardwood frame leaves it looking as if it came from the same tree as the plywood panel.*

Many brands of gel stains, many shades of cherry

Gel stains are available in oil- and water-based forms. These stains come in the typical range of wood tones as well as in bright primary colors. For this article, I tested the cherry stain from various manufacturers to show the wide range of tone and each stain's ability to grab the wood, or "take." I chose to illustrate It on cherry and pine boards, two blotch-prone woods.

ON CHERRY

ON PINE

BARTLEY

Very rich in tone, one application alone imparts a deep color. This stain leans toward the reds that are good for traditional work such as reproductions. The label states that the product stains and seals in one step. However, a surface left at this stage is vulnerable and lacks sheen. It's best to topcoat with gel varnish or polyurethane.

CLEARWATER

Because this product is a dye, it tends toward greater transparency than the other gels, which are pigments. Clearwater has no binder, so any topcoat can be used over it. However, if a water-based topcoat is used, preseal the gel stain with a thin dewaxed shellac to prevent color bleed-through.

MINWAX

This stain is weak in color and light bodied; the tone is closest to unstained cherry. It must dry for 24 hours before a polyurethane topcoat can be applied.

OLYMPIC

This oil-based interior/exterior antique cherry is the most orange colored of the five stains shown here because one of its ingredients is red iron oxide. The consistency in the can resembles thick latex paint, and more than two coats hides most grain. Topcoat with oil- or water-based polyurethane.

WOOD-KOTE

This stain is heavily pigmented with an orange/brown tone. The colorant is so strong that it can "grab" the wood a bit too intensely. It is not as easy to wipe off as the other gels, and it also has a strong odor. After Wood-Kote dries in two hours, polyurethane or lacquer can be used as a topcoat.

Compound Angles Without Math

Simple set-up block dials in tablesaw settings for accurate butt and miter joints

BY STEVE BROWN

Work from a model

By beveling the edges of a wood block at the desired slope for your sides, you create a working model of the box or tray and all of its angles. Used alone, laid on its side, the block gives you the blade and miter-gauge angles for a butt joint; add a 45° triangle (above), and you have the settings for a miter.

Compound angles add visual interest to a piece. Instead of building a cradle that looks like a stiff box, you can angle the sides to give it a more subtle, inviting appearance. Angled sides are used in many types of woodwork, from simple serving trays and window boxes to the high-style bombé chest, with its flat, sloped case and drawers that are carved into a bulge on the outside.

A compound angle occurs at the intersection of two sloped sides, and there are a number of joints that can be used to connect them. The most basic and fundamental of these is the butt joint. Miter joints and dovetails are more complex options. At North Bennet Street School, where I teach, we've found an easy tablesaw method that handles all three variations required, with some handwork for dovetails.

To form a compound angle on the tablesaw, both the blade and the miter gauge must be angled for crosscutting. The problem is that you cannot get those angle settings from the standard views on drawings. When any piece features surfaces that are not perpendicular to the line of sight, there is distortion in their size and shape. Take the front side of a simple box. If each side slopes outward 10°, the front and side views will show a slightly shortened front side, and the crosscut angle at each end will be distorted. The top view is also deceiving—you are not looking straight down on the top edges of the box, so you can't read the true bevel angle of the butt joints.

Photos: Asa Christiana

There are a few traditional approaches to calculating these two angle settings. The first involves drafting a corrected view that shows the true dimensions and angles of each side of the box. The second is a mathematical solution using trigonometry. However, while working through these traditional solutions with our students, we became dissatisfied with their complexity and potential for inaccuracy. There are chances for error when drawing or making calculations and also when you turn those numbers into actual tablesaw settings. This led us to rethink the problem and eventually figure out a simpler method for determining and cutting compound angles on the tablesaw.

Set-up block is a simple solution

To carry out this method, you need to know only the slope angle for the sides. This slope is also usually the blade angle used to rip the top and bottom edges of each side. If the slope is 10°, for example, most designs call for a 10° bevel along the top and bottom edges.

The basic trick is using that same blade angle to bevel the edges of a set-up block, which then becomes a working model of the box and all of its angles (see the photos and drawing at right). That's it. The edges of the block represent the sides of the box. Simply flip the block on one edge and slide an adjacent edge against the blade to find the appropriate blade and crosscut angles for an accurate butt joint.

This approach lets you walk up to the saw with any slope in mind and quickly create tight joints.

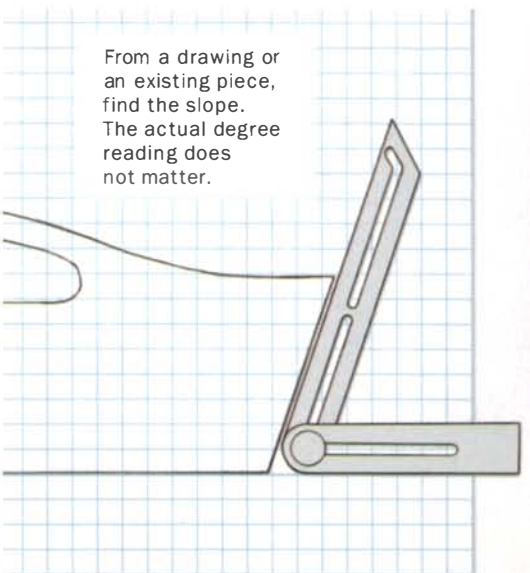
Start by ripping the box parts to width (or height, depending on your perspective) with the appropriate bevel on the top and bottom edges. Next, joint and plane a block of wood flat and square on all sides. Make the block roughly 2 in. thick by at least 3 in. wide by 10 in. long, for reasons that will become apparent later. Next, crosscut each end of the block and rip at least one side at the same blade angle you used to bevel the sides. If necessary, you can hold the box parts in place against the block to see if the slope suits your tastes. You now have your set-up block.

Cut the basic butt joint

At this point a butt joint is easy to produce. Set the blade angle first. Lay the block on one of its beveled sides and change the

PICK A SLOPE, ANY SLOPE

To make the set-up block, you need to know only the slope of the sides of the box. Set the sawblade to that angle and bevel three edges of a long block. The block becomes a working model of the box and all of its angles and can be used to set up the tablesaw to cut the joints.



Transfer that angle to the blade. *This is a good time to rip the top and bottom edges of the box sides, which usually are cut at this angle.*

Now make the set-up block. *Mill a flat, square block roughly 2 in. thick by 3 in. wide by 10 in. long. Then rip one edge (above) and crosscut the two ends at the slope angle (inset).*

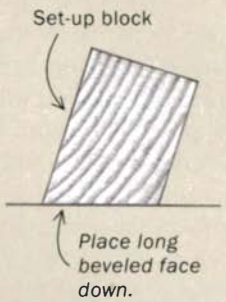
Drawings: Kelly J. Dunton

COMPOUND-ANGLE BUTT JOINT

The set-up block is all you need to cut a perfect compound-angle butt joint. The block should be narrow enough to fit under the teeth of the blade when it is fully raised, with the end of the block flush against the blade's side.

Use the block to set the blade and miter-gauge angles

Find both angles in one step. *Place the set-up block on its long beveled side. Pivot it forward and back while changing the blade angle until the end of the block is flush against the blade.*



Hold the block in place and bring up the miter gauge. *When the gauge is flush to the block, lock in the angle setting.*

Cut both ends of the board

Switch miter slots, not settings. *There's no need to change the blade angle when cutting opposite ends of a box side; just flip the board edge for edge and move the miter gauge to the other side of the blade. Label the inside and outside faces of each part and lay out all of the cuts to keep track of them. Also, use a stop block to index the second cut on each side.*

blade angle until it is flush with the angled end of the block (the block should be narrow enough to fit against the side of the blade without hitting the teeth). Next, keeping the block on its side, hold it against the miter-gauge fence. Adjust the miter-gauge angle until the end of the block mates perfectly with the flat face of the blade. The saw is now set up to cut the correct compound angle on all of the sides.

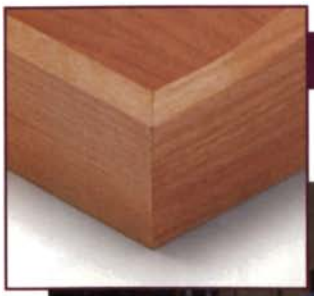
Tablesaws tilt only one way, so one end of each side will be crosscut on the left side of the blade, with the miter gauge riding in the left miter slot. The other end will be cut on the other side of the blade, with the board flipped edge for edge onto its other face. To help keep track of the cuts, lay out each one and label the inside and outside faces of each part before starting.

This simple approach usually yields a perfectly fitting joint on the first try; however, just to be safe, I recommend cutting a sample joint first. Then set the parts against the set-up block to check the joint. If any adjustments to the miter fence or blade angle are necessary, take another slice off the sample sides and check the joint again. Remember to save all of your offcuts; you'll be able to use them as clamping blocks later during glue-up.

Miters aren't much harder

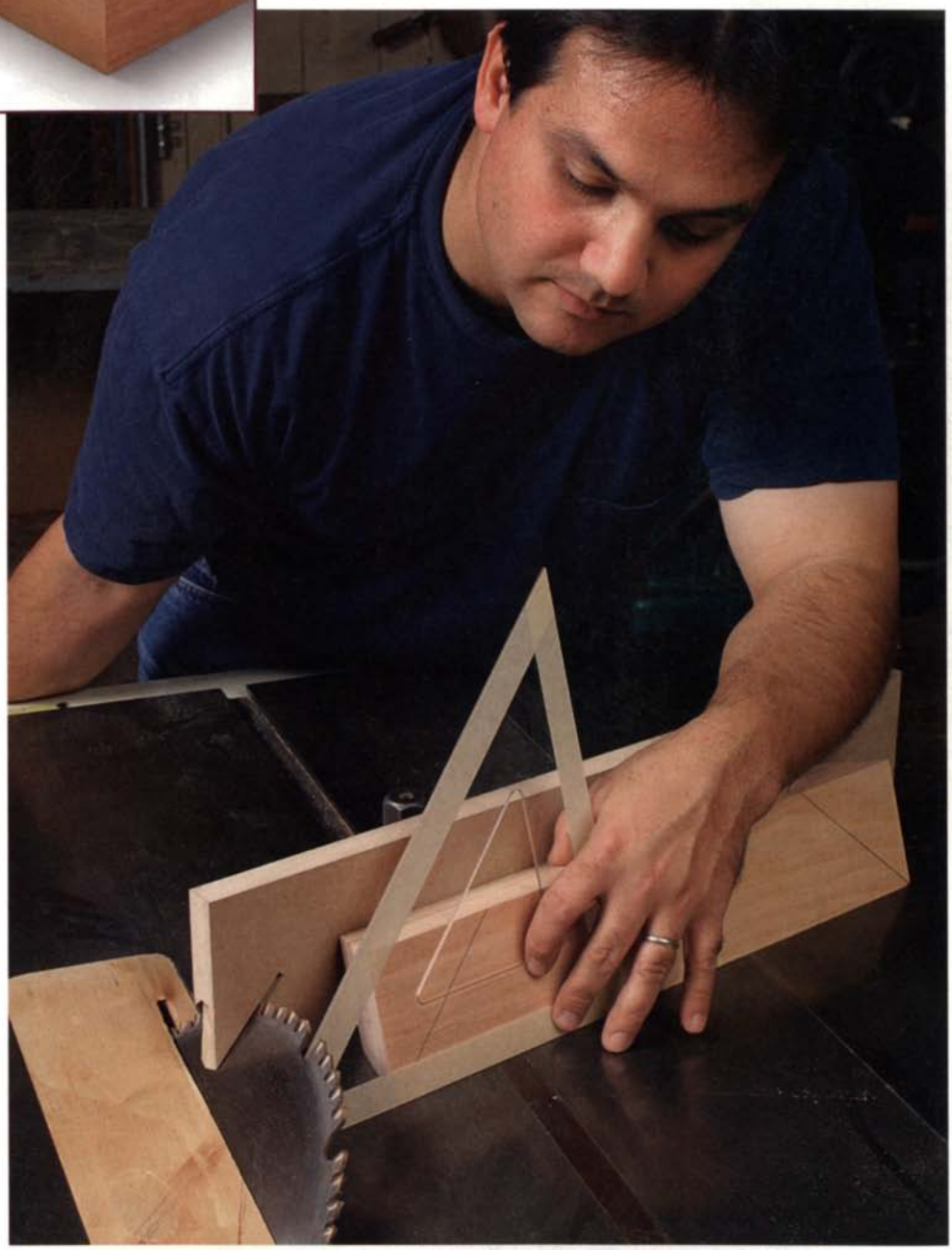
To cut miters, the crosscut angle stays the same; only the blade angle has to change. To find that new angle, you will need a 45° triangle. When you have the set-up block on its side and the miter fence properly angled, lay the triangle against the top face of the set-up block. Now crank the blade angle over until it mates with the edge of the triangle (see the left photo on the facing page).

What is happening here is complex mathematically but much simpler visually. If you look at the top view of the box with butt joints, the sides will appear to meet at a 90° angle. Although you know that the



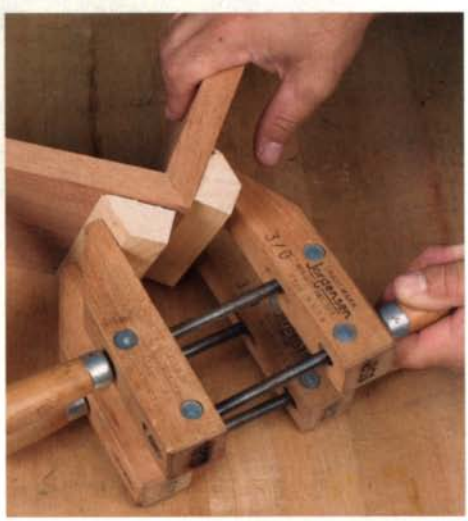
COMPOUND-ANGLE MITER JOINT

To turn the butt joint into a miter joint, simply add a 45° triangle to the front face of the set-up block and reset the blade angle. The miter-gauge angle stays at the butt-joint setting.



Place the triangle flat against the front face of the set-up block. *Angle the blade to meet the edge of the triangle.*

Again, lay out and label the sides to keep track of the cuts. *Workpiece creep is especially a problem with these sharply angled cuts, so clamp on a stop block, or a stop stick.*



Miter-joint clamping strategy. *Rip some scrap stock at the current blade angle and glue these blocks onto the workpieces. Use these clamping cauls to draw the joint tightly together. The blocks can be pared away later.*

ends of the boards were not crosscut with the blade at 90°, from that angle (looking straight down on the sloped sides), the joint is square. That's why you can lay a square across the beveled top edge of the set-up block or the box itself and find a 90° angle between the sides. Likewise, a miter on this compound-angle joint will actually be 45° when viewed from the top. By placing the triangle flat across the top side of the set-up block, you are using this phenomenon to find the right blade angle for a perfect miter. The blade will not actually be 45° from the table, of course, because the triangle itself is being held at an angle.

If all of this doesn't make perfect sense to you, don't worry; the procedure will work anyway.

To learn how to lay out compound-angle dovetails, see Master Class on p. 96.

With this technique you'll never have to fear compound angles. You can cut a butt or miter joint at any angle. You can even set adjacent sides of a box at different angles and still determine the tablesaw settings for perfect joints. Also, with the butt joint in your repertoire, dovetails are just a layout procedure away. □

Steve Brown is the head of the cabinet- and furniture-making program at North Bennet Street School in Boston.

TOOL TEST

Midi-lathes

This new breed of small lathe offers several features found in bigger machines at a more affordable price

BY ANDY BARNUM

A lathe can make most good shops even better. A woodworker can add considerable appeal to a furniture piece (depending on the style) by including turned parts, such as legs, knobs, spindles and pedestals. Other turned items, such as bowls, plates and boxes, stand fully on their own merits.

Many woodworking shops, however, don't have a lathe—most likely because of cost or space. Lathes require cash, something many of us don't have in surplus. And lathes take up a lot of space, something most shops have little of, if any, to spare.

But the arrival of a new category of small lathes has made cost

Meet the testers

Students and instructors from the School of Art and Design at Purchase College tested five midi-lathes for a semester, giving each of the lathes a serious workout. In the process, the students created dozens of turnings.

Photos, except where noted: Michael Pekovich

DELTA 46-250

The Delta weighs less than the average lathe in this group, making it easier to lift and move. It has an on/off switch that is conveniently located above the headstock. The tailstock handwheel turns comfortably.

Telephone: (800) 438-2486

Street price: $300 ($50 for bed extension)

Weight: 65 lbs.

Motor: ½ hp, 6.6 amps

Swing: 10 in.

Distance between centers: 14½ in. (37 in. with extension)

Speed settings (rpm): 500, 800, 1,250, 1,800, 2,650, 3,700

Headstock spindle: 1-in. by 8-tpi threads, #2 Morse taper

Tailstock spindle: #2 Morse taper, 1½ in. travel

Faceplate included: Yes

Outboard turning option: No

and space less of an issue. Introduced in the late 1990s, these machines—often called midi-lathes—are generally bigger and beefier than the so-called minilathes, yet they're smaller than full-sized machines. Midis are affordable—selling for between $285 and $350—and take up very little space. Plus, when not in use, most can be picked up and stored out of the way, although a couple of the heavier models might best be moved by someone who spends regular hours at a gym.

Midi-lathes have other features that appeal to me. Unlike minilathes, the midis include some qualities normally found only on bigger machines, such as ½-hp motors and spindles with 1-in. by 8-tpi threads and #2 Morse tapers. Also, when used with an optional bed extension, a midi can turn long spindles between centers.

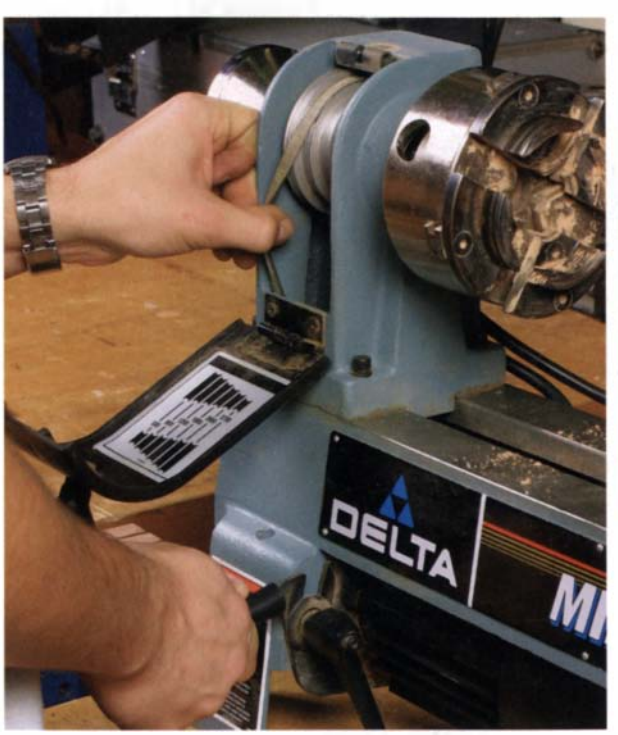
For someone unsure whether wood turning is going to be worthwhile, a midi-lathe just might be the best way to test the waters. Not only are the midis relatively inexpensive, but they also have enough power to do some serious work. And as your turning skills grow, you can grow the lathe by adding a bed extension.

So midi-lathes have a lot going for them. But how well do they work?

Students give the test

I teach wood turning at the School of Art and Design at Purchase College in New York. The shop has 10 full-sized lathes. But the class, part of a furniture-design program, often attracts as many as 15 students. With an obvious need for more lathes, I arranged to borrow the five midi-lathes currently on the market—the Delta 46-250, the Fisch TC 90-100, the General 25-100 M1, the Jet JML-1014 and the Nova Mercury—to find out how well they could hold up to the wear and tear of regular use. By the way, the Nova Mercury is marketed as a minilathe, even though it has a ½-hp motor, 1-in. spindles, #2 Morse tapers and an expandable bed, all features found on the other midis. So I felt comfortable including it in the midi-lathe group.

To find out how the midis would hold up under daily use, each



Two ways to change speeds. *To make any speed change on the Delta, Fisch, General or Jet, the belt (left) is repositioned on stepped pulleys. Changing speeds on the Nova (right) is mostly just a matter of turning a dial.*

Photo, this page (top): Tom Begnal

FISCH TC 90-100

At 81 lbs., the Fisch weighs slightly more than the average midi-lathe weight of 74 lbs. It has the lowest price of the bunch. And, at 15 in., it ties for the most distance between centers without a bed extension. The on/off switch is conveniently located in the headstock.

Telephone: (724) 663-9072

Street price: $285 ($60 for bed extension)

Weight: 81 lbs.

Motor: ½ hp, 6.6 amps

Swing: 10 in.

Distance between centers: 15 in. (39 in. with extension)

Speed settings (rpm): 500, 800, 1,250, 1,800, 2,650, 3,700

Headstock spindle: 1-in. by 8-tpi threads, #2 Morse taper

Tailstock spindle: #2 Morse taper, 2½ in. travel

Faceplate included: Yes

Outboard turning option: No

one was put to work in my once-a-week, all-day class for an entire semester. As the semester progressed, the student testers provided plenty of candid feedback on the strengths and weaknesses of each machine. Here's what we found.

Power isn't a problem

Anyone taking a quick look at these small lathes might be tempted to dismiss them as less-than-serious machines. So right off the bat we wanted to know if they have enough power. And within a few weeks, after turning an assortment of bowls, plates and spindles, the students concluded that they do. The ½-hp motors, a size that's often standard on larger (12-in.) lathes, provided all the muscle we needed.

Dial-a-speed is simpler

Lathes are designed to run at several speeds to accommodate different sized workpieces. Large, heavy workpieces require a slow speed, while small, light parts can be spun considerably faster. So it's helpful to be able to change speeds without a lot of annoyance.

The Nova stands out from the others in this regard. Thanks to a d.c. motor, a three-step pulley and variable-speed control, the Nova has an overall speed range of 140 rpm to 5,350 rpm. Depending on the pulley location, the lathe can be set to slow (140 rpm to 1,750 rpm), medium (320 rpm to 3,670 rpm) or fast (470 rpm to 5,350 rpm). The medium speed range took care of almost all of our needs. And because the belt setting was rarely changed, speeds were varied simply by turning a dial.

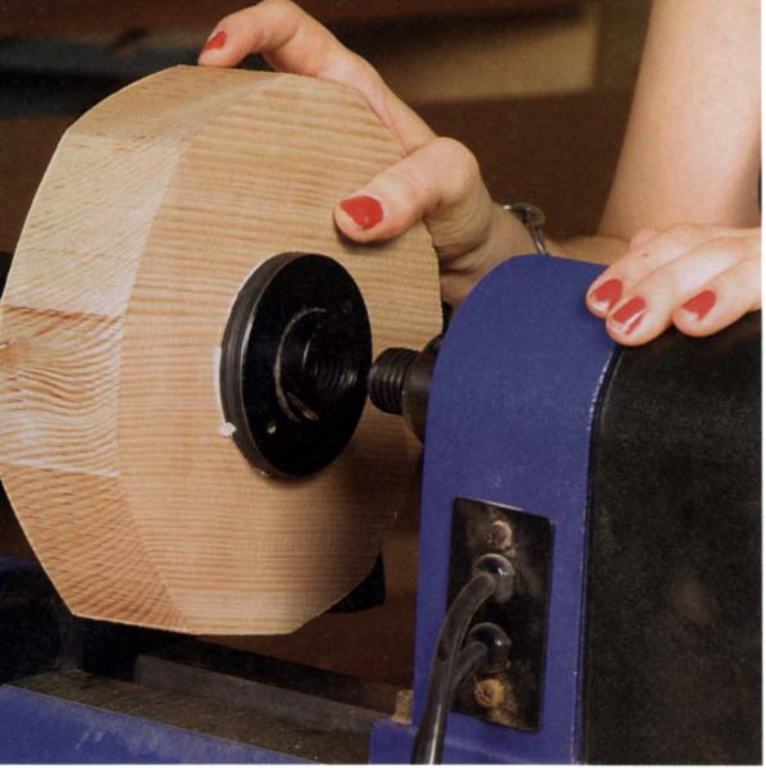
The Delta, Fisch, General and Jet have six speeds each (see the charts for more specs). To change speeds, the motor must first be raised and then a V-belt shifted to the appropriate position on a step pulley. While the procedure isn't a major headache, it falls short of the simpler Nova system. Also, the small belts on all of these lathes made belt tensioning a bit fussy. If it's too loose, the belt could slip; if it's too tight, the belt could strain the bearings.

Cast-iron parts make a beefier machine

A lathe should feel solid and steady during the turning process. Excessive vibration or movement can interfere with tool control and,

A plywood base adds support. *To make sure these machines don't move around while in use, it's a good idea to bolt the feet to a piece of plywood, then clamp the plywood to the bench. The only lathe not eager to wander was the General. Its large, soft rubber feet helped keep it in place.*

Photos, this page (top) and facing page (bottom): Tom Begnal



Faceplates welcomed. *A steel faceplate is supplied as a standard item on all of the midi-lathes reviewed.*

ultimately, the quality of the wood surface. While the midi-lathes aren't as rock-solid as most full-sized lathes, they are hardly rickety, mainly because the beds, headstocks and tailstocks are made from cast iron, a material favored for its vibration-dampening property. Also, on each of the lathes we looked at, the way on the bed—which allows both the tailstock and tool rest to slide—was ground smoothly.

We did notice, though, that because midis are relatively light in weight, all but the General moved around on the benchtop a bit when in use. Four large, soft rubber feet kept the General lathe from wandering. To keep the others solidly in place, it's a good idea to bolt them to a plywood base and then clamp the plywood to a sturdy workbench.

Headstocks have sturdy spindles

The 1-in. headstock spindle really separates these lathes from the previous generation of minilathes. Those earlier lathes used ¾-in.-dia. spindles, making them more likely to flex and vibrate.

Each of the five lathes has a headstock spindle with 1-in. by 8-tpi threads and a #2 Morse taper. And all accept a faceplate. The Nova allows outboard turning when used with an optional outrigger unit.

Two lathes, the Delta and the Jet, come with a handwheel at the outboard end of the spindle. This useful feature makes it easy to check tool-rest clearance and to examine work in progress.

Better and best. *Only the Nova uses a live single-point center (right) in the tailstock; the other midis use a live cup center (left). The students favored the live-cup version.*

Tailstocks offer live centers

Except for the Nova, all of the midi-lathes have a tailstock spindle with a live cup center and a #2 Morse taper. The Nova uses a live single-point center along with the #2 Morse taper.

All proved to be an improvement over the dead cup center of old, but for most work we preferred a live cup center over a live single-point center because the live cup center engages the wood

GENERAL 25-100 M1

By far, the General is the heaviest of the midis, weighing in at 106 lbs. At 15 in., it ties the Fisch for the most distance between centers, sans a bed extension. Add the long bed extension, and it provides 45 in. between centers, more than any of the other midis reviewed.

Telephone: (514) 326-1161

Street price: $300 ($145 for long bed extension; $85 for short bed extension)

Weight: 106 lbs.

Motor: ½ hp, 3.8 amps

Swing: 10 in.

Distance between centers: 15 in. (35 in. or 45 in. with extensions)

Speed settings (rpm): 480, 1,270, 1,960, 2,730, 3,327, 4,023

Headstock spindle: 1-in. by 8-tpi threads, #2 Morse taper

Tailstock spindle: #2 Morse taper, 3¼ in. travel

Faceplate included: Yes

Outboard turning option: No

JET JML-1014

This midi weighs in at just 59 lbs., a number that back muscles will appreciate. With the bed extension added, the Jet has 40 in. between centers, one of the longest. At a price of $350, it is the most expensive lathe in this group.

Telephone: (800) 274-6848

Street price: $350 ($50 for bed extension)

Weight: 59 lbs.

Motor: ½ hp, 5 amps

Swing: 10 in.

Distance between centers: 14 in. (40 in. with extension)

Speed settings (rpm): 500, 840, 1,240, 1,800, 2,630, 3,975

Headstock spindle: 1-in. by 8-tpi threads, #2 Morse taper

Tailstock spindle: #2 Morse taper, 2 in. travel

Faceplate included: Yes

Outboard turning option: No

more solidly. A live single-point center can wear away at the wood and eventually loosen.

The tailstock on each of these lathes uses either a cam lock or a quick lock, providing the convenience of one-handed moving and locking. To lock the tailstock in place you simply give the handle a quarter turn. These locks worked just fine and proved to be a nice plus.

On the Delta, Fisch and Jet, a handwheel is turned to adjust the tailstock spindle in or out. The Nova incorporates a knurled knob that made the task less convenient.

The Delta, Fisch, General and Jet have self-ejecting systems for the Morse taper center, a feature we liked because it was quick and easy to use and didn't require an extra tool. You simply retract the spindle, and the center pops loose. The Nova gets the job done with a long, cylindrical piece of steel called a knockout bar. You slip the bar into the hollow spindle, then the bar is used to tap the Morse taper and free it up.

Short tool rests lack support. *A 6-in.-long tool rest, the standard for all of the machines, wasn't favored by the students. Longer tool rests are available aftermarket.*

A longer tool rest would be a nice upgrade

All of these midi-lathes have relatively short (6-in.) tool rests, which drew many complaints from the students. They wanted a longer tool rest that wouldn't have to be repositioned as frequently when turning a long piece.

A longer tool rest (12 in.) is available from Fisch as an option. We tried it, and it quickly proved to be a hit. It also worked on all of the other midis, but to fit the Nova we had to sand down the shaft diameter a bit. By the way, Fisch also offers an optional curved bowl-turning rest.

The best full-sized lathes feature a cam lock to secure the base of the tool rest. A cam lock allows for easy one-handed adjustments of the tool rest. The midis all had a sturdy scaled-down version of the cam lock that worked just fine.

Choosing a favorite was a challenge

By the end of the semester, all five of these midi-lathes had accumulated a good many hours of run

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

NOVA MERCURY

Although it's the lightest and most compact of all the midis, the Nova is limited to 8 in. between centers without a bed extension, 20 in. with one. Variable-speed control makes it quick and easy to change speeds. It's the only one that allows outboard turning.

Telephone (Woodcraft): (800) 225-1153

Street price: $300 ($50 for bed extension)

Weight: 50 lbs.

Motor: ½ hp, 5.5 amps

Swing: 8 in.

Distance between centers: 8 in. (20 in. with extension)

Variable-speed settings (rpm): 140-1,750; 320-3,670; 470-5,350

Headstock spindle: 1-in. by 8-tpi threads, #2 Morse taper

Tailstock spindle: #2 Morse taper, 2½ in. travel

Faceplate included: Yes

Outboard turning option: Yes

time. Yet all of them were still going strong. And along the way, the students were able to create dozens of remarkable turnings.

That said, when forced to pick a favorite, we ended up giving a slight nod to the Nova. It's the lightest and most compact of the bunch, so it's easier to carry and store. Those are important features in our shop.

Also, on the Nova, we like the simplicity of the variable-speed dial. It pretty much eliminates the need to fuss with belts when changing speeds. That's a nice plus.

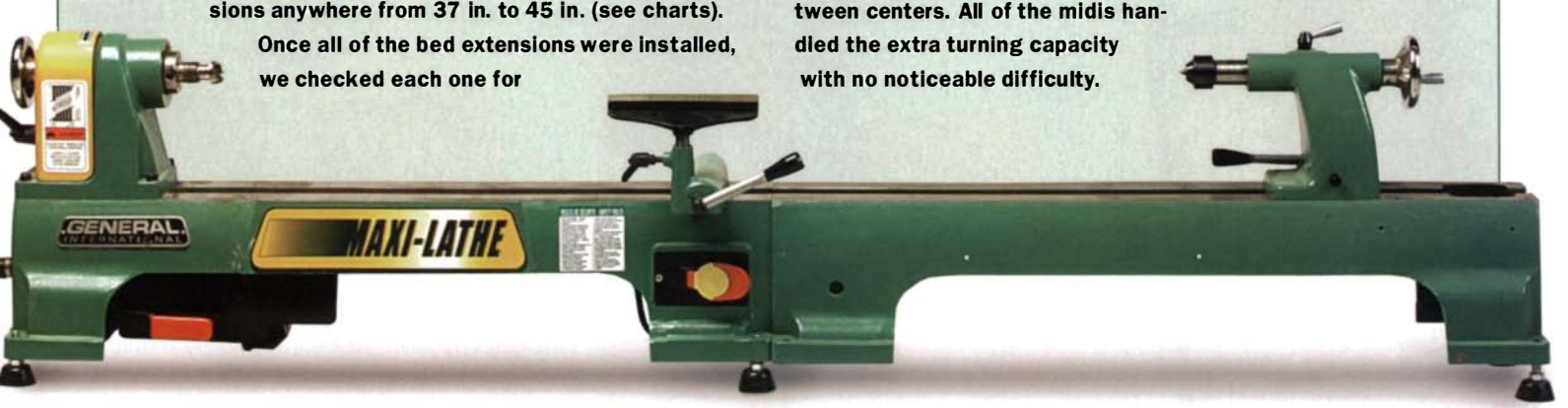
On the downside, though, the Nova has the shortest distance between centers. Adding the bed extension increases the distance between centers, but when compared to others with added bed extensions, the Nova still comes up short in the length department.

Everything considered, though, we were more than pleased with the performance of all these lathes. Indeed, the machines did everything we asked of them from the first day of class to the last. Anyone looking to get started in wood turning, but with a limited budget or minimal shop space, ought to consider taking a closer look at these little lathes. □

In addition to teaching wood turning at Purchase College and Brookfield Craft Center, Andy Barnum builds furniture at his shop in Carmel, N.Y.

Bed extensions stretch the lathes

All of these midi-lathes offer optional bed extensions that bolt to the end of the lathe, effectively increasing the distance between centers. With an extension, the Nova, the smallest of the lathes, grows to 20 in. between centers. On the opposite end of the scale, the other midis stretch the center-to-center dimensions anywhere from 37 in. to 45 in. (see charts). Once all of the bed extensions were installed, we checked each one for alignment with their base castings. We were pleased to find that all of them lined up, with the tool rests and tailstocks sliding smoothly from one casting to another. Also, with the bed extensions added, we did some spindle turning with the tailstock positioned for the maximum distance between centers. All of the midis handled the extra turning capacity with no noticeable difficulty.



A Life Built on Bookmarks

This modest woodworking business thrives on efficiency and ingenuity

BY JONATHAN BINZEN

If a Newport secretary contains a waterfall of woodwork, then one of Alan Bradstreet's wooden bookmarks holds barely a droplet. Then again, it might take one person the better part of a year to build a full-bore secretary; in the same 12 months, Bradstreet, who works alone in a small shop, would have stacked up 50,000 of his handsome bookmarks.

Bradstreet, 54, moved to Maine in the 1970s and found his way into woodworking. Unlike many other woodworkers who make a modest profit designing and building magnificent furniture, he makes a comfortable living by working very small and selling very cheap—in very large numbers. The Bradstreet collection of bookmarks comprises some 130 scrollsawn designs.

It's not that Bradstreet doesn't have the same urges toward creativity and complexity as his peers; he has just chosen to channel them differently.

Bradstreet's first decade in woodworking was spent in a 40-man factory in Auburn, Maine, that produced wooden kitchenware. He began as a laborer and worked his way up to foreman and eventually to vice president. He loved his years there and is grateful for the training. When he left in 1985, he took what he had learned and became a one-man factory.

When you visit his shop now, it is evident that Bradstreet combines the attributes of a hard-headed businessman, an enlightened foreman and a clever, untiring worker.

The boss

Bradstreet the businessman has focused on manufacturing one thing and has stripped away everything extraneous. For some years he made jewelry boxes, business-card holders and other small items, but these days he is bookmarks and nothing but.

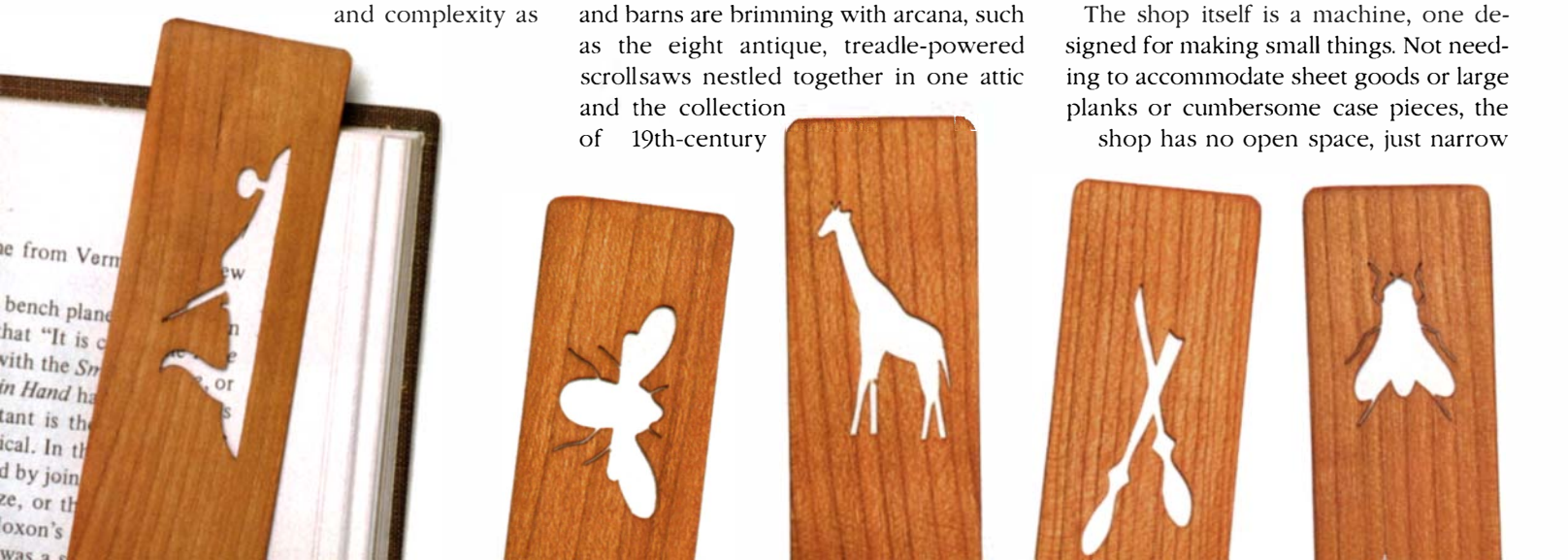
Personal interests are purged here, too. Bradstreet is a mad collector—his house and barns are brimming with arcana, such as the eight antique, treadle-powered scrollsaws nestled together in one attic and the collection of 19th-century shaving-razor sharpeners displayed in a bathroom. But there's no arcana in the shop. It's all business.

Stack and slice. *Bradstreet built a miniature crosscut sled for cutting the blanks to length one stack at a time. He keeps an eye out for even tiny imperfections in the wood.*

Bradstreet used to sell through craft fairs, but now he and his wife, Susan, who handles all of the shipping and other office work, sell exclusively wholesale. By far their largest customer is L.L. Bean, whose outlet store in nearby Freeport sells about half of what Bradstreet produces.

With silky surfaces, nicely eased edges and beautifully scrollsawn decorations, Bradstreet's bookmarks have a distinctly handmade feeling. But for efficiency's sake, he sticks to machines.

The shop itself is a machine, one designed for making small things. Not needing to accommodate sheet goods or large planks or cumbersome case pieces, the shop has no open space, just narrow



TV or not TV. *Reruns of* Remington Steele *keep Bradstreet company as he scrollsaws the designs in his weekly quota of 1,200 bookmarks. Addressing the safety issue, he said, "I don't watch the screen while I'm sawing, but if something interesting comes on, I stop to look."*

A sophisticated squeegee. *Bradstreet removes excess linseed oil from bookmarks after dipping. The essential component of this high-tech squeegee? Coffee-can lids.*

passageways between rows of machines cleverly arranged to achieve one purpose.

Aiming for the utmost economy of time, energy and materials, Bradstreet has bought pairs of some machines. "It's like Noah's Ark in here," he said. To avoid constant changing of sawblades, he has two identical bandsaws that stand side by side—one with an aggressive blade for rough cutting, and one with a fine-toothed blade for more delicate work; and there are two stationary drum sanders—one fitted with a balloon sanding drum, and the other with a flap wheel.

Another of Bradstreet's canny efficiencies is that his business runs on scrap. He buys offcuts from several large furniture manufacturers, greatly reducing his material costs. The scrap comes jointed and planed, saving work and further gratifying Bradstreet's Yankee love of thrift.

The foreman

Bradstreet the foreman has made the shop as pleasant as possible. The shop sits on the corner of his property in a 150-year-old building with one room on each of two floors. Windows on all four walls fill the place with light. At 17 ft. by 21 ft., the building is not large, considering the number of machines it holds, but Bradstreet's logical layout makes the place feel cozy, not crowded.

The shop is also amazingly absent of sawdust. A central dust collector is hooked up to every machine and is supplemented by a ceiling-hung air filter.

However pleasant the surroundings may be, producing 50,000 bookmarks a year is not scintillating work. To ward off tedium, Bradstreet listens to news on the radio built into his hearing protectors. And by the scrollsaw sits a small black-and-white television that is often tuned to reruns of *Star Trek* and *Remington Steele*. "I think I'd go nuts if I didn't watch TV," he said. "It's an important part of my shop."

The craftsman

For Bradstreet the worker, "It's all about discipline," he said. He sets a target every week—1,200 bookmarks is the current quota—and every week he hits it. "Then it's play time," he said. His favorite playground is the Haystack Mountain School of Crafts, an hour or so away in Deer Isle, Maine. There and elsewhere in just the past four years, Bradstreet has taken some three dozen workshops—most of them a few days in duration but some of them lasting a week or two. He's tried his hand at twig furniture, carving, found-object assemblage, turning, reed furniture and mixed media.

When Monday rolls around, Bradstreet is back in the saddle, sitting at the scrollsaw beside a box full of bookmarks-in-the-making. He is proud of what he produces. "I want these bookmarks to be—bar none—the best out there," he said. And no doubt they are. But for Bradstreet the one-man factory, this is not just a craftsman's point of pride; it's an imperative of good business. A bookmark—like a Newport secretary—won't sell nearly as well if it is poorly made. □

Jonathan Binzen is a freelance writer and former senior editor of Fine Woodworking.

Photos: Jonathan Binzen

Current Work

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Dorothy Roof Beverly, Mass.

Roof built this settee (18 in. deep by 46 in. wide by 38½ in. tall) while she was a student at The Furniture Institute of Massachusetts. To build the piece Roof worked from a photo of the 1805 John and Thomas Seymour original at the Winterthur Museum in Wilmington, Del., and used mahogany, flame birch and maple in its construction. Roof chose this project for the challenging joinery, interesting birch inlay and the variety of turned and carved details. The finish is linseed oil and shellac. Photo by Charlie Mulcahey, Two Fast Photo

Albert Bangert
Scituate, Mass.

After a 32-year career in the consumer-products industry, Bangert decided to change directions and learn the art of furniture making. As a student at North Bennet Street School in Boston, he built this Duncan Phyfe-style drum table (21 in. dia. by 21 in. tall) to hone his skills in carving, hammer veneering and bricklaying of the apron core. The table is constructed of mahogany, crotch-mahogany veneer and poplar. The finish is shellac. Photo by Lance Patterson

Aaron P. Griffith Dexter, Mich.

In his first year as a professional woodworker, Griffith made this display case (15 in. deep by 20 in. wide by 35 in. tall) for his first client, a collector of 18th- and 19th-century miniature portraits. Griffith faced a unique design challenge because the portraits are subject to fading. His solution was to design a case that opened for viewing but was otherwise closed to protect the antiques. Built from crotch and African ribbon mahogany with ebony trim, the case has a hand-rubbed lacquer finish.

Thomas Mannello Plantsville, Conn.

This mahogany corner cabinet (26 in. deep by 49 in. wide by 89 in. tall) took Mannello more than two years to complete. The carvings, moldings, finials and other design concepts were borrowed from a Goddard-Townsend secretary. The display-cabinet interior is quilted sycamore. The cabinet has a shellac finish.

Richard Johnson
Caledonia, Ont., Canada

Johnson built this library stand (16½ in. deep by 18 in. wide by 42 in. tall) to hold a dictionary. Taking approximately 400 hours to complete, the stand is made of amboyna and cedar of Lebanon. The storage compartment allows one to keep notepaper at hand, and the through-shelf provides a place to write. The lid features a dyed, braided leather stop and Japanese marbled paper on the inside. The stand has a shellac and wax finish.

Joe S. White Jr. Brooksville, Fla.

This tall cabinet (15 in. deep by 23 in. wide by 70 in. tall) is made of walnut and butternut. White built this piece from the top down. He first formed the bent-laminated top, then fit the sides and doors to the top. "The placement of the stained glass was a critical design decision," said White. "You tend to focus your sight to the intersection of the doors and top." The exterior of the cabinet is finished with polymerized tung oil and paste wax, and the interior is finished with tung oil and shellac. Photo by Bryant Photography

Noel Forde
Calgary, Alta.,Canada

This bedside table (17 in. deep by 22 in. wide by 27 in. tall) is one of several pieces Forde has made for a local client. Designed and built in the Arts and Crafts style, the table is made of quartersawn white oak. It is finished with dye stain, glaze and Swiss oil.

Guy Lewis Dorset, United Kingdom

"When visiting art galleries," said Lewis, "I am always slightly disappointed that the seating arrangements do not do the exhibits justice." This piece is Lewis' example of a better gallery bench. Constructed of maple and walnut, the bench (20 in. deep by 80 in. wide by 20 in. tall) took approximately 120 hours to complete and is finished with oil and wax.

Phil Sollman Bellefonte, Pa. ▲

Sollman designed and built this display cabinet (24 in. deep by 72 in. wide by 96 in. tall) for a client who collects American and English glass and pottery. The cabinet's plywood substrate was vacuum-bag laminated with ⅛-in.-thick shopmade, book-matched tiger-maple veneer. The shelves are hollow to allow for air circulation for the low-voltage lighting. The cabinet has a sprayed lacquer finish.

Michael Moss ▶
Cape Elizabeth, Maine

This cabinet-on-table (12 in. deep by 16 in. wide by 52 in. tall) was Moss' final project while attending a 12-week course at The Center for Furniture Craftsmanship in Rockport, Maine. The cabinet is in the Krenovian style, while the table is of Moss' own design. Made of cherry, the piece features walnut-burl veneered door fronts and ebony door and drawer pulls. The finish is Waterlox and tung oil.

Joe Pellegrene Indiana, Pa. ▲

Pellegrene built this serpentine desk (31½ in. deep by 51 in. wide by 30 in. tall) because he wanted to make something special for his dad. Taking approximately 400 hours to complete, the desk is constructed of mahogany and birch with crotch mahogany, sapele and holly veneers. The writing surface is inset with leather. The piece is finished with lacquer over shellac.

Tips for photographing your furniture

1. *Clean and dust the furniture.*
2. *The furniture will appear more three-dimensional if it is lit so that each plane has a different brightness. Take care, however, to avoid excessively bright highlights or dark shadows.*
3. *To be sure the photos will be free of distortion, avoid the use of wide-angle lenses, and photograph with the camera positioned even with the center of the furniture both vertically and horizontally.*
4. *Use 35mm color print (negative) film of moderate speed (ISO 200-400). If you're using a digital camera, shoot at the highest resolution and place the image on a CD.*
5. *Photograph the furniture from several angles. Include some head-on shots, as well as some shots that show both the front and side of a piece.*
6. *Keep the background simple. A cluttered or otherwise distracting background may draw the viewer's attention away from the subject.*

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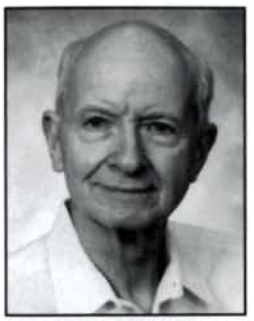

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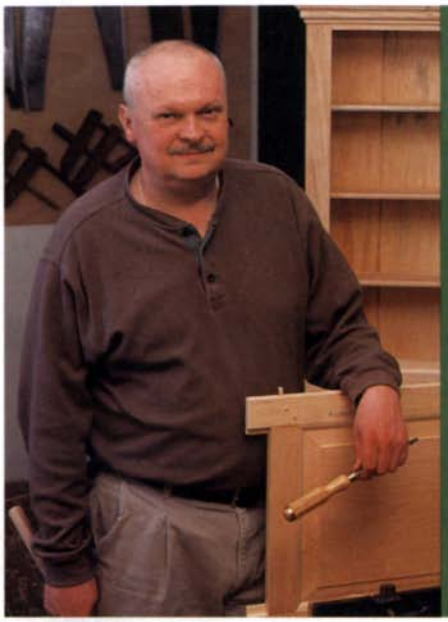
BY MIKE DUNBAR

Top 10 unavoidable truths of woodworking



Woodworkers are only human, and we tend to seek the path of least resistance, finding the quick or easy way out. This tendency almost always leads to trouble.

The good news is that you can control this urge as long as you recognize the symptoms. There are many ways woodworkers can go astray trying to find a shortcut. These pitfalls are especially inviting to beginners, who have yet to learn the hard way, but the shortcuts also snare their fair share of old pros, like me, who should know better.

There are 10 unavoidable truths of woodworking. For me these rules are the pillars of good work, and most are based on common sense. Follow them carefully if you want to reach your full potential. Ignore them at your own risk.

1. Don't rush

Do not confuse working quickly with rushing. After years of practice, the best craftsmen appear to work very fast, but they do not rush. You rush when you focus on getting the job done in less time. It's an impulse we all fight. Pros have deadlines and hourly rates to meet. And hobbyists, because of work and family, have limited shop time.

Rushing causes more injuries than any other bad habit. It also results in more mistakes. When you are focused on the completion time, you are less attentive to the work and the process.

> Knowing how to sharpen is a gateway skill: It opens the door to faster, easier techniques that yield better results.

2. Learn to sharpen

Sharpening is a skill that too few woodworkers ever master. Most tools will not work well if dull, and some won't work at all. This forces woodworkers to resort to methods that are frequently clumsier and more awkward. Knowing how to sharpen is a gateway skill: It opens the door to faster, easier techniques that yield better results.

Many woodworkers admit they do not know how to sharpen. Others think they know how but really don't. When handed a truly sharp tool, they cannot believe the difference between it and the tool they have been using.

Do not be intimidated by sharpening. It's not complicated, but it is a lot easier if you find someone to show you how. Sharpening has some subtleties, and no matter how many times you read that a sharp tool will cut wood cleanly and effortlessly, you have to experience it to truly understand.

Sharpening and honing are part of the measured rhythm of fine work and so are connected to Rule #1.

3. You get what you pay for

Most of us have limits on our woodworking budgets that cause us to think twice about paying the long dollar for equipment or materials. However, quality in new or used machines and hand tools always has been and always will be expensive. When you try to cut corners by buying the low-end brand or lower-quality materials, you set yourself up for disappointment.

4. Finishing is half the battle

When you're finished with the woodwork, you're only halfway done. While we all love to work wood, most of us dread finishing. We enjoy being precise and finicky when making a project, but most of us hate the sanding and cleanup required for a perfect

Photo: Michael Pekovich

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finish. However, when we skimp we get poor results. Glue spills show up suddenly when finish is applied. Or we find flaws in surfaces that are supposed to be perfectly flat.

I can't tell you how many woodworkers I know who have left raw wood rather than go through the effort of finishing it.

I, too, am guilty of taking finishing shortcuts. Often, when I make something for the house, I wipe on a quick and easy oil finish that looks disappointing a couple of years later. I keep telling myself that one of these days I will do a more permanent finish over the oil, but I don't. I just don't want to deal with the steps involved in applying a great-looking finish.

> The truth is that the quality of your projects is better if you are not learning the skills on the job.

The undeniable truth is that the finishing is as important as the woodworking, and it frequently takes almost as long.

5. Practice makes perfect

When we decide to undertake a new project, we can't wait to jump right in and get to work. However, woodworking is a bundle of skills that are polished by practice. That's why your parents and teachers told you, ad nauseam, "Practice makes perfect." It does.

The truth is that the quality of your projects is better if you are not learning the skills on the job. Try unfamiliar skills first on some scrap. Cut a few dovetails before tackling the drawers of your Queen Anne highboy.

6. Dry-fit before glue-up

This is one of the first things to go when we are rushing. It also can be the result of over-confidence. Other times we simply forget. Whatever the excuse, dry-fitting saves a lot of grief.

Joints that are too tight can lock up when glue hits them, and freeze before coming together completely. You don't want to get caught racing against a glue's set time, trying to hammer a piece apart. It usually results in damaged or broken parts.

A dry fit lets you figure out which components of an assembly to put together first, which clamps to use and where to put them. Basically, you don't want to be scrambling around or discovering any nasty surprises after the glue has been spread and the clock is ticking fast.

7. Glue won't rescue poor joinery

When it comes to securing two or more pieces of wood to each other and having the joint look good and hold up over the long haul, nothing replaces proper fitting. There is no glue so strong or so gap filling that it makes up for sloppy joinery.

Because we are human, things will go wrong. While there are tricks for correcting mistakes, these never should be thought of as ways to get around good workmanship. When a joint isn't right, sometimes there is no sound and seamless way to fix it short of doing it over again. Don't let laziness come back to haunt you.

8. Your router won't do everything

It's an unavoidable truth that our craft involves a wide range of skills, techniques and tools. While we all wish it were different, there is no universal wonder tool that will do everything perfectly and effortlessly.

In an effort to do it all with one machine, woodworkers often end up working in ways that are cumbersome and time-consuming. They end up wasting precious shop time building elaborate router jigs instead of making the one-time investment in a new tool or technique. Some woodworkers will spend hours working on a router setup to cut curved, tapered table legs, for example, when a bandsaw and a well-tuned spokeshave would do the job in much less time.

9. Use both hand and power tools

Woodworkers tend to come in two extremes. The first are those who will (or can) only use machines. And then there are others who insist on doing everything by hand. I say you can't do it all by machine, but working only by hand wastes time.

When it comes to performing an operation only once or twice, it is frequently faster and easier to work by hand. The same applies to delicate work like fitting joints. On the other hand (no pun intended), some woodworkers regard woodworking as an alternative to the gym. Who wants to spend an afternoon thicknessing 1-in. planks to ¾ in. with a jack plane just because they did it that way in the old days? I would rather spend 20 minutes at the thickness planer and save my precious shop time for the fun and important parts. The reality is that an efficient, effective woodworker knows how to use both machines and hand tools.

> The reality is that an efficient, effective woodworker knows how to use both machines and hand tools.

10. Keep your shop clean

Think of your shop as a tool. Keep it tuned up and well-maintained. We all get so involved in our work that our benchtop and every other flat surface quickly become cluttered. A messy shop is dangerous for you, your tools and your projects. It is also very inefficient. Cleaning up as you work is a habit you can develop. I am hardly a paragon of tidiness when I work, but every time I reach for a tool, I look at the bench and see if there is anything I can put away. This is a lot easier than forcing myself to stop and do a general cleaning. □

Q&A

What causes curl in cherry?

What sort of stress could a cherry tree have been under to produce curl?

—Kenneth A. Swanson, Winchester, Va.

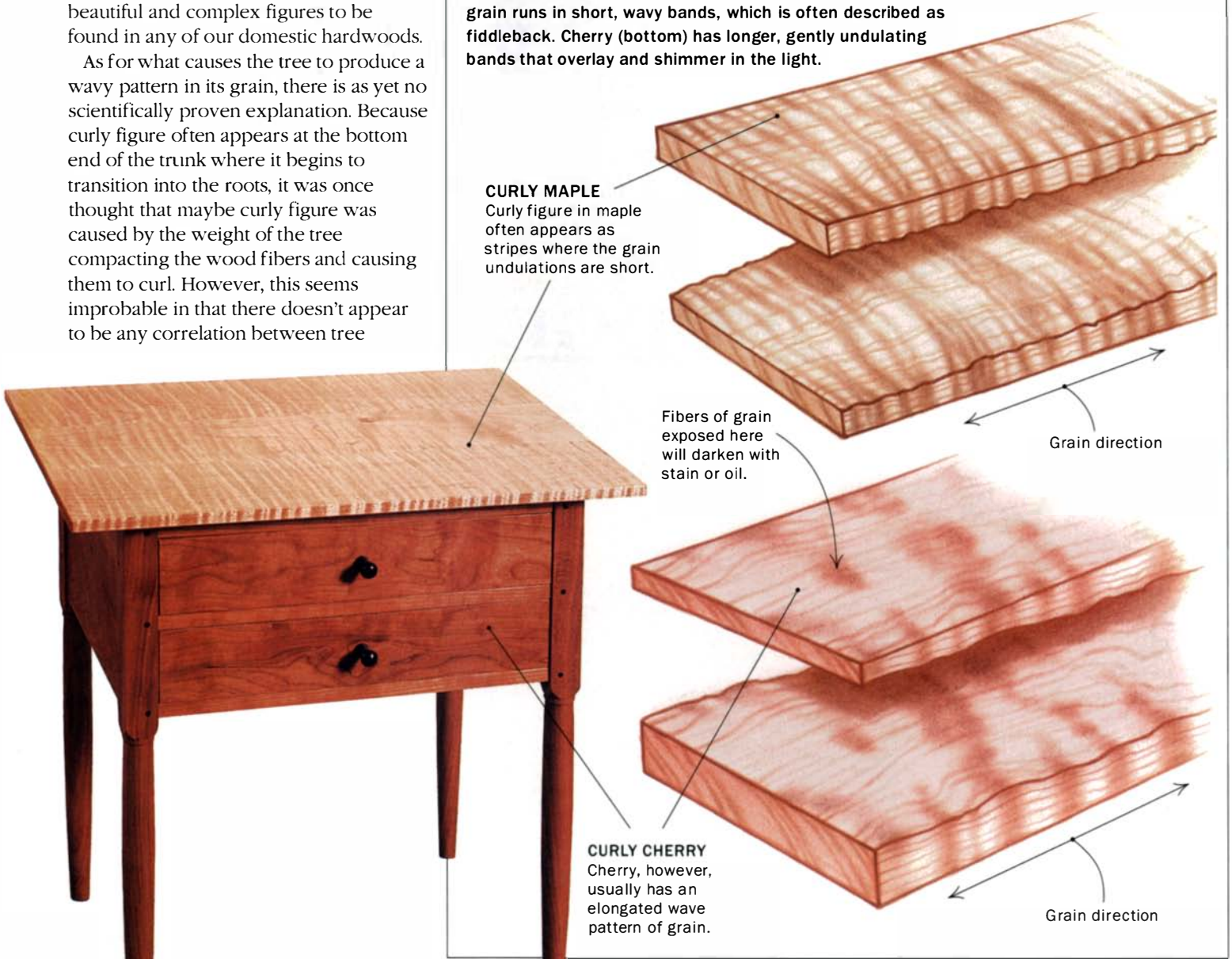
Jon Arno replies: The curly figure of cherry exhibits lustrous, cross-grain bands that seem to shimmer with changes in the direction of light. When occurring in maple, curly figure is known as fiddleback, because this form of showy maple has long been a wood of choice in violin making. Curly figure is even more attractive when it occurs in cherry because the shimmering bands overlay but do not totally obstruct cherry's somewhat bolder, natural grain pattern. The end result is one of the most beautiful and complex figures to be found in any of our domestic hardwoods.

As for what causes the tree to produce a wavy pattern in its grain, there is as yet no scientifically proven explanation. Because curly figure often appears at the bottom end of the trunk where it begins to transition into the roots, it was once thought that maybe curly figure was caused by the weight of the tree compacting the wood fibers and causing them to curl. However, this seems improbable in that there doesn't appear to be any correlation between tree size and the occurrence of curly figure. Big, heavy trees don't always develop curly figure, and it is not always associated just with the bottom end of the trunk. Although it is only a hypothesis, the more likely explanation is that curly figure results from an imbalance in the tree's growth hormones, possibly in turn caused by the tree's inability to access some essential nutrient when it needs to. So, as you suggest, stress very likely may trigger the formation of curly figure.

Although curly figure is found in many species, it does seem to be especially common in cherry. As you might expect, the life history of a typical cherry tree is one of almost perpetual stress. Cherry is a shade-intolerant species, often referred to as a "nurse tree," because it quickly gets established on burned-over or logged land, but is eventually crowded out by more robust species. Virtually from the moment it germinates, cherry first experiences the frenzy of rapid growth in full sunlight, then the struggle to adjust to

CURLY MAPLE VS. CURLY CHERRY

The grain of these woods follows a roller-coaster path. But cherry and maple curl in different ways. With maple (top), the grain runs in short, wavy bands, which is often described as fiddleback. Cherry (bottom) has longer, gently undulating bands that overlay and shimmer in the light.



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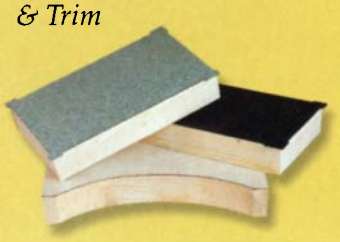

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constantly changing light sources as other trees begin to overtake it and, finally, the extreme light deprivation as a mature forest canopy forms above it. It's a life you wouldn't wish on your worst enemy, but then from a more selfish perspective, it does indeed result in one of the most prized of all cabinetwoods.
[Jon Arno is a wood technologist in Troy, Mich.]

Open-grained wood doesn't absorb water-based stain

For many years, I have been having trouble staining oak with aniline dye stains. The pores are not absorbing the dark brown stain, leaving many small, whitish flecks. I suspect that the culprit is surface tension in the solvent (water). My solution has been to apply a walnut-colored paste filler after sealing with vinyl lacquer. This process is messy and tedious. Other than substituting pigment-based stains for the dye stains, do you know of a simpler solution?

—E.K. Hulet, Diablo, Calif.

Chris Minick replies: The driving force for dye-stain absorption into a wood surface is capillary action. The depth of penetration of the dissolved dye into the wood is dependent on the surface tension of the liquid dye stain and the diameter of the wood pore. So, you are right—your penetration problem is related to the surface tension of the dye stain you are using. An alcohol-based dye stain (or just adding a few drops of dishwashing liquid to the water-based dye) would improve penetration, but not as much as you might think. As it turns out, the pore diameter has a much greater effect on penetration depth than does the surface tension of the dye stain. You can prove this to yourself by staining a piece of scrap flatsawn oak with both a water-based dye stain and a solvent-based (non-grain-raising) dye stain. You will find that the largest pores have not been stained with either product.

Unfortunately we don't have any control over pore size. So we have to devise other methods to completely color the large pores found in oak. Pigment stains are the answer. The act of wiping a pigment stain on a piece of oak physically packs each pore with colored pigment.

I don't understand your reluctance to use a pigment stain, since you are essentially doing the same thing with your laborious pore-filling process. If you wipe off the excess stain thoroughly, the pigment stain will not obscure the wood significantly. I think that all that cloudy grain business is overblown. If applied correctly, most pigment stains are just as transparent as dye stains.
[Chris Minick is a contributing editor.]

Making three-phase machines work in a one-phase shop

I am thinking of buying some used industrial equipment from a local cabinetmaker, but all of the machines have three-phase motors. This is for my home shop, where I have only single-phase power. Is there anything I can do to convert these machines to operate on single-phase power?

—Franklin Maeve, San Diego, Calif.

John White replies: Most heavy machinery is designed to be run on three-phase electrical power because three-phase motors are simpler, more efficient and sturdier than single-phase motors. Unfortunately, three-phase power generally is not available in residential areas, but it may be worth checking with your power company. Even if it is

WATER-BASED STAINS WON'T ENTER PORES

Due to surface tension, water has trouble penetrating the pores of open-grained woods. *As a result, specks of unstained pores are left across the surface.*

Use oil-based pigment stains with oak. *Oil-based products will penetrate the pores more effectively than water-based products, resulting in an even finish.*

available, the cost of connecting may be financially prohibitive.

Short of running three-phase power, there are a number of options available to get a three-phase tool running on single-phase power. The first and most obvious option is to replace the machine's motor with a single-phase unit. But this may not be possible on some machines because the original motor has special mounting brackets or the drive shaft has custom threads or splines. Unfortunately, specialized motors are fairly common on tablesaws. If the tool's manufacturer is still in business, you may be able to obtain a single-phase motor from them.

Another option is to use a converter that will allow you to run a three-phase machine on single-phase power. There are three basic types of converters: static, rotary and electronic.

Of the three, the static type is the least expensive. A static converter has no moving parts and needs to be sized for the motor it's running. Unfortunately, a static converter reduces the available horsepower of the motor by about a third and has difficulty starting air compressors, dust collectors, large bandsaws and other machines with heavy starting loads. The reduced horsepower often isn't a problem and can be compensated for by reducing the feed rate or by taking lighter cuts. But overloading or stalling a motor hooked up to a static converter will cause destructive overheating of both the motor and the converter. A hard-to-start machine can be run by first starting another lightly loaded machine, an "idler" that serves as an electrical flywheel to start the second machine. A surplus three-phase motor can be used as a dedicated idler that runs continuously to improve both the starting and the running of other motors hooked up to a static converter.

A rotary converter, which looks like a heavy-duty electric motor with an oversized junction box attached, functions as both a motor and a generator. As a rotary converter is spun by single-phase power, it generates three-phase power to run other machines. More expensive than a static converter, a rotary converter costs around $600 for a 3-hp unit but doesn't have the starting and reduced-power problems that occur with a static converter. If you expect to own several three-phase machines, buy a good-sized rotary converter, which will be more economical in the long run.

An electronic converter is more properly called an inverter for technical reasons, and most catalogs will list this device under that name. An electronic inverter transforms single-phase power into direct current and then uses microchip-guided controls to simulate three-phase alternating current. The electronics in an inverter allow you to control the motor's speed, torque and direction of rotation, and often allow for a soft start to bring the machine up to speed gradually. Most of the added control offered by an inverter would be wasted on a tablesaw but would be a great advantage on a lathe or possibly a

bandsaw. Because it must be programmed, an inverter typically is dedicated to running only one machine, but with some compromises, it can be used to run several tools. The price of inverters has been dropping steadily over the last few years.

Choosing the right type and size of converter and hooking it up correctly can be complicated. You should do some research and get more advice before investing in a converter or an inverter. (Manufacturers of converters and inverters offer extensive literature and phone consultations.) You'll find a list of expert sources on our web site: www.finewoodworking.com.
[John White is the shop manager for *Fine Woodworking*.]

Testing for sharpness

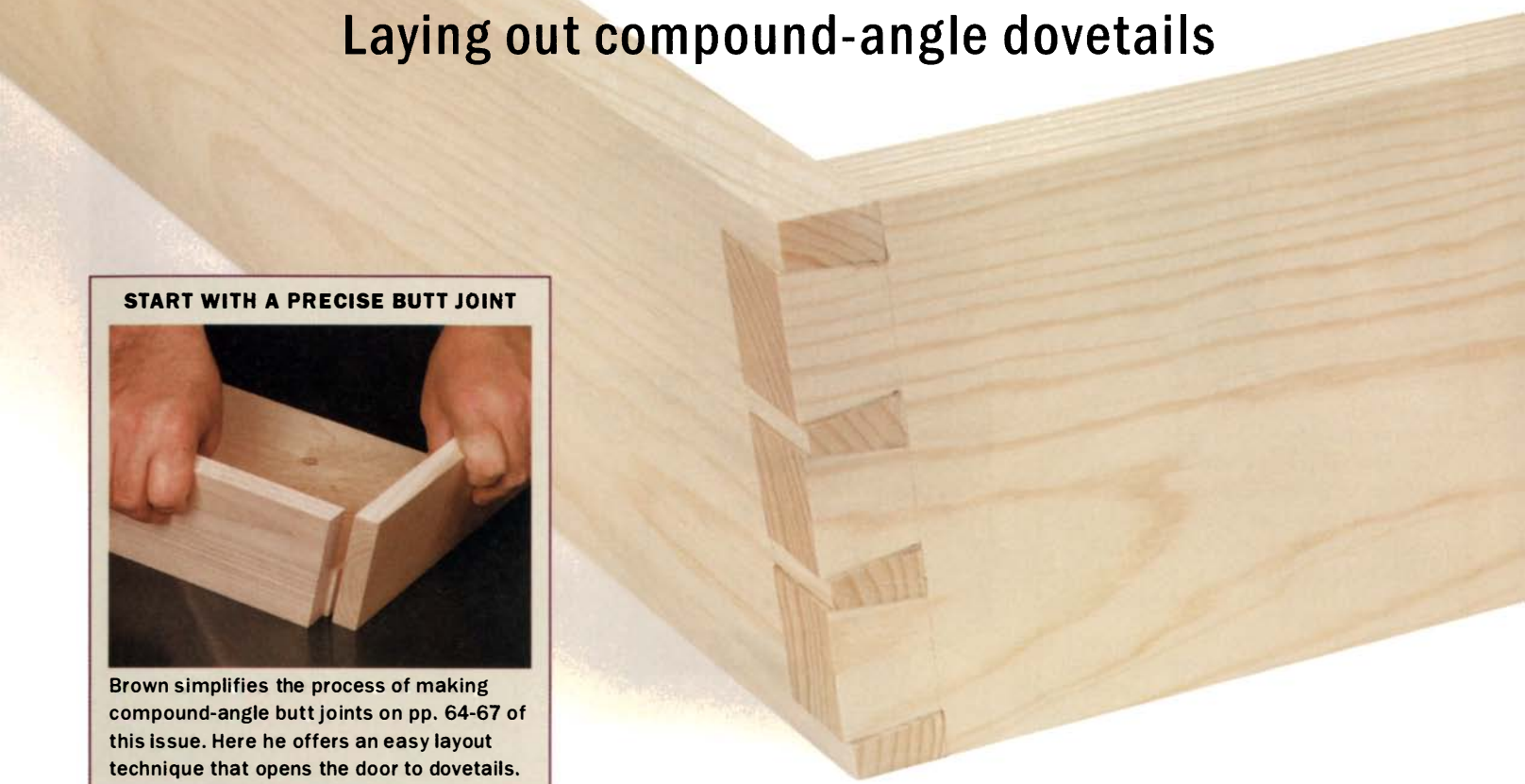
I enjoyed the recent article on honing systems ("Sharp and Sharper," FWW #157, pp. 36-41), but one question comes to mind: Is there any way to test for sharpness while you are honing a blade without loading it in a plane and taking a cut?
—Bill Woodson, Peoria, Ill.

Aimé Fraser replies: You can check for sharpness quickly by holding the tool lightly between your thumb and forefinger and lowering the edge gently onto the thumbnail of your other hand (see the photo at right). A sharp blade will catch on the nail immediately. A not-quite-sharp blade will skid a little and then catch, but not very solidly. A dull one will slide. If your iron fails the sharpness test, go back and start at the beginning of your honing process. I recommend using a honing jig for quick, consistent results. Spend plenty of time on the coarsest stone until you feel a fine burr along the entire back of the blade. Then go through the abrasives again, one by one, lapping the burr off the back after you finish with the finest grit. Try the sharpness test again.
[Aimé Fraser is a woodworking teacher and writer.]

Sharpening rule of thumb. *A dull edge will skid across a thumbnail. A sharp edge will catch.*

BY STEVE BROWN

Laying out compound-angle dovetails



START WITH A PRECISE BUTT JOINT

Brown simplifies the process of making compound-angle butt joints on pp. 64-67 of this issue. Here he offers an easy layout technique that opens the door to dovetails.

If you can cut an accurate butt joint on a compound angle (see pp. 64-67), then you can cut compound-angle dovetails. The rest is basically a layout lesson. Done well, these specialty dovetails become an attractive design element in themselves. Cradles and trays are just a few projects that require them. The drawers on a bombé-style chest are another example.

Fundamentally, compound-angle dovetails are the same as normal dovetails. The shoulders of the pins and tails are parallel to the ends of the board, and the lines for the pin faces are parallel to the top and bottom edges of the board. The angle for the flare of the tails still needs to be appropriate to the overall grain direction. And spacing the pins is still a matter of strength and individual taste. The challenge is to figure out specifically what these angles are when you factor in the compound angle, and also how to work with the awkwardly shaped boards.

By the way, with the extra angles involved, hand-cutting is probably the easiest way to form these joints. I suppose a tablesaw or bandsaw could be used, but only with a number of ramps or jigs. And as far as I can tell, a router setup simply is not possible.

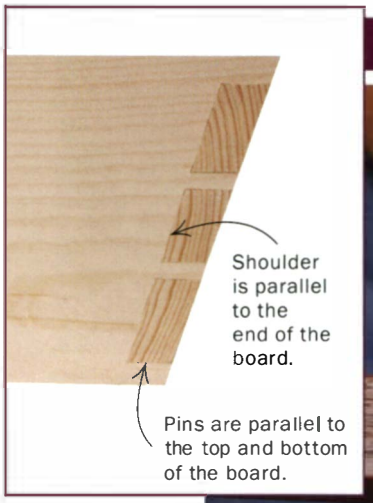
Scribe the shoulder

The shoulder (the length of the pins and tails) is still determined by the thickness of the adjacent board. However, because these boards connect at an angle, the dimension of the shoulder line is not the actual thickness of the adjacent board but the width of its edge when cut at an angle. Sounds complicated, but all you have to do is use the angled end of one board to locate the scribe line on the other. Mark the face that has the sharper corner, because this is the edge that a marking gauge can be used on. Then carry the line across the edges using a square, keeping the line parallel to the beveled edge and the blade of the square flat on that edge. Last, use a straightedge to carry the shoulder line across the other face.

I prefer to cut pins before tails, but going tails-first also would be feasible here. Lay out the rise and run angles the same way to get the two bevel-gauge settings needed; then

Projects like this Shaker cradle depend on compound-angle dovetails. *The angled sides make the interior more accessible.*

Photos, except where noted: Asa Christiana; this page: Lance Patterson (bottom), Kelly J. Dunton (top right)



SCRIBE THE SHOULDERS AND SIDES OF PINS

Use the marking gauge on the inside face (with the sharper edge). *Rub the beam along the face of the board to keep the gauge in proper alignment.*

Carry the lines across the edges. *Using a square with its blade laid flat along the beveled edge of the workpiece, scribe the lines with a knife.*

transfer those angles to the face grain of the tails boards, rather than to the end grain of the pins boards.

Rise-run technique simplifies layout

Start by laying out the pin spacing along the inside face of the board. Just as with regular dovetails, use the centerlines to mark the edges of each pin. The difference here is that the pencil lines used to lay out the sides of the pins should be parallel to the top or bottom edge of the box, not square to the end of the board.

The key point with compound-angle dovetails is that the flare of the pins (and tails) is not a single angle as it is with normal dovetails; both the direction of the grain and the centerline are parallel to the top and bottom edges of the box sides but not square to the ends of the boards. So the top and bottom of each pin are at different angles.

To find the two necessary bevel-gauge settings, set up a rise-run ratio on the face of one of the boards. To get a true 6:1 dovetail angle, don't take the rise dimensions as measurements up the face of the board. Instead, take them as elevations, with the board in its sloped position. To do this turn again to the indispensable setup block (see p. 65). Lean the board against it, and then use the top face of the block and two box sides laid on top of it to make three evenly spaced marks.

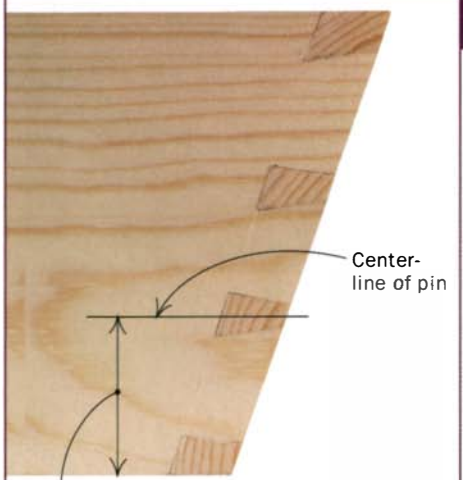
Now set up the run. Draw a line through the center mark, parallel to the top and bottom edges of the box. Measure the thickness of the box sides and use that increment to make six marks along that long centerline. That's the run for a 6:1 ratio. Last, connect the sixth point with the top and bottom rise marks you made earlier. These are the correct angles for the top and bottom of each pin (or tail). Lay a sliding bevel gauge along the end of the board and take the top setting. Lay out all of the top sides of all of the pins on the

Connect the lines. *Last, use a straightedge and marking knife to connect the scribe lines along the outside face of the board.*

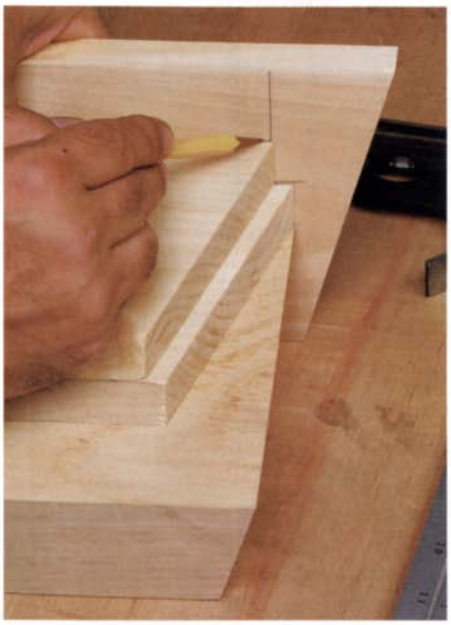
Brown prefers doing pins first. *Along the outside face of the board, mark the spacing. Set the blade of your sliding bevel gauge parallel with the top and bottom edges of the board and lay out the sides of the pins.*

Photos, this page: Kelly J. Dunton (top left), Michael Pekovich (top right, middle right)

A RISE-RUN RATIO DETERMINES THE ANGLES

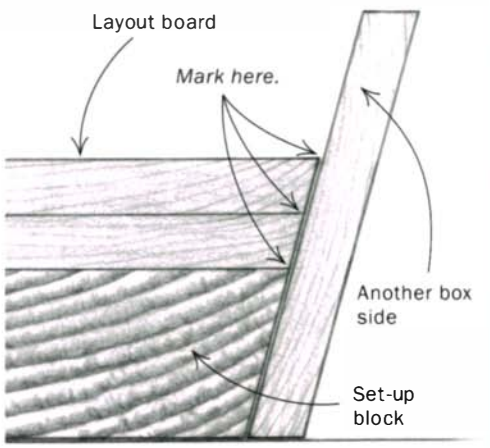


The centerlines of the pins (and tails) run parallel to the top and bottom of the box. Therefore, the top and bottom of each pin and tail are at different angles to the end of the board.



MAKE A LARGE SET-UP BLOCK

Make it like the one on p. 65, with its sides cut at the slope of the box sides. Then use the block and two of the actual box sides to lay out three equal divisions on another side of the box.

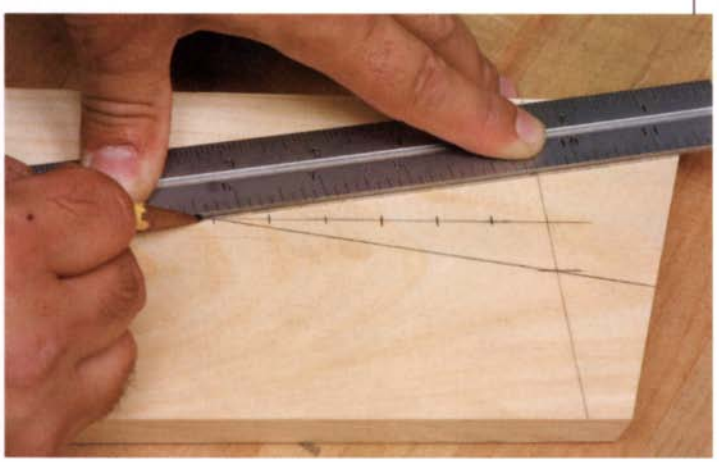


box before changing the setting and laying out the other side of each pin.

Saw, chop and transfer

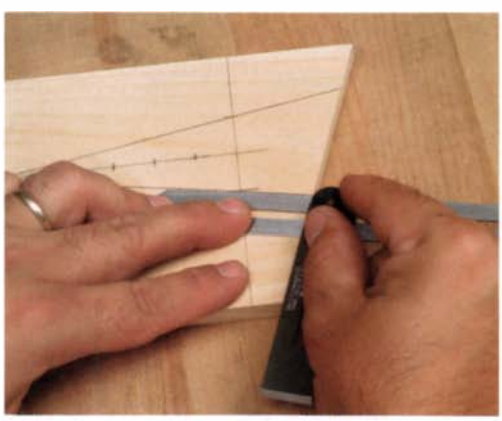
Once the pins have been laid out, the sawing, chopping and paring to the lines are basically the same as when making conventional dovetails, except the shapes look different and might be a bit awkward to reach. You can rip an extra block while cutting the butt joint and use it as a paring block when cutting the shoulders, clamping it onto the workpiece to guide your chisel.

Transferring the layout of the pins onto the face of the tail board is similar to the regular process, but holding the boards is a bit of a challenge. Lay out the tails with a sharp pencil (a marking knife will bruise the nonwaste portion of the wood). Last, transfer the marks across the end of the board with a bevel gauge set at the appropriate angle. Don't try to mark the tails on the other side of the board. Saw, pare and fit the tails in the standard way. □



Mark out six divisions of the same thickness as the sides to create a 6:1 dovetail angle. Use those lines to set your sliding bevel gauge. There will be different gauge settings for the tops and bottoms of the pins.

SET THE BEVEL GAUGE AND MARK THE PINS



Take the two settings from the layout board. *Lay out one of the angles on all of the pins or tails, then reset your bevel gauge to the other angle and finish the layout.*

Cut the pins or tails and transfer their locations to the mating board. *It's no easy feat to keep these angled boards in perfect position during this step.*

Drawing and photo, this page (top left): Kelly J. Dunton

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A versatile 18th-century stain

BY DAVID SALISBURY

In the cabinetmaker's shop at Colonial Williamsburg, where I have worked for more than 25 years, our goal is to replicate as nearly as possible the furniture-making methods used in Virginia between 1750 and 1776. This means that we eschew tablesaws for handsaws, the only router that we use is the hand-powered router plane, and all of our finishes are traditional.

When I started working at the cabinet shop, we were using aniline dyes that were not available until the late 1800s. So after studying the few contemporary descriptions of 18th-century woodworking stains, I began to do my own experiments.

About 15 years ago our shop made two mahogany tables for one of the historical houses in Williamsburg. The wood we had was very light colored and did not have the prized, and historically accurate, red color. That was when I decided to try staining using an 18th-century method.

One stain makes many colors

The most popular way to stain a wood red was to use the sawdust from brazilwood, now known as pernambuco. In the interests of authenticity, at Colonial Williamsburg we still use brazilwood sawdust, but a quicker alternative is to buy brazilwood extract. This stain will produce completely different colors, depending on which mordant is used to pretreat the wood.

A mordant, from the French infinitive *to bite*, not only chemically reacts with the stain but also helps it to penetrate the wood and bind with the fibers. This combination of stain and mordant gives the striking, deep colors that would not be possible using a stain alone.

It is critical to experiment on scrap to find the color you are seeking. The recipes on p. 110 (one for red stain; the other for black) should only be considered as guides. To avoid the risk of chlorine or other chemicals interfering with

Choose your color

Brazilwood extract produces different-colored stains based on which mordant is applied and the concentration of the liquids. Bright red to deep burgundy result from a combination of alum (potassium aluminum sulfate) and brazilwood. Copperas (ferrous sulfate) and brazilwood yield dark purple to ebony.

BEGIN BY APPLYING A MORDANT

Adding either the alum or the copperas to warm water makes the mordants dissolve faster. Use only distilled water to avoid chemical impurities. Liberally apply the mordant with a brush, making sure you cover the whole surface.

Photos: Mark Schofield

USING THE STAIN

Traditionally, brazilwood sawdust was used to stain wood red. A quicker alternative is to buy brazilwood extract. Different colors can result, depending on whether the wood has been treated with an alum or a copperas mordant before the stain is applied.

Not a flawless finish. *When brushing on the brazilwood stain, don't worry about air bubbles or the grainy appearance of the finish. Work fast to maintain a wet edge. While the stain is still wet, wipe off the surplus with a clean, dry cloth.*

the process, use only distilled water when making the mordant and the stain. Heat the water until you can just put your finger in it, then add the chemicals or the brazilwood extract, stirring thoroughly. Warm liquid is more likely to raise the grain, so after the compounds dissolve, stand the jars aside to cool.

Raise the grain, sand the wood

Using a water-based stain in liberal quantities raises the grain. Any sanding done after the stain is dry is likely to cut through to bare wood, and it is almost impossible to touch up a stain without redoing the entire surface or creating a blotchy appearance. To avoid these problems, take the time to preraise the grain with warm water and sand the wood thoroughly smooth, at least two or three times.

First the mordant, then the stain

Apply the mordant with an old or cheap brush, swirling the container often to keep the mineral in suspension. After the mordant has dried, which takes about an hour, apply the stain. Work quickly so that you maintain a wet edge and avoid streaking. The mixture tends to settle, so stir it often. Don't worry about the grainy texture of the surface or try to brush out any bubbles; these blemishes will be removed when you wipe the surface with a clean, dry cloth.

If you miss a spot or work on an area too large to maintain a wet edge, wet the unstained area with a cloth soaked in distilled water and then apply the stain. This lessens any chance of leaving streaks. If you end up with streaks or blotching, remove the stain with a wet cloth before the stain can dry, then start again. If you want a darker appearance, apply a second coat of stain after wiping down the first coat and letting the surface dry.

The application method for the black stain is the same as that for the red stain, except that copperas is used as the mordant. To obtain a really black look, two or even three coats of the stain may have to be applied.

Sealing and finishing

If you preraised the grain, the surface should remain fairly smooth, but if you detect some roughness, resist the urge to sand it and risk cutting through the stain.

Instead, apply two or three coats of shellac to seal the finish and then sand the surface smooth. For other types of topcoat finishes, make sure the previous coat is dewaxed shellac that is sanded to allow good bonding. □

Recipes

RED

Stain: 2 tbsp. brazilwood extract, 8 oz. distilled water, mixed together

Mordant: 2 tsp. alum, 8 oz. distilled water, mixed together

BLACK

Stain: 4 tbsp. brazilwood extract, 8 oz. distilled water, mixed together

Mordant: 1½ tbsp. copperas, 8 oz. distilled water, mixed together

SOURCES OF SUPPLY

Earth Guild (800-327-8448; www.earthguild.com) sells 4-oz. containers of alum for $1.60 and 4-oz. containers of copperas for $2.20.

Kremer Pigments (800-995-5501; www.kremer-pigmente.com) sells brazilwood extract in 100-gram bags for $10.80.

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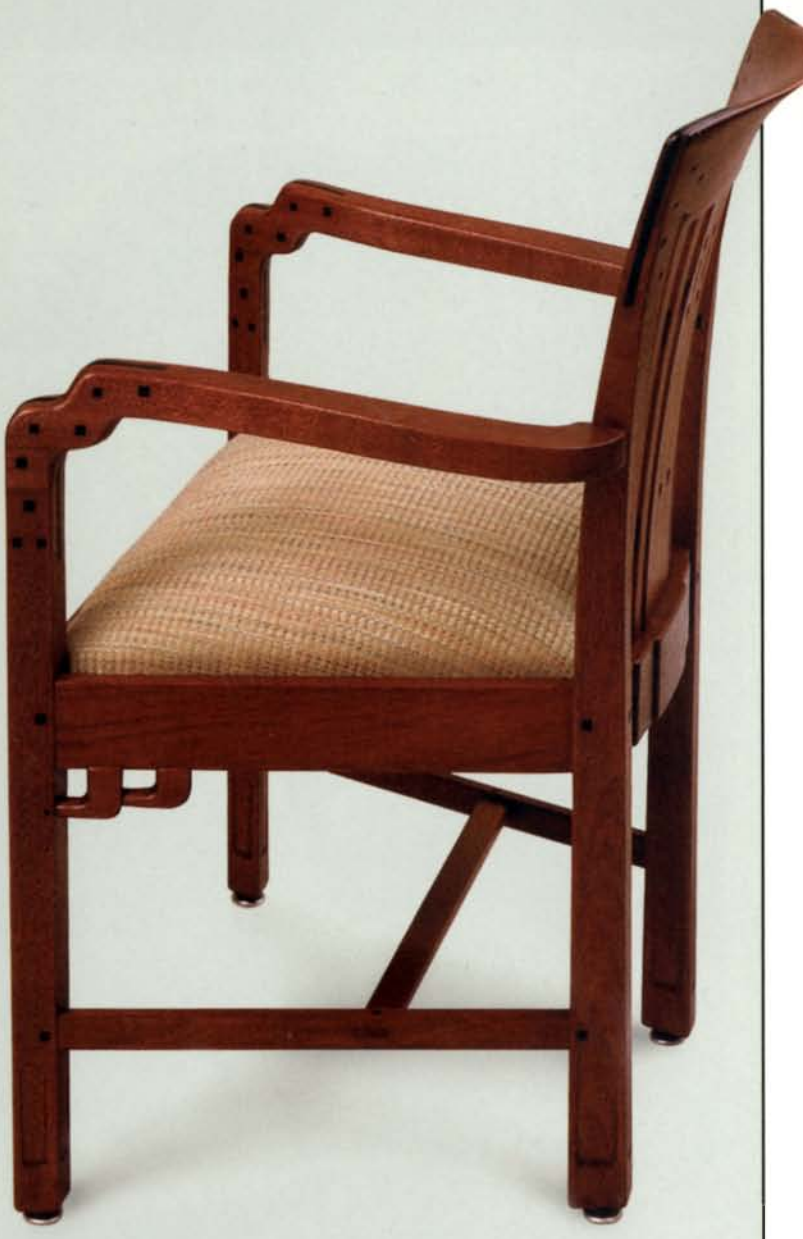
Armchair Woodworker



There's a fair amount of reproduction furniture being built in the Greene and Greene style, specifically pieces inspired by furniture from the brothers' famed Blacker House in Pasadena, Calif. Few, if any furniture makers, however, go to extremes to replicate the originals like Watertown, Mass., craftsman David B. Hellman. His Blacker House living-room armchair just demands to be touched, so organic are its lines and details. The chair's crest rail, with its big sweep and backward curl, looks as if it were shaped by years of wear, not merely carved out of a thick piece of mahogany. The inlays flow in random, natural lines and thicknesses, possible only through painstaking handwork. And the legs, which might look square in a photograph (depending on the view), are actually parallelograms. No shortcuts were taken at the interface between chair and person: The seat contains hand-tied coil springs and traditional materials. Photos: Lance Patterson