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CELEBRATING 25 YEARS

April 2001
No. 148

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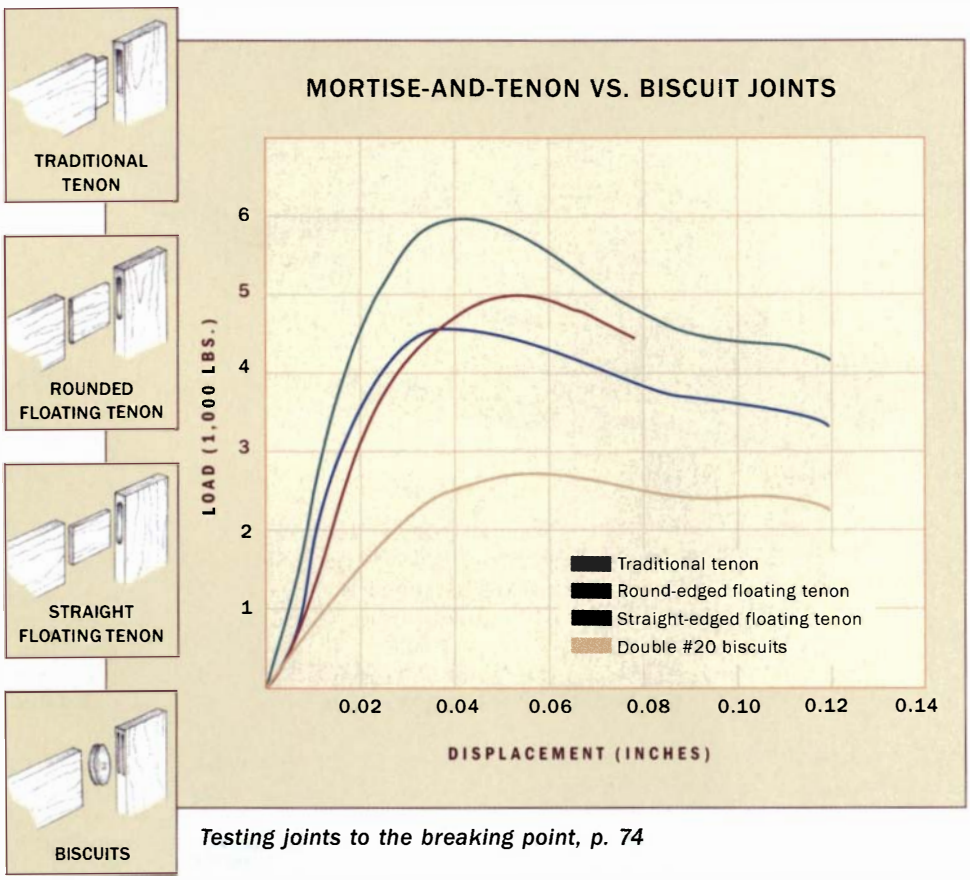
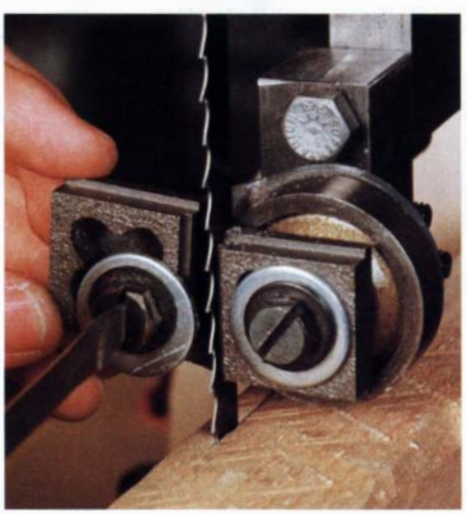
On the Cover:
Jeff Jewitt's four-step approach to matching finishes is easy to follow and guarantees good results.
See p. 46
Photo: William Duckworth



Testing joints to the breaking point, p. 74



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Articles

Scrapers refine turned surfaces, p. 56

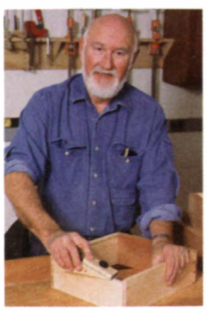
Fast and accurate table joinery, p. 50

Contributors

Gary Williams ("Shopmade Squares") has spent his career in publishing and in technical writing but has always done woodworking on the side. He has specialized in building furniture and millwork for churches, although he once strayed into door- and window-making for a casino. He is the author of three books on computers and one on designing and building grandfather clocks. Williams is a new grandfather and presently works as a technical writer for a telecommunications firm in San Diego. A one-time boat carpenter, he is currently working on two boats for his own use.

By day, **Tim Albers** ("Choosing Bandsaw Guides") is chief financial officer for a California-based fruit importer. But in his free time he is a self-confessed tool junkie with a passion for ironing every last wrinkle out of his woodworking equipment, jigs and shop setup. Aside from hunting down the best new equipment, Albers enjoys refurbishing older machines in his backyard workshop in Ventura. Occasionally he is forced to sell something to make room for actual woodworking to occur.

David J. Lunin (Master Class) has been a professional woodworker for more than 10 years. He has worked in a number of reproduction and restoration shops and recently opened his own shop in Lancaster, Pa. Turning between centers has long been his specialty. "Most of my designs incorporate intricate turnings," he said. "The lathe is definitely the focal point of my shop." Lunin is busy creating reproductions by order, as well as doing custom wood turning.



Norm Pollack ("Wooden Chisel Plane") retired from the Naval Research Laboratory in Washington, D.C., as an electronic technician, although he continues to work there part time. It's a job, he said, that occasionally has less "part" and more "time." When not keeping busy as the father of four married children and the grandfather of nine, he is helping local Boy Scouts earn merit badges. Pollack is also a prolific plane maker, and he builds them in a variety of styles. The featured chisel plane is one of his favorites.

Bruce Gray ("Testing Joints to the Breaking Point") is a California native who now lives and works in New Brunswick, Canada. How he got from one place to the other is a story of love and money: He married a Canadian, and he had a job offer to work on the information systems for a phone company. About 10 years ago, he left that career to become a full-time, self-employed woodworker. All his work is by commission--everything from large libraries to small, carved hourglasses. His specialty is tables, built from large slabs with live edges. Using his trusty stroke sander, Gray can mill and surface tabletops that are the same size as a standard sheet of plywood.

In 1994, **Rue Ann Flanders** (Finish Line) decided that it was time to leave the corporate rat race and quit her position as an account executive at a network TV station. Using her interest in design and a love of colors, she attended the Marc Adams School of Woodworking and began designing and building furniture. Her work has been featured in magazines as well as on local TV newscasts. For relaxation, Flanders spends several hours a week practicing and teaching karate, in which she holds the rank of black belt.

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Letters

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.
—Timothy Schreiner, editor in chief

Celebrating 25 years—Twenty-five years ago, I received, unsolicited, your first edition of *Fine Woodworking*. I liked it so much that I subscribed, and I now own all 147 issues. I still like it.

From the first issue I made the bowl, and we have used this bowl ever since, especially at Halloween, when it is filled with treats for all the little ghosts and goblins that come to our door.

I still look forward to every issue and go through it page by page looking for tips. Thank you again for that first issue. I remain an avid reader of *Fine Woodworking*.

—Robert Floyd, Hilton, N.Y.

Congratulations on capping 25 years with such a fine issue. As a woodworker who is self-taught and works alone, I depend heavily on reading to learn and improve. The profiles on some of the men who have unknowingly changed my life were great. Thank you, Mr. Frid, for affirming that the eye is best and that I am not the only guy using a belt sander to sharpen chisels. Thank you, Mr. Krenov, for keeping me true to myself. Thank you, Mr. Maloof, for keeping me focused on my dream of earning a living making furniture. Thank you, Mr. Dunbar, for assuring me that I am not crazy to go two months without a paying job in order to produce my first real inventory and for introducing me to the Windsor. You fellows and many more have helped me more than you know!

—Barry Walker, S. Dartmouth, Mass.

I want to commend you on this 25-year issue. It is of such high quality that I am rationing myself with regard to devouring its contents: I don't want the experience to end! This issue exemplifies why *Fine Woodworking* is such an excellent publication. There is no fluff. The magazine meets the needs of a broad range of woodworkers and is extremely well written and well edited. I do not often find this level of writing in other wood-related magazines.

Now, then, on to what drove me to write this letter: The superb article by Hank Gilpin, "Professor Frid." Being relatively new to the world of woodworking, I was not familiar with the work or teachings of Tage Frid. Hank Gilpin does a remarkable job of bringing his experience to life. We have a wonderful snapshot of what life must have been like in the classroom and shop of Tage Frid, and at the same time, we are provided with incisive commentary with regard to the philosophy of woodworking. I would imagine that, as is clearly the case with Tage Frid, Hank Gilpin must be a remarkable teacher. Students of both men should consider themselves fortunate. And I, too, consider myself fortunate, as I have been able to at least vicariously experience this magic through the pages of *Fine Woodworking*. Keep up the great work!

—Gary Eisenberg, Los Angeles, Calif.

After looking at your 25-year issue, I'm very unhappy with the content. The advertising was too much to deal with. I

Fine WoodWorking
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If we're in your neck of the woods, come by and see us

Feb. 16-17: Managing Editor Matthew Teague and Associate Editor Tom Begnal, who edits Tools & Materials, will be in our booth at the Carolinas Industrial Woodworking Expo at the Greensboro Coliseum, Greensboro, N.C.

March 9-10: Editor in Chief Tim Schreiner and Executive Editor Anatole Burkin will be in our booth at the Northwest Industrial Woodworking Expo at the Stadium Exhibition Center in Seattle, Wash.

March 14-17: We are sponsoring four carving demonstrations and a presentation on the work of James Krenov by his colleague, David Welter, at The Furniture Society annual conference at Arizona State University in Tempe. Tim Schreiner will also take part in a panel discussion on 25 years of *Fine Woodworking*.

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wish you luck. I think you will need it, as there is a new type of woodworker out there that is in no mood for hype.

—Gregory Dale Cook, Missoula, Mont.

To certify or not to certify: the battle rages—*Fine Woodworking* does a disservice to its readers by providing a platform for Jon Arno's misinformed attack on my arguments for forest certification (*FWW* #146, pp. 64-67).

Arno builds his case on the unfounded premise that certification was cooked up by its "inept" or "misguided" advocates in the developed world to force "Third World producers ... to buy the right to market their own forest products." Of the 48.5 million certified acres worldwide, at least 83% are in temperate or boreal forests. Only 76 out of a total of 273 individual certifications occur in tropical countries. Forest Stewardship Council certification is, by definition, entirely voluntary. It is based on regional standards, developed through painstaking consultation among local stakeholders and applied to on-the-ground practices. As of this writing, there are more than 40 active regional standards groups in 28 countries.

Few environmentalists deny the benefits of conservation set-asides, which Arno falsely pits against certification. Although it is doubtful that much tropical forest can be permanently protected from harvest, most supporters of certification consider conservation to be complementary with the goals of certification—not mutually exclusive.

Many people would like to preserve old-growth forests, in North America as well as abroad, but Arno is wrong when he equates certification with an "economic boycott of [tropical] old-growth timber." FSC certification promotes responsible wood use, not boycotts, and it makes no prohibition against the harvest of old-growth trees. Indeed, I have visited certified tropical forests where old-growth trees are being harvested according to management plans that allow for their eventual replacement.

Our relationships with forest resources are complex. The truth is that no one solution, no silver bullet, will save the rain forests—or any forests. What we need is a variety of thoughtful, creative responses, informed by responsible discussion. Certification is not perfect, but Arno doesn't begin to address the real issues.

—Scott Landis, South Berwick, Maine

In Jon Arno's second paragraph he acknowledged that there is a problem in the world's forests. He waited until the final paragraph to suggest that the best solution to deforestation is to be found in the model of the Nature Conservancy of buying forest land to be set aside as reserves.

Is there any conflict between certification and hands-off reserves? Perhaps the problem needs to be attacked on a number of fronts. I have long thought of certification of lumber as being akin to the markets that have been created in the realm of organic farming. If you don't feel comfortable with pesticides and fertilizers, you now have an option to buy food in your supermarket that has been certified as organic. Those who don't feel comfortable with the way timber is harvested have an option to buy wood that has a certification as having been harvested sustainably. This is a voluntary effort, and one that can work in harmony with other efforts to protect our natural resources.

—Silas Kopf, Northampton, Mass.

Jon Arno's arguments against forest certification are dated and do not recognize the advances made by this important initiative over the past decade.

As a forester working for the past two decades in the South American tropics, I have watched certification revolutionize the forest industry in places like Bolivia, where over 2 million acres have been certified to date, and forest owners are, for the first time, rushing to bring new forest areas under sustainable forest management (SFM). These forests represent a wide range of ownerships from indigenous communities, to small and large private landowners, to huge forest concessions. And they include both primary (old growth) and secondary forests. Forests in Bolivia, Brazil, Peru, Ecuador and throughout Central America are being placed under such management at an unprecedented pace, and that belies Arno's contention that certification will accelerate the conversion of natural forests to nonforest uses.

—Robert Simeone, Sylvania Forestry, Land O' Lakes, Wis.

Bandsaw tension-gauge clarification—In the article "Shopmade Tension Gauge" (*FWW* #147, pp. 80-83), the spacing between the clamps isn't mentioned. The clamps should be spaced 5-in. apart.

Writing an article

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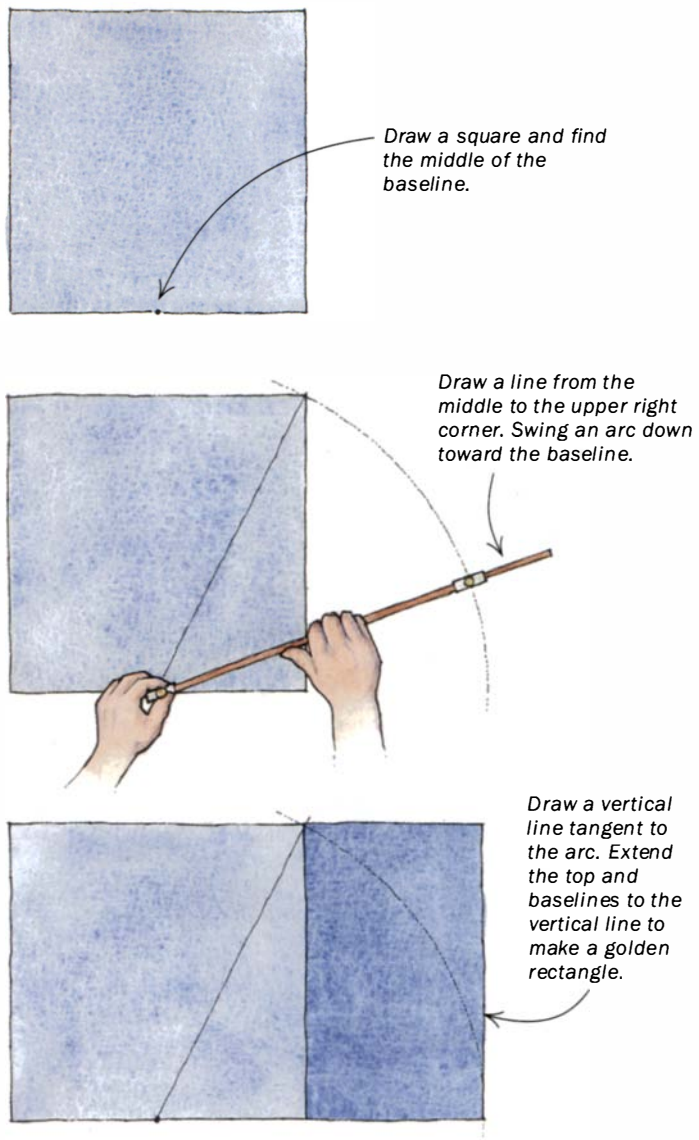
Methods of Work

EDITED AND DRAWN BY JIM RICHEY

An easy method for drawing a golden rectangle

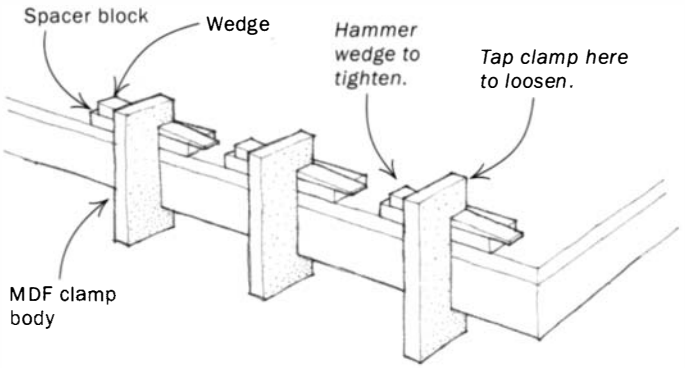


The proportions of a golden rectangle (in which the ratio of width-to-length is about 1:1.6) have long been regarded as pleasing to the eye. Golden rectangles were used extensively in Greek architecture and 18th-century furniture. It is generally agreed among designers and tradespeople who possess a discerning eye that a golden rectangle just looks good.

Learning to incorporate golden rectangles into your work can become quite complicated, but it doesn't have to be. Some woodworkers and designers use a mathematical approximation of a golden rectangle, based on consecutive numbers from what is called the Fibonacci series. In a Fibonacci sequence (1, 1, 2, 3, 5, 8, 13, 21, 34 ...), each number is the sum of the two previous numbers, and the ratio between any two consecutive numbers averages out to about 1.6—the same number found in a golden rectangle.

As a high school math and woodshop teacher, I realized that by incorporating geometric construction into my woodworking designs, I could achieve the same results more simply. The advantage to the construction method outlined (see the drawings at left) is that all you need to make a golden rectangle is a square, a tape measure (or a compass, if you're more of a purist) and a pencil. Start by drawing a square, and you end up with both a large and a small golden rectangle. No complicated math is necessary if you use this simple technique. *—David Casey, Sebastopol, Calif.*

Inexpensive shopmade clamps



In the display business where I work, we never seem to have enough clamps. One day, after I ran out of clamps one too many times, I made a large number of the simple, wedge-activated clamps shown above.

I chose to make several sets of clamps in 3-in. increments, but you could make them in any sizes that you find handy. I wouldn't recommend using solid lumber because the grain will be weak at the inside corners, regardless of how you cut the clamp pattern from a board. Either medium-density fiberboard (MDF) or a good grade of plywood will be less likely to break.

Cut the wedges and the spacer blocks from hardwood. The wedge profiles should be sized for no more than 1 in. of thickness for every 6 in. of length. The spacer blocks (wider than they are thick) serve two purposes: They spread out the clamping force over a larger area, and they also act as space adjusters because they can be used either on edge or flat.

To use one of these clamps, simply find a combination of clamp, spacer and other material to make a tight fit for the wedge. Then

Our reward for the best tip

David Casey won an engraved Lie-Nielsen handplane for his winning tip about drawing golden rectangles. Casey has been teaching mathematics courses to high school students for 16 years. He's also worked for his father, a general contractor, every summer since he was 12 years old, so he's had plenty of opportunity to apply what he knows to real-world solutions. 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.*

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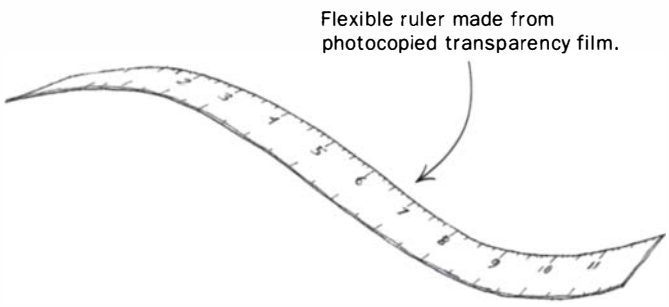
pound the wedge into place. A simple tap on the downhill side of the clamp body will release it immediately.

I used scrap pieces of MDF to make the clamp bodies. But even if I cut the bodies out of a new sheet of MDF, the cost would be only about 10 cents each.

—Robert B. Chambers, Richardson, Texas

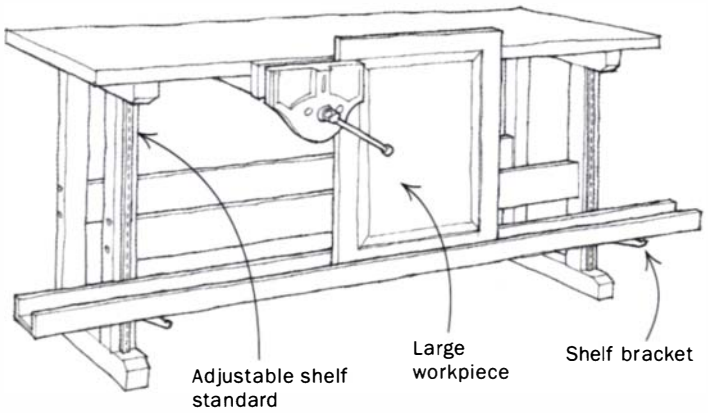
See-through rulers



Clear, thin plastic rulers are handy because they don't obscure what you're measuring and can be wrapped around a curved surface. You can easily make one by photocopying your regular ruler on transparency film made for use in plain paper copiers. You can get a 12-in. ruler on regular letter-sized film by laying the ruler diagonally on the copier bed. Rulers that reproduce the best are those with a good contrast between the blade and the markings.

—R.B. Himes, Vienna, Ohio

Auxiliary work rest for large panels

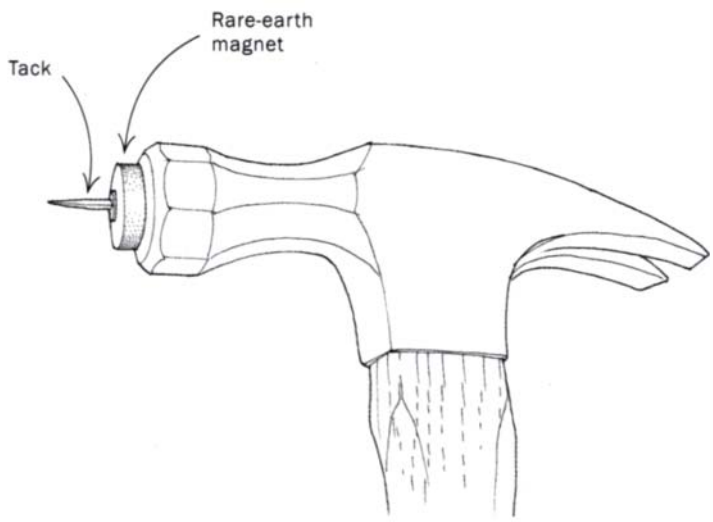


I attached metal shelf standards and brackets to the legs of my workbench. With the aid of a small shelf resting on the brackets, I can support large awkward workpieces, such as doors, at the right height for planing or installing hardware. I clamp one corner of the workpiece in my bench vise to hold the work steady and upright and add a pipe clamp to the other corner if needed.

—Roy H. Hoffman, Oriental, N.C.

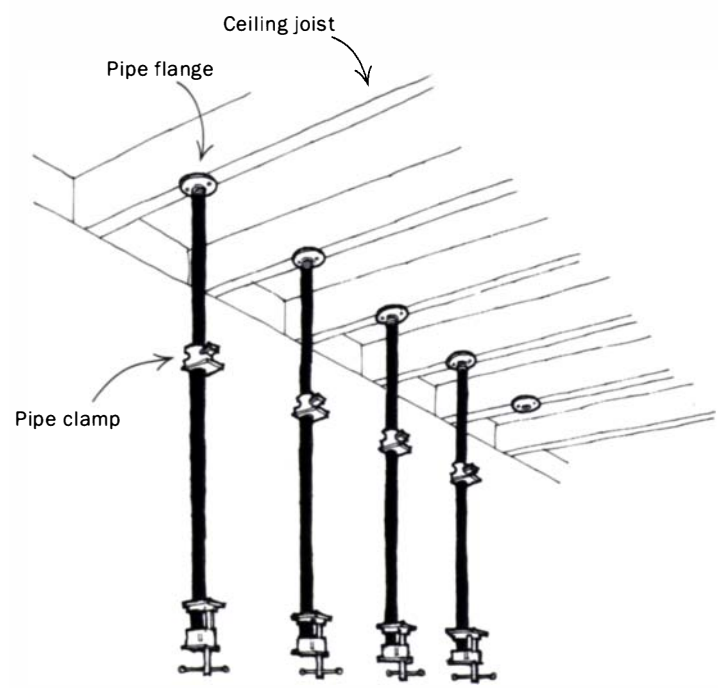
Quick tip: To prevent glue squeeze-out problems when assembling drawers, simply finish the insides of the drawers before assembly. Sand all of the inside drawer parts and apply two or three coats of shellac, carefully avoiding the surfaces that will be glued. Later, when you assemble the drawers, any bead of glue will pop right off after it has dried. *—Joe Barry, Lumberton, N.C.*

Magnetic tack hammer



To turn any ordinary hammer into a magnetic tack hammer in seconds, simply place a rare-earth magnetic disc on the face of the hammer, place a tack on the magnet and tap the tack in position to get it started. Then remove the magnet or use a second hammer to drive the tack home. (You can buy magnets from Lee Valley Tools.) *—Leonard Feldberg, Chestnut Ridge, N.Y.*

Ceiling-hung panel clamp



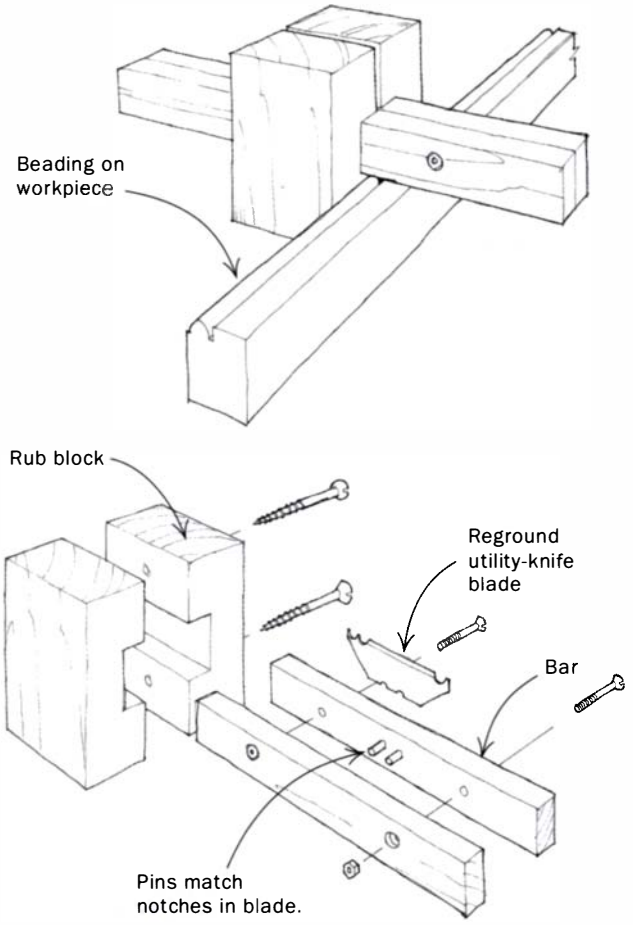
The frustrations of gluing up an unwieldy large face frame in my small basement shop prompted this idea for clamping up large panels. Attach ¾-in. pipe flanges along a straight line to the shop's

ceiling joists. When you're ready to glue up a panel, just screw in as many pipe clamps as needed. Having the clamps secured serves as a third hand—making it easier to load the workpieces and tighten the clamps. With the panel hanging vertically, you have ready access to both sides of your work, which makes adding more clamps and scraping excess glue a breeze.

—Jon Williams, Grants Pass, Ore.

Quick tip: The same rubber abrasive stick that you use to clean sanding discs and belts will also remove gum buildup from your bandsaw blade. Just push the stick against the sides of the blade while the saw is running. *—Robert P. Cromwell, Royalston, Mass.*

Shop-built bead scraper

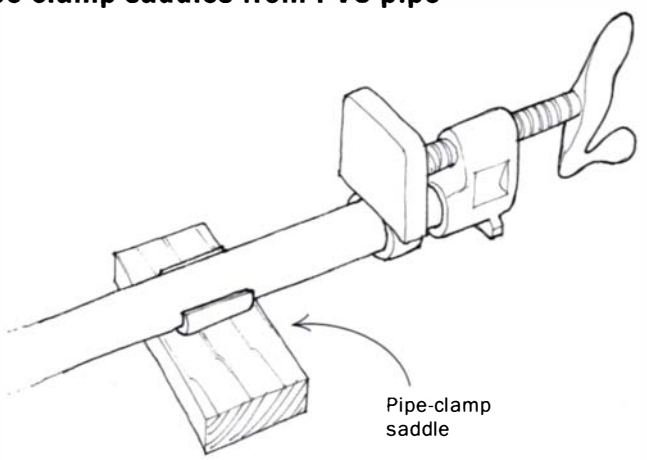


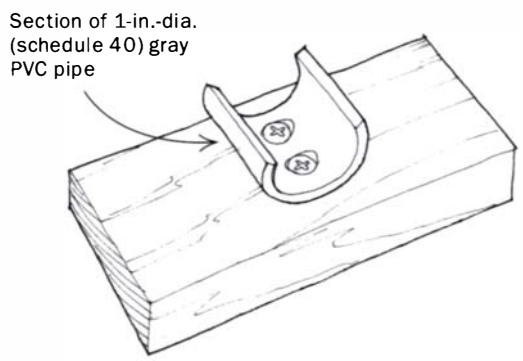
I use a shop-built scraper and recycled utility-knife blades to create decorative beads on furniture and trim, such as those often found around the faces of drawer fronts. The scraper consists of two oak parts: A two-piece bar that holds the blade in place and a sliding rub block that allows lateral adjustment of the blade. The bar is fitted with two brass pins that match the two ⅛-in. notches in the top of a utility-knife blade. Fixed against the brass pins, the blade does not move up or sideways when I apply pressure to scratch a bead.

To use the scraper, I first file the desired bead profile into the edge of a utility-knife blade. Then I install the blade in the bar, registering the notches in the top of the blade with the brass pins in the bar. After tightening the blade in the bar with machine screws and nuts, I install the bar in the sliding rub block and lock the bar at the position desired with the pressure of two wood screws. I often cut a different profile at each end of the same blade and slide the block to one end or the other to use the desired profile.

—Jose L. Martinez, Niceville, Fla.

Pipe-clamp saddles from PVC pipe





I always wanted several sets of pipe-clamp saddles but never wanted to pay 10 bucks a pair. When I discovered that 1-in.-dia. (schedule 40) gray PVC pipe snaps perfectly onto ¾-in.-dia. iron pipe, I was able to make up all of the pipe-clamp saddles I needed for pennies each.

To make the saddles, cut a 1¼-in.-long section of the 1-in. PVC pipe, then mark the centerline on the end of that section. Using a bandsaw, with the centerline as a guide, slice out a less-than-half section (about 150°) of the PVC pipe. This gives you a little more than a semicircle of conduit. The inside diameter of the PVC pipe is just a little smaller than the outside diameter of the ¾-in. iron pipe, so it will snap onto the pipe firmly and won't slide around. Drill and countersink a couple of short drywall screws through the PVC section into a block of wood (as shown) to make a saddle.

You could also make a clamping jig by screwing several sections of the PVC saddles onto a longer piece of wood to space out your pipe clamps evenly. Or you could use the saddles to fasten your clamps into a storage rack. Because the saddles are made of PVC, it would be easy to glue them to each other or to other PVC materials to make an infinite variety of jigs. *—Jim Foley, Mickleton, N.J.*

Garrett Wade Tools

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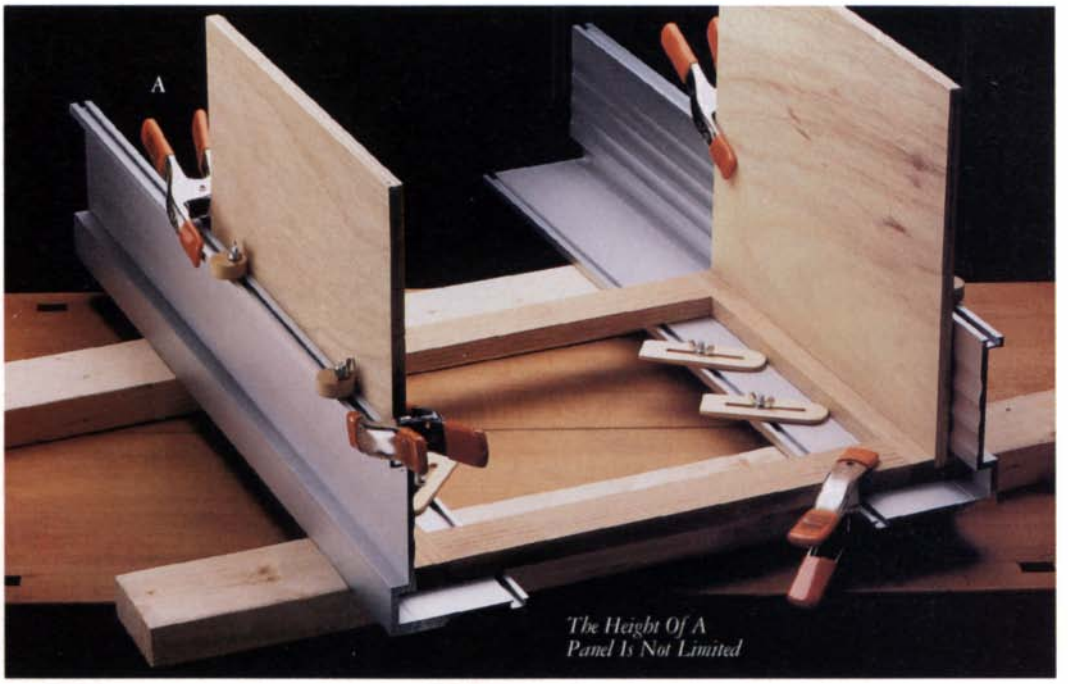
Garrett Wade Gives You a Hand

A / Fabulous Universal Assembly Jig Is A Cabinetmaker's Third Hand

Our long experience with this tool reinforces our appreciation of its incredible range of application – in the shop or job site. *It allows true, one-man case assembly work with machine square accuracy*, and gives you confidence where it would otherwise be virtually impossible.



When assembling cabinets, face frames, drawers or boxes, you really need something to hold the stock in place while checking squareness and during glue-up. The Universal Assembly Jig fits the bill perfectly. Unique to this jig is the built-in offset in the corner that makes it exceptionally useful for kitchen cabinets. Detailed instructions show you exactly how to use it.

This Jig can also be used to hold very long pieces, like bookshelf sides (*of virtually any height*), vertically while you fasten them. This practical lack of a height restriction gives the Jig exceptional utility. Extra-heavy (8 lbs.) extruded, anodized aluminum, it is a massive ⅜" thick and 30½" long. Sides are 4½" and 6". Two Adjustment Cams and two Position Clamps are included. Other clamps needed are common shop clamps (spring clamps, bar or pipe clamps etc.).

One Assembly Jig will do the job, but two are much more handy, and more economical. We highly recommend this tool. Patented.

		Regular	*Sale*
14B01.01	Assembly Jig (each)	$ 89.95	
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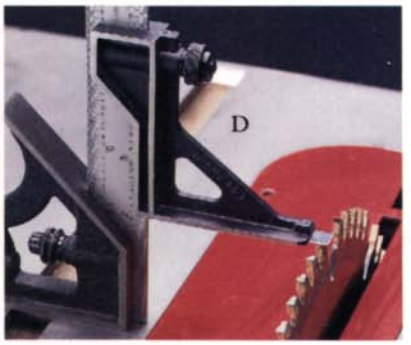

C / Premium Float Glass – An Accurate Affordable Surface Plate

Ordinary black silicon carbide sandpaper pasted to a very flat surface can accurately true the soles of hand planes and quickly flatten the backs of chisels and plane blades, or resurface your stones.

Traditionally, surface plates made of iron or granite, were quite expensive - and heavy. In contrast, "Float Glass" is an industrial product that is extremely flat, parallel sided, stable and reasonable in cost.

Not to be confused with ordinary glass, premium "Float Glass" is made by floating molten glass on a molten tin bath.

All three plates are ½" thick and 4" wide. Sizes shown are length. Edges are beveled. (Sandpaper not included.) The 44" plate is packed in a special wooden crate which is included in the cost.

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20K14.05	24" Float Glass Plate	$37.95
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READER SERVICE NO. 161

Notes & Comment

Canadian creativity on display

Made for the corner office. *Michael Holton built this walnut desk for his father. It is currently on display with a touring furniture exhibition in Canada.*

Under the direction of Michael Grace, graduates from the woodworking program at Selkirk College in Nelson, B.C., Canada, have won several awards.

One student, Michael Holton, made a corner executive desk (above) for his father so that he could inherit his grandfather's desk, which his dad is currently using. Built from walnut, western birch and ebonized birch with a catalyzed lacquer finish, the desk was selected for the Canadian Furniture Exhibition, which is touring the country for three years, so it will be a while before Holton gets his grandfather's desk.

Another graduate, Tim DuPlessis, won first prize in the *Niche* magazine competition for student craft, design and furniture, with a stereo cabinet made of cherry, English yew and rice paper and an interior of zebrawood, walnut and maple. The rice paper acts as a calm spot in the spectacular yew doors as well as allowing the use of a remote control while the doors are closed.

—Mark Schofield, assistant editor

A cabinet for stereo components. *Tim DuPlessis' cabinet, made of English yew with rice-paper doors, won a first-place award for student work.*

Piece of cake for Krenov

Another milestone. *James Krenov and his wife, Brita, celebrate the woodworker's 80th birthday during a party at the College of the Redwoods.*

About 100 people gathered at the College of the Redwoods at the end of October, to celebrate the 80th birthday of James Krenov. The founder of the Fine Woodworking Program there passed on the lion's share of the credit for his success to Brita, his wife of nearly 50 years, and to all of the friends he has made over the years. The college has set up a scholarship fund in Krenov's name for the woodworking program. Contributions may be sent to: Krenov scholarship, College of the Redwoods, 1211 Del Mar Drive, Fort Bragg, CA 95460.

—Doug Noyes, a graduate of the Fine Woodworking Program at the College of the Redwoods

Battery chargers recalled

In cooperation with the U.S. Consumer Product Safety Commission, DeWalt and Black & Decker are recalling 1.7 million battery chargers used with cordless tools. The DeWalt model numbers are DW9107 and DW9108. The Black & Decker model numbers are 97015 and 97016. The chargers can fail to shut off automatically after the battery is fully charged, which can cause the battery to burst, giving consumers the risk of burns and electrical shocks. The chargers were sold between May 1996 and August 2000, both alone and with DeWalt and Black & Decker tools.

Consumers should stop using the chargers and take them to a DeWalt or Black & Decker service center for a free replacement. For the nearest center, call toll-free (866) 543-3401 or (888) 388-3273, or go to www.dewalt.com.

Photos, this page (clockwise from top left): John Dean photographs; Doug Noyes; Tim DuPlessis

Taking woodworking to new heights

Gulfstream aerospace staff

High-altitude luxury. *Beneath the high-gloss finish on this padauk veneer is a very strong, but very light, aluminum honeycomb structure in the Gulfstream executive jet.*

Short of winning the lottery, owning an executive jet will remain a dream for woodworkers. But last year nearly 70 individuals and corporations put down $30 to $40 million to own a Gulfstream IV or V jet. For this price they get a custom-made interior that combines the look of exotic woods while meeting stringent aviation rules for safety and weight.

The strength of the fittings is derived from an aluminum honeycomb substrate. A three-ply wood veneer, which has been soaked in fire retardant, is then bonded to the aluminum with water-based contact cement. The choice of woods is limited only by how much the customer wants to spend: previous interiors have featured Honduras and Cuban mahogany, satinwood, ebony, teak, bubinga, zebrawood, bird's-eye maple and walnut burl. Four to six coats of polyester (a two-part resin) are applied and polished up to 5-micron to achieve an armorlike finish. Despite this, Lou Davis, the completions and installations manager, said they nearly weep at the condition of some of the aircraft that return for refurbishment after teenagers have had parties on board and tables have been used as footrests.

Some things never change.

—M.S.

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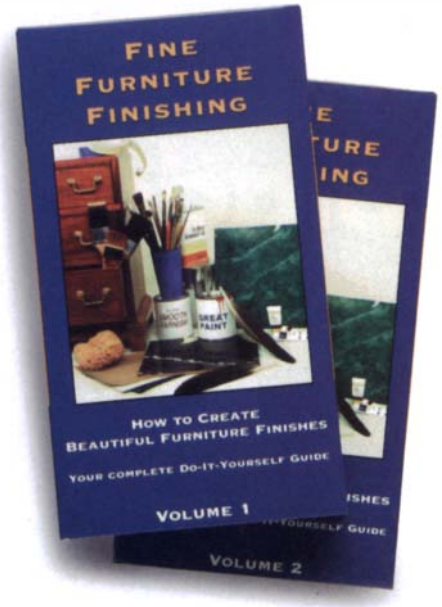
Faux finishing videos



Fine Furniture Finishing *by David Sorg. Two videotapes, total length 4 hours 53 minutes; $29.95 each, available at www.finefurniturefinishing.com.*

I have always had great admiration, bordering on envy, for finishers who can do a good faux marble. I've repeatedly tried this technique over the years, usually with the same result: My efforts resemble a bad paint job more than marble. David Sorg's two-tape set, especially the faux stone segments, inspired me to try again. Sorg is an accomplished finisher whose forte clearly leans toward the artistic side of wood finishing. The tapes are jammed with techniques useful for mimicking marble, granite, tortoise shell and the like. Sorg also demonstrates a few, more easily mastered techniques such as crackle finishes, flyspecking and glazing.

Being a great finisher doesn't necessarily make you a good teacher. I found myself longing for more information, especially after the more complicated faux stone segments. Often I was left with more questions than answers. Even the simpler shellac/wax finish or oil stain/varnish video segments were confusing. A more thorough explanation of the materials used, especially color selection and mixing instructions in the faux stone segments, would have been helpful. If Sorg reissues this tape set some day, I hope he will include a segment dealing with fixing finishing mistakes.

Nonetheless, experienced finishers looking to expand into the arty world of faux finishing will benefit from the techniques demonstrated in these videos.

–Chris Minick, consulting editor

Notes & Comment

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2001 National Tour Show Calendar

March 16-18
NORTHERN VIRGINIA
Capital Expo Center, Chantilly, VA

OHIO – Cleveland
Summit County Fairgrounds, Tallmadge, OH

March 23-25
GEORGIA – Atlanta
Gwinnett Civic Center, Duluth, GA

MICHIGAN – Grand Rapids
DeltaPlex Expo Center, Walker, MI

March 30-April 1
MASSACHUSETTS
Eastern States Exposition, West Springfield, MA

PENNSYLVANIA
Farm Show Complex, Harrisburg, PA

April 6-8
TEXAS – Houston
Astroarena, Houston, TX

KENTUCKY
Kentucky Fair and Exposition Center
Louisville, KY

April 20-22
ILLINOIS – Chicago
Odeum Sports & Expo Center, Villa Park, IL

April 27-29
CALIFORNIA – Sacramento
Cal Expo, Sacramento, CA

May 4-6
CALIFORNIA – Los Angeles
Orange County Fairgrounds, Costa Mesa, CA

May 11-13
WASHINGTON
Tacoma Dome, Tacoma, WA

May 18-20
WISCONSIN
Brown County Expo Centre, Green Bay, WI

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Makita redesigns its 12-in. planer

Flat and happy. *The flat top makes a convenient place to put stock while you're planing.*

I've owned a Makita model No. 2012 benchtop planer for 10 years, and it's one of the best power-tool purchases I've ever made. When I heard the company had redesigned its 12-in. planer, I wondered why. I've yet to find a flaw with the original. Well, I got a chance to try the new No. 2012NB, and to Makita's credit, the company did improve an already good machine.

The most obvious change is that the machine has a flat top, which makes a handy place to rest stock temporarily. Of the more substantial changes, Makita redesigned the planer so that the cutterhead moves up and down while the table remains stationary. The stationary table allows you to build a permanent extended bed for handling long stock. For rigidity, the machine has four posts in addition to a pair of threaded rods, all of which pass through the cutterhead/motor assembly.

Other key features include a bigger motor, rated at 15 amps, a micro-adjustable depth stop and a depth-adjusting scale in the crank handle. For safety, there's a switch lock and a pilot light that indicates whether the machine is plugged in.

Inside, the cutterhead appears much like the original. The knife-changing procedure is a breeze. Simply remove two thumbscrews to access the cutterhead, which contains a pair of double-sided, disposable knives. The machine comes with a toolbox containing a socket wrench and magnetic knife holders. The box is stored above the dust deflector.

As far as performance, I noticed a bit more oomph from the beefed-up motor. With new knives, stock fresh out of the machine requires very little sanding or scraping. Snipe, a slightly dished cut, shows up mostly on the front end of stock and measures only about 0.008 in., which is the best you can expect from anything on the market, even those with cutterhead locks. The dust chute, for hookup to a vacuum, is an option but should be included.

The Makita 2012NB sells for about $490, higher than the competition. But when and if my first machine bites the dust, I'll replace it with another Makita.

—Anatole Burkin

More oomph. *With a larger motor, Makita's model No. 2012NB is a new and improved version of an already good planer.*

Photos, except where noted: Michael Pekovich

Combo protractor and bevel gauge

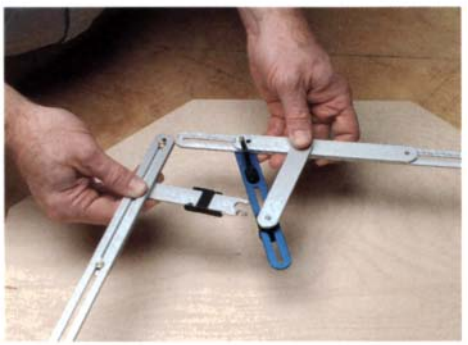
The Multifix. *The features of a protractor and sliding T-bevel are incorporated into a single tool.*

Build a better mousetrap? Nobex, a Swedish company, has done it with its Multifix tool, a combination protractor and sliding T-bevel. I found it useful because it automatically determines the bisecting angle for any miter joint. You'll still need to make the micro-adjustments to get a perfect fit, but the Multifix gets you very close on the first try.

To use the tool, loosen the knob and set the two outside blades to the angle you want to miter. Then unclip one blade from the Multifix tool, and you're left with the proper angle for a miter saw or miter gauge.

The Nobex Multifix is available from Garrett Wade (800-221-2942) for $39.95. *—Lee Grindinger*

Set. *As the outside legs of the Multifix are adjusted to match the desired angle, the center leg automatically slides to the miter angle.*



Separate. *To make it easier to work with the center leg, the outside legs come apart.*

Scribe. *With the outside legs separated, use the center leg to scribe the miter angle directly to the workpiece.*

Get the right angle for tight spots

Responding to a deluge of requests from its rotary-tool users, Dremel has come out with a right-angle attachment, which simply screws onto the end of the tool. It can be rotated a full 360° in 30° increments.

The accessory gives the tool the ergonomic feel of a compact right-angle drill. Along with a seven-piece drill-bit set sold separately, it gives a Dremel owner the ability to drill in very tight quarters, such as when drilling pilot holes for hardware. Dremel's right-angle attachment uses the same collet and fits all of the company's other accessories. It sells for about $30 at most home centers.

—Christopher Baumann

Getting close. *The Dremel right-angle attachment is handy for drilling a hole that's right next to a surface.*

Photo, this page (bottom): Christopher Baumann

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Router jig cuts ellipses easily and accurately

Perfect ellipse every time. *The router pivots around an axis plate, cutting a perfect ellipse.*

It's always been a chore to make elliptical tabletops. But Micro-Fence recently introduced a jig that makes the task a lot easier. It works in tandem with a circle-cutting jig (also made by Micro-Fence) and a plunge router, allowing you to make accurate, repeatable ellipses.

At the heart of the jig is a phenolic-resin axis plate with dovetail slots milled across the face at right angles. Two UHMW (ultra-high molecular weight) plastic, dovetail slider blocks attach to trammel bars on the circle jig and ride smoothly in the dovetail slots. The circle jig provides easy adjustment for sizing the ellipse by sliding the trammel bars along parallel rods that attach to the router base.

Setup is easy. Simply adjust the trammel bars to measure half the width and half the length of the proposed ellipse. Then start routing. The blocks glide securely in the dovetail slots, allowing the router to rotate easily, so you end up with a smooth, accurate ellipse. As an added bonus, you could shorten the major-axis measurement and cut string-inlay grooves parallel to the outside edge.

The axis plate has holes for screwing the plate to the workpiece. But to avoid marring the surface, I used double-sided (carpet) tape instead.

Using the 12-in.-long guide rods that are provided with the circle jig, you can make ellipses that range in size from 19¾ in. by 23½ in. up to 31⅛ in. by 42⅝ in. Larger, or more elongated ellipses can be made with optional 24-in.- or 36-in.-long guide rods. A smaller axis plate is also available. When this smaller plate is used with the 12-in. rods, you can make an ellipse as small as 15⅜ in. by 19⅛ in. The Ellipse Jig can be ordered from Micro-Fence (800-480-6427) for $189.95. The Micro-Fence circle jig is $139.95. *—Roland Johnson*

Ceramic-tipped blades

Carbide Processors Inc., a company in Tacoma, Wash., is making new ceramic-tipped sawblades that threaten to outshine tungsten-carbide tipped blades. And early reports from the manufacturer indicate that the ceramic blades cut faster, quieter and smoother and last longer than comparable carbide-tipped blades.

The tips are titanium carbonitride—a material made from metal-based ceramics in a metal matrix. Titanium carbonitride is not new. It's been used for years to make metal-cutting tools. But until recently, this technology hadn't been applied to woodworking sawblades because it was much too expensive to attach the tips. The blades aren't a bargain quite yet. Plan to pay roughly double what you'd spend for a top-of the line, carbide-tipped blade.

I recently used a brand-new, 60-tooth, triple-chip grind ceramic blade to make crosscuts in ¾-in.-thick maple, melamine and medium-density fiberboard (MDF) and also 1¾-in.-thick cherry.

The blade cut all of the stock quickly and smoothly. Tearout on the solid stock was minimal, and there was no noticeable chipout on the melamine. However, I was able to make cuts of equal quality with a 40-tooth sawblade made by Forrest (the WW II). So I'd have trouble justifying the extra cost in my home shop. But a commercial shop just might want to look a lot closer at this blade. For more information, contact Carbide Processors Inc. (800-346-8274). *—Tom Begnal*

New blade on the block. *The manufacturer says ceramic-tipped blades cut faster, quieter and smoother and last longer than carbide-tipped blades. But plan to pay about double the carbide price.*

Photos, this page: Roland Johnson (top); Tom Begnal (bottom)

Blade and bit cleaner

Environmentally friendly cleaning products often seem to be long on friendly and short on cleaning. Here's one, however, that's long on both. Formula 2050 Blade & Bit Cleaner, made by CMT, is nontoxic and nonflammable. And after trying it recently, I found the cleaner was able to remove built-up resin and gum from blades and router bits in no time. All I had to do was spray on the cleaner and let it sit. After a few minutes the resin and gum became soft enough to wipe off with a rag. Formula 2050 Blade & Bit Cleaner can be mail-ordered from Sommerfeld Tools for Wood (888-228-9268). The price for an 18-oz. spray bottle is $11.90. —*L.G.*

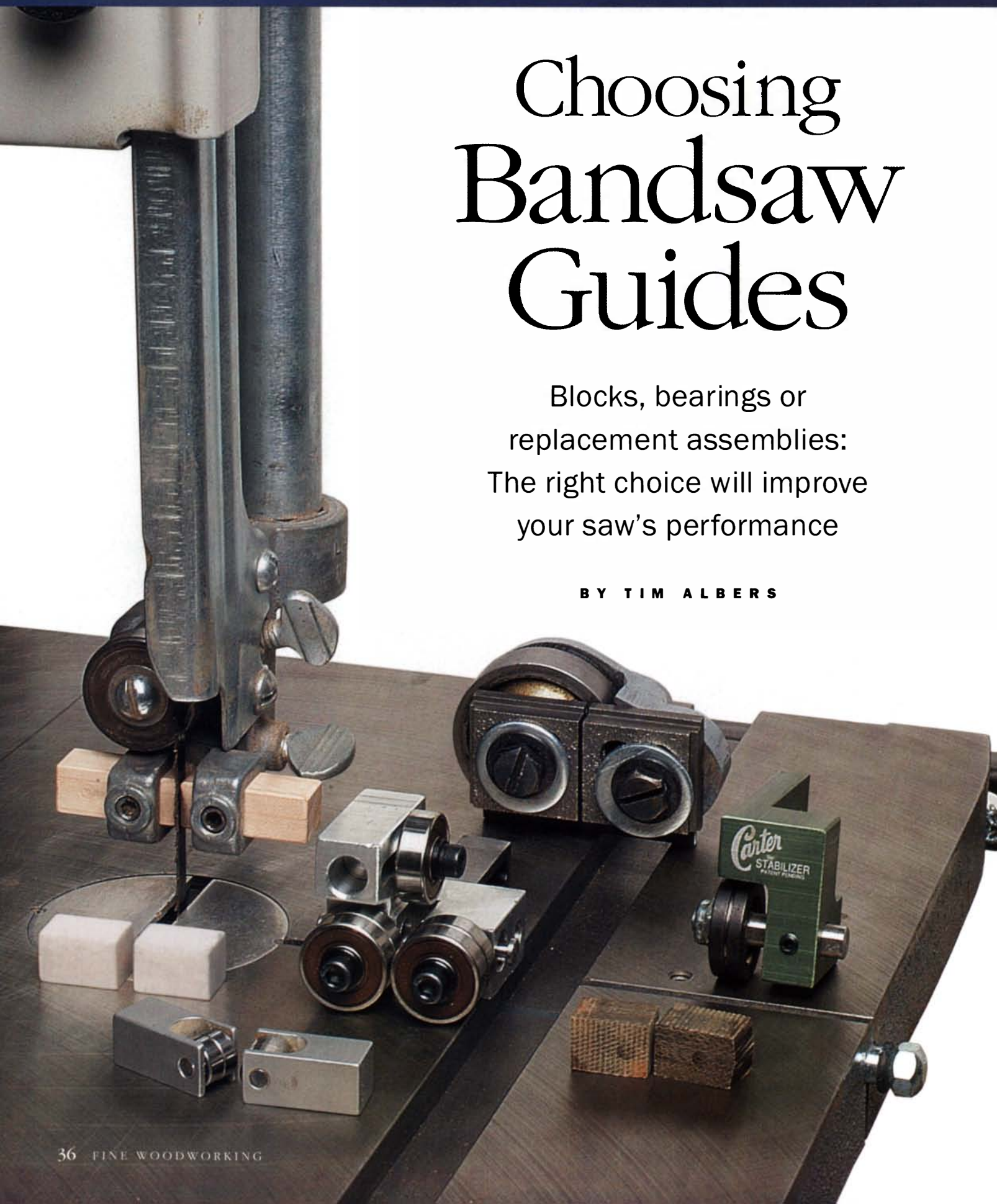
Spray and wipe. *Resins and gums loosen a few minutes after Formula 2050 is applied. The dissolved residue simply wipes off.*

Anatole Burkin is executive editor; Lee Grindinger builds carved furniture in Livingston, Mont.; Christopher Baumann is editorial assistant; Roland Johnson has a woodworking business in Sauk Rapids, Minn.; Tom Begnal is an associate editor.

Choosing Bandsaw Guides

Blocks, bearings or replacement assemblies: The right choice will improve your saw's performance

BY TIM ALBERS



The bandsaw continues to be one of the most versatile tools in the shop, and with the increasing use of bimetal and carbide bandsaw blades, it's not uncommon for woodworkers to have several hundred dollars invested in blades. But many woodworkers don't think twice about the guides on their bandsaw.

It's important to have guides that are appropriate for your type of woodworking. Whether you are a luthier using your bandsaw for precision resawing, a toy builder making hundreds of curved cuts or a furniture maker doing some of both, there are bandsaw guides that are right for you.

Anatomy of guides

Bandsaw guides typically have one assembly above the table and one below. The bottom assembly is fixed, while the top assembly travels vertically on a guide post. Each assembly contains three support elements: two side, or lateral, supports and one rear support. The rear support element is known as the thrust bearing and limits the rearward movement of the blade while cutting.

Some guides use blocks to provide lateral support, while some use bearings. Bearing guides are further divided into American and European styles. American-style bearing guides support the blade with the curved outside surfaces of the bearings, rolling along the blade as it travels by. European-style bearing guides contact the blade on their flat side-faces, potentially offering more support area but also more friction and noise.

Replacement blocks

The stock guide assemblies that come with most small-shop bandsaws use square, adjustable blocks for lateral support. These blocks are easy to adjust and, because of their simple design, they have spawned a number of aftermarket replacement blocks.

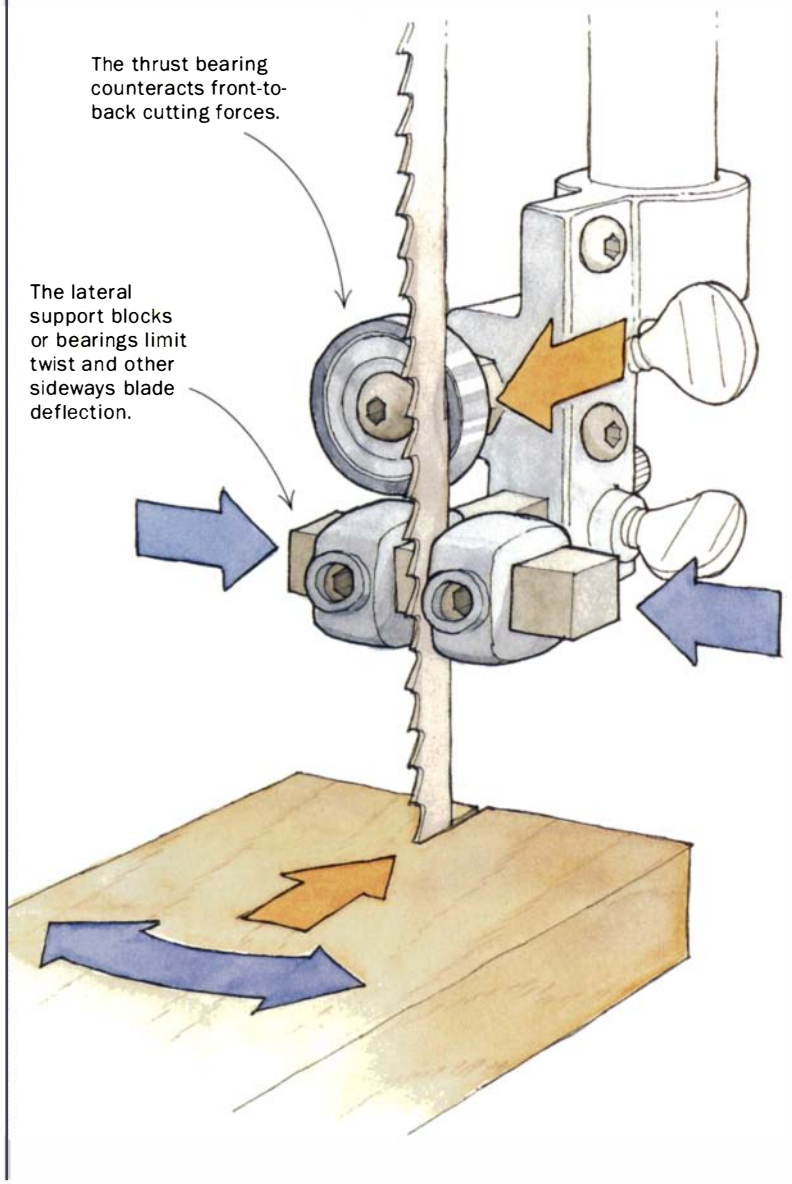
The standard blocks are usually steel and provide solid support for both resawing and curve-cutting. However, steel blocks have significant drawbacks. They generate some heat and noise. The small amount of heat generated by steel blocks isn't the problem (see the related story on p. 41). I find the most significant disadvantage to be their potential to make contact with the teeth and ruin an expensive blade. This is an unnecessary risk, considering that alternative blocks can be bought cheaply or even made for free.

Cool Blocks—With the widespread popularity of the 14-in. Delta bandsaw and its clones, many innovative alternatives to steel blocks have sprung up. Cool Blocks, manufactured in a wide range of sizes to fit most 8-in. to 16-in. bandsaws, are the most popular replacement option. Made from graphite-impregnated phenolic—a hard type of plastic—Cool Blocks are inexpensive, easy to replace and adjust, and provide good support for both resawing and curve-cutting. Adjusted to the recommended clearance of 0.004 in. (the thickness of a dollar bill) between blocks and blade and located directly behind the gullets of the teeth, my blocks have delivered excellent longevity. An added benefit is that you can push them close to the blade and teeth without the risks inherent in steel blocks. Finally, when they wear or get damaged, a quick touch on a disc sander trues them up. Watch out for knockoff versions of Cool Blocks. These melt away quickly.

Hardwood blocks—These are a good alternative to steel blocks, mostly because scrap wood is free. And anyone can make a section of hardwood guide stock in a few minutes. Like Cool Blocks, wood blocks virtually eliminate the potential for blade damage posed by steel blocks. Wood blocks are best for ⅛-in. or 1/16-in. blades, which can be completely encased in the blocks to prevent them from twisting in tight cuts. And, because these blocks are free, you don't have to fret about resurfacing them each time you

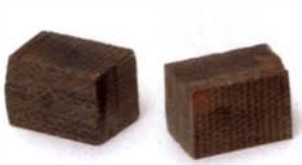
BANDSAW-GUIDE ANATOMY

Bandsaw guides work to counteract cutting forces and keep the blade aligned properly.



Drawing: Jim Richey; photo, facing page: Michael Pekovich

REPLACEMENT BLOCKS



Cool Blocks

Hardwood blocks

Iturra Bandrollers

Iturra ceramic blocks

BLOCKS	SAW SIZES	BLADE SIZES	PRICE	SOURCES	COMMENTS
Cool Blocks	For most saws up to 16 in.	⅛ in. to ¾ in.	$13	Catalogs, retail outlets	Best all-purpose replacement for stock steel guide blocks; economical; won't damage blade
Hardwood blocks	Cut to fit	All blades	Free	Shopmade	Ideal for cutting curves; can encase narrow blades but wear too quickly for resawing
Iturra Bandrollers	Fit all 14-in. saws and some other sizes	¼ in. to ¾ in.	$70	Iturra Design (888-722-7078), catalogs	Economical version of bearing guides; not recommended for very narrow blades; good for resawing
Iturra ceramic blocks	For Delta and import 14-in. saws	¼ in. to ¾ in.	$25	Iturra Design	All-purpose blocks; reduce pitch buildup on blade; must be kept clear of teeth

switch back to a larger blade. The downside of wood blocks is that they wear quickly. If you have a lot of cuts to make, you don't want to stop frequently to true your guides.

Ceramic blocks—Iturra Design recently introduced replacement blocks made of a proprietary ceramic material. These blocks have a lifetime guarantee against wear. However, like steel blocks, ceramic blocks must always be kept clear of the teeth, because they can ruin a good blade in a hurry. Iturra recommends that ceramic blocks be used for high-resin woods, so I tried them on some old pine. The blocks did a good job of scraping the resinous sawdust off the blade while not creating the heat buildup that can occur with steel blocks in the same situation. But I don't see any other advantages to them over Cool Blocks or wood blocks.

Iturra Bandrollers—Iturra Designs' other blocks (see Tools & Materials, *FWW* #136, p. 32) replace standard steel blocks, but they use small bearings to support the blade. Like Cool Blocks, Bandrollers are made in a wide range of sizes and fit all 14-in. bandsaws. It took me about two minutes to install the Bandroller Pro guides. Iturra recommends a blade clearance of 0.003 in. However, I run American-style bearing guides in light contact with the blade to obtain the most support. I decided to run these the same way and experienced no problems doing so.

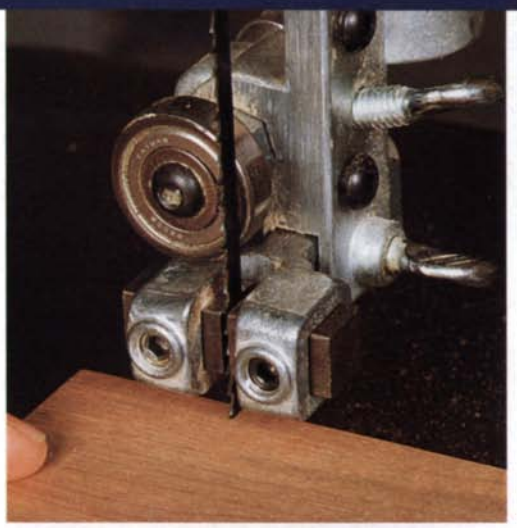
With less surface area contacting the blade, Bandrollers don't provide as much support as blocks for cutting tight curves. On the other hand, they perform well for all other tasks, especially resawing. For a relatively small investment, Bandrollers offer the benefits of bearing guides while allowing a quick changeover to blocks for smaller blades.

Replacement block assemblies

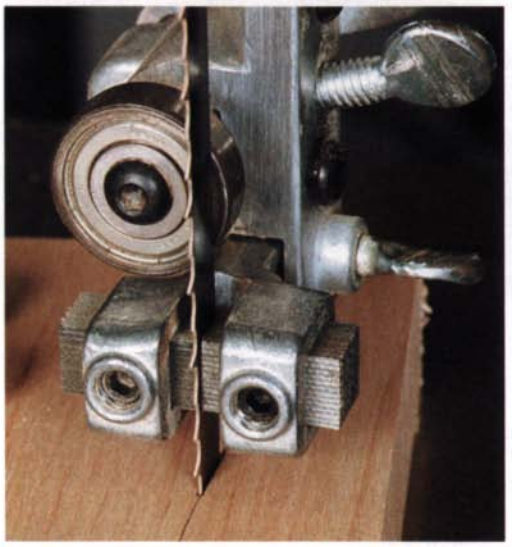
While relatively inexpensive replacement blocks are best for newer 14-in. saws, updating an older or larger saw requires a complete replacement of the guide assembly. Some of these aftermarket units use blocks to provide lateral support, and some use bearings. Let's look at the block assemblies first (see the chart on p. 40)

Carter's Micro-Precision guide—The Carter Products Micro-Precision guide, popular for larger saws, is available in three sizes,

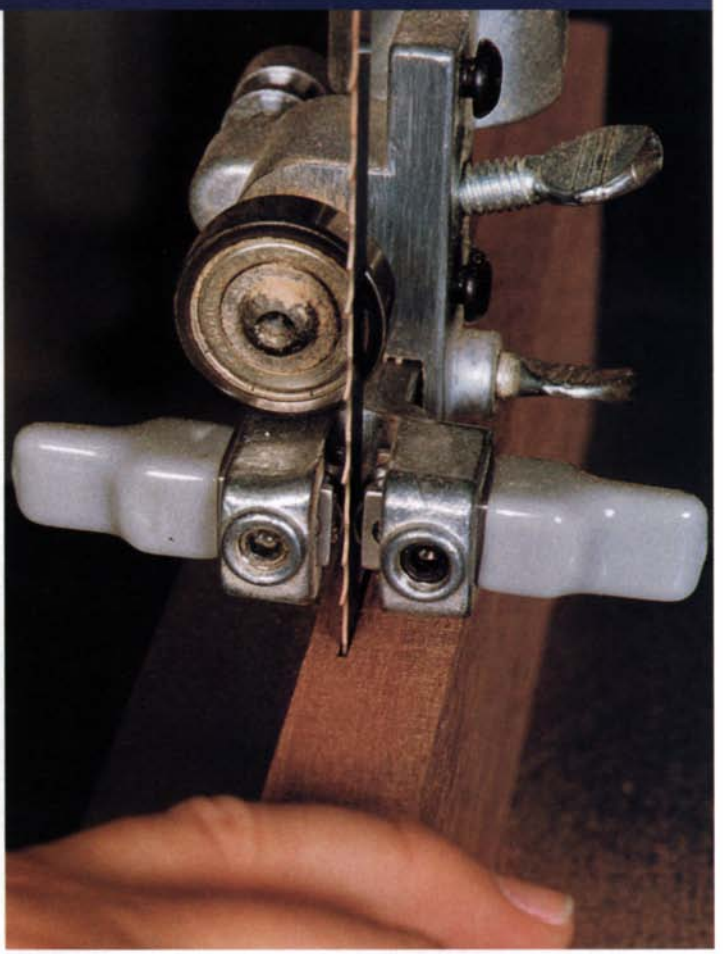
Photos, this page: Erika Marks



Steel blocks should be replaced. *With inexpensive block replacements available for many of today's guide assemblies, why risk ruining an expensive blade? Here, an improperly adjusted thrust bearing allows the teeth to contact the metal blocks.*



Cool Blocks are the author's favorite aftermarket blocks. *Available for every bandsaw on the market, they are inexpensive, easy on teeth and can be adjusted so they completely encase smaller blades.*



Iturra Bandrollers offer smaller saws the benefits of bearing guides for much less cost than a complete replacement guide assembly. *Like all bearing guides, Bandrollers can be run against the blade without creating excess friction, making them a good choice for resawing, where blade tracking is so important.*

from #00 to #1 (for more on choosing the right size guide assembly for your saw, see the chart below). However, the company does not recommend this guides for 14-in. bandsaws or smaller. The Micro-Precision guide functions essentially like standard block guides, but Carter's blocks are larger and made of a material called Tefloy, a Teflon-impregnated metal alloy that produces less friction and wear than steel blocks, according to the manufacturer. The large, square blocks on this assembly, coupled with the large thrust bearing, provide excellent blade support.

Wright guide—Manufactured by Black Diamond Saw & Machine Works, the Wright guide, like the Carter guide, is available in a range of sizes from #00 to #2. In this case, however, only the #00 size is relevant because the other, larger sizes are designed for large, industrial bandsaws beyond the scope of this article.

SIZING GUIDE ASSEMBLIES

Most aftermarket guide assemblies are sized according to a standard numbering system, from #00, the smallest, to #2, the largest.

SIZE	BLADE SIZE	MACHINE SIZE
#00	⅛ in. to ½ in.	12 in. to 16 in.
#0	⅛ in. to 1¼ in.	16 in. to 24 in.
#1	¼ in. to 1½ in.	30 in. to 36 in.
#2	¼ in. to 2½ in.	36 in. and up

The #00 Wright guide has a unique design. The large thrust bearing and blocks are mounted together in one compact but sturdy unit. The blocks are approximately 1 in. square by ⅜ in. thick and are mounted so that their sides support the blade.

The blocks have rabbets on three sides, each one slightly deeper than the last, offering four different contact areas for different blade sizes. By simply rotating the blocks, you can adjust for blades from ½ in. down to ⅛ in. However, each side of the block is 1 in. tall, providing excellent blade support. I experienced absolutely no problems with a ⅛-in. blade, even in very tight curves. While this assembly uses hardened-steel blocks, their easy adjustment and excellent blade support outweigh—and even reduce—their potential to damage a blade.

Both the Carter and Wright block assemblies employ a hardened-steel thrust bearing that is much more durable and resistant to grooving

Photos, except where noted: Asa Christiana

REPLACEMENT BLOCK ASSEMBLIES

MODEL	GUIDE SIZE(S)	BLADE SIZES	PRICE	SOURCES	COMMENTS
Black Diamond Wright guide	#00 to #2 (#00 tested)	⅛ in. to ½ in. for #00	$58 for #00*	Black Diamond Saw & Machine Works (508) 653-4480	Best replacement assembly for all-around use on saws 14 in. and smaller
Carter Micro-Precision guide	#00 to #1	⅛ in. to 1¼ in. for #0	$130 for #0*	Carter Products (616) 451-2928 www.carterproducts.com	Best replacement assembly for all-around use on saws 16 in. and larger

*Often requires accessory mounting bracket

than the thrust bearing on the stock guide assembly on your bandsaw.

American-style bearing assemblies

A few aftermarket guide assemblies use bearings to provide lateral support. They are available in two styles: American and European. I'll start with American-style bearing assemblies, which support the blade with the curved, outside edges of their bearings. These rolling guides are great for resawing, because they hold the blade solidly in place without generating much friction.

Carter vs. Paddock—I evaluated two American-style bearing assemblies on a 20-in. saw: Carter Products Guidall 500 and an assembly from Paddock Tool Co.

These bearing guides take slightly longer to adjust than block guides, but both the Carter and the Paddock guides held their adjustments well (see the chart on p. 42).

I have the luxury of a large bandsaw dedicated to resawing, and I maintain an American-style bearing assembly on this saw. The downside of these bearing assemblies is that you are limited in blade width. Bearings do not provide good support for very narrow blades, which can jump out of the guides and cause blade damage or disaster. You need to make sure these bearing guides are adjusted just right for ¼-in. blades, especially when cutting tight curves. The #0-equivalent guides work best on blades ⅜ in. and wider.

Depending on the wood species being cut, pitch buildup can be a problem on bearing guides. Pitch will create extra friction and blade deflection, just the things you are trying to avoid. So, for my larger saw dedicated to resawing, I have a slight preference for the more expensive Paddock guide, because its bearings are a bit easier to adjust, and its hooded assembly seems to shed sawdust better and keep the bearings cleaner. Also, the bearings on the Paddock have a much sharper edge than those on the Guidall 500, resisting a narrow blade's tendency to roll out of the bearings when twisted.

Black Diamond Wright guide

Carter Micro-Precision guide

Carter also makes a replacement bearing assembly—the Guidall 2000—for specific 14-in. and 16-in. bandsaws. The bearings on this assembly have much sharper edges and can handle blades down to 3/16 in.

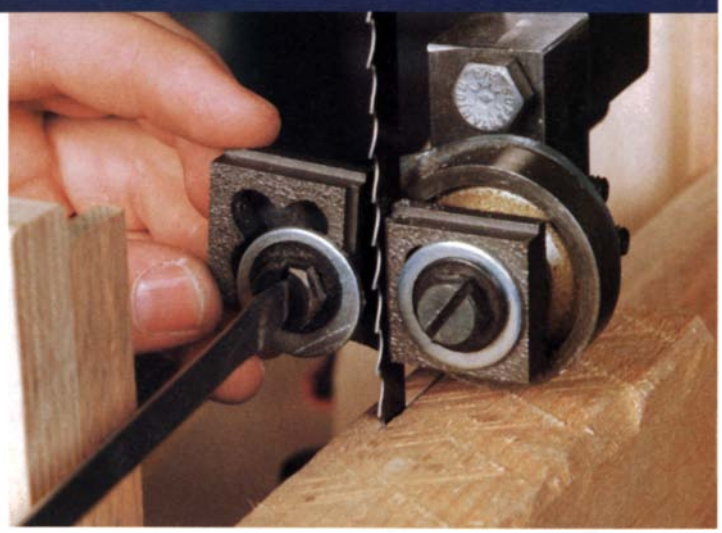
Stabilizer—The latest wrinkle in bandsaw guides is the Stabilizer from Carter Products. The Stabilizer is designed only for narrow blades, up to ¼ in., and is unlike other bearing guides. It has a single bearing mounted in the thrust-bearing position. The blade rides in a groove machined around the outside of the bearing. The Stabilizer replaces part of the upper guide assembly and is manufactured for a variety of small and midsized saws.

The manufacturer recommends that the Stabilizer be mounted so that the bearing pushes the blade forward 1/16 in. and the assembly sits about 4 in. to 6 in. above the tabletop. While the latter distance allows the blade to flex somewhat, a ⅛-in. or 3/16-in. blade, adequately tensioned, will track extremely well through even the tightest cuts. A sharp blade is a necessity, of course.

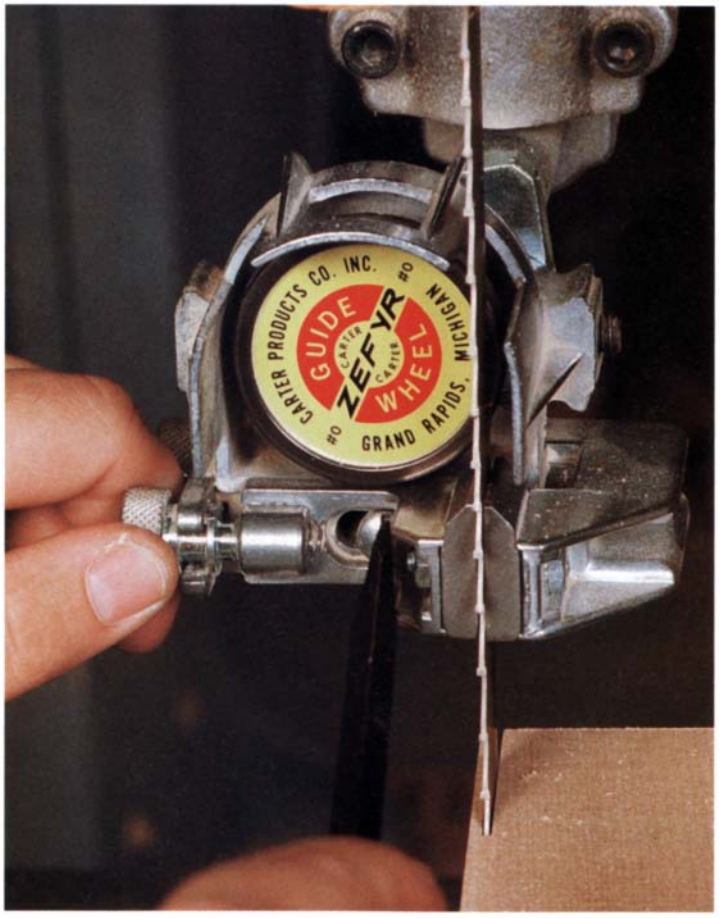
European-style bearing assemblies

European steel-framed saws have boomed in popularity the last few years. These saws generally arrive with what most of us call European-style bearing guides. On these guides the blade is sup-

Photos, this page: Erika Marks



The Wright guide's blocks and thrust bearing are mounted together in one compact, sturdy unit. *As a result the thrust bearing cannot be adjusted forward and back to accommodate different blade sizes; instead, the blocks offer four rabbeted sides of varying thicknesses. The blocks can be rotated and adjusted quickly and easily.*



Carter's Micro-Precision guide is an excellent replacement assembly for all-purpose use on a large saw. *Made of a Teflon-impregnated alloy, the large blocks can be run closer to the blade, offering better blade support without creating more friction and wear. Adjusting these blocks takes a little getting used to, because both sides are secured with the same screw.*

Don't blame the guides if your blade overheats

A common misconception is that steel blocks generate excessive heat, which in turn causes loss of tooth hardness or blade failure. In fact, guide setup and feed rate—rather than which type of guides are used—are the greater contributors to friction and heat.

As a test I set up two similar bandsaws, one with its original steel blocks and one with Cool Blocks, and I used a Raytek infrared thermometer to measure the temperature of the blades. On both saws I used a ½-in. standard carbon-steel blade. With the blade sufficiently tensioned and the guides properly adjusted, I made a series of heavy cuts. The highest blade temperature I obtained with Cool Blocks was 89°F, or 14° above the ambient temperature in the room (75°F). The highest temperature from the steel blocks was 107°F, or 32° above room temperature. Some of the cuts created cooler temperatures very close to Cool Blocks' measurements. So, the highest temperature difference I could get between the two types was 18°.

The author used a Raytek infrared thermometer to check the temperature of the blade in use or immediately thereafter. *He learned that friction and heat are more a function of feed rate and saw setup than the particular guides being used.*

For testing purposes I then moved the thrust bearing on the upper assembly back very slightly and used a faster feed rate to cut the same thick board. It wasn't difficult to achieve temperatures in excess of 150°F, and I'm sure with more aggressive cutting the blade would have gotten even hotter.

It's not hard to generate blade heat while cutting, but it's also not hard to reduce it to manageable levels. Adjust the lateral support blocks or bearings as recommended. Minimize blade flex by bringing down the upper assembly close to the workpiece, properly tensioning the blade and adjusting the thrust bearing to just a hair behind the blade when it is running freely. Then watch your feed rate, and don't try to follow curves that are too tight for your blade size.

REPLACEMENT BEARING ASSEMBLIES

Carter Guidall 500

Carter Guidall 2000

Paddock guide

Carter Stabilizer

MODEL	GUIDE SIZE(S)	BLADE SIZES	PRICE	SOURCES	COMMENTS
Carter Guidall 500	#0 equivalent	¼ in. to ¾ in.	$154*	Carter Products (616) 451-2928, catalogs	Good for resawing; not good for narrow blades
Carter Guidall 2000	#00, for most 14-in. bandsaws	3/16 in. to ½ in.	$150-$170	Carter Products, catalogs	Not as versatile as stock guides
Paddock guide	#00 to #1 equivalents	Model 10: ¼ in. to ¾ in.	$265 for model 10	Paddock Tool Co. (913) 621-3234 www.paddocktool.com	Excellent for resawing; easier to adjust than Guidalls; less prone to pitch buildup
Carter Stabilizer	Fits most 10-in. to 14-in. saws	⅛ in. to ¼ in.	$70	Carter Products, some catalogs	Best used for cutting curves; limited in capacity but very good at supporting small blades

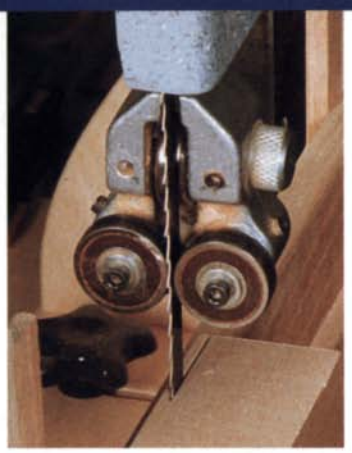
*Often requires accessory mounting bracket

ported between the flat side-faces of two bearings, rubbing rather than rolling between them.

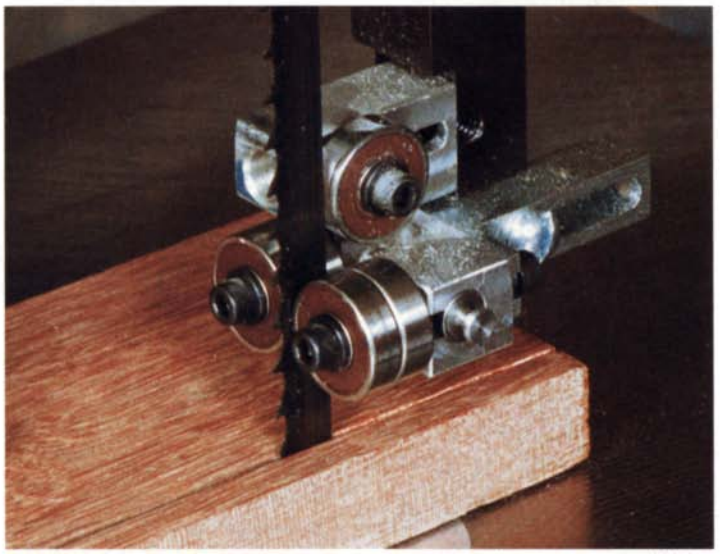
The only advantage of these guides is their ease of adjustment, with knurled locking rings replacing the usual combination of Allen wrenches. European bearing guides, however, have significant disadvantages. These guides are very large, so they eat up resaw capacity and cause the bottom assembly to be mounted farther below the table, allowing more blade flex. Also, these large guides block my line of vision, making it more difficult to follow a line on intricate cuts. The most significant problem I have found with several of these European-style saws, including the one I own, is that the side bearings are not parallel to each other and cannot be made parallel without a decent amount of filing and adjusting. Bearings that are not parallel can reduce blade support, cause more friction and make set-up procedures a headache.

Some manufacturers claim that the guides on their saws are adjusted so that the bearings are slightly toed-in, the idea being that the guides can be adjusted closer to the blade and its teeth without creating excess friction. But this setup will support the blade well only if the toe-in is minimal, 0.002 in. or less, and only if the toe-in position is directly at the front of the bearings. The greater the toe-in, the less the contact area and support. Many of the saws I have inspected have too much toe-in. Worse yet, it's located at the bottom or top of the bearings.

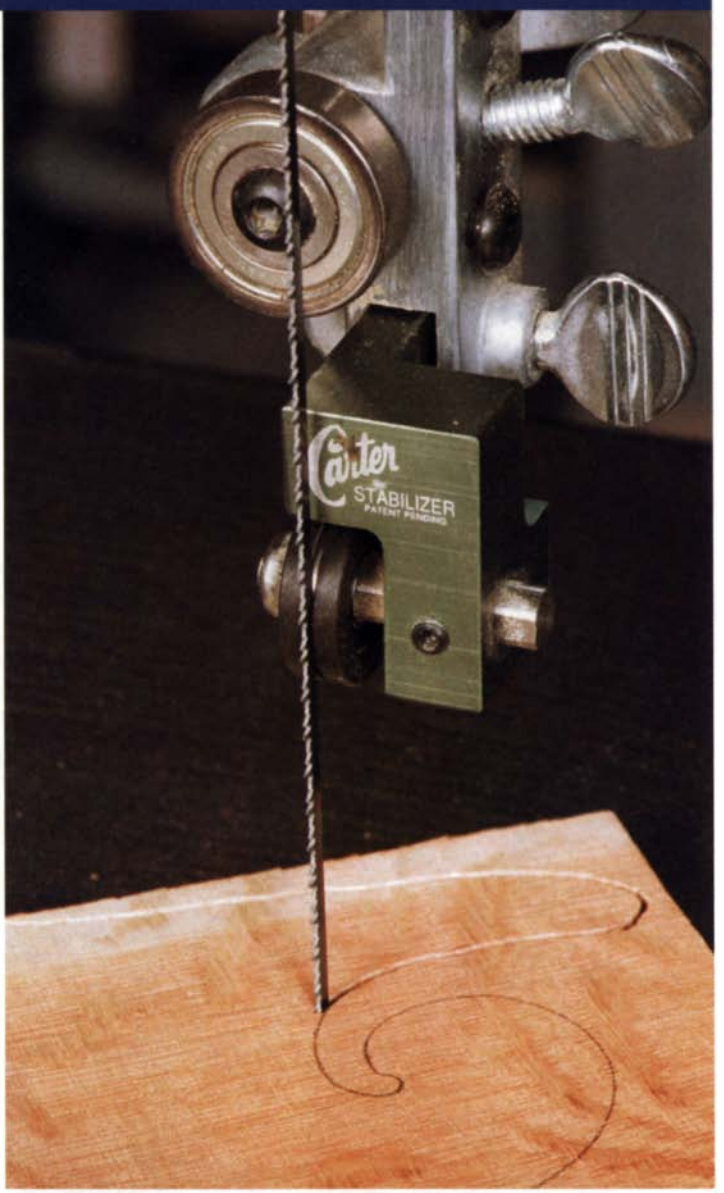
Photos, this page: Erika Marks



Both Carter and Paddock make bearing guides well-suited to larger saws used primarily for resawing. *The Carter Guidall 500, left, is less expensive, but its lateral-support bearings have rounded corners that don't hold smaller blades as well as the Paddock's sharper-edged bearings. Also, the Paddock has less trouble with pitch and dust buildup.*



Carter also makes a smaller bearing assembly, the Guidall 2000, as a conversion option for newer saws. *The sharper-edged, smaller bearings on this assembly do a much better job supporting narrow blades while still excelling at resawing.*



Carter's Stabilizer is in a category of its own. *The best option for guiding small blades through scrolling cuts, it consists only of a grooved thrust bearing. The existing upper thrust bearing and entire lower guide assembly are retracted when the Stabilizer is in use.*

The bottom line is that I would spend the money to replace these guides with aftermarket block guides.

Replace the guide assembly or just the blocks?

I like block guides for all-around cutting. It's hard to beat their versatility. If you have a newer 10-in. to 14-in. bandsaw, stick with the manufacturer's guide assembly and replace the steel blocks with Cool Blocks. If you do a lot of resawing, get a set of Iturra Bandrollers. It takes only a minute to switch styles. And if you do a lot of cutting with ⅛-in. blades, consider the Carter Stabilizer.

If I were replacing the assembly on an older, smaller saw (up to 14 in. or 16 in.), I'd go with the Wright block guide. However, for a newer 14-in. bandsaw, this block assembly is not enough of an improvement over stock guides to justify its expense.

On a larger saw (from 16 in. to 20 in.), I would choose Carter's Micro-Precision guide for all-around cutting. I would also use the Micro-Precision guide to replace the European-style bearing assemblies on today's larger, welded-steel-frame saws; however, replacements are not available for all saws.

If you have a larger saw dedicated to resawing or making veneer, I would install an American-style bearing assembly, with the slight edge going to the slightly pricier Paddock guide. □

Tim Albers is a woodworker and machine refurbisher in Ventura, Calif.

Six Steps to a Perfect Inlay

A little glue, a sharp knife and a minirouter make inlaying easy

BY ROLAND JOHNSON

Several years ago I was commissioned to restore an antique pool table with rosewood rails inlaid with ivory. The high quality of the original craftsmanship demanded that the repairs be of a similar level, a fact underlined by the $30,000 value of the table. After trying several methods I finally hit on a process that makes perfect inlays every time, whether for pool tables or Federal tables.

Start by gluing the premade inlay to the tabletop using rubber cement, the kind found in office-supply stores and hobby shops. Once the glue has set, carefully cut around the inlay with an X-Acto knife. I use the type of knife that has the snap-off blade sections so I can always have a dead-sharp point to follow the edge of the inlay. The first couple of times around the inlay, take light cuts to avoid following the grain of the wood rather than the edge of the inlay. Once a groove has been established, harder pressure can be applied.

Because inlays are not always perfectly symmetrical, and because you are cutting the outline by hand, mark one corner of the inlay and its corresponding place on the table with an X to maintain the correct orientation when you permanently glue the inlay in place.

Carefully remove the inlay from the tabletop using a thin-bladed putty knife. I rounded one corner of my knife to lessen the risk of cutting into either the inlay or the table while I am lifting. A bit of acetone on a cotton cloth will remove the rubber cement from the inlay and the veneer, leaving a perfect outline of the inlay.

To remove the substrate, I use a Dremel tool with an added router base (see *FWW* #132, p. 36, for more information on Dremel router bases). A laminate trimmer would work just as well, as long as the opening for the bit allows for a good view of what you are cutting. I use a ⅛-in. straight router bit extending past the base by the thickness of the inlay plus room for adhesive. Use a high-quality bit to ensure a clean cut.

Starting in the middle of the inlay area, rout in a somewhat circular motion, removing the material quickly. If the inlay covers a large area, I set up a small router with a ½-in. straight bit to remove most of the material, then I switch back to the Dremel tool as I get close to the line. Rout as close as possible to the scribed line, ideally to within about 1/16 in.

Use the X-Acto knife and chisels to finish the job. Rather than using the scribe line to guide the chisel or knife, cut through the bottom of the waste to break it free. The scribed line acts as a stop cut and allows only the waste to be lifted out. The result is an absolutely accurate outline of the inlay. A skew chisel is useful for removing the waste from corners.

Apply a light coat of yellow or hide glue to the tabletop, carefully apply the inlay, cover with wax paper, position a caul and clamp it down. I usually remove the clamps immediately to check whether the inlay is flush, then I replace the caul and clamps and allow the glue to set. When scraping away the backing paper and any dried glue, move from center to the outside to lessen the risk of catching a high edge. I find a chisel easier to control than a cabinet scraper. The final step is to sand the area with 150-grit, or higher, paper and a block, and the perfect inlay is done. □

Roland Johnson is a woodworker who lives near St. Cloud, Minn.

1 ***Cement the inlay to the tabletop.*** *Apply a thin layer of rubber cement to the exposed side of the inlay. Then align the inlay carefully in the desired location and push it down.*

2 ***Cut around the inlay.*** *Using a very sharp hobby knife, cut into the tabletop using the edge of the inlay as a guide. Keep the blade at a right angle to the tabletop to achieve a straight incision.*

3 ***Rout away the waste.*** *With a Dremel attached to a router-type base and a ⅛-in. straight bit, cut as close to the knife cut as you are comfortable with.*

4 ***Clean up the cut with a chisel.*** *Cut from the routed area into the waste using the knife cut as a stop cut.*

5 ***Glue the inlay.*** *A generous coating of yellow glue lessens the chance of the inlay blistering. An X marked on the inlay and the veneer ensures consistent orientation.*

6 ***Clamp the inlay.*** *A layer of wax paper between a sturdy caul and the inlay prevents squeezed-out glue from bonding the two together. Leave the clamps on overnight to ensure a tight bond.*

Photos: Mark Schofield

How to Match a Finish

New projects sometimes need to blend in with existing furniture

BY JEFF JEWITT

Sooner or later, most woodworkers will likely face the challenge posed by a client or a spouse: "Well, I know it's pretty wood and all, but can you make it match the rest of the furniture?" The first time I heard those words my heart sank. I had made two matching nightstands for my wife using the most stunning figured ash I'd ever seen. The last thing I wanted to do was stain them, but I had to admit that pearly white wood didn't exactly fit in with our decorating scheme.

Many factory finishing operations involve specialized stains (such as sap stains, equalizing stains and pad stains) applied to the furniture in as many as six separate coloring steps. But it doesn't have to be that complicated. If you understand how stains work on wood and apply some basic color principles, the job can go a lot smoother. You don't need dozens of different stain colors. Armed with a few dyes and pigment stains in wood-tone colors—plus red, yellow, green and black—you should be able to match just about anything by following a systematic process of staining, glazing and clear coating.

Before we get into the process of matching one finished piece to another, it will help to keep in mind the following:

- Matching a finish requires the correct lighting conditions. Incandescent and some fluorescent lighting will distort the color. It's best to work in diffused natural daylight or under full-spectrum, color-corrected fluorescent lights.
- Work from light to dark gradually. You can always darken a color, but it's very difficult to lighten wood tones under a transparent finish that are already too dark.
- It's easiest to match colors when the finish has a high-gloss sheen. Most colors shift slightly when the finish over them is satin or flat. If the sample you want to match does not have a glossy sheen, wet the surface with some mineral spirits to simulate the effect of gloss.

You can build color in different ways

Wood stains can be grouped into two distinct types—dyes and pigments. Manufacturers sometimes mix the two together, but I find it easier to work with one at a time when matching color.

Pigment stains use an inert, finely ground colored powder as the colorant. This powder is suspended in a mixture of resin and thinner. When applied to wood and wiped, the small pigment particles lodge in the surface texture of the wood. When the

STEP 1 ESTABLISH A CONSISTENT UNDERTONE

A dye stain for the undertone. *Start with a light-colored dye stain to even out different colors in the wood. If you use water-based dye stain, this step also raises the grain.*

STEP 2 ADJUST THE COLOR WITH A DARKER STAIN

A second, darker color of stain should get you close. *If possible, add this coat when the first one is still wet: It'll help prevent blotches.*

thinner evaporates, the resin dries and binds the color in place. Soft woods with a spongy texture (such as pine and poplar) have plenty of minute cavities for the pigment to lodge in, so it's possible to make the wood very dark. Hard, dense woods (such as cherry and maple) have fewer cavities, so pigment stains won't work as well if your goal is a dark color.

Dye stains are colored solutions in which microscopic dye particles are mixed with either water or alcohol. When applied to wood, the color is distributed evenly and deeply, so you can stain all types of wood more effectively. The result is a more transparent color than what you get with pigment stains, because dyes don't muddy the surface. And because dyes penetrate deeper and contain no binder that would inhibit absorption, it's easy to shift a color that's slightly off the mark by using another dye.

Glazes are just modified pigment stains. Commercial versions are thicker, have a lower binder content, and they're slower drying because they're sometimes manipulated after application to produce special effects. Add mineral spirits to a pigmented gel stain, and you'll get pretty much the same thing as a store-bought glaze.

Paste wood fillers are pigment stains that contain a fine quartz-silica additive to bulk

STEP 3 FINE-TUNE THE COLOR WITH A GLAZE

Learn to mix your own. *Store-bought, oil-based glazes can be tinted with concentrated Japan colors to get the exact shade you want.*

Glaze refines the process. *Liberally coat the workpiece with glaze, then wipe it off.*

Photos: William Duckworth

up the pores of open-grained woods to attain a glass-smooth finish. Oil-based versions are easier to apply and control.

Match a finish in four basic steps

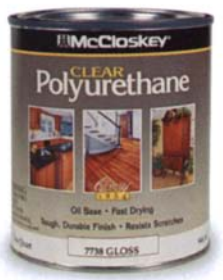
To match a finish, start with the undertone color of the wood (using dye stains). Over that you often need to change the color using a second dye stain or a pigment stain. When the color is close, add a coat of sealer to lock it in. To tweak the color even more, use a paste wood filler (on porous open grain) or a glaze (on tight grain). And finally, you need to match the sheen of the original finish (with a gloss, satin or flat finish). Using the unfinished cherry side table in the photos to illustrate the process, let's go through each step.

Match the undertone first—When matching old furniture or woods that change color easily, this step establishes an underlying golden-colored patina, which evens out different colors in lumber and veneer and helps blend sapwood to heartwood. The undertone is the hardest color to see, but it often is the lightest background color in the wood. It's best to use a dye stain and try it first on a stain board (see the story below). Also, if you're not sure about the color of the undertone, it's safer to go with a color that is a hair lighter.

Adjust the color, and seal it in—Adjust the undertone with a second color of stain, if necessary. This step is more often required with tight-grained woods (such as the cherry shown in these photos) and darker colors. On open-grained woods (such as oak or mahogany), the color of the pores has a dramatic impact on the overall color and appearance of the finish. An oil-based paste wood filler or a glaze will vary that visual impact effectively. Before continuing, you can maintain more control in matching a finish if you first lock in the color with a sealer coat of shellac or lacquer.

STEP 4 MATCH THE SHEEN WITH A TOPCOAT

To match a color, always apply a gloss finish. *After it dries, you can rub out the surface with fine sandpaper or steel wool to achieve the desired sheen, or you can use a satin or flat finish on the last coat.*



Tweak the overall color with a glaze—Once the wood has been sealed and the basic color established, you should need to make only small adjustments to the final color. You can sneak up on it by using a glaze of thinned, concentrated colors. They're easy to apply and, if you get the color wrong, easy to wipe off before they set up. Start with a glaze of wood-tone colors and mix in pure Japan colors such as red or green to adjust the final hue. Check the color of the glaze by smearing some on a piece of glass. When you have the color right, check it on a stain board. To darken a color, use dark brown rather than black, which makes the overall color "cooler," or less red. Swab the glaze on liberally, then wipe it off. A glaze should dry overnight before being covered with a topcoat.

Toning is another good way to produce darker color and tonal shifts, but you'll need to do this with a spray gun by mixing pigment stain or dye stain into the finish.

Match the sheen—The color will deepen and go to a shade slightly darker once a clear finish has been applied. Avoid using dark or strongly colored finishes (such as exterior varnishes and orange shellacs) because they will change the final color. If you use a varnish or polyurethane with a gloss sheen, you can rub out the finish to any sheen you wish after the topcoats cure. To determine the sheen of an existing finish, place the sample under a fluorescent light. If the reflection of the tube is distinct, the finish is gloss. If it's slightly fuzzy, the sheen is satin; and if the reflection isn't discernible, the finish has a flat sheen. Gloss topcoats deepen the color the most, and satin and flat sheens lighten up the color slightly or add a frosted look. □

Jeff Jewitt restores furniture and sells finishing supplies at his shop in Cleveland, Ohio.

A stain board to guide the way

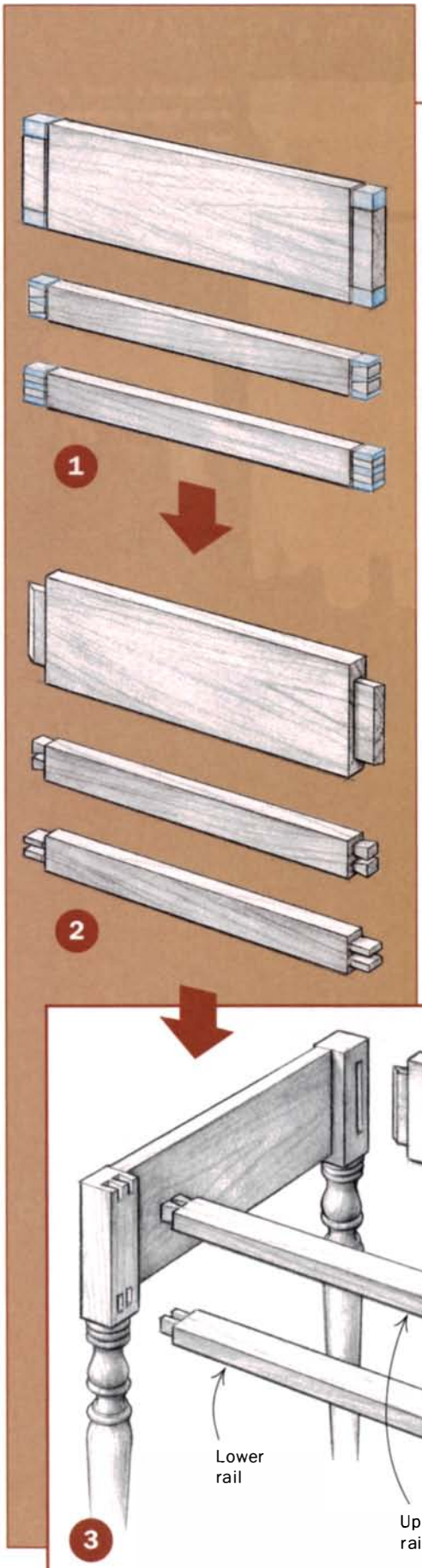
To help in the finishing process, make a stain board. Take a scrap cutoff from the piece you're working on and divide it into several sections to give yourself some leeway to tinker with colors until you get a match. You can test colors on the stain board before applying them to your project.

It's surprising how few colors I use regularly to match all the finishes my shop has to produce. For a basic color kit, start with an assortment of four dyes in wood tones: a honey-colored dye for undertones (especially the yellow undertones on antiques), a medium nut-brown color, a reddish-brown cherry color and a dark brown. Add red, yellow and green dyes to modify these wood-tone colors. For pigment stains, you should have comparable colors to those mentioned above plus concentrated versions of red, green, black and white—sold as Japan colors for oil-based finishes and universal tinting colors (UTCs) for oil- and water-based finishes.

Fast and Accurate

A Sheraton-style table comes together easily, thanks to an efficient approach

BY STEVE LATTA



MILLING MATCHING PARTS

1. Begin with all parts cut to the same length. Then cut the shoulders on all of them.

2. Machine the joints and trim as needed without disturbing the shoulders.

3. The table will come out square because the distance is equal between the shoulders of the rails and the rear apron.

When the hand, eye and brain fall in sync, something wonderful happens. I call it "hitting rhythm." The ability to find that rhythm, however, is consciously developed over time. It begins with a combination of both instincts and careful planning that takes into consideration joinery, measurements, milling procedures and fine-tuning. If done correctly, no time is wasted remaking parts and refitting them. A piece of furniture properly planned from the start ends up precise and looks crisp.

I learned all of that the hard way. As an apprentice, I worked in a small, overcrowded shop that made a lot of dining tables. Anxious to see big slabs of outrageously figured wood, I milled the tabletops first. But days later, as the base was nearing completion, I would find the tops full of dings and scratches from being around the shop far too long. A lot of time and profit disappeared fixing those little nightmares.

Design logically, but don't sacrifice aesthetics

There is a logical approach to building a piece. I call it "sequencing." Well thought-out strategies allow you to machine all of your joints (tenons, double-tusk tenons, even dovetails) at the same time, using the same initial setup, which helps ensure accuracy. In the case of this Sheraton-style table, a project built by our freshmen each year, most of the joints are executed on the tablesaw. The underlying strategies can be applied to any project, regardless of the joinery or the style.

The table consists of only a few elements: a top, four legs, three aprons, rails, a drawer and its supports. But the choices made when sizing parts can help or hinder construction. The Sheraton table is a delicate piece, so I constructed it using primarily ⅝-in.-thick stock, which makes up the top, aprons, upper and lower rails, drawer runners and kickers. The drawers are mostly ⅜-in.-thick stock, except for the 11/16-in.-thick front.

On a table like this, I design the upper and lower rails to be the same width as the leg so that they end up flush when joined. During the joinery phase it will become apparent why I like doing it this way. One big rule exists, however: Never let engineering conveniences take precedence over aesthetic concerns.

Always mill extra stock

Life happens, and accepting the inevitability of occasional mistakes makes one a more efficient woodworker. That's why, if my stock allows, I make extra pieces to use

Drawings: Bob LaPointe

Table Joinery

for machine setups or for mistakes if they occur. A lot of time gets wasted remilling pieces to fix screw-ups. On the flip side, however, running an extra apron or rail along from the start burns little time at all.

Mill the stock for the rails, aprons, top, kickers and runners down to ⅝ in. Because edge-glued boards often don't line up perfectly, leave the boards used for the top a hair thicker than ⅝ in.; after they've been glued up, they'll need to be handplaned flat. Next, mill up the drawer parts and choose a nicely figured piece for the front.

Regardless of the type of table being built, machine leg stock oversized by about ⅛ in. to ¼ in. and let the blanks sit overnight in case they want to move a little. For final dimensioning, surface adjacent faces on a jointer, then run the opposing faces through the planer to bring the faces parallel and to final thickness. On that final pass, I also run the upper and lower rails through the planer, on edge, so they come out exactly the same thickness as the leg. If this sequence is followed, the stock ends up identically dimensioned, square and without tablesaw marks that can be a nuisance to remove later.

Rip and crosscut all of the parts to length, leaving the internal drawer runners and guides a little long; they will be fitted to the base after it has been assembled. To avoid having to clean up tearout, place a fresh auxiliary fence on the miter gauge. Additionally, crosscut stock so that tearout shows up on unexposed faces. Paying strict attention to tearout adds to the overall cleanliness of the piece and eliminates time spent removing it later.

Strategy for accurate joinery

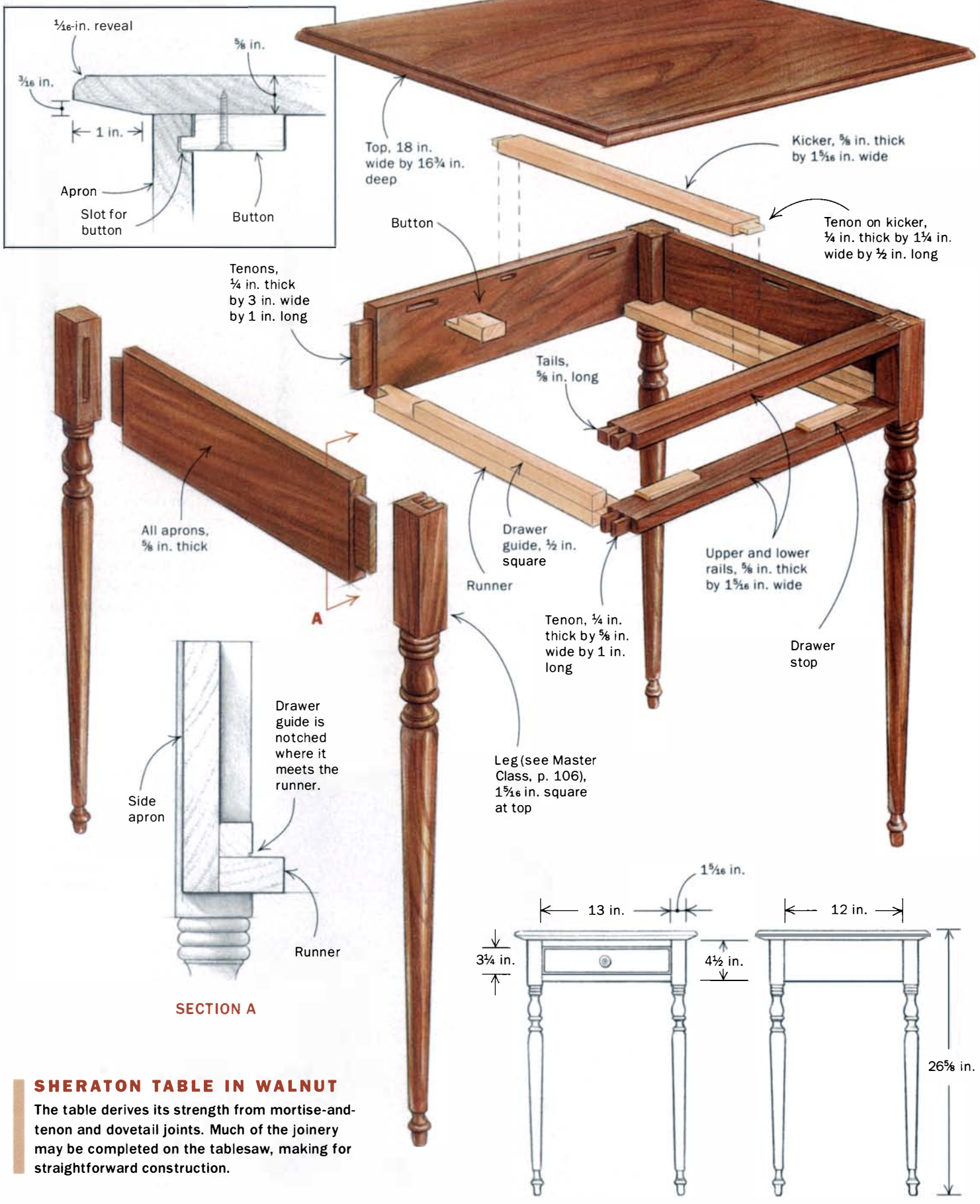
Well-made joints determine the overall structural and cosmetic integrity of a piece of furniture. On any square or rectangular table, the critical factor is the shoulder-to-shoulder distances of parts on opposite sides of each other. In other words, the shoulder-to-shoulder distances of the rear apron and upper and lower rails must be identical. The same goes for the side aprons. If these dimensions differ by even a tiny amount, the table will be out of square, and the drawer won't fit properly. To guarantee these parts come out right, cut all of the shoulders on the tablesaw using the same fence setting.

Mortise the legs first because tenons are easier to fit to mortises than vice versa. So begin with the legs (for more on how to turn a Sheraton leg, see Master Class on p. 106). If you don't wish to turn the legs, simply taper them down to ¾ in., beginning 5 in. below the top. Next, paying close attention to the grain, choose the best way to orient the legs, then mark the faces as front and side. It's a good idea to look at legs in pairs to get a pleasing match. Then lay out and cut the mortises. (Because the upper sections of the legs remain square, joints may be cut after turning.) Don't wor-

ORGANIZE YOUR MILLING TASKS

Mill legs and rails at the same time. *The table's legs (left) and rails (on edge, right) are both planed to the same thickness.*

Photos: Anatole Burkin



SHERATON TABLE IN WALNUT

The table derives its strength from mortise-and-tenon and dovetail joints. Much of the joinery may be completed on the tablesaw, making for straightforward construction.

ry about the dovetail sockets on the front legs for now.

Crosscut parts to length—Cut all of the aprons, rails and extra stock to length on the tablesaw. As the drawing on the facing page shows, the rear apron and lower rail are the same length. Even though the upper dovetailed rail is shorter, cut it to the same length as the upper rail and rear apron. Keeping that lower rail long at this stage will help keep the distance between shoulders identical to the top rail.

Make shoulder cuts on all parts—Cut the shoulders in a logical sequence. Use scrap stock to check your setups. Set the fence 1 in. to the outside of the blade. Then raise the blade so that it barely grazes the stock. With this setting, score the top and bottom faces of the lower rail. Raise the blade to ⅛ in. and cut the bottom face and the front and back edges of the upper rail.

Next, raise the blade and make all of the shoulder cuts on the faces of the aprons. This cut should leave the beginnings of ¼-in.-thick tenons.

Raise the blade again and cut the front and rear edges of the lower rail. Those cuts define the tenon shoulders. Then nibble away at the waste to make a tenon.

Last, cut the edges of the aprons to define the width of the tenons. This step requires raising the blade even more, and due to runout or other saw anomalies, the already cut shoulders on the faces of the aprons may be nicked. To prevent that, move the fence a hair toward the blade before making the cut. Afterward, chisel away the excess material to end up with clean shoulders. Note that up to this point the fence location has not been changed once while making all of the shoulder cuts. Using one setting ensures identical shoulder-to-shoulder distances between components.

Cut the cheeks using a tenoning jig

A simple shopmade tenoning jig in which your hand acts as the hold-down clamp is faster than using a commercial jig that requires stock to be clamped for each cut. But you should use what you feel comfortable with. The concepts are the same.

Set the jig to cut away one cheek from the upper rail, leaving it with a ½-in.-thick tenon. This tenon will be cut into a pair of tails. When done, put it aside for now.

Reset the tenoning jig to cut tenons for

EFFICIENT SHOULDER CUTS

Set the saw fence at 1 in., measured to the outside tooth, then make all of the shoulder cuts on the rails and aprons.

For the first cut, raise the blade just a hair. *Make the first cut on the top and bottom faces of the lower rail, just scoring the stock.*

Crank up the blade to ⅛ in. *Score the bottom face and front and back edges of the upper rail.*

Raise the blade to 3/16 in. *Cut the shoulders on the faces of all the aprons. The stock left between the kerfs should be ¼ in. thick.*

Raise the blade to almost ¼ in. *Cut the front and back edges of the lower rail, then nibble away at the edges.*

Check the fit by holding the rail against a leg. *The edge of the rail should meet the edge of the mortise.*

EFFICIENT CHEEK CUTS

This simple shopmade tenoning jig (left) is made of medium-density fiberboard (MDF). It rides on an auxiliary fence screwed to the saw's stock fence.

Machine the shoulder of the upper rail. *Cut the cheek on the bottom face of the rail, leaving it ½ in. thick. Dovetails are cut later.*

Cut the cheeks on the apron. *The author cuts the tenons slightly fat; later he will trim them with a shoulder plane to fit.*

Cut the double tenons of the lower rail. *Cut the outer cheeks first, then nibble away at the waste in the center until the joint fits snugly.*

the aprons. Again, use a piece of scrap to dial in the jig, and check it against the actual leg mortises. Mill these tenons a tad thick and let them shrink overnight. Then, using a shoulder plane, trim them to fit.

Leave the blade height alone, reset the tenoning jig and cut the outside cheeks for the double tenons on the lower drawer rail. Once the outside sections have been removed, reset the jig and remove the waste in the center. Flip the stock and make two passes each time the jig is adjusted; that way the tenons come out identical. By now you'll realize why it was a good idea to mill the legs and rails to a similar dimension. Once fitted, the lower rail is flush to the front and rear faces of the legs.

It's time to finish the upper rail. Trim the tenons to ⅝ in. long, then mark and cut a pair of dovetails. Use the tails of the rail to mark the matching sockets atop the front legs. Cut out most of the waste on the leg using a router with a straight bit, then finish the joint with chisels. When you fit upper and lower rails to the leg, the opening should be perfectly square, as long as the joint closes fully.

The tenoned aprons are mitered where they meet in the rear leg mortises. Cut these at 45° on a chopsaw.

An easy way to fit a kicker

Two small slots, one in the inside edge of the upper rail and one in the back apron, must be cut for the kicker. Cut the slots on a router table using a ¼-in.-dia. straight bit. Position the fence so that the slot comes out centered on the edge of the rail and apron. It may take a few tries to get the fence just right; I use scrap stock. Then cut the slots in the rail, followed by the rear apron. There's no need to move the fence; just reference the top edge of the apron against the fence.

While the router table is still set up, reposition the fence and cut the slots for the buttons. With a chisel, square up the rounded ends of all the slots.

Dry-fit the base first, then glue it up

A lot can go wrong—and often does—during this process. Clamp pads are forgotten, and stock gets marred. Forces from clamp pressures are ignored, and things end up out of square. Too much glue is applied and left to harden before removal. Back in *FWW* #31, Ian Kirby did a wonderful job covering all of the bases in his article on gluing up. For the short course, remember three rules.

First, always do a total dry-fit, complete with clamps, pads, clean-up tools and anything else you'll need for the real thing. Second, after your piece has been dry-clamped, study it, check it for square, and make sure everything looks good before moving on. Third, if you really have to crank on something to pull it together, don't. Disassemble the parts and trim the parts that bind.

Begin the glue-up by attaching the rear legs to the rear apron. Then attach the drawer rails and front legs as a subassembly. Pay close attention to the squareness of the drawer opening; too much clamping pressure, or misaligned clamps, may distort the opening.

When the first set of parts has dried, glue up the rest of the base. In the excitement of the moment, a few of my students have for-

gotten to insert the kicker while gluing up the base. You'll be sorry if you do.

Get to know the ins and outs of drawers

The drawer on this table is inset flush with the front rails and legs. The drawer front, a choice piece of walnut, is first cut to size, then beaded using a scratch stock. To help prevent tearout, use a file to round over end grain, then scratch-bead.

After that, it's time to dovetail the box. A fine piece of furniture deserves dovetails. Because they leave fat pins, router-cut dovetails are unacceptable to me.

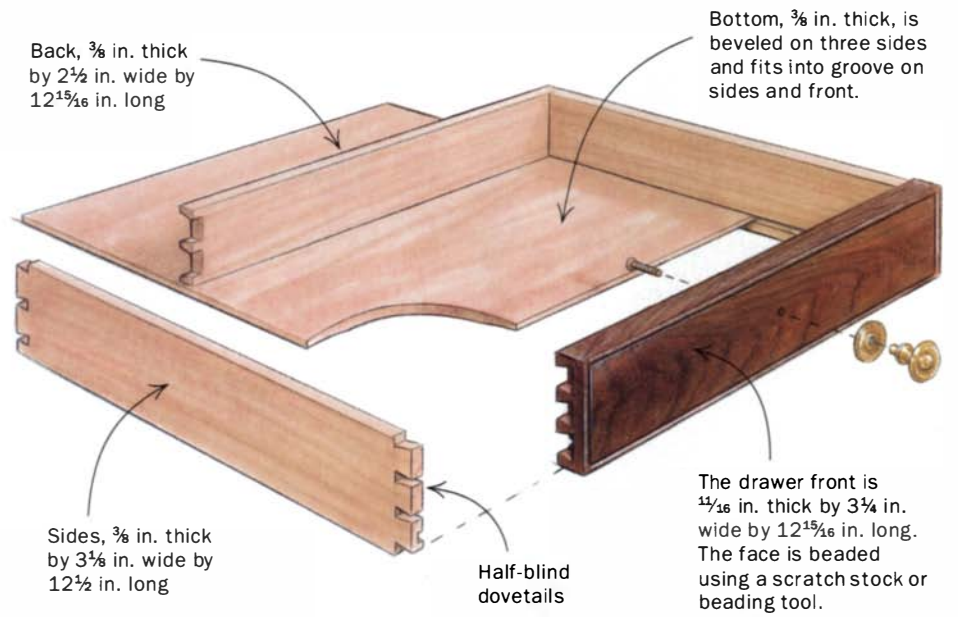
When cutting the drawer parts to final dimensions, make the sides slightly narrower, by about ⅛ in., than the face. The sides, made of secondary woods, such as poplar, usually expand and contract at a different rate than the drawer front, and I don't want them proud. The drawer bottom is a piece of solid wood beveled along the underside and fits into a slot cut into the front and sides of the drawer.

The base requires two more parts—a pair of runners and guides—before you can fit the drawer. Begin by cutting the notches on the runners where they meet the rear legs. Then handplane the wear surfaces for a smooth finish. Glue the runners into place flush with the lower rail.

A few tricks of the trade come in handy when making the drawer guides. First, choose straight-grained stock, then orient the grain so that they may be planed easily in place (the side that rubs against the drawer) without causing tearout. There are two other tricks to remember: one, cut a notch on the lower corner of the guide, where it meets the runner; and two, trim the guide about 2½ in. short of the rear leg.

A TRADITIONAL DOVETAILED DRAWER

The drawer face is made of figured walnut, and the interior components are poplar.



The drawer guide is notched and shorter than the runner. *When it comes time to fit a drawer, plane only the guides, not the sides of the drawer.*

Drawer stops are glued to the lower rail. *To position the stops, remove the drawer bottom, replace the drawer and position the stops against the inside edge of the drawer front.*

Use nicely figured wood for the top and appropriate finish and hardware

Ideally, a one-board top is the best. I shake my head thinking back to my shop classes where the instructor told us never to use boards wider than 7 in. because they would cup. Many a beautiful board was butchered those early days for the sake of a woodworking theory.

A couple of guidelines, however, deserve consideration. First and foremost, never compromise appearance for some theoretical guideline. The top often dominates the piece visually, and it should be drop-dead gorgeous. If both faces of the top look attractive, orient the growth rings so that the edges cup to the aprons. Boards typically cup against the annual rings, and that fact should not be ignored.

Machine stock for a tabletop close to final thickness before glue-up, as opposed to assembling the slab heavy and planing the whole thing down. In figured woods, grain patterns can change significantly in a single pass through the planer. By following this sequence, you'll have greater control over the final look of the top.

The top of the Sheraton table has a router-cut thumbnail profile and a chamfer along the bottom edge, cut on the tablesaw, and then it's handplaned smooth. When detailing the edges, always profile the end grain before the long grain to prevent blowout in the corners.

The best finish for a period piece is shellac. It's easy to apply and, if damaged, repairs well (for more on shellac, see *FWW* #134, p. 129). Two or three coats, whether padded, brushed or sprayed on, should do fine. Then rub it out for the sheen you desire. For hardware, order something appropriate and of high quality. At my school we use a Sheraton knob (H-30) made by Horton Brasses (800-754-9127). □

Steve Latta is a member of Executive Council of the Society of American Period Furniture Makers and teaches at the Thaddeus Stevens College of Technology in Lancaster, Pa.

Scrapers Refine Turned Surfaces

Some experts say don't use them, but scrapers clean up ridges left by gouges and greatly reduce sanding time

BY RICHARD RAFFAN

Photos, except where noted: Anatole Burkin

Within minutes of venturing into the workshop on the first day of my wood-turning career, I was initiated into one of the great myths and practices of wood turning. With a twinkle in his eye, the boss said, "You might have heard that real turners don't use scrapers—but we do in this workshop. It makes life a lot easier."

In the wonderful but sometimes bitter world of wood turning, those of us who use scrapers often are maligned and dismissed as inept by the cutting-tools-must-be-used-at-all-times brigade. This myth appears to have arisen in the late 1960s and seems to have come from a popular wood-turning author. The advice must have held back thousands of would-be turners who thought they would be breaking some divine regulation by even so much as *looking* at a scraper. Some wood-turning teachers even advertise the fact that *no scrapers* are used in their workshops. Don't they know how? Or are they too blinkered to try? It would be comical if it wasn't so sad.

I am certain the origin of this myth that real wood turners don't use scrapers lies with spindle turners who do indeed use only gouges, chisels and parting tools, except in some highly specialized areas involving very hard woods and intricate detail, such as in the manufacture of boxwood chess pieces. Scraping techniques rarely produce good surfaces on spindles, but they excel for end-grain hollowing and faceplate work.

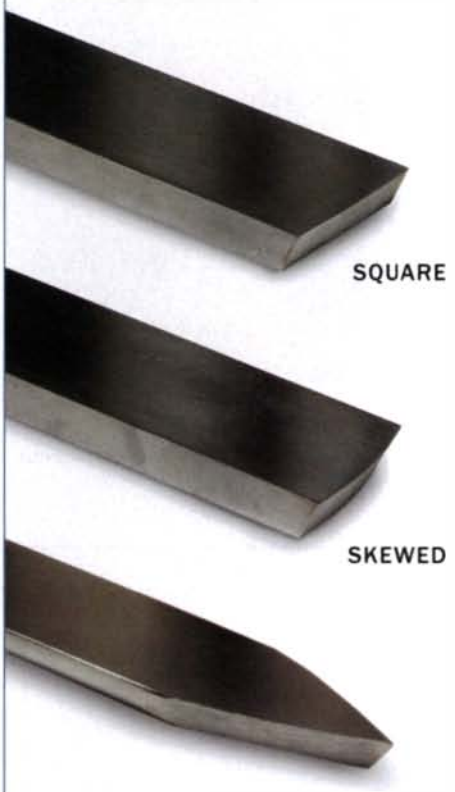
Scrapers refine gouge-cut surfaces on faceplate work (where the grain is aligned 90° to the lathe axis) and surfaces within end-grain hollows such as goblets or boxes. Remove the bulk of the waste using gouges, then finish with scrapers if need be. Even in expert hands, gouges leave a slight groove, which must be removed for a truly smooth surface.

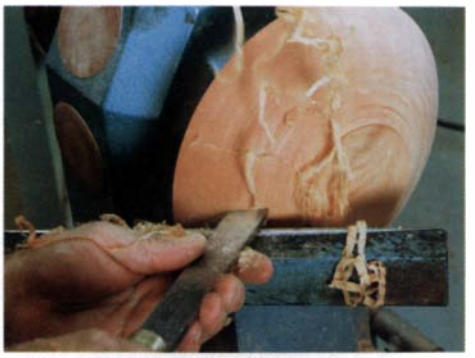
To burr, or not to burr

The edge I commonly use has a slight burr straight off an 80-grit grinding wheel. I find this edge to be ideal for general use, especially for the relatively heavy cuts that sweep across the inside curve of a bowl. A honed edge can leave a smoother surface, but when I'm in production mode (working fast), I rely on abrasives for the final step, which is faster than trying to get a perfect surface with just a scraper. There

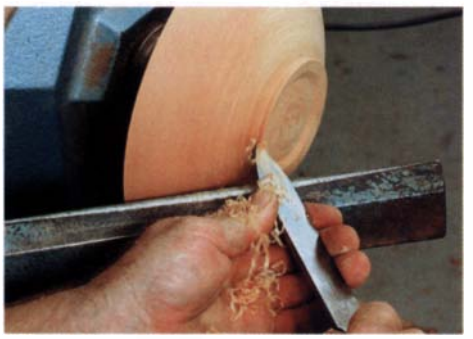
EXTERNAL SCRAPING CUTS

Apply light pressure, angling the tool in the direction of the cut.

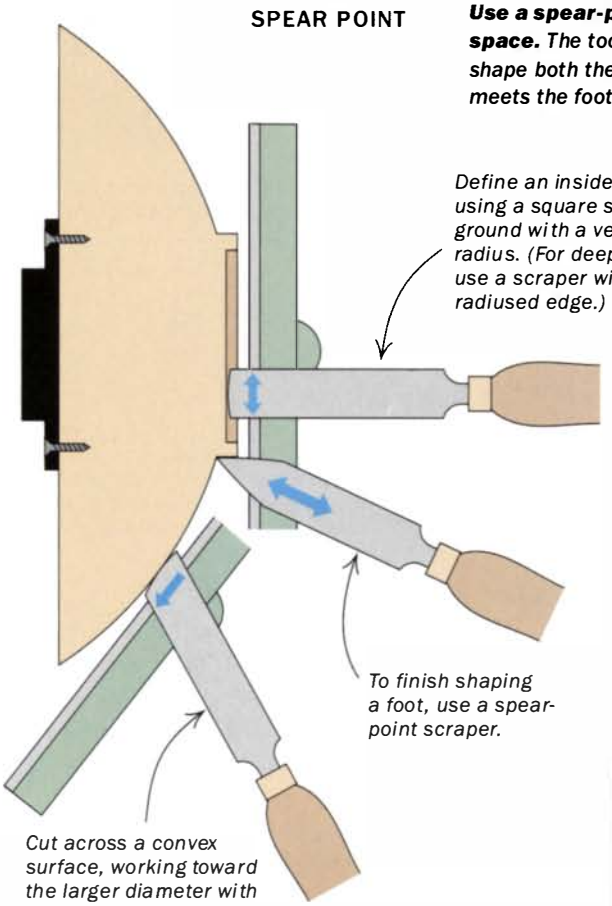


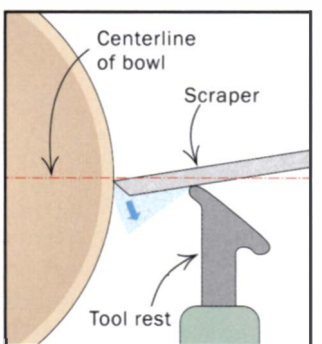


Approach the stock with the tool at an angle but with its shank flat on the tool rest. *For a more aggressive method, called shear cutting, roll the tool slightly to one side, which will create ribbons of shavings.*



Use a spear-point scraper in a narrow space. *The tool's narrow profile allows you to shape both the foot and the bowl where it meets the foot.*





The tool rest should be set lower for external cuts. If the tool does catch in this position, it will fly off harmlessly into space.

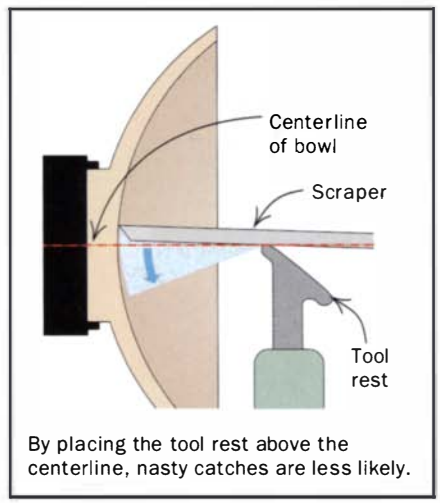
Photos, facing page (bottom) and this page (top left): Erika Marks

INTERNAL SCRAPING CUTS

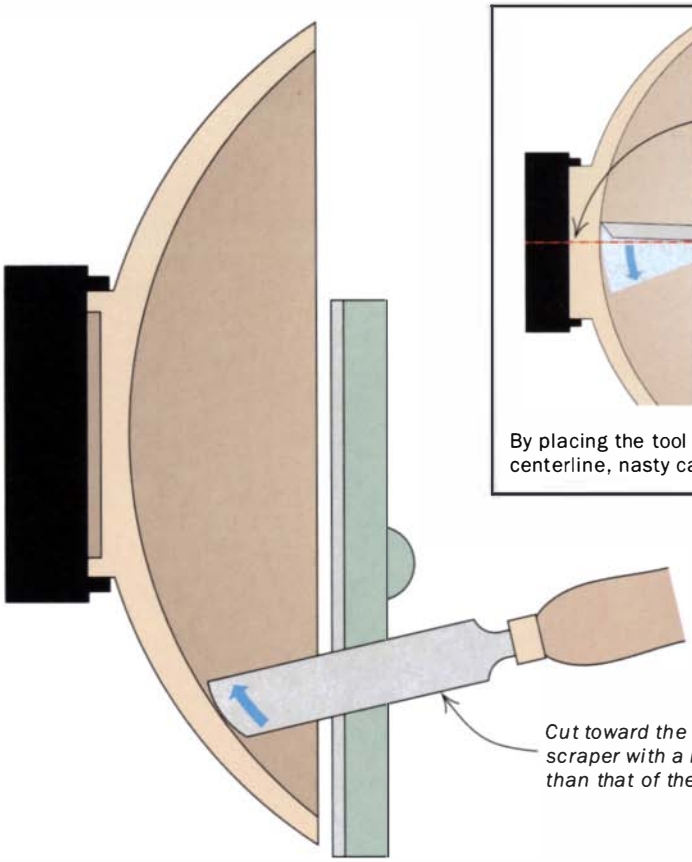
Because the tool rest can't get in close to hollow sections, greater leverage must be applied to control the tool.

SKEWED

Radiused scrapers are best for inside cuts. *As the wall of the bowl gets thin, place a finger behind the area being worked to dampen the vibration.*



By placing the tool rest above the centerline, nasty catches are less likely.



Cut toward the center using a skewed scraper with a radius slightly less than that of the region being worked.

are times, however, when a burred edge may cut too aggressively and be prone to catching. When I turn extremely hard woods, such as cocobolo and African blackwood, I hone the sharpened edge with a diamond stone to remove the burr. Let experience be your guide on which woods work best with what type of edge.

A bench grinder is the perfect tool for raising the burr on a scraper. Most turning tools today are made of high-speed steel and may be ground and sharpened quickly using aluminum-oxide wheels of 36 and 80 grit. Hone the top of a scraper flat to remove an old burr before grinding a new one. Keep the tool flat on the grinder's rest and swing the handle to grind the edge. For a single facet bevel, start with the bevel heel on the wheel, then raise the handle until sparks come over the top of the edge.

Don't be shy about regrinding the edge profile of a scraper to better suit the particular piece being turned. When removing a lot of metal, you should quench the tool occasionally in water to prevent it from overheating. Use the 36-grit wheel for reshaping; the 80-grit wheel is all you need to maintain a burr. For most turned work where the surfaces are generally curved, you'll want scrapers with radiused edges. But for some jobs, such as deep hollows, you'll need to grind the scraper with a straight edge.

Scrapers are rarely used to advantage by the majority of wood turners I've met, because most people don't sharpen them frequently enough. If the lightest touch against the revolving wood fails to produce a little curly shaving, resharpen the edge rather than force the tool into the wood.

Avoiding catches

A scraper must always be held so that if it catches, the edge will swing directly into space. When scraping profiles (external surfaces), use the scraper with the blade tilted down a degree or two from horizontal and with the tool rest at the centerline of the piece (see the inset drawing on p. 57). On internal curves, such as working inside a bowl or end-grain hollow, you may tilt up the tool a degree or two, as long as you're above the centerline of the piece, and not risk a major catch. But on all internal *flat* surfaces, such as the bottom of a bowl or coaster, the scraper must be tilted down. Typically, when working internally, I adjust the tool rest so that it resides at center, or just a hair above center (see the inset drawing at left).

The very word scraper has an onomatopoeic ring to it, implying the sort of grating force needed to remove old paint from surfaces being refurbished. A more appropriate term would be strokers, because that's how they're used. As with all turning, the secret is to let the wood come to the tool. If you force a scraping edge into the wood, the tool will invariably tear the fibers and very likely catch. You need to sweep a radiused scraper *across* the surface so that it skims along it like a boat planing over water. Square, flat-edged scrapers used at 90° to the surface need a fine touch to avoid catches. Use them for

scraping deep hollows where a skewed edge can't reach.

Working convex curves and corners

Whenever possible, angle a scraper in the direction you want to cut, across the surface rather than directly against it. A tangential angle limits the pressure you might put into the cut. If the tool blade is 90° to the surface being cut, a catch is more likely. Additionally, a tool aligned at 90° is difficult to sweep smoothly across a flat surface, let alone around a curve.

For working convex curves, such as the outside of a bowl, I recommend using a skewed flat-edged scraper (with a very slight radius) because it's the easiest shape to work with. When scraping convex surfaces, take light cuts. Apply the same kind of pressure you would while rubbing your hands together under a hot-air drier. And remember to avoid attacking the wood with the tool at 90°.

For all of these cuts the scraper shank remains flat on the tool rest. You may find that the scraper doesn't work well on the end grain, where wood fibers are barely supported. The secret to getting a better finished surface is to tilt the tool on its side so that the edge slices the end grain at a slight angle. This shear cut allows you to stroke the curve of the wood tangentially by easing the tool back and forth to work on a recalcitrant bit of grain.

When shear cutting, keep the point of cut in the lower half of the edge. Here the tool rides on the bottom left corner of the shank, which may make it difficult to move smoothly along a tool rest, especially one that is pitted. Such a tool rest should be filed smooth. Some modern skewed scrapers have a rounded side, which makes them slide across even the roughest rest.

Smoothing concave surfaces

The above rules also apply to using scrapers on internal curves (the inside of bowls). Concave sections have their own problems, however. On a smaller bowl, the width of a tool rest may prohibit getting in close; consequently, greater leverage must be applied to the tool. And because hollowing reduces the wall thickness of a piece, vibration becomes a problem.

As you cut near the rim, your touch must become delicate. I am exceedingly wary of scraping internal rims of bowls because the walls become thin and vibrate with the slightest excess pressure. So I cut the first inch or two using only a gouge, then refine the rest of the curve using a scraper, which gives me more control. Support the back of the thin workpiece with your fingers. If your fingers get too hot, you're pushing the tool too hard into the cut.

On internal curves I use as big a scraper as possible with a radius slightly tighter than the curve being cut. Despite the large tool, I use only a small portion of the edge at one time and never use it as a profile cutter, which will eventually result in a huge catch. A large tool makes it easier to visualize the shape of the curve being cut. It also requires less movement because you can pivot the tool and use different sections of the cutting edge to do the work. With a narrow scraper, you need a much broader motion to produce an accurate curve.

If you keep the tool rest at or slightly above center when cutting internal curves, the tool blade needs to tilt below horizontal only when cutting at center. Elsewhere the tool may be tilted up a degree or two without the risk of catching.

Spear-points refine details

I find a spear-point scraper enormously useful for getting into corners and around details such as beads. The long point reaches into the top of a foot at the base of the bowl wall, an area that can be very difficult to cut cleanly with a gouge. Spear points may also be used to clean the area around beads. If you don't own one, simply regrind a ¼-in. by 1-in. chisel to suit your needs.

Scrapers in all their forms are wonderful tools and not to be sneered at. In the appropriate situation, they perform well and can greatly reduce the time required to sand a piece to completion. □

Richard Raffan is a professional wood turner and author from Canberra, ACT, Australia.

SHARPENING A SCRAPER

Use silicon-carbide grinding wheels for high-speed-steel tools. *To raise a burr, grind the bevel on an 80-grit wheel at 45°, then go right to work.*

Extremely dense woods require a honed edge. *When using very hard woods, hone away the burr to avoid catches.*

Drawings: Michael Pekovich

Box Joints on the Tablesaw

Quick, reliable joinery with a simple jig

BY LON SCHLEINING

Boxes of every imaginable size and material can be assembled with mechanically interlocking box joints that are nearly as strong as the material itself. Box joints are not only reliable and attractive, but they also can be easy to make. They can be cut by hand or with a router, but I prefer to use a simple jig that fits onto my tablesaw crosscut sled. With this easily made accessory, you'll be able to assemble a strong, useful box in as little as an hour.

The same basic jig can be adapted to cut box joints as narrow as ⅛ in. or as wide as ¾ in., but I'll concentrate on ½-in.-wide joints—a useful size for drawer boxes and small chests.

Adapting a crosscut sled

My crosscut sled is easily the most useful and frequently used jig in my shop. If you have one already, great. If not, take a look at the model featured in *FWW* #128, pp. 66-69. You'll soon wonder how you ever got along without one. As long as the sled is accurately made and works smoothly, it can be modified to cut box joints.

The rear fence must be substantial, because it will provide a mounting surface for the box-joint jig. To support the jig adequately, the rear fence on your crosscut sled must be secure, at least 5 in. or 6 in. high and square to the sled.

For ½-in. box joints, the sled will wind up with a ½-in. slot in it, but I'll also show you how to make a plywood insert that will return your sled to its more common uses, making it as good as new.

Setting up the box-joint jig

I cut box joints no wider than the thickness of the material. The jig shown on the facing page is for cutting ½-in. joints, because it's a common and useful size. But ½ in. is only a starting point—⅛-in.-wide box joints are perfectly fine in ¾-in. material. The thing to remember is that you'll be building a separate jig for each size. And keep in mind that the narrower the box joint, the longer it takes to cut and more likely accumulating error will cause problems.

To make the jig, start by ripping a clear piece of hard maple for a spacer block. Initially, leave it 1/16 in. wider than the size of the joint you're going to make. In this case, the spacer block should be about 9/16 in. square and long enough to run through a surface planer safely.

Photos: Matthew Teague

One of the critical adjustments is the width of the dado cut. For cutting box joints, you'll need a good stacked dado set—not the kind that wobbles—that can be reset to the same width easily.

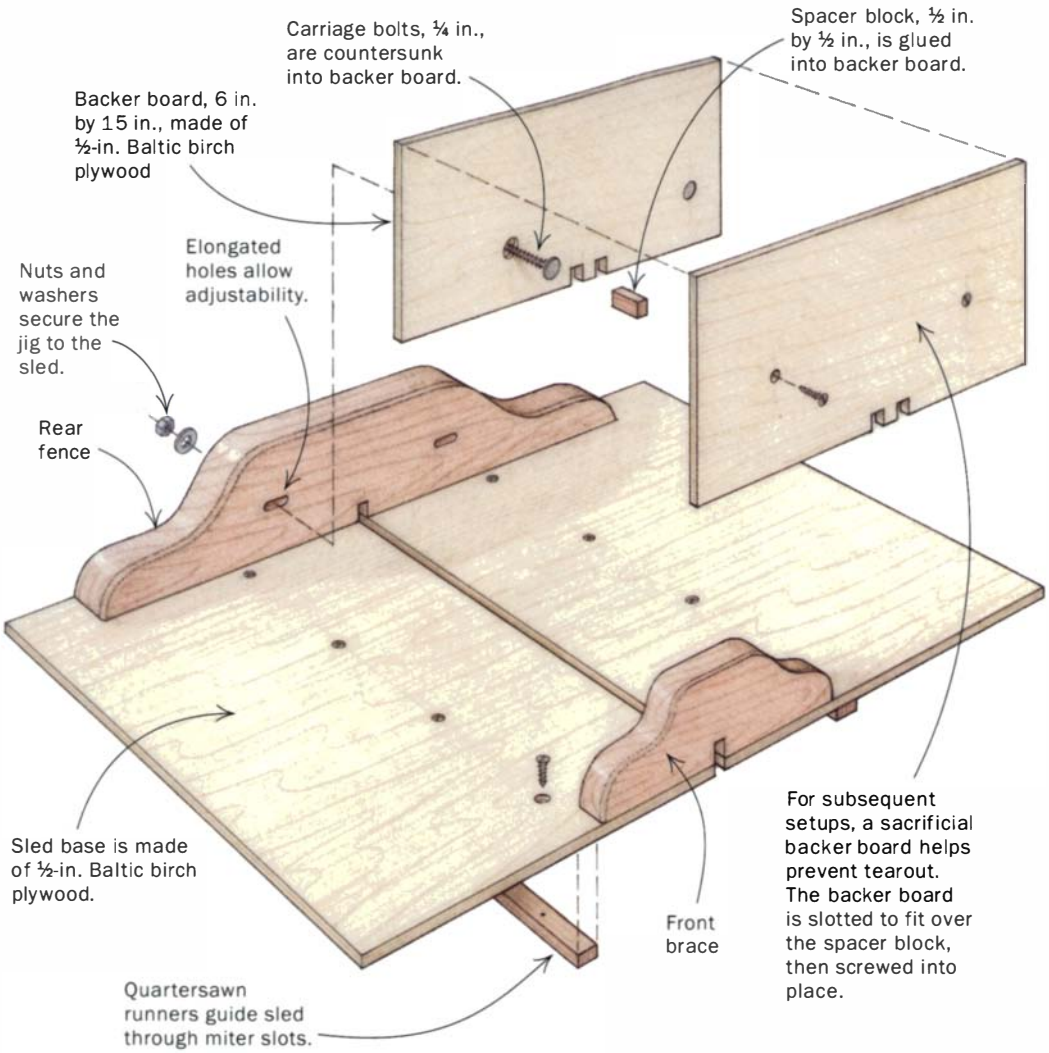
Once the dado is set up, everything else will be adjusted to fit. The width of the dado determines the width of the box joint because both the pin and slot are the same size. As you set up the various blades to cut a ½-in. dado, mark which ones you use and how they are installed so you'll be able to use the same setup next time.

With the dado blades in place, make a new ½-in.-wide slot in the sled. Then you are ready to fit the spacer block. Using the sled, cut a slot in a piece of scrap with the dado, then surface-plane the spacer block until it fits tightly in the slot. Next, you'll need a backer board that will bolt to the rear fence. Set the height of the dado above the sled base to match the thickness of the spacer block. Cut two pieces of ½-in. Baltic birch plywood or equivalent, about 8 in. by 14 in., and then cut ½-in.-deep slots with the dado in the center of both pieces on the longest side. Glue a 2-in. piece of the spacer block into the slot on one of the pieces and set it aside to dry. Make sure the spacer block is square to the backer board, and remove any excess glue while it's still soft. Use ¼-in. carriage bolts to hold the backer board to the sled. Begin by recessing the heads into the birch plywood so they do not protrude. Then drill ¼-in. holes the rest of the way through the plywood.

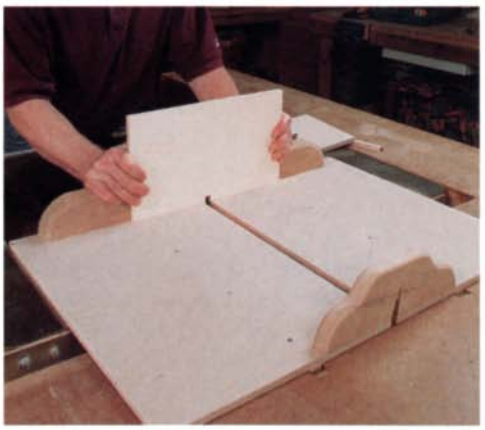
Set the backer board onto the sled so that the spacer block is about ½ in. to the right

THE BASIC BOX-JOINT JIG

Adding a box-joint jig to a crosscut sled takes only a few bolts and scraps of plywood. This jig is set up to cut ½-in. joints, but the same methods can be used to make jigs for any joint size.



ATTACHING THE JIG TO A CROSSCUT SLED



Set up the dado blade. *Use a stacked dado the width of the box joints to cut through the sled. Run a slot through the backer board at the same time.*

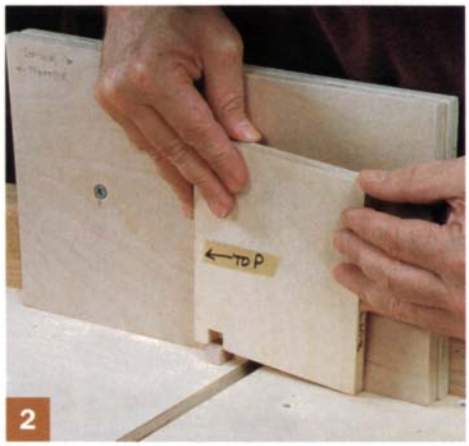
Glue the spacer block in place. *Take light cuts on a surface planer until the spacer block fits into the slot in the backer board. Then glue a 2-in. length into place and set aside the assembly to dry.*

Adjust the jig. *To find a starting point, use the leftover length of spacer material to locate the spacer block ½ in. to the right of the dado blade, then tighten down the bolts.*

Drawings: Vince Babak

CUT A TEST JOINT AND CHECK THE FIT

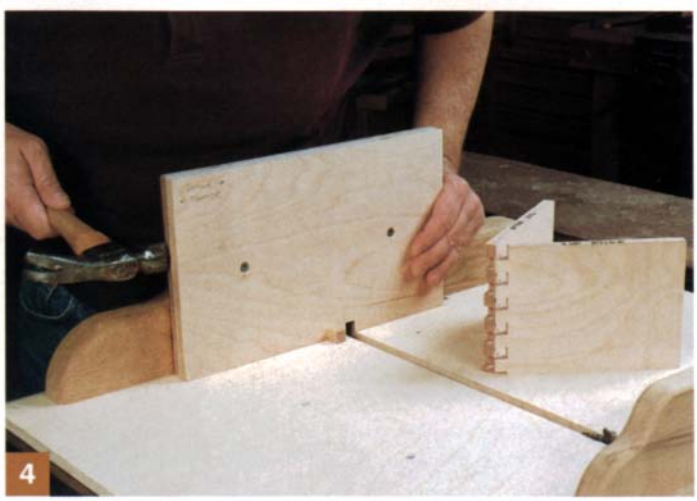
Make the first cut. *Hold the end piece against the spacer block and backer board, with the top edge facing the spacer block. Cut slowly and remove the piece before returning the sled to the starting position.*



Continue cutting the joint. *For subsequent cuts, fit the slot over the spacer block and proceed to the end of the piece.*

Make the first cut on the side piece. *Hold the end piece so that its top edge is against the top edge of the side piece. With the end piece fitted over the spacer block, and with its top edge facing the dado blade, position the top edge of the side piece toward the spacer block and continue cutting.*

Check the fit, adjust the jig. *The corner will be too loose, too tight or possibly just right. If it's too loose, move the jig slightly to the left. If it's too tight, move it to the right. Tighten the bolts again, then cut another trial corner joint to make sure it's just right.*



of the dado blade and clamp it in place. Mark the locations for the mounting holes in the sled fence by inserting a pencil through the holes in the backer board. Unclamp the backer board and lay out holes ¼ in. to the left and to the right of the marks. Drill two 5⁄16-in. holes for each bolt and chisel away the wood between the holes. Place flat washers under the nuts, then tighten the nuts just enough to draw the carriage bolts into the backer board.

The beauty of this jig is its adjustability. As a starting point, use a piece of the leftover spacer block to locate the pin exactly ½ in. to the right of the dado blade, then tighten down the nuts. A few test joints will lead you to the necessary adjustments.

Cutting box joints with the jig

There are different methods for positioning the pieces with this jig. With the one I suggest, the finished box starts with a full-sized joint on its top edge and leaves any partial joints on the bottom.

Begin by setting the height of the dado blade to about 1⁄16 in. higher than the thickness of the material you're cutting. By setting the height slightly above the thickness, the slots will be deep enough to ensure that the pins will be slightly proud rather than slightly below the surface, allowing you to power-sand the joints flush after the glue dries.

To prevent tearout on the cuts, the extra slotted backer board you cut earlier will serve as a sacrificial backer board. Position the slot over the spacer block and then screw the sacrificial backer to the jig's backer board. Once all of that is done, it's time to try it out.

Cutting the first joint—Cut a strip of Baltic birch plywood about 6 in. wide, then crosscut two pieces about 12 in. long and two more about 8 in. long. This will make a box that you'll use to test and adjust the jig.

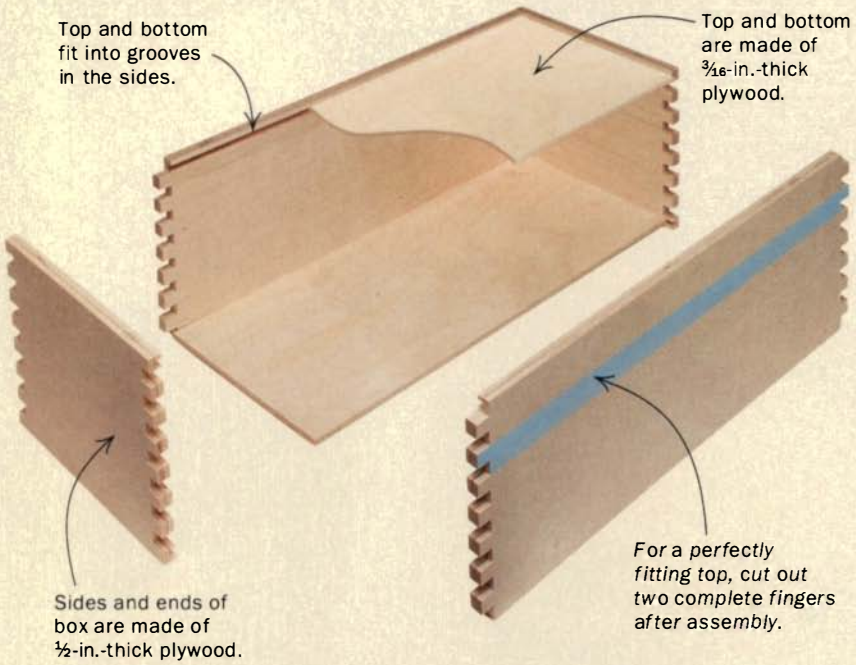
Mark the top and bottom edges of each of the pieces so you can orient them correctly as you cut. Mark the long pieces as "sides" and the short ones as "ends."

It's important to note that the piece you're cutting always has its top edge facing to the right. Make the first cut with the top of the first end piece facing the right. Hold the piece against the base of the sled and against the backer board, firmly against the spacer block.

Cut all the way through with the dado

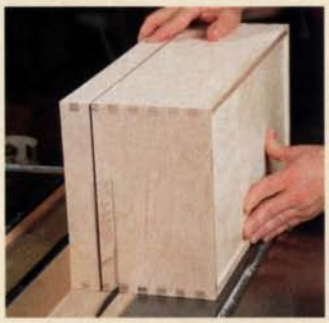
The 60-minute toolbox

I'm replacing all of my old metal toolboxes with wooden ones. With the box-joint jig, I can make a box in an hour. I start by gluing up an enclosed box, then cut the lid free on the tablesaw. I add an extra inch to the box height so that I can cut away the lid while still maintaining the full width of the pins. After I'm done, I simply add a piano hinge, handle and latches. Using this same technique, I've made boxes ranging in size from a few square inches to more than 5 ft. long.



Glue up the box. *To speed glue-up, lay out the box parts on a flat surface. Before leaving the assembly, check to see that the box is square, not twisted.*

Fill the void. *The groove for the top and bottom can be filled easily with end-grain plugs of plywood. Once glued in place, you'll have a hard time spotting the fix.*



Cut the lid free. *Adding an extra inch to the box height allows you to keep uniform ½-in. pin sizes. Set the blade height just below the thickness of the sides so that the box stays intact during the cutting. Then use a handsaw to separate the top from the bottom.*

blade until the sled hits its stop. Pull the workpiece out of the jig, then return the jig to the starting position. Reposition the end with the slot fitted over the spacer block and make the next cut. Cut slowly to minimize tearout. Continue until all of the slots are cut on the side piece.

Cuts on the adjacent piece—The next step is to cut the joints on one of the side pieces. Use the end piece with its box joints already cut to position the side piece on the jig. Place the first slot cut—the one near the top edge of the end piece—over the spacer block so that the top edge faces to the left. Then place the side piece against the edge of the end piece so that they are aligned top edge to top edge.

With these two pieces in place, make the first cut on the side piece. If the pieces are too small or cumbersome, use clamps to hold them in place. Remove the end piece and set it aside. Make the rest of the cuts on the side piece the way you did the others on the end piece, always firmly placing the piece against the spacer block and firmly down on the sled base and against the backer board.

The two pieces should fit together quite easily—neither too tightly nor too loosely—allowing enough room for glue. If your pieces fit together perfectly, congratulations. But chances are the joint will not fit perfectly at this point. Mark the position of the jig before making any adjustment so you know how far to move it. If the joint is too loose, back off the nuts and move the backer board and spacer to the left just a little. If the joints are too tight, move the spacer just slightly to the right.

To make sure the jig is set correctly, it's always a good idea to run a test corner before you cut the joints on your project. Experiment on scrap until the joints fit as they should. Continue to cut individual test corners until the fit is just right. As you work with the jig, its operation will become more familiar.

Putting the sled back to normal use

A sled's narrow sawkerf slot ensures accuracy and safety. The edges of a newly cut slot can be used for measuring and set-up purposes, and being small, nothing gets caught during a cut. Now it seems like we've ruined the sled by cutting a ½-in.-wide slot down the middle of it. Fortunately, it's a simple matter to close the gap.

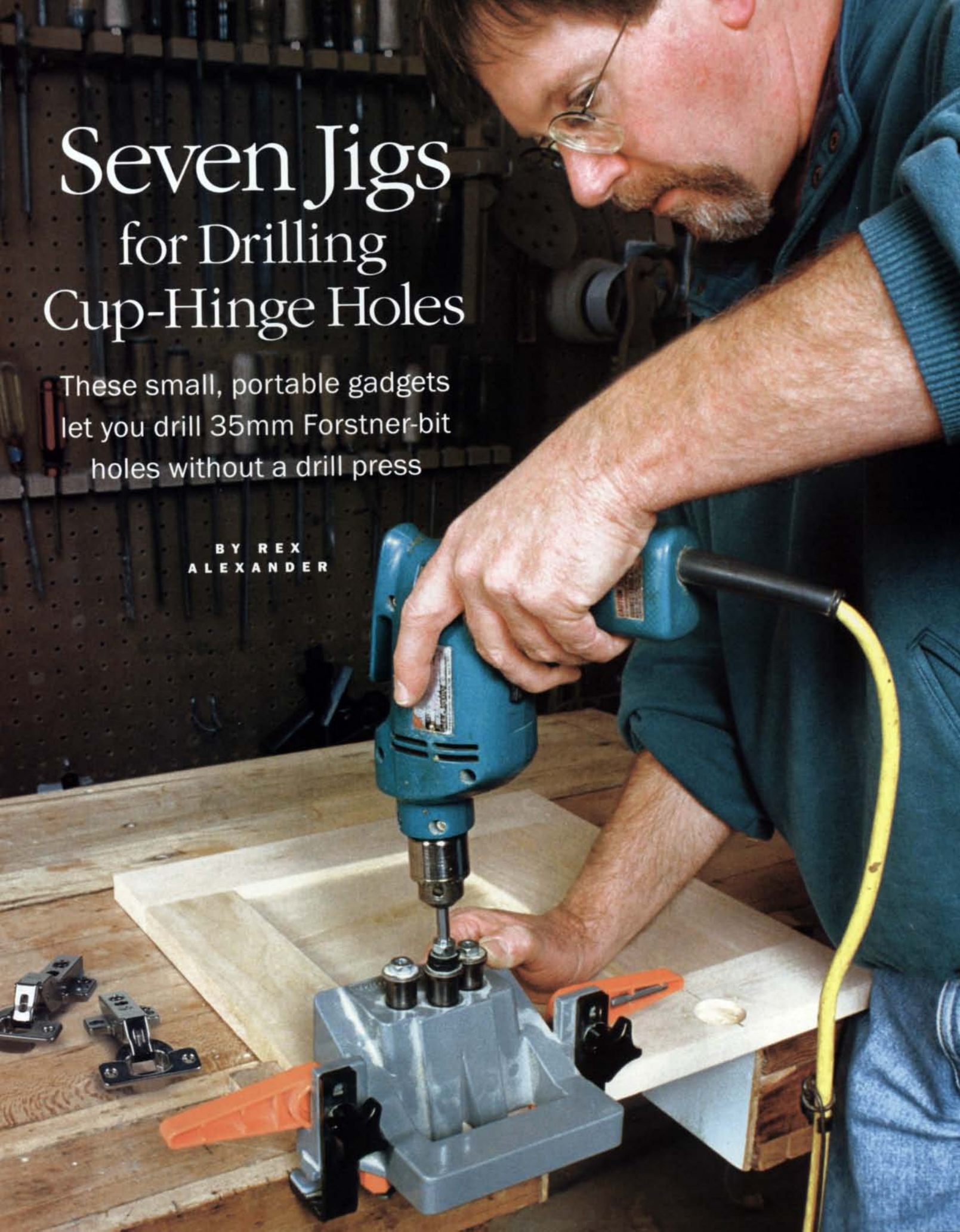
Cut a piece of ¼-in. Baltic birch plywood to the size of the sled and screw it into place using short countersunk screws. With your normal blade back in the tablesaw, cut through the renewed sled base. Mark the plywood inserts with a triangle so you can put them back the same way each time. Now the sled is just like new. □

Lon Schleining is a woodworker in Long Beach, Calif.

Seven Jigs for Drilling Cup-Hinge Holes

These small, portable gadgets let you drill 35mm Forstner-bit holes without a drill press

BY REX ALEXANDER



A designated jig just to drill a hole? If you have cup hinges to mount, the answer just might be yes, because to make the hinge both strong and easy to install, the cup is designed to fit snugly into a 35mm hole bored in a cabinet door. A cup hinge installed in a sloppy hole won't enjoy full strength. So you want the hole to be a good one. That's exactly what these jigs promise to help you do.

The jigs come in a variety of designs. Some offer stark simplicity at a low cost. Others are more sophisticated and come with a price that reflects that refinement. But all of these jigs have a couple things in common. They get their power from an electric or cordless drill. And they serve as a surrogate tool for the drill press, supporting the 35mm bit when a drill press can't be used. Without that support, a large bit like this will skitter around the wood.

These jigs are especially handy when you're faced with drilling cup-hinge holes in a door that's large and unwieldy. Just clamp the door to your workbench, then mount the jig and drill.

The jigs are also handy if you're installing cup hinges at a remote site, where there's no access to a drill press.

All of the jigs allow you to adjust the distance from the edge of the door to the edge of the hole—a dimension called the "backset" or "tab." This dimension provides the necessary clearance for the door to open.

Also, each jig has a mark, usually a notch, that serves as a guide to positioning it on the door. Use a square and a sharp pencil to mark the hinge centerline. Then align the pencil line with the notch on the jig.

Most of the jigs have some sort of clamping system that anchors the jig to the cabinet door as you drill. A couple jigs are handheld. One has to be screwed down.

With a few exceptions, the jigs also provide some sort of means to position and guide a smaller drill bit to bore pilot holes for two mounting screws that secure the cup to the door.

It's easy to see how one of these portable gadgets can have a useful place in a workshop. So when asked by *Fine Woodworking* to give the jigs a workout, I was happy to comply. (An unexpected dividend from drilling countless cup holes during my 27-year career as a cabinetmaker.) □

Rex Alexander builds furniture and cabinets in Brethren, Mich.

Cup hinges simplify door installations

Cup hinges, also called European-style or concealed hinges, came into prominence in Europe immediately after World War II. These hinges still are the standard in Europe, but despite years of favor there, the hinges didn't attract much attention in the United States until some 15 to 20 years ago. That's when cabinetmaker's here began to recognize that there's a lot to like about them.

For example, the hinges are completely out of sight when the cabinet door is closed (hence the moniker, concealed hinges), and they pack plenty of strength. Plus, they can be installed quickly and allow considerable adjustment of the door after it has been installed.

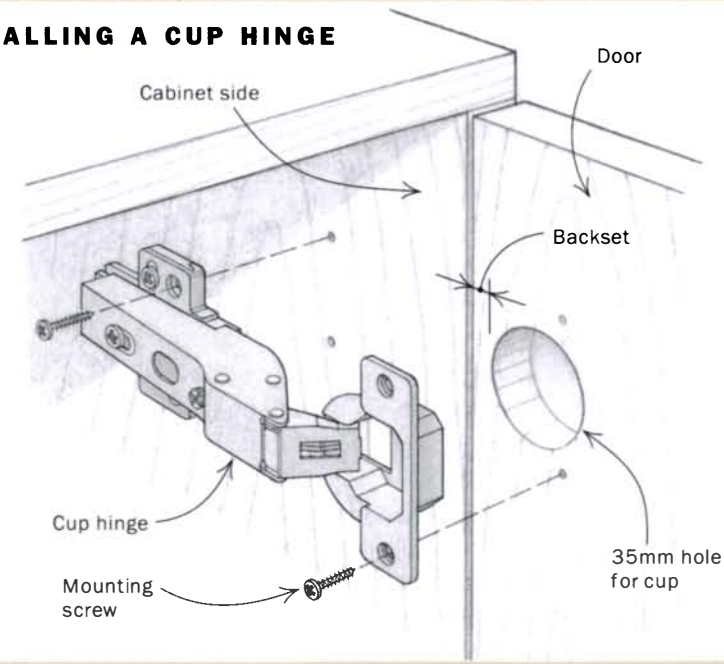
Cup hinges are commonly available as two-piece hinges. The cup and mounting plate are mounted separately. Then, much like you'd secure a seat belt, the cup half of the hinge and the door it's mounted to simply slip into the mounting plate and lock securely in place. The mechanism makes it easy to disengage the two halves of the hinge, so the door can be removed for easy cleaning.

Some cup hinges can be installed entirely without screws: They simply press into place. Others offer various types of quick-mounting attachments.

Cup hinges really shine after they've been installed. Because simply by turning a few screws, you can adjust the door in three planes: up or down, side to side and in or out. As a result, you can just about be certain that a door is going to end up fitting perfectly.

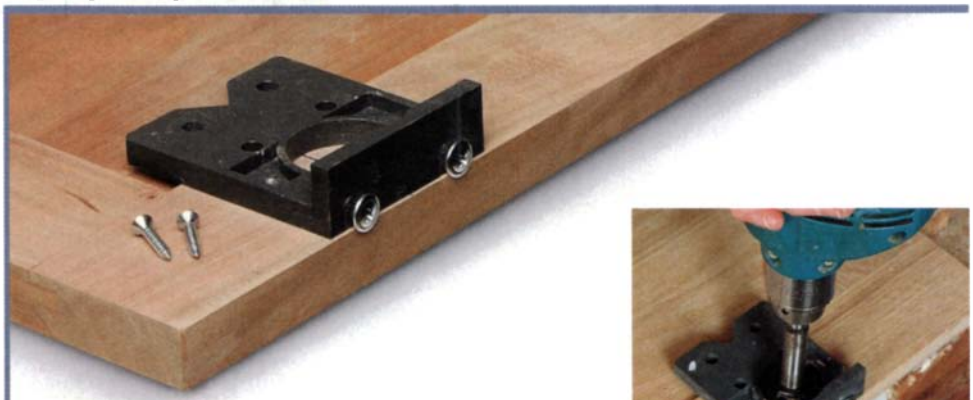
You'll find cup hinges at many hardware stores or building supply centers. You can also get them on-line at www.cabinetparts.com or www.wwhardware.com.

INSTALLING A CUP HINGE



Drawing: Vince Babak; photos, except where noted: Tom Begnal; this page: Erika Marks

EURO EASY DRILL

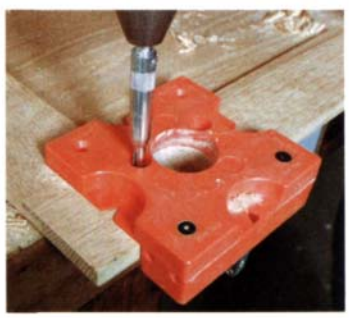


Start drilling. *The hole in the jig acts as a bushing, keeping the Forstner bit contained and preventing it from skittering around as the cut starts.*

Among the jigs tested, the Euro Easy Drill is unique in that it must be screwed to the door before drilling can begin. Then, once the cup hole has been started, the jig is removed, and the hole is completed by eyeballing the final depth. Backset adjustment is possible with the Euro Easy Drill, but it requires fiddling with screws and a square to make sure everything lines up.

If you don't have a drill press and have only a few hinges to mount, this jig will do a decent job. But the lack of a mounting clamp and a depth stop slows down everything, so you'll need to bring a good measure of patience to the shop. The Euro Jig is available for $8.99 from Woodcraft (800-225-1153); a 35mm bit costs $22.99.

EURO-EZE II



Drilling the mounting holes. *A self-centering bit is used to drill the pilot holes for the mounting screws. The jig has four pairs of predrilled holes for the bit.*

A removable stop block, attached to the underside of the Euro-Eze II, is used to establish any of eight backset options. A Forstner bit is included.

The clamp works okay. And the backset is easy to set up. However, even though I'd given the brass nut on the depth stop a good hand-tightening, the stop slipped about ⅛ in. after drilling a few holes in oak. I then discovered the nut could be hand-tightened another quarter turn or so, apparently because the bit heated during the cuts and softened the plastic collet and hub that are part of the stop system. The stop stayed securely in place after that second tightening. A self-centering bit is available as an option. It fits nicely into predrilled holes for the mounting screws.

This jig has a low price and is simple to use. If your budget is limited, and you have only an occasional need to drill holes for cup hinges, the Euro-Eze II is worth considering. But keep an eye on the depth stop.

Woodworker's Supply (800-645-9292) sells the jig ($29.95) and the optional self-centering pilot-hole bit ($9.95 for a 7⁄64-in.-dia. bit; $29.95 for a 5mm version).

CONCEALED HINGE JIG-IT

This jig has two main parts: a template (a steel base with a hardwood fence) and a plastic housing that accepts the built-in Forstner bit. The fence maintains an accurate backset. And clamping the jig is quick and easy. The Jig-It doesn't have guide holes for drilling the pilot holes for the mounting screws.

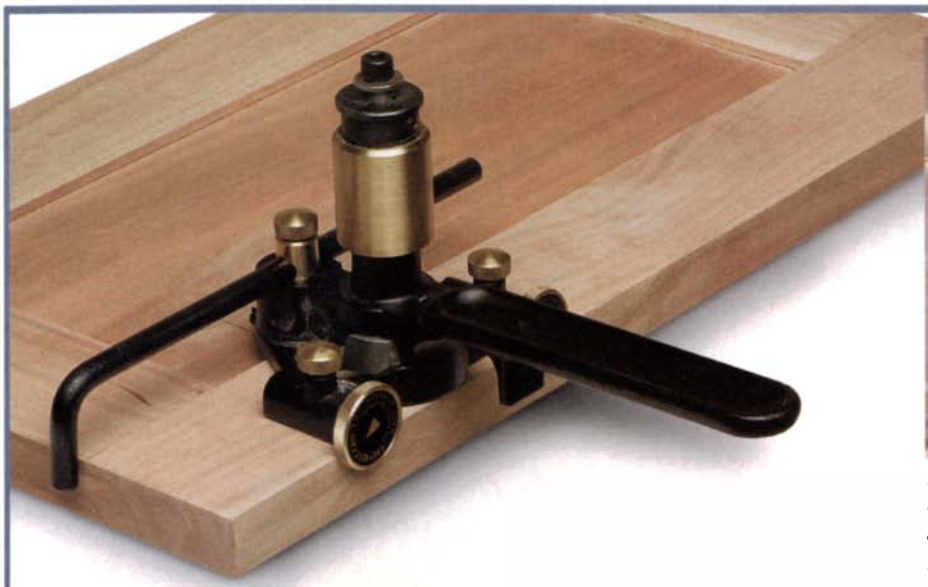
The housing is a nice feature because it helps keep the bit square to the jig as you drill. And because the housing simply lifts off the base after a hole has been bored, the chips don't pack around the bit, a nuisance I ran into with a couple of the other jigs.

The Jig-It sells for $29.99 (Forstner bit not included) at Rockier (800-279-4441). A 35mm, carbon-steel Forstner bit costs $15.49; carbide costs $28.49.

Keeping square. *The housing helps keep the bit square to the door as the hole is drilled.*

Photos, this page (top left, top right, bottom left): Erika Marks

VERITAS HINGE-BORING JIG



Handheld. *This jig isn't designed to be clamped or secured to the door. Instead, you hold the jig in place with a handle that extends out the front. The author would have preferred a clamp.*

Machine-screw fence. *A pair of knurled, brass machine screws serves as the fence.*

The Veritas is a nicely built jig that's designed to be handheld. A pair of brass machine screws serves as an easy-to-adjust fence. The depth stop works well. A long, bent rod that mounts to either side of the jig quickly allows you to set all of the holes the same distance from the door top and bottom. A built-in carbide-tipped Forstner bit comes with the jig.

But the design could use a little tweaking. For instance, when trying to drill a pilot hole for the mounting-plate screws, the drill chuck butted against the jig, preventing me from drilling a hole that was square to the door.

All in all, this is a sturdy jig that looks like it could hold up to drilling lots of holes. The jig felt comfortable in my hand, but it was awkward to hold flat when drilling. My preference would be to clamp it in place. The Veritas Hinge-Boring Jig sells for $99.75 from Lee Valley Tools (800-871-8158).

EURO DRILL

Like the Veritas Hinge-Boring Jig, the Euro Drill is handheld. With a pivoting stop on each side, you can quickly position the center of the hinge at the commonly used dimension of 3¾ in. from either end of the door. The depth stop is easy to use. However, the Euro Drill doesn't offer a way to drill pilot holes for the mounting screws.

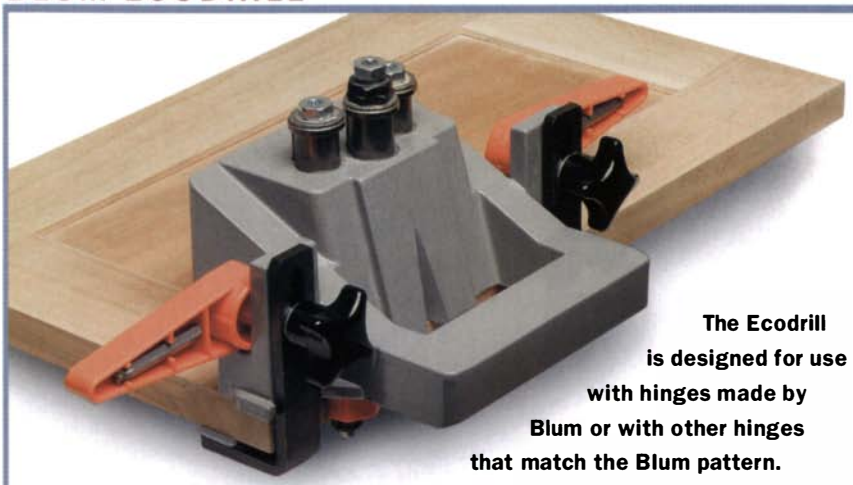
The chips have a tendency to pack pretty solidly around the Forstner bit, so plan to clean them out after drilling each hole.

This sturdy jig looks like one a professional might have in his toolbox. I just wish there could be a quick way to clamp the jig rather than hold it in place by hand. As was the case with the Veritas jig, the Euro Drill was awkward to hold flat as I drilled. You can buy the Euro Drill from McFeely's (800-443-7937). The price, not including a Forstner bit, is $98.95. A 35mm carbide-tipped Forstner bit will cost another $23.95.

Packing them in. *With no place to go, the chips quickly pack around the Forstner bit, even after one cut. The author used an air-compressor hose to blow out the chips after boring each hole.*

Photos, this page (top left, bottom right): Erika Marks

BLUM ECODRILL



The Ecodrill is designed for use with hinges made by Blum or with other hinges that match the Blum pattern. Mounting holes are 8mm and accept only Blum's Press-In or Expando dowels or Blum's Enserta hinge.

Chuck a Torx driver bit (supplied) into your drill. Slip the bit into a mating nut on the end of the Forstner bit and start drilling. Then do the same for the two pilot holes. You'll need to clean out the chips after drilling the holes.

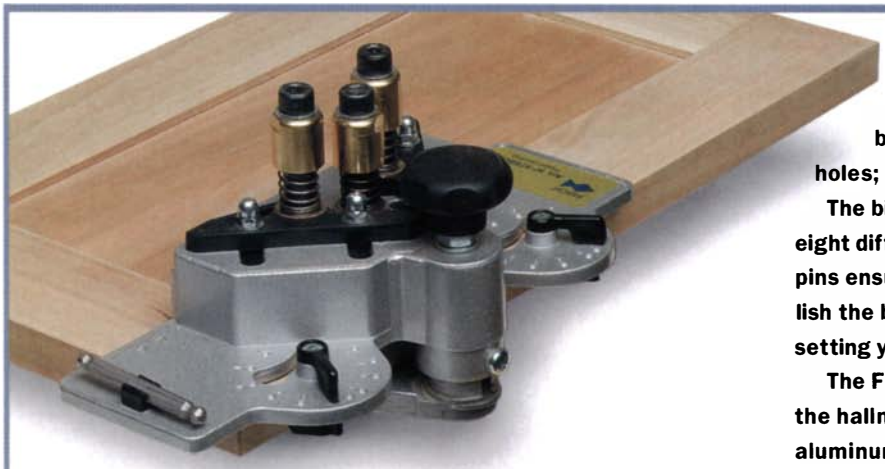
This jig has adjustable backset stops, which may be set to seven different positions. It's also easy to use the clamp. Pivot down the handles, and the jig clamps to the door.

This professional-quality jig is a pleasure to use. It sets up quickly and then drills the cup hole and two mounting holes to the correct depths in seconds with little effort. I'd use it even if I had a drill press. You can order the Ecodrill from the Superior Distributing Co. (800-622-4462). The $169 price includes the Forstner bit and two 8mm bits.

Dial in the backset. *Setting the backset is just a matter of turning a pair of multisided blocks.*

Drilling the cup hole and two pilot holes is as easy as one, two, three. *One, insert the driver bit in the cap screw on the end of the 35mm Forstner bit and drill the hole; two, move the driver bit to a pilot-hole bit and drill; and three, repeat for the final pilot hole.*

FISCH MULTI-PATTERN EURO JIG

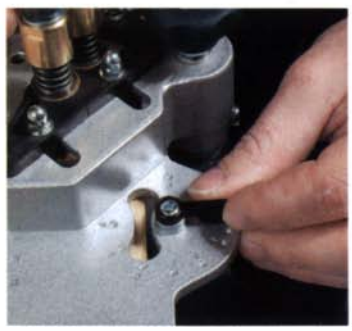


This top-of-the line jig drills all of the common hinge patterns. In addition to the 35mm Forstner bit, it comes with a 7/64-in.-dia. bit for the mounting holes; 5mm and 8mm bits are sold separately.

The bits for the mounting holes can be adjusted to any of eight different positions. And once adjusted, a pair of metal pins ensures that the bits won't shift out of position. To establish the backset, just turn two short, plastic levers to the exact setting you want.

The Fisch jig is the most expensive of the bunch, but it has the hallmarks of a well-built tool, starting with a beefy cast-aluminum housing that serves as the foundation for all the remaining parts. The Forstner bit cuts cleanly and quickly. Like Blum's Ecodrill, I'd use this one even if I had a drill press. The jig is available for $219.99 from Fisch Precision Tools (724-663-9072).

Movable mounting-hole bits. *The jig offers eight different positions for the mounting holes. And once the bits are positioned, a pair of steel pins keeps the bits locked in place.*



Select a backset. *Just turn a couple of levers to set the backset to any of eight options.*

Photos, this page (top and bottom left): Erika Marks

Shopmade Squares

Four precision tools from a quarter sheet of plastic

BY GARY WILLIAMS

A good square is an indispensable tool in the shop. So it makes sense to have several of them within easy reach of your workbench. For checking small parts, a 2-in. machinist's square is a good choice. As parts get bigger, a 6-in. try square or 12-in. combination square is nice to have. And for larger parts, a framing square comes in handy.

But there can be a need for a shop square that's sized somewhere between a combination square and a framing square. For an especially big project, like a cupboard, it would be handy to have a shop square that's even bigger than a framing square.

Unfortunately, you can't run to the hardware store to get such odd-sized shop squares. And you won't find them in a mail-order catalog or at any nearby woodworking store. So I decided to make my own. That way I could size the shop squares to suit my needs to a tee.

Just one word: plastics

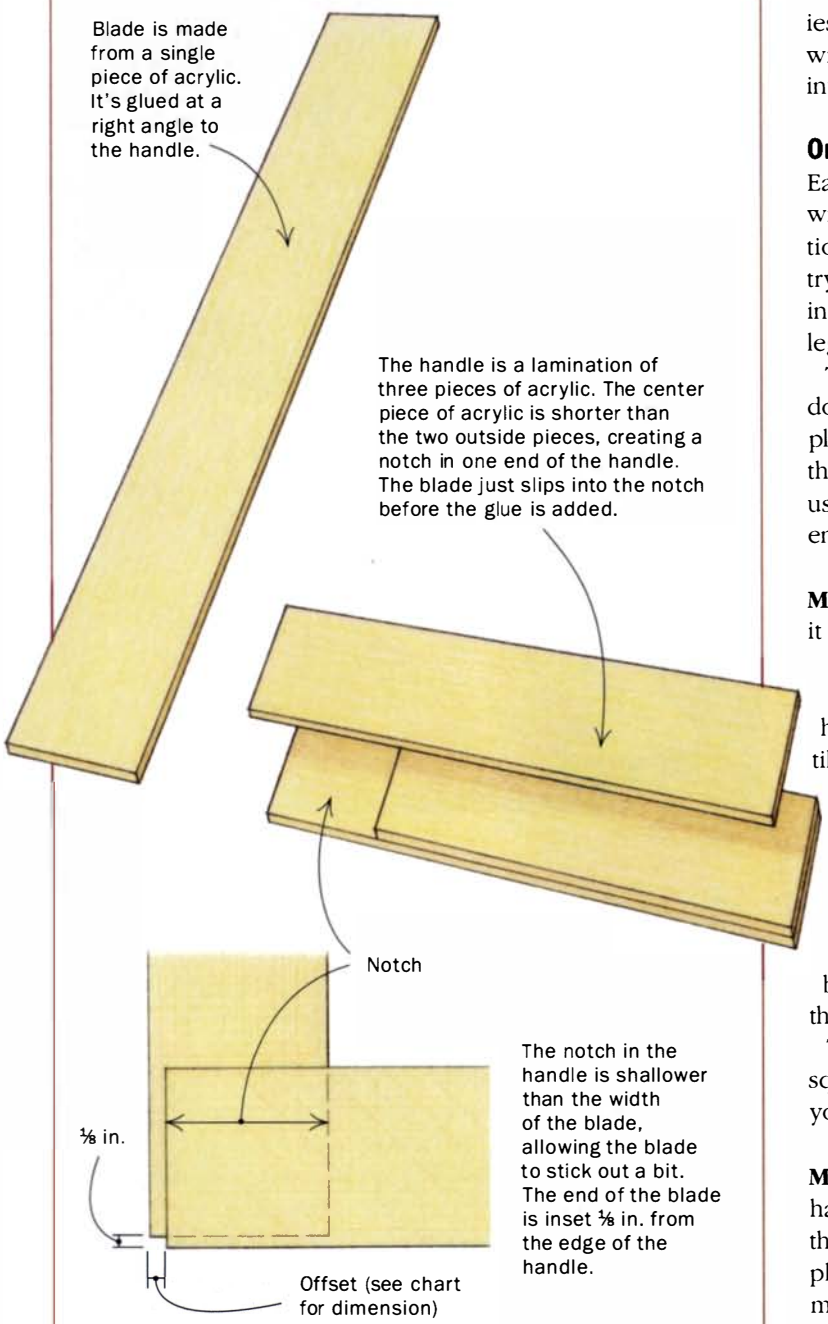
To be of any real value, a shop square needs to be dead accurate. So when making one, it's best to use a stable material that won't warp when the relative humidity starts changing. I ended up choosing acrylic plastic sheet, a product sold under trade names such as Plexiglas and Lucite.

Don't worry if you haven't cut acrylic sheet before. A sharp, 60-tooth, carbide-tipped combination blade does a nice job. The acrylic colors you're most likely to find locally are white or clear,

Photo, this page (left): Michael Pekovich

SQUARE CONSTRUCTION

The squares are made from ¼-in.-thick acrylic plastic, a material that resists warping. Acrylic sheets can be cut on the tablesaw using a 60-tooth, carbide-tipped combination blade.



SQUARE DIMENSIONS

SIZE	BLADE	HANDLE	OFFSET
48 in.	3½ in. by 48 in.	3½ in. by 24 in.	½ in.
30 in.	3 in. by 30 in.	3 in. by 17½ in.	⅜ in.
20 in.	2½ in. by 20 in.	2½ in. by 11½ in.	¼ in.
12 in.	2 in. by 12 in.	2 in. by 6½ in.	¼ in.

but more interesting colors are available from suppliers like Ridout Plastics (800-542-6325). Ridout will ship you a 2-ft. by 4-ft. piece, which provides more than enough material to make the four squares shown on p. 69. You can also order the acrylic sheet on-line at www.ridoutplastics.com.

You'll also need to order special glue for acrylic plastic. The easiest to use is a water-thin product called Weld-On No. 3. It's used with a squeeze bottle that has a needle applicator and is drawn into the joint after clamping.

One design, four squares

Each of these shop squares uses a three-piece laminated handle, with the blade inserted and glued into the middle of the laminations. This construction provides a nice, thick handle like that on a try square, which I find much easier to use than a one-piece framing square. It also ensures a strong connection between the two legs of the tool.

The procedure for building these shop squares can be broken down into four basic steps. First build a glue-up jig. Next, make a plywood testing square and use it to square the jig. Third, cut out the blade and handle parts, and glue up the handles. And finally, use the glue-up jig to assemble each blade and handle so that they end up perfectly square.

Make a glue-up jig—This is really just two pieces of plywood, but it is the heart of this project. A true reference board laid exactly perpendicular to a true edge becomes an "index" for calibrating all your new squares. When the blade of a square is glued to the handle, the jig squares the two parts and keeps them that way until the glue dries.

For the jig to be accurate, the bottom edge of the base must be perfectly straight. Use the factory edge of good-quality plywood or medium-density fiberboard (MDF). If you have a large jointer, you can run the edge over it just to be sure.

It is also important for both of the long edges of the reference board to be straight and parallel. Once the reference board has been ripped, measure its width carefully at several places along the length. Use a caliper if you have one.

To complete the jig, the reference board has to be clamped square to the base. That might seem easy, but to do it precisely, you need to make one more helper—a testing square.

Make a testing square—Like the shop squares, the testing square has a blade and a laminated handle. But instead of acrylic plastic, the testing square is made of ½-in. plywood. And it differs from the plastic versions in one other important way—the blade isn't permanently attached to the handle. Instead it simply slips into the notch in the handle and is held in place by a pair of clamps. The clamps can be loosened, allowing the blade to pivot in the handle, and that's the secret to using the testing square to square the glue-up jig. I'll talk more about this later.

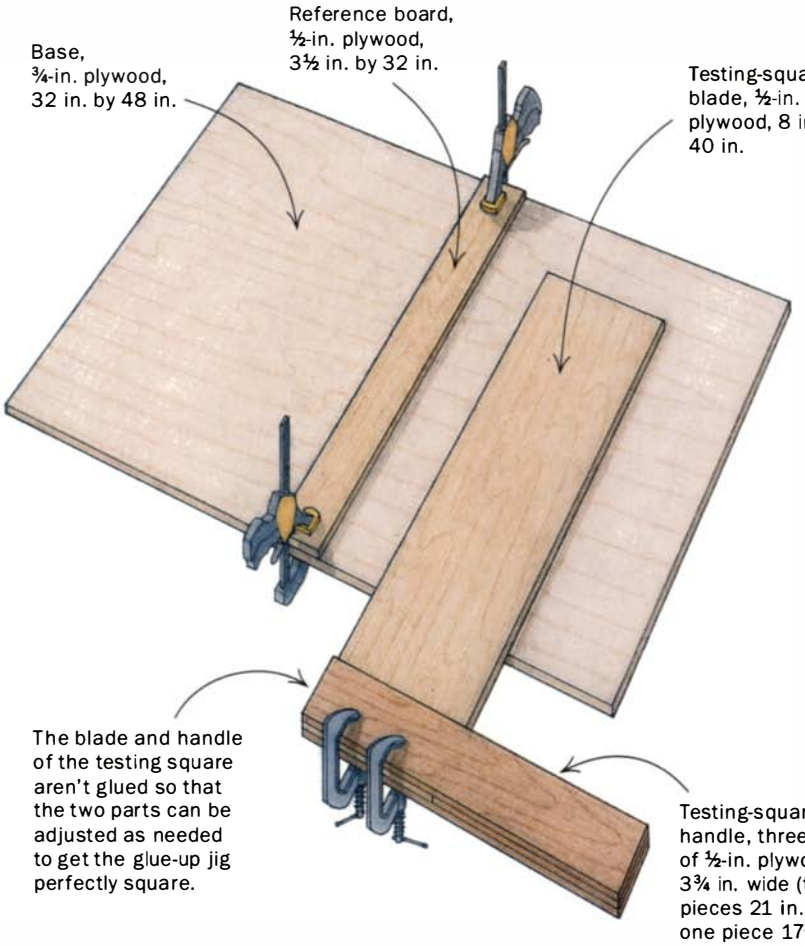
Rip a 4-ft.-long blade and three pieces to make the handle. Size is not critical, but make this square big enough to be sturdy. Then glue up the three-part handle. And as has been the general rule from the get-go here, straight and parallel is the goal. So when the glue dries, rip both sides of the assembly again.

Squaring the glue-up jig now becomes a matter of flip-flopping. First position the reference board so that it's roughly perpendicu-

Photos, except where noted: Tom Begnal

A GLUE-UP JIG ENSURES A PERFECT 90° ANGLE

The blade and handle of the square are assembled on a simple, two-piece jig made up of a reference board that's mounted exactly 90° to the lower edge of the base. To get the jig angle just right, you need the aid of a testing square.

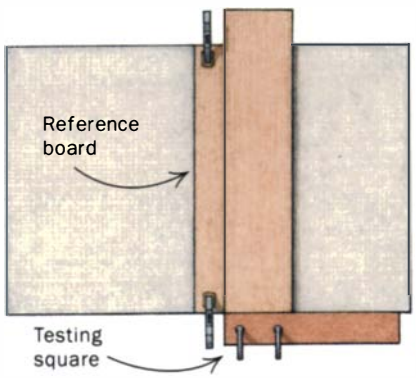


For the jig to be accurate, the base must have a perfectly straight bottom edge. *A good factory edge works fine, but if you have doubts about the straightness of the edge, run it over the jointer a couple of times.*

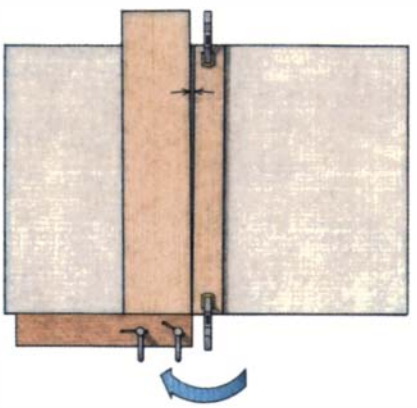
Check the reference board for parallel. *The width of the reference board should be the same within a few thousandths of an inch along the board's length. If you have a caliper, this is a good time to use it.*

A testing square is used to square up the jig. *A long blade and notched handle make up the testing square. When the two parts are clamped together, the glue-up jig is ready to be squared.*

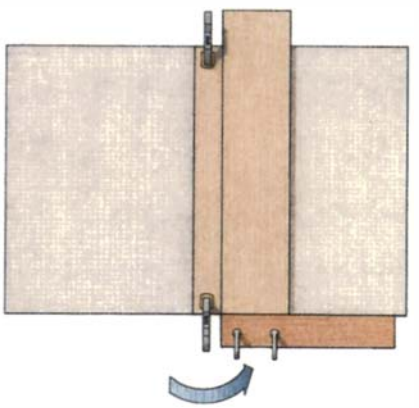
Use the testing square to align the reference board



1 Clamp the reference board roughly square to the bottom edge of the base. Loosen one of the two clamps on the testing square while holding the handle against the bottom edge of the base. Then pivot the blade until it butts to the reference board.



2 Flip the testing square. The gap that shows is exactly twice the amount that the parts are out of square. Pivot the reference board to remove about one-half the gap. Then adjust the testing square flush with the reference board.



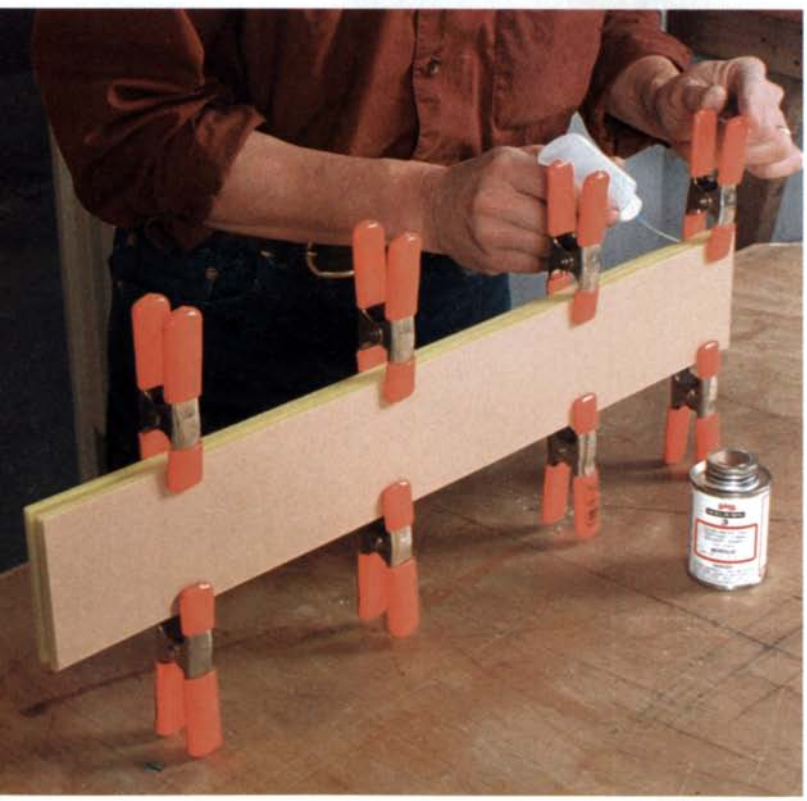
3 Flop the testing square to the other side of the reference board and repeat the adjustment steps. Continue the flip-flop steps as needed, until the gap is completely gone. Three or four adjustments usually get the job done.

Drawings: Vince Babak

MAKE THE HANDLE

Cut the handle parts. *A sharp, 60-tooth, carbide-tipped combination blade cuts the acrylic sheet without much fuss. The paper backing on the sheet helps reduce chipout, plus it protects the plastic from getting scratched.*

Chamfer the edges. *The water-thin glue, used to join the three parts of each handle comes in a squeeze bottle with a needle applicator. Sanding a light chamfer along the mating edges of the handle parts creates a shallow groove when the parts are joined together.*



Assemble and glue the handle. *Secure the handle parts with spring clamps and check to make sure that all of the edges remain flush. With the sanded groove as a guide, run a bead of glue all along the joint lines on the handle. The glue is pulled deep into the joint and quickly forms a sturdy bond.*

lar to the bottom edge of the base. Hold it temporarily in place with a clamp on each end.

Now you're ready to calibrate. Position the testing square on the jig and pivot its blade to snug up against the reference board. Clamp the square in this position.

Flop the square over to the other side of the reference board. Unless you have remarkable luck, you're going to see a gap between the board and the square, either close to the handle or out at the end of the blade.

To begin correcting this out-of-squareness, loosen one clamp on the reference board and pivot it to remove approximately half the gap. Retighten the clamp. Then loosen the clamps on the testing square, and again pivot the blade to exactly match the angle of the reference board.

Now flop the testing square back to the other side of the reference board and repeat the procedure, removing half the error each time. It might take a few of these flip-flop adjustments, but you'll soon find, on both sides of the reference board, that the edge of the blade butts along the entire length of the board. When that happens, the reference board is exactly square to the bottom edge of the base. And the jig is ready to use.

Cut and glue up the plastic parts—With the glue-up jig completed, you're ready to start making the four shop squares. The first thing to do is rip and crosscut the parts for all four squares. Rip the parts a little wide, say about 3⁄16 in., so that they can be ripped true after lamination. By the way, if you start with a 2-ft. by 4-ft. piece, you're going to have enough material left over to cut one or two more squares.

Before you begin cutting, raise the blade fairly high above the saw table. That gets the cutting edge of the blade closer to 90°, which helps produce a better cut in acrylics. And to avoid overheating the plastic, push it as quickly as possible through the blade. As always, use eye protection—those bits of cut plastic are hard, and they like to fly. And keep your fingers well away from that raised blade.

Once the parts have been cut out, glue up the three pieces that make up each of the handles. But before starting, it's helpful here to understand how the Weld-On No. 3 glue is applied. Just run the end of the needle applicator along the joint line, squeezing a narrow bead of glue as you go. The glue immediately gets drawn deep into the joint to form a strong bond.

To make it easier to follow the joint line with the needle applicator, you'll want to add a little chamfer to the mating edges of the handle parts. That way, when the handle parts are fitted together, the chamfers create a little groove that positions the needle directly over the joint.

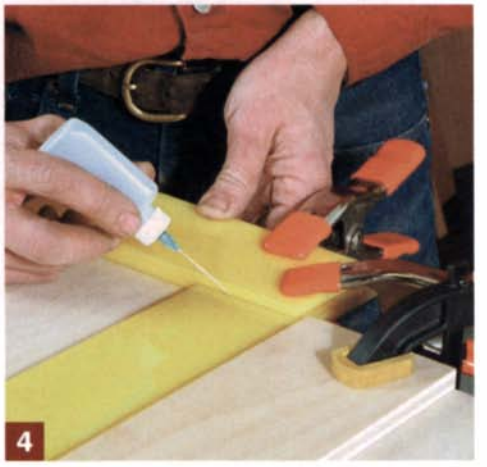
Hold the three parts together with some clamps. Then it's just a matter of running the bead of glue along all of the joint lines.

After all of the handles have been glued up, rip both edges again and crosscut a bit off the ends, so that the finished assembly is straight and parallel.

At this point, the hard work is done. All that's left to do is attach the blades to the handles, a step that's just about foolproof, thanks to the glue-up jig.

To help support the end of the handle, it's a good idea to clamp a piece of scrap stock to the corner of the jig. Then add a smaller scrap to serve as a spacer, which helps level the handle.

ASSEMBLE THE SQUARE USING THE GLUE-UP JIG



After cutting the blade to size, it's time to put the jig to use. *But first, to help support the handle during the glue-up, clamp a scrap piece to the corner of the jig.* *(1)* ***Assemble the blade to the handle, then hold the handle to the bottom edge of the jig and butt the blade against the reference board.*** *(2)* ***A stick of scrap stock clamped to the base of the jig keeps the blade from shifting during the glue-up.*** *(3)* ***When the blade and handle are properly positioned, a pair of clamps is added.*** *(4)* ***Use the needle applicator to apply the glue to the joint lines connecting the handle and blade.***

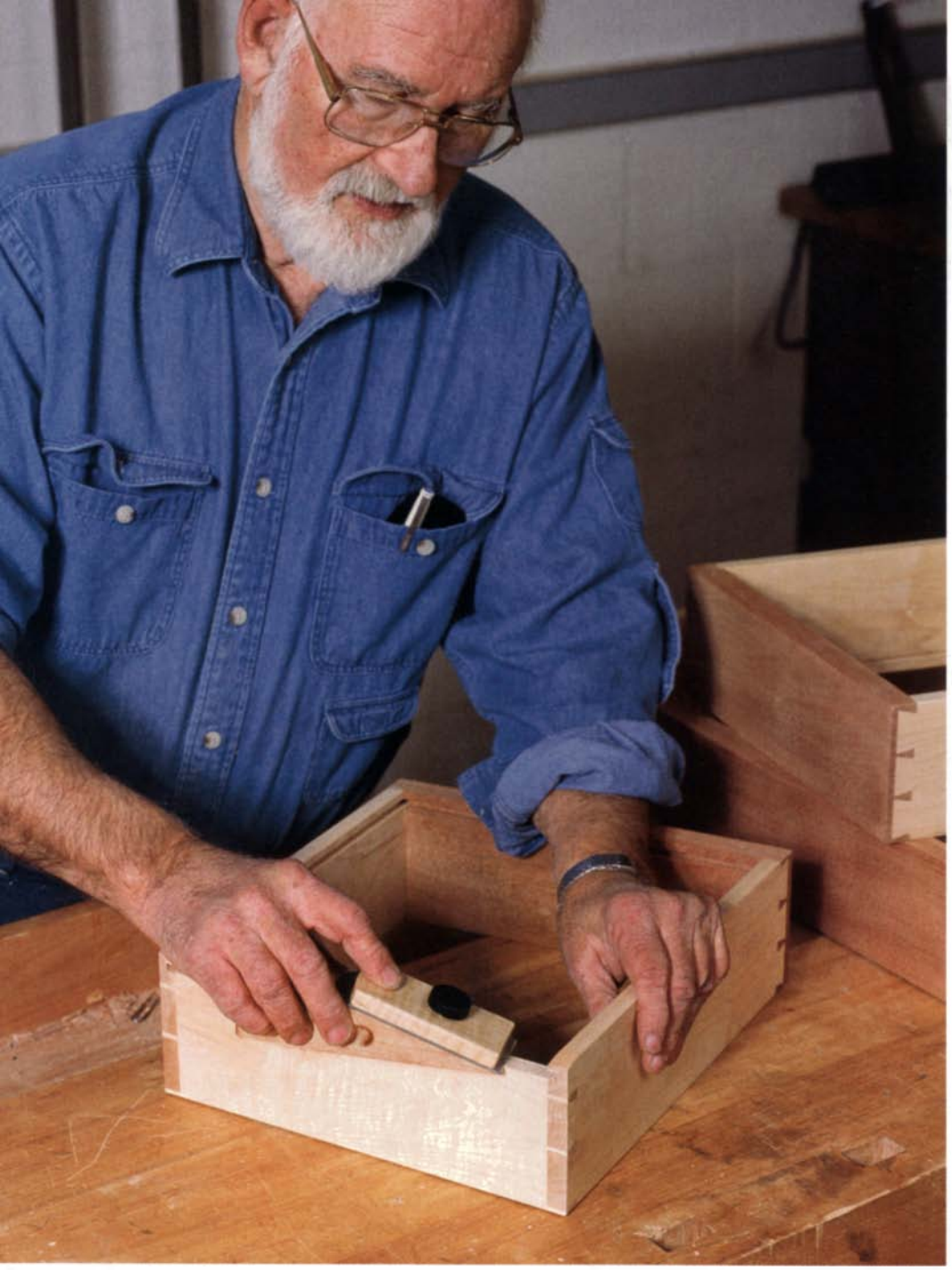
To join the parts, just slip a blade into a mating handle. Position the end of the blade so that it ends up about ⅛ in. short of the outside edge of the handle. That way the end of the blade won't stick out and get in the way when using your shop square to check an inside corner.

Now, with the handle firmly against the base of the glue-up jig, pivot the blade so that its edge is pressed against the reference board. Clamp the joint to hold the two parts in position and apply a bead of glue all along the joint lines.

Keep the parts in the jig until the glue starts to set up. A couple of minutes should be enough time. After that, set the clamped square in a safe place and allow it to dry overnight.

With the assembly completed, only a few things remain to be done. To soften the sharp edges of your new shop squares, round over the edges ever so slightly with some 220-grit sandpaper. Then, drill a hole in the handle and find a good spot on your shop wall to hang them. □

Gary Williams is a technical writer, woodworker and new grandpa living in San Diego, Calif.



Wooden Chisel Plane

Build this classic tool in an afternoon

BY NORM POLLACK

Tools are made to fill a need. That's why the chisel plane has been around for centuries in one form or another. It's able to do some things that other planes can't do as well—or at all.

What's unique about the chisel plane is the location of the blade. It extends ever so slightly out the front, allowing a planing cut right up to an inside corner. A bench chisel can do the same thing, but the plane provides more control. The chisel plane also is useful for trimming dowel plugs flush with a surface. And many woodworkers like to use this plane to remove glue squeeze-out along a joint line.

The construction is simple enough that you can easily make one in less than half a day. It's best to make the plane from a tight-grained hardwood. Beech is a good choice, so is hard (sugar) maple.

The chisel plane uses a steel blade (also called a plane iron) that's made to fit a block plane. If it's not available locally, a mail-order source for the blade and the other hardware needed can be found on the facing page.

I like to round the heel of the plane until it fits comfortably in my hand. You may want to round it more or less, depending on what feels best for you. A shallow groove for the fingers is added, one on each side of the body, for a better grip.

Making the body

The body of the plane has two parts—a base and a heel—which are glued together. This construction lets you cut the 20° angle of the body in a single pass on the tablesaw before glue-up. And because the base and heel are ripped from the same piece of stock, the glueline hardly shows once the two parts have been attached.

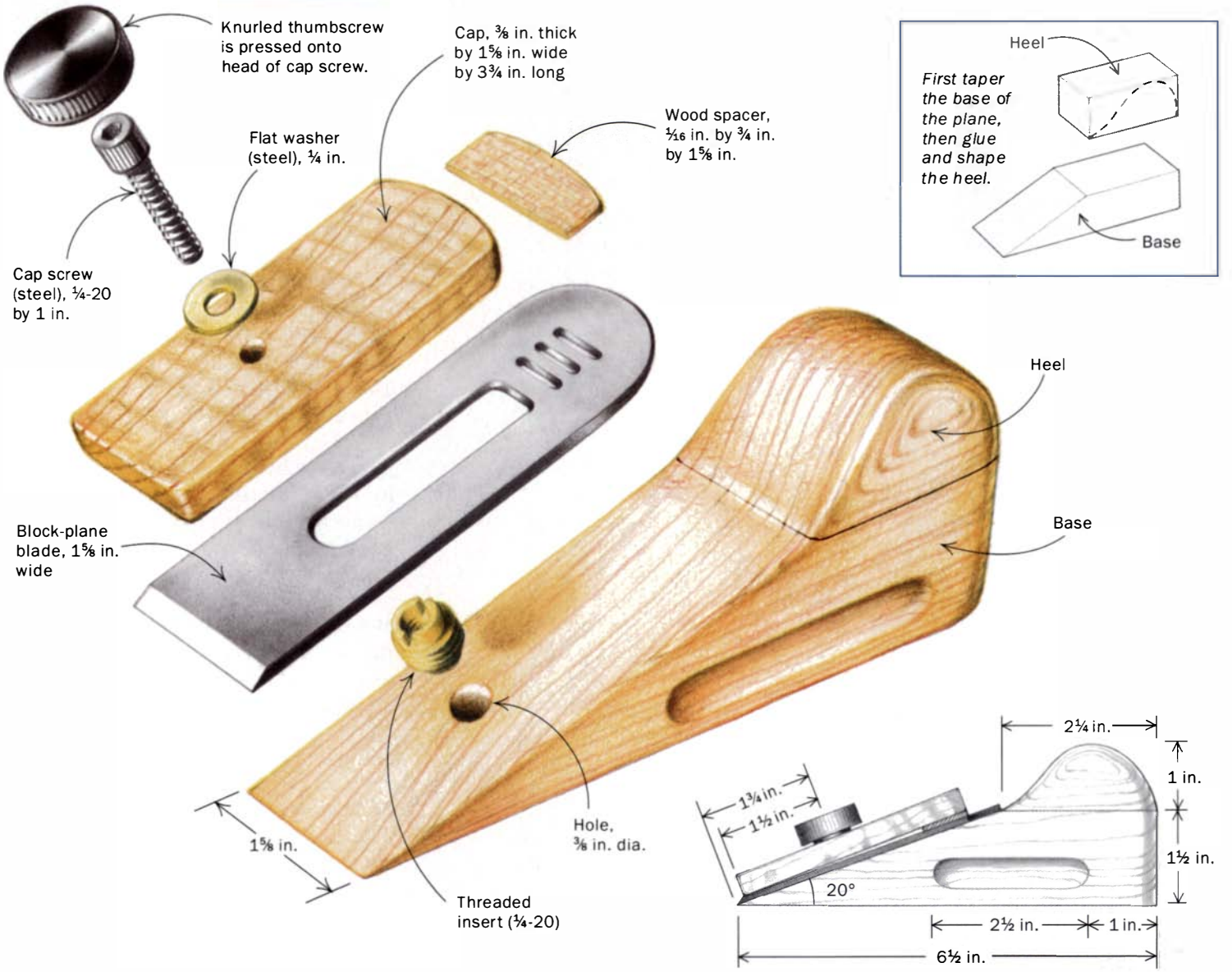
Start with a piece of 1⅝-in.-thick stock, measuring at least 3 in. wide and 10 in. long. Although the length here is almost double that of the finished plane, the extra material allows for some trimming that's done later. By the way, you can make two of these planes almost as fast as you can make one. If you want two planes, start with a 24-in. length of stock.

Rip the board to 1½ in. for the base. Then relocate the fence and rip the 1-in.-tall heel.

Cut the taper using a trimming jig— Now you can cut the 20° taper on the top edge of the base. This cut needs to be flat and square to the sides of the base. So to

Photo, this page: Michael Pekovich

A USEFUL TOOL FROM A SMALL INVESTMENT



get a good cut, I made a jig that allowed me to use my tablesaw.

The jig is a piece of ¾-in.-thick medium-density fiberboard (MDF) or plywood, with a notch for the base (see the top photo on p. 82). Cut the jig to size and mark the location of the notch, then bore a clearance hole at the corner to prevent dust buildup. Then cut out the notch with a bandsaw, staying slightly on the waste side of the line as you cut. Sand the sawn edge exactly to the line.

Next, bore a hole in the base to accept a 2½-in. screw, which secures the base to the jig. That's important, because you don't want your hands near the blade here. Drill the hole about ⅝ in. from the end of the base and ⅜ in. from the side. If you're concerned about ending up with a plane that has a hole in it, don't worry. The end with the hole gets cut off after the taper has been cut.

Now, place the base into the jig and drive the screw. Position the rip fence so that the inside tooth of the blade is about ½ in. from the edge of the jig. Then use a long pusher to push the jig through the blade.

With the taper cut, the glue-up can start. First, though, trim the end of the base so that you end up with a 2¼-in. flat along the top edge. Then cut the heel to the same length and glue it to the base.

Rout the finger grooves—I cut the finger grooves on the router table with a ½-in.-dia. cove bit. Because each groove is hidden as you cut, you need guide lines on the body of the plane and on the fence.

On one side of the body, mark lines to show where the groove begins and ends. Then extend the lines to the bottom edge,

SOURCES OF SUPPLY

REID TOOL (800-253-0421)
Hardware

WOODCRAFT (800-225-1153)
Stanley block-plane blade

A complete parts list is available on our web site: www.finewoodworking.com

Drawings: Michael Gellatly

TAPER THE BASE, THEN ADD THE HEEL

Safer and simpler cutting with a jig. *The tablesaw jig ensures a straight, flat 20° tapercut on the base of the plane, which is held in place by a screw.*

A trimming jig supports the base of the plane during the tablesaw cut. The jig is made of ¾-in. MDF or plywood.

where the body meets the fence. Next, with the bit installed, butt the fence against the bit and make two marks on the fence, one aligning with the left edge of the bit and one with the right edge. Use a square to lengthen both of the lines so they can be seen when the body of the plane is against the fence. To complete the setup, position the bit to extend ⅛ in. above the table, and locate the fence ¼ in. from the bit.

Now fire up the router. With the back end of the plane body on the table and the bottom of the plane against the fence, lower the body into the bit by pivoting the front end down onto the table. When the body is on the table, push it to the right until the left lines on the body and fence line up. Then push the body to the left until two right lines align. Repeat on the other side.

Shape the heel in three steps—First, after drawing the curve, cut the heel to rough shape with the bandsaw. Then fair the curve with rasps and files. And finally, sand the heel smooth.

Mount the threaded insert—The plane's cap is held in place with a knurled, plastic thumbscrew that fits a threaded insert in the tapered face of the body.

The ¼-20 insert fits into a ⅜-in.-dia. through-hole. So you'll want to start the procedure by marking the center point of the hole on the taper.

Because the hole must be bored square to the tapered face, you'll have to tilt the drill-press table to match the 20° angle of the taper. Or, if you have a drill-press vise,

GLUE UP AND SHAPE THE PLANE BODY

Glue the heel onto the base. *The grain at the joint line matches nearly perfectly because the two parts are ripped from the same piece of stock.*

Rout the finger groove. *A shallow finger groove on each side of the plane is cut on the router table using a cove bit.*

Hand-shape the heel. *After bandsawing the rough shape, a few minutes with a rasp and file complete the rounding of the heel. Smooth out the file marks with sandpaper.*

Photos, except where noted: Tom Begnal

DRILL AND INSTALL THE THREADED INSERT

Bore the hole for the threaded insert. *The hole is drilled at a right angle to the tapered portion of the base. Use a vise and square to position the stock for drilling.*

Install the insert. *With the drill turned off, and with the help of a couple nuts, a threaded rod and a wrench, the insert goes in easier and straighter.*

as I do, you can clamp the body into the vise and use a square to make sure the taper is 90° to the bit. Once everything is square, drill the hole.

A threaded insert has a slot that allows you to install it with a wide-bladed screwdriver. But it takes a fair amount of torque to turn the insert, so the slot quickly gets chewed up, making it harder to turn. And if that's not annoying enough, the insert likes to go in crooked. To make this job easier I put a couple of nuts on a short length of threaded rod. One end of the rod chucks into the drill press. On the other end, the nuts butt together, allowing about ⅝ in. of the rod to be exposed.

After threading the insert up to the first nut, raise the table just enough to start the end of the insert into the hole. Then use a wrench to turn the upper nut, which turns the insert. At the same time, lower the quill to feed the insert into the wood. Don't thread the insert all the way in. Instead, I like to leave about 1/16 in. extending above the surface to help center the blade slot when it's added later.

The process of turning and feeding gets the insert installed in no time with little effort. And it's always square. By the way, to prevent the entire plane from turning as you use the wrench, clamp a stop block to the table.

Making the cap and adding a finish

You'll need ⅜-in.-thick stock for the cap. After the stock has been cut to size, lay out and mark the center point for the hole that accepts the thumbscrew.

To concentrate more pressure along the front of the blade, add a thin wood spacer along the back of the cap. The added pressure in front helps keep the cap from twisting and prevents chattering of the blade. After the spacer has been glued in place, the back end of the cap and the spacer are sanded to an arch shape on a disc sander.

A penetrating oil makes a good finish for the plane. And if you take some extra time to add five or six coats, the finish builds to a nice luster. Once the finish dries, slip the slot of the blade over the end of the threaded insert. Make sure the bevel faces up. Then add the cap and snug it down with the thumbscrew and washer.

Adjusting and using the plane

Adjusting the blade is pretty straightforward. Loosen the thumbscrew just enough to allow the blade to move. Then, with the bottom of the plane on a flat, wooden surface, slide the blade forward. When the entire front edge of the blade just touches the wood, tighten the thumbscrew.

Because there's no support in front of the blade, a chisel plane can dig into the wood if you apply too much pressure at the front. The secret is to apply slightly more pressure at the heel. □

Norm Pollack, a retired electronic technician, lives in Woodbridge, Va., where he spends a lot of time making wooden planes.

Photo, this page (bottom): Michael Pekovich

Current Work

Current Work provides design inspiration by showcasing the work of our readers. For more details and an entry form, visit our web site: www.finewoodworking.com. Send photos and entry forms to Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470.

Timothy Mowry

Much of the inspiration for Mowry's sideboard (20 in. deep by 60 in. wide by 36 in. tall) came from Japan. "The forged pulls are a stretched version of a pull you would see on a tansu cabinet," said Mowry. The panels, woven of teak veneers, are reminiscent of the woven bamboo panels seen in Japan. The piece is made of quartersawn white oak, maple, teak and teak veneer and is finished with oil.

Jim Lee

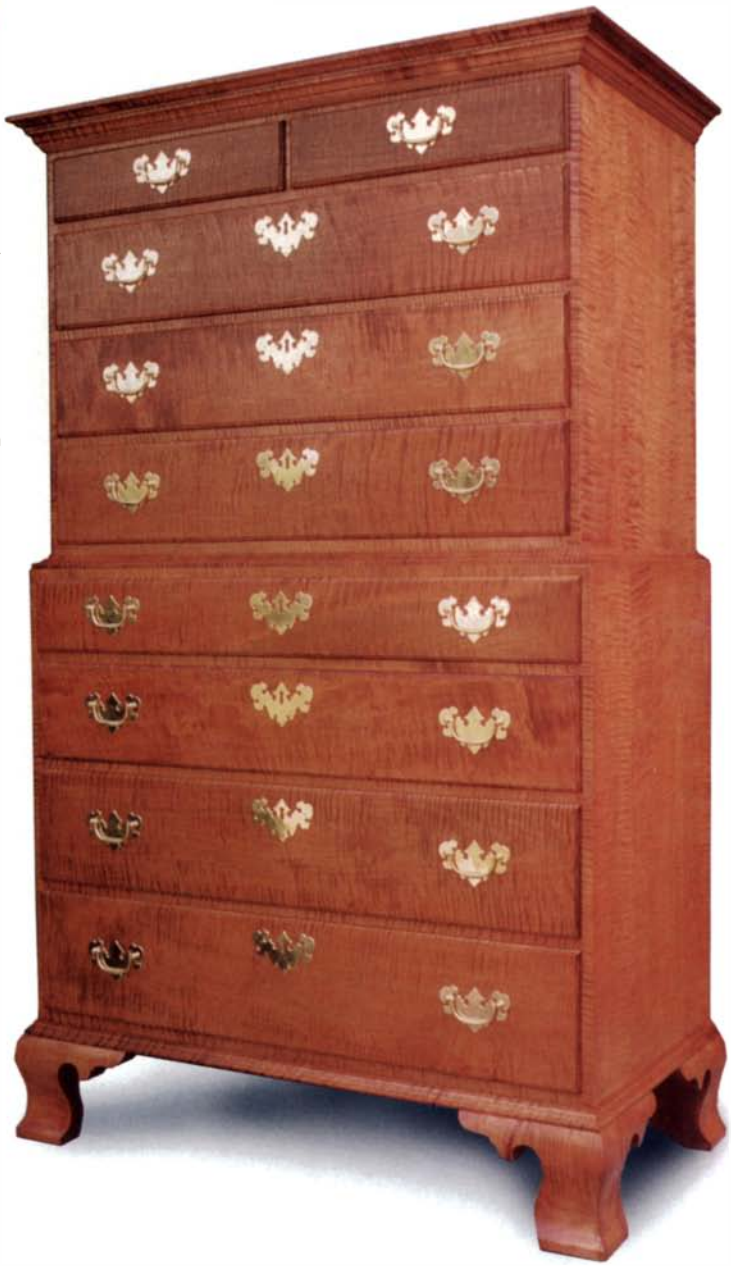
This Philadelphia-style, tip-and-turn piecrust table (27¾ in. dia.) took Lee 200 hours to complete. His final project at Rockingham Community College's Fine and Creative Woodworking Program, this table was also his first carving project. The top was turned from a single, 32-in.-wide board.

Charles Wiedman

Wiedman's client asked for a carved dressing mirror that would portray oneness with the earth and its solar system. Though Wiedman had never done any carving, he figured it was time to learn something new. The mirror (22 in. deep by 48 in. wide by 86 in. tall) features a carved mahogany frame with cherry legs and feet. Inset is a ¼-in. beveled mirror.

Pete Sangree

This bubinga coffee table (44 in. deep by 20 in. wide by 14¾ in. tall), Sangree said, was designed "to incorporate the inherent strength and beauty of the arch to support the functional top," which was cut from a single slab of bubinga.



Gerald L. Mayberry

Mayberry has been building period furniture since visiting Williamsburg, Va., in the 1960s. Based on the chest-on-chest drawn by Carlyle Lynch in *FWW* #81, Mayberry's tiger-maple version features several modifications to the original design: a more complex crown molding, fewer top drawers and larger ogee feet.

Peter Turner

The bulk of Turner's humidor (11½ in. deep by 22 in. wide by 12 in. high) is made of curly maple, but the top features a bird's-eye panel. Turner stained the base a darker tone to ground the piece. It was finished with oil and Bartley's gel varnish.

Michael and Paul Wilson

The Wilson brothers run Wilson woodworking in Windsor, Vt., and built this home office for a local doctor who wanted to bring home work but be able to hide it. The unit is made of pine and stained, and we're told, has proven itself very user-friendly.
Photos by Jerry LeBlond and Robert North

Ed Willer

This walnut hunt board (20 in. deep by 60 in. wide by 41 in. tall) recently won first place at the North Carolina State Fair. Willer's version, built of air-dried, field-grown walnut, is an adaptation of one found in Carlyle Lynch's "Furniture Antiques Found in Virginia." The walnut was dyed, filled and finished with Danish oil and varnish.

John Grew Sheridan

Built for the Open Studio Weekend in San Francisco, this hall entry table (19 in. deep by 60 in. wide by 34 in. tall) is made of rosewood and cast iron. The top is lacquer, rottenstone-polished to a mirror finish, and the base is a cast-iron grinder pedestal from the 1940s, painted gloss black. Photo courtesy of shoppleinstudio.com

Joseph H. Willard

Though he studied under Tage Frid at the School for American Craftsmen at the Rochester Institute of Technology (two benches over from Jere Osgood), Willard decided to pursue woodworking as a hobby rather than as a profession. This desk is made of walnut with solid burl on the block front.

Steve Knowles

The "Impulse End Table" (17 in. deep by 17 in. wide by 25 in. tall) was designed, Knowles said, "to emphasize curves and a sense of motion." The three-legged design looks at once sturdy and delicate. The pieces are made of jatoba, African satinwood and Bolivian rosewood.

Tips for photographing your furniture

1. *Use 35mm color print (negative) film of moderate speed (ISO 200-400).*
2. *Clean and dust the furniture.*
3. *No matter how you light the furniture, it will appear more three-dimensional if each plane has a different brightness. Take care, however, to avoid excessively bright highlights or dark shadows.*
4. *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.*
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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READER SERVICE NO. 111

Rules of Thumb

BY MIKE DUNBAR

Furniture design: the four objectives

When you design a piece of furniture, you have four primary objectives. You may not be consciously aware of them, but they are part of your decision-making process.

The four goals are function, comfort, durability and beauty. Although these are all very fundamental to woodworking, they deserve to be explored from time to time.

Does it work?

For me the function of a piece is axiomatic. It must do its intended job. If the piece is a chair, it has to hold your backside off the ground. If it's a table, you must be able to sit at it, and you must be able to lie in a bed. Function implies a generally accepted definition of purpose.

A lot of ink has been spilled in the art-furniture debate—for example, is a chair that you can't sit in truly a chair? For most of us, who accept function as integral to furniture, the answer is self-evident.

Is it comfortable?

A piece of furniture not only has to do its intended job, but it also must be comfortable and commodious. A rock will keep your backside off the ground, but a rock is neither comfortable nor convenient; a chair is both. You must be able to sleep all night in a bed, and a table must be the proper height and dimensions for its job. A coffee table's height makes it ideal for serving tea and coffee to guests, but it is uncomfortable for dining.

Will it last?

A piece of furniture should hold up under its intended use. The life expectancies of different pieces vary and are linked to their particular functions. For example, Adirondack chairs and picnic tables that are left outdoors are not expected to last as long as a chest of drawers or a lamp stand—pieces that you hope to leave to your great-grandchildren.

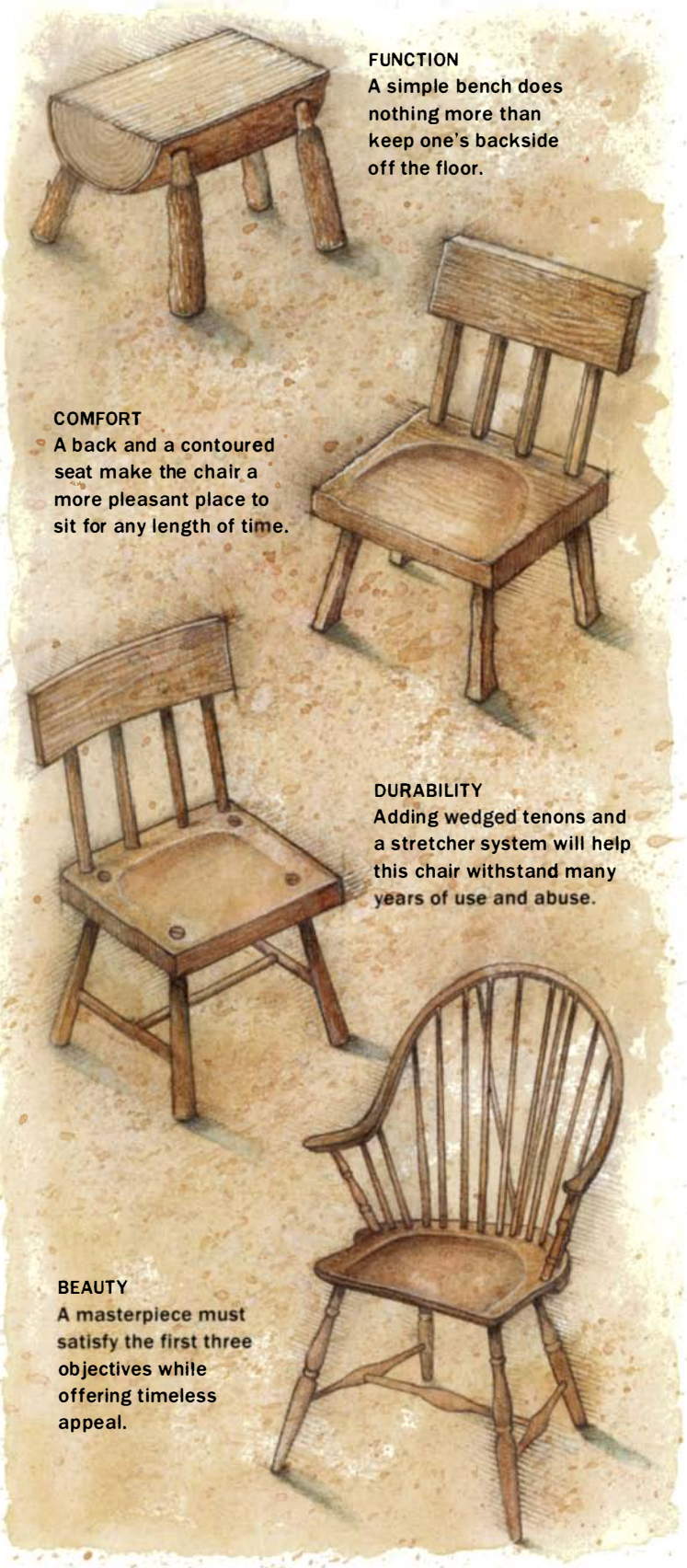
Durability often is confused with quality, but in reality quality requires successful accomplishment of all design objectives, including the next one: beauty. A strong but ugly or uncomfortable chair is not good quality.

Is it attractive?

In the days of the craft shop, appearance was the one objective that separated the journeyman from the master. By virtue of his training, the journeyman knew how to accomplish the first three objectives. He knew how to make a piece of furniture that did its job, that was comfortable to use and sturdy enough to last.

However, only the master understood form well enough to produce the masterpiece. As a furniture maker, I define a masterpiece as a decorative object that not only satisfies the first three objectives of function, comfort and durability, but the piece also transcends time and culture.

Picture yourself entering a museum and coming upon a Ming vase. You are struck by the object and drawn to examine it. You first observe it in its entirety, standing back several paces to take in the overall statement. Next, you move closer to examine the vase in greater detail, to appreciate the finer points and to observe



Drawings: Kirk Caldwell

evidence of the craftsman's technique. The vase was made centuries before you were born and by someone living in a completely different culture. Yet it speaks to you, a viewer removed from the maker by all that time and space. It is a masterpiece.

We all want people to notice our woodworking and to appreciate the effort we invested in making it attractive. And we know intuitively that the things we make will survive us and be used by future generations. We want them to appreciate our work as well.

It is a common mistake to confuse the masterpiece with the fashionable. Both the fashionable piece and the masterpiece are appreciated in the maker's own time and culture. The appeal of the fashionable piece, however, is transitory. Trendy furniture eventually will look dated.

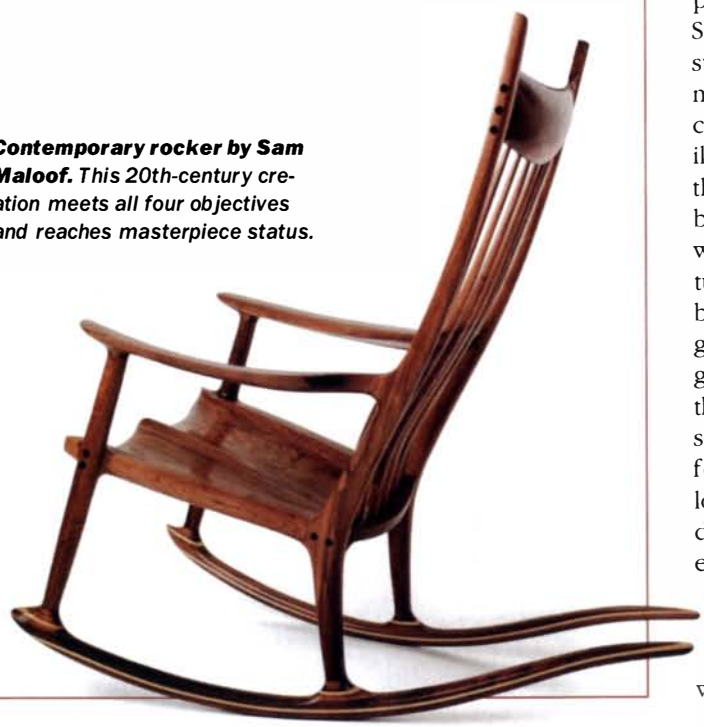
The masterpiece's transcendence is frequently not detectable to someone living in the period and place in which it was made. This quality emerges only as the winds of time winnow out the merely fashionable.

Look at some early issues of *Fine Woodworking*, and you'll notice the modernist furniture that was being made 25 years ago by some of the country's best known and most highly regarded woodworkers. Although the height of fashion at the time, today much of their furniture looks dated.

A Queen Anne highboy, however, is as fashionable now as it has been for a couple of centuries. Some modern furniture has generated enough universal acclaim, for enough time, to suggest similar transcendence. Sam Maloof's chairs are good candidates for masterpiece status.

Massachusetts-style highboy by Randall O'Donnell. *The appeal of this period piece has remained strong.*

A Queen Anne highboy is as fashionable now as it has been for a couple of centuries. Some modern furniture has generated enough universal acclaim, for enough time, to suggest similar transcendence.



Contemporary rocker by Sam Maloof. *This 20th-century creation meets all four objectives and reaches masterpiece status.*

Quality furniture meets all objectives

The four objectives are in constant tension with each other. However, you cannot make good furniture by emphasizing one or more objectives at the expense of another.

When showing my students how to make a Windsor chair seat, I explain that the broad solid surface that supports the sitter's backside satisfies function. Also, the seat has to be nearly 2 in. thick so that it can be deeply saddled to make it comfortable and also allow deep, strong joints. However, the mass of a thick seat is in conflict with the chair's graceful lines. To resolve the conflict, the maker carves the edges and upper surface of the seat, making the slab seem thinner than it really is.

Another example of the tension between the four objectives is the Klismos chair, popular in the young United States and western Europe starting about 1815. The Klismos chair was developed in classical Greece and was often illustrated on Grecian urns. Although very fashionable and beautiful, the Klismos chair was not a good piece of furniture. Stretchers were not used because they did not look good when combined with graceful saber legs. However, the legs were too thin to create strong joints. The result is that few Klismos chairs lasted very long without breaking. After a decade or two of bad experience, furniture makers were forced to add stretchers to their Klismos chairs to strengthen a beautiful but weak design.

Photos: Boyd Hagen (top); Gene Sasse (bottom)

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Q&A

Crooked glue-ups

I have problems gluing and clamping my work. Although I know about measuring diagonals, I have trouble keeping everything square. Do you have any tips?

—Nils Rausch, via e-mail

Lon Schleining replies: I know of a few possibilities that could account for your problems: clamp overkill, overcorrection or a crooked clamping surface.

Clamp overkill means using big clamps on small projects. Oversized clamps can be so heavy that they make your project bow, twist or very slowly ooze out of square just when you think you're finished clamping.

Overcorrection is a frustrating phenomenon. Let's say your box project measures slightly out of square diagonally. You apply a fair amount of diagonal clamp pressure to correct the problem. The box moves slowly toward square but then keeps moving beyond square in the other direction. The solution is to monitor the shape of the piece carefully for several minutes after a critical correction.

However, even if the assembly is perfectly square, it still can be twisted. There are several ways to counteract this. First, glue up the project on a benchtop or other flat surface, and make sure no blocks or clamps are lifting one corner of the project—a sure bet to throw the shape out of whack. Check to make sure the box doesn't rock. If it does, clamp down the corners that are high and bring it back into square. Sometimes the box will need clamps above and below, preventing solid contact with the benchtop. In this case, try setting up the project on evenly sized blocks to allow access to the underside while still keeping everything flat. Again, check to see that it doesn't rock back and forth.

Be careful not to overcorrect a glue-up that measures out of square. *The workpiece often continues to move for several minutes after clamping pressure is applied, carrying it beyond square in the other direction.*

Try using winding sticks across the top to check for twist. Even when using a sea of clamps, as I did recently on the Jefferson Desk (*FWW* #144, pp. 64-71), winding sticks allow me to check whether it's twisted by sighting along the tops of the boards.

One rule of thumb that may just correct the problem before it has a chance to develop is to clamp the project dry. By doing a dress rehearsal, you can check whether something you're doing can account for the project winding up out of square. Once the project is in the clamps with glue in the joints, you have only a few minutes to make corrections.

[Lon Schleining teaches woodworking at Cerritos College in Long Beach, Calif.]

Poor results with dovetail jig

I just bought a Porter-Cable dovetail machine. Is there a way to minimize the breakout that occurs both when machining the joint and when assembling the drawer sides? While dry-fitting, the fragile corners come off, even though the joint seems to be a good fit. I am using the brand-new bit that came with the jig.

—Seth Patterson, Boulder, Colo.

Gary Rogowski replies: Yes, there is a way: Cut your dovetails by hand! Sorry—a little joke. Actually, all dovetail router jigs can have this problem. This is sacrilegious, I know. The problem is most severe when the dovetail bits are ground at a wide angle, as they are on your model. Porter-Cable uses a 14° bit, which is well past what any sensible hand-dovetailer would choose. Twelve degrees, or a 1:5 angle, is a good limit. As a result of this bit design, you end up with more short grain at the tips of the tails, which is very likely to break off.

There are a number of other ways to improve your situation. Try slowing down your feed rate on the tail cuts. Move into the wood a little more slowly. You could also put a backer piece behind the tail board to prevent the breakout. It can't be very thick, though, or the boards won't fit under the finger template.

Loosen the fit ever so slightly on your joints so that you're not squishing them together to get them to fit. You can also very lightly relieve or bevel the inside

Photo, this page: Asa Christiana

corners of the joint so that the tails and pins start to fit together nicely before you push them home.

You might also try a wood that isn't so liable to fracture. A harder, tighter-grained wood like maple will be more durable, but your fit better be right.

The last thing I'd consider is to look carefully at the grain of each board where you'll be cutting the joints. Make sure you have straight grain with no curl or swirl. This also will help cut down on the blowout. Good luck.

[Gary Rogowski is a contributing editor.]

Hidden wire shelf supports

A few years ago I learned about a hidden shelf fastener used in Europe, called "Magic Wires." I know basically how these work, but I would like to know more about them. Also, I can find only two large sizes on the market. Are there smaller sizes?

—Stanley E. Kebbe, Milford, Pa.

Asa Christiana replies: The Magic Wire shelf support is a formed, ⅛-in. wire that is inserted into two holes drilled in the side of the case, leaving a section of the wire protruding. One support is installed on each side. Then a stopped groove is cut in each end of the shelf, and the shelf slips over the supports, hiding them from view.

Magic Wires are distributed in the United States by Selby Furniture Hardware Co. Selby carries them in five standard sizes, ranging from 6¼ in. to 13¾ in. long. There is also a "mini" size that is 1½ in. long and uses only one mounting hole. To find a Selby retailer in your region, call (718) 993-3700. You can order direct from the distributor, but Selby only accepts orders of $100 or more. Woodworker's Hardware (800-383-0130; www.wwhardware.com) retails the two sizes you mentioned (7¾ in. and 9¾ in.). According to Woodworker's Hardware, these supports are rated to hold up to 30 lbs. per shelf and can be used in most materials, including particleboard.

[Asa Christiana is an associate editor.]

Sand between coats of varnish?

When applying varnish, tradition holds that one must sand between coats. However, Chris Minick, in a recent Finish Line (FWW #143, pp. 121-122), says that "simply sanding to increase adhesion is not necessary unless the dried varnish coat is older than six months." Is there a definitive answer?

—Roland B. Clark, Sutherlin, Ore.

Chris Minick replies: Ask a dozen woodworkers if sanding between coats of varnish is necessary, and you'll likely receive 12 different answers. Some insist every coat must be thoroughly sanded for proper adhesion. Others contend that sanding between coats is needed only to remove some coating flaw. A brief review of how varnish cures will shed some light on when sanding is necessary and when it is just an option.

Once the carrier solvent has evaporated from the freshly applied varnish coat, oxygen is absorbed from the atmosphere and polymerization begins. Initially, the reaction proceeds fairly rapidly, but it slows dramatically as the molecular weight and the viscosity of the finish film increases. After 12 to 24 hours of drying, the varnish film is solid enough to appear fully cured, when in fact the cure is only 80% to 85% complete. At this point a sufficient quantity of active bonding sites are still available at the surface of the semicured varnish film to ensure maximum adhesion when the next varnish coat is applied. Therefore,

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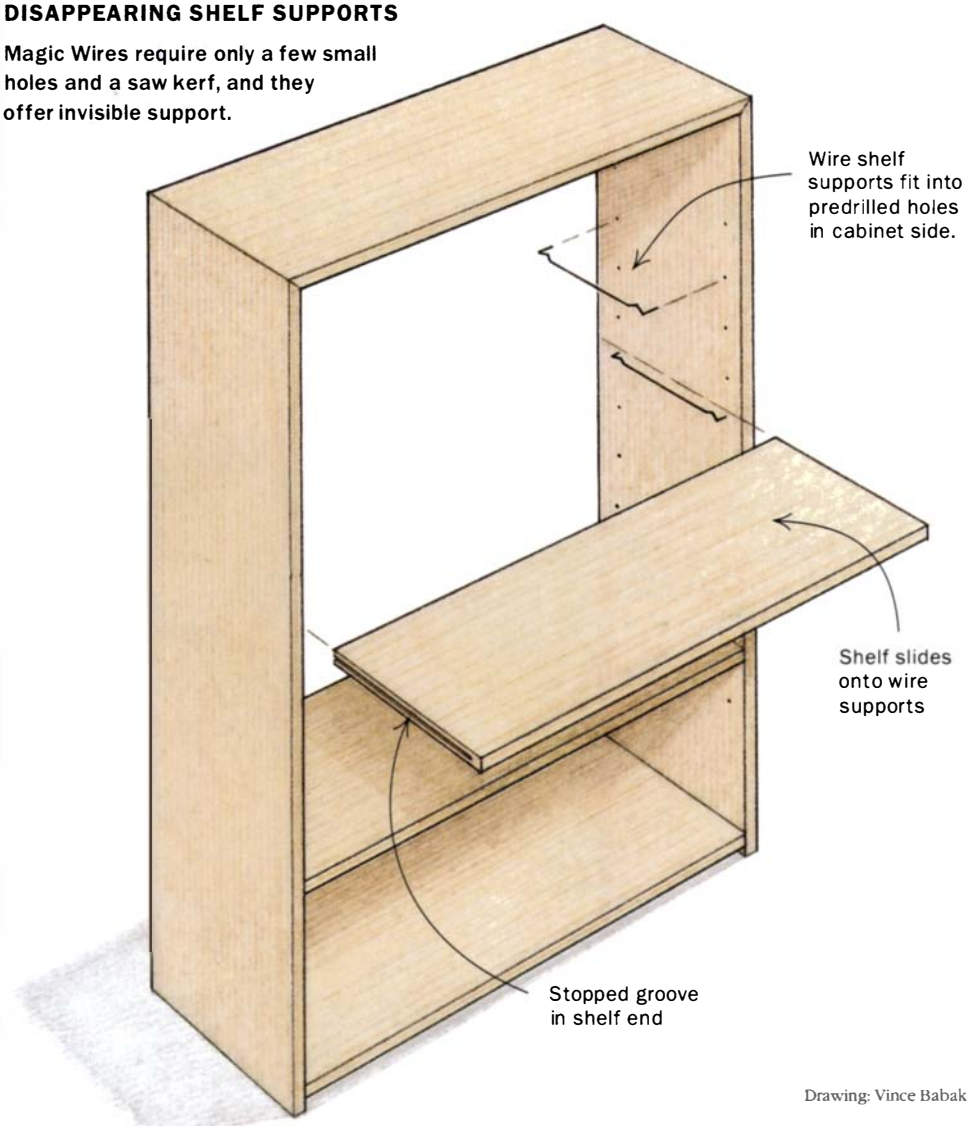

Drawing: Vince Babak

sanding between fresh coats of varnish is not needed except to remove any cosmetic defects that may have been in the initial coat of varnish.

In general, varnish coats that are less than two or three weeks old can be recoated without adhesion loss. As the time span increases between subsequent coats, there are less active polymerization sites available on the surface for chemical bonding. Even though standard oil-based varnish never achieves 100% cure, varnish coats that are six months or older benefit greatly from sanding prior to being coated with fresh varnish.

Because active bonding sites are at a minimum in old varnish coats, we must rely on another chemical phenomenon to hold the fresh varnish film to the old varnished surface: van der Waals bonds. First quantified by Dutch physicist Johannes Diderick van der Waals in 1880, these bonds are caused by the weak electrical attraction between adjacent atoms or molecules. Van der Waals bonds are weaker than the chemical bonds formed by initial polymerization, but they are sufficiently strong to bond the two finish layers together permanently. Sanding an old varnish film plows V-shaped grooves in the finish and greatly increases the surface area available for bonding. This allows the fresh coat of varnish to achieve permanent adhesion to the old coat. [Chris Minick is consulting editor.]

Different planes, same job

I am beginning to collect and use handplanes, but my knowledge of these beautiful tools is lacking. What is a coffin smoother vs. a smoothing plane? —Rick Ward, Hornbeck, La.

Garrett Hack replies: Smoothing planes, special tools for cutting final surfaces so polished that they shine, come in a wide variety of sizes, styles, weights and materials. The cast-iron Stanley/Bailey No. 4 bench plane is the most common smoothing plane, once made by the millions by Stanley and other plane makers. Before such metal handplanes dominated the market, smoothing planes had wooden bodies, often in a traditional coffin shape with

Metal-bodied planes eventually replaced the older, wooden-bodied planes such as the coffin smoother at left. *The straight-sided, cast-iron Stanley No. 4 (right) became the most common American smoothing plane. British plane makers, such as Spiers, retained the coffin sides in their updated smoothers (center) but used steel bodies in-filled with rosewood.*

no handles. British plane makers, such as Norris and Spiers, took a different approach, building handsome and highly effective coffin smoothers with steel bodies infilled with rosewood.

A well-tuned coffin smoother has all the virtues of a good smoothing plane and then some. It is compact in size (because it is designed only to smooth a surface that has already been leveled by a longer plane), so it's easy to handle. It has a stout iron fully supported by the plane body and enough mass to hug the surface and maintain cutting momentum. The coffin body—slimmed down at the ends and widened at the cutting area—is pleasing to both eye and hand, affording a positive and comfortable grip. The coffin shape allows for a wide iron (requiring fewer strokes to smooth a large surface) yet keeps the sole area to a minimum for less friction.

The only disadvantage of a wooden-bodied plane is that the sole wears, opening the throat and reducing the tool's effectiveness. However, a wooden plane is easily restored by letting in a new hardwood throat plate.

[Garrett Hack is the author of *The Handplane Book* (The Taunton Press, 1997.)]

The problem with oak and iron

I am making some Adirondack chairs of white oak. I've heard that some screws react with red and white oak and stain the wood. What do you recommend?

–Charles Dahl, Madison, Wis.

Jon Arno replies: The black stain resulting when ordinary steel nails or screws are used in oak is caused by a tannic acid reaction. The oaks have very high tannin content, and when iron is exposed to this acid, mineral salts are created that are black in color.

Over the years, woodworkers have addressed this problem by using brass, galvanized or stainless-steel fasteners, but stainless steel is by far the most effective choice. When brass oxidizes, it produces green pigments that are, depending upon your point of view, just as ugly as black ones. On the other hand, galvanized fasteners are simply ordinary steel fasteners that have been hot dipped in zinc. The zinc coating works well provided it stays in place, but it is so brittle it tends to chip off when the fasteners are installed.

Even though stainless steel is an alloy composed mostly of iron, it has a seemingly magical immunity to corrosion. So long as the alloy contains an adequate proportion of chromium (typically about 18%), its iron content can be isolated from oxygen and most other corrosive compounds in the environment. Stainless steel was developed early in the 20th century, and it would take a metallurgist to detail the many varieties now available, but its prohibitively high cost has kept it from dominating the wood-fastener business. However, in applications where there is a high risk of corrosion or staining, it is money well spent.

[Jon Arno is a wood technologist and wood consultant in Troy, Mich.]

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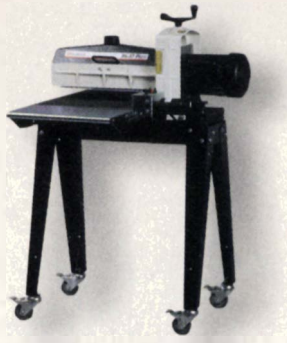

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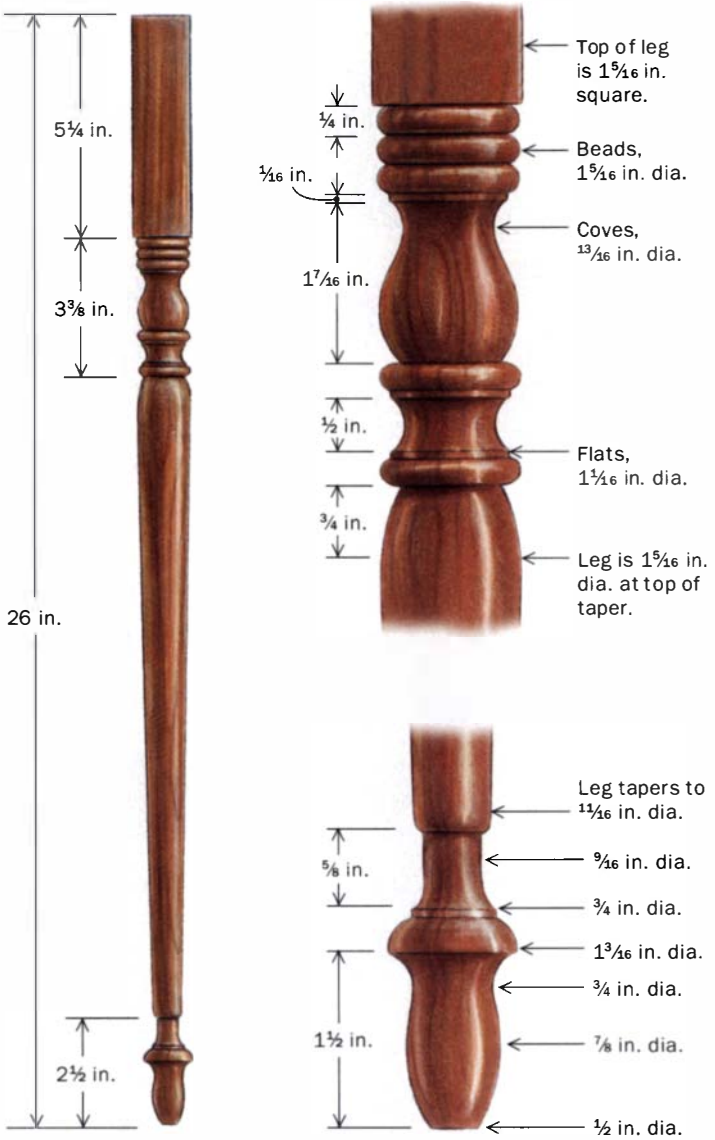
BY DAVID J. LUNIN

Turning a Sheraton-style leg

Work from a full-scale drawing. *Transfer a mark locating where the square section ends and the uppermost bead begins.*

The legs on the Sheraton table on pp. 50-55 are modeled after a Thomas Seymour design. The original was a sewing table or bag table, which had a cloth bag hanging underneath for storage of sewing supplies and brass casters on the legs. Used as a side table, the casters are unnecessary, so I redesigned the foot to flow directly to the floor. The legs, which are a series of coves and beads, may also be embellished with reeding for a higher-style look, but for this piece I kept the long, tapered section smooth.

The changes I made are in keeping with other examples from the period but are adapted for a modern world (such as eliminating the sewing bag). Sensitive changes allow a piece such as this to feel at home in a house full of antiques.



Work from top to bottom

The upper leg remains perfectly square. Where it transitions into a bead you must be careful to avoid any tearout. I scribe that region using a knife, which cuts the fibers and will help prevent tearout at the corners.

Mark the centers on the ends of the leg blank and chuck it on the lathe, placing the

BEGIN BY TURNING A CYLINDER

Mount the blank and use a skew chisel to cut a shallow groove where the bead begins. *Make just enough room to provide clearance for the roughing gouge, so it won't chip the square corner.*

Switch to a roughing gouge. *Round the blank, turning it slightly thinner toward the base, but leave enough material to turn the widest part of the foot. Smooth the grooves left by the gouge using a skew chisel.*

Drawings: Bob LaPointe

foot toward the tailstock. Begin by cutting a shallow groove just to the right of the scribe line with a skew chisel.

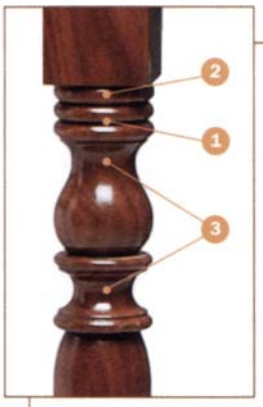
Next use a roughing gouge to round the blank. Refine the shape with a skew chisel, removing only enough material for the largest finished dimension. The skew chisel leaves a smoother finish than a gouge. Next, transfer key points from the drawing to the turning.

Although it looks complex, the job doesn't seem so daunting if you look at the leg as a series of coves and beads (for more on turning beads, see *FWW* #145, pp. 84-87). The triple beads are formed by first defining the divisions with the long point of the flat skew chisel down. Then, with the long point up, bring the bevel to bear against the workpiece. A rolling motion makes the cut. The round part of the urn-shaped bead, just below the triple beads, is worked the same way.

Cove cuts are made using a spindle gouge. But first, to give your gouge a place to rest, define the start of the valleys with the point of the skew. This will prevent the tool from catching. The narrow transition between the third bead and urn is flat and is turned with the short, or near, point of the skew.

When the upper elements have been completed, move toward the tailstock and begin working in the foot. Complete the foot, leaving the cuff (just above the foot) slightly thick.

Then go back to the main section of the leg and use the skew to make a clean taper. Once that's done, you can fine-tune the cuff with a gouge. If your tools and technique are sharp, only some fine sanding with 320-grit paper is required. Last, grab handfuls of shavings and burnish the leg.

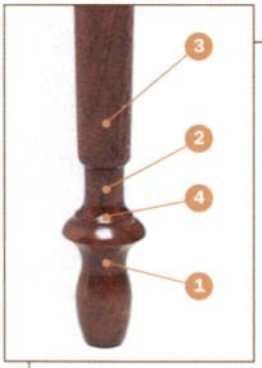


1. Make a series of grooves. *Use the long point of the skew chisel to define the valleys between the beads.*

TURNING THE SHOULDER AREA

2. Roll the uppermost bead first. *It is the most difficult to turn because of the sharp corner. Then turn the others.*

3. All cove cuts are made using a narrow gouge. *Cut into the valley from both sides to avoid catches.*



TURNING THE FOOT

1. Shape the valley of the foot beginning with a gouge. *Then switch to a skew chisel to make the soft convex curve.*

2. Work on the cuff, which is mostly straight. *Both the flat and concave sections are cut using a gouge.*

3. Complete the taper with a skew. *Take light passes and support the thin spindle, which is prone to vibration, with the left hand.*

4. Define the collar at the base of the cuff using the corner of a skew. *Fine details such as this should be consistent from leg to leg.*

Photos: Anatole Burkin

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BY RUE ANN FLANDERS

Open a new world of possibilities by using paint to color wood

Painting by numbers. *Three main colors give this piece harmony and continuity. Natural poplar is blended with the painted wood by coloring the grain and then spattering it with green and mustard paints.*

Coloring wood provokes more controversy than any other form of finishing. For some, using paint and dyes in any form constitutes sacrilege, but for others, it truly delights. Color, while enticing, can also be very intimidating. I sometimes attribute this fear to the early elementary-school experiences of being able to use only the acceptable color combinations while we tried to color "within the lines." If you want to imbue your work with exciting visual interest, you must venture beyond the limitations of wood-colored stains and experiment. Using paint as a stain opens whole new areas of the color spectrum.

Guidelines to color by

The amount of color used is crucial to the appeal of your furniture. In large quantities color can detract from the beauty of the piece and fight with other patterns in the room. However, if a room is stark and void of color, a vividly painted piece can become the focal point and the inspiration for the rest of the room's design.

Follow the rule of three—When using color, whether in large or small quantities, limit the number of different colors used. The most appealing pieces of furniture seem to have no more than three different colors. This does not mean you will not see more than three shades or tints of the same colors, but only that there are at most three distinct colors.

Colors need continuity—When I began to use color in furniture, I often allowed the natural color of the wood to show through. I thought these expanses of neutral areas balanced the piece. But something was missing. Now, to maintain continuity, I color the grain of the natural wood to marry it to the painted sections. In the armoire at left, I painted the grain in the same colors found on the molding and the leaf accents but in translucent form.

One color randomly placed on a piece will not appear to belong there. The color needs to be used elsewhere to tie it together. Again the rule of three applies: Using a color on the piece in at least three areas, even if blended with other colors, adds visual continuity, which is more pleasing to the eye.

Colors can have weight and depth—A beautiful piece of furniture with exquisite colors can appear awkward if the colors are misplaced. Darker shades of color used at the bottom add weight to a piece; conversely, paler tints at the top add lightness.

Color combinations are everywhere—How can you pick color combinations that will be appealing? If you do not trust your own eye for choosing colors, then use someone else's. A field trip to a fabric store can provide an endless source of color combinations. Wallpaper, print ads and product packaging can be helpful as well. Decorating magazines can illustrate proper use of color in a room, which can be transferred to a piece of furniture. Take pictures of gardens that appeal to you. Or look at woods that may be too expensive to buy but whose colors are appealing. Purpleheart's color can be duplicated with paint used in translucent form to allow the grain to show through.

Color combinations. *If you feel uncomfortable selecting your own trio of colors, swatches of fabric provide ideas for harmonious combinations.*

Painting technique

While there are several guidelines to choosing color combinations, the painting method I describe here is quite simple

Photo, this page (left): Author

ENHANCING GRAIN PATTERNS

Color the grain. *The paint must be thin enough to be translucent once applied. Latex house paint, in particular, needs considerable thinning. The author paints growth rings with any of the colors used elsewhere on the piece of furniture.*

Mute the colors. *A very thin coat of white paint is brushed on and immediately wiped off to set back the colored grain and to provide a more uniform base for the spattering.*

and ensures good results. You will find that you can master the techniques with only limited practice on scrapwood.

Prepare the wood—I mostly use poplar because it is inexpensive and takes paint very well. If the wood is going to be painted opaquely, seal it with a sanding sealer. If you want to let the paint penetrate the wood, skip this step. In either case sand to 400-grit sandpaper to achieve a very smooth surface and to minimize the wear on your brushes. Make sure the wood is free from dust particles. I suggest you practice on a sample piece first.

Choose the paint—I use simple acrylic paints found in any craft store, or even latex paint from a paint store. These paints are available in many colors and also dry fast, especially helpful when layering colors. For the armoire I used a mustard yellow for the leaf accents and some of the trim, and sage green for the remainder of the trim.

Color the grain—To make the accent pieces tie in with the body of the armoire, I added color to the grain of the body. Using the diluted paint with a No. 1 or No. 2 artist's liner brush or round brush, I streaked both the mustard yellow and the sage green along the natural grain of the wood and wiped off any excess. When satisfied with the appearance, I whitewashed the entire surface to set back the colors and to provide a uniform surface for the spattering. For a translucent whitewash, mix one part white paint to at least six parts water. I brushed the watery mixture over the armoire in small sections and wiped it off immediately with a clean cloth.

Spatter the colors—To further set the colored grain into the background, I spattered the entire piece with all of the colors I had used, including the white. This can be done using a stiff paint brush, a toothbrush for finer spattering or a spatter brush, which can be found in a paint or craft store. Place the spattering tool in heavily diluted paint and shake off the excess to avoid drips. Then, holding the brush in one hand with it pointed to the surface, quickly run the other thumb or forefinger across the bristles to spatter. If some spatter dots look too big, use the artist's brush to paint a different color inside the large dot, making it two small ones. Try to spatter consistently over the entire area. This requires practice, but once you get the knack, it becomes very easy.

To finish the project, lightly dry-sand with 1,500-grit paper, which smooths the surface but doesn't remove any of the paint. Then clear-coat in your favorite manner. Adding coats of paste wax and buffing will make the surface even slicker. This is a fun and easy way to use paint for a different approach to finish.

SPATTERING UNIFIES THE PIECE

Create a spattering effect by flicking the bristles of a brush. *An ordinary toothbrush dipped in paint makes an effective tool.*

When a spatter becomes a splatter. *If a paint drip falls on the piece, wait until it has dried, then paint out the middle of the drop with another color used for spattering.*

Photos, except where noted: Mark Schofield

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The Right Marriage of Material to Design

When John LaGattuta first heard about a new source for Cuban mahogany (*FWW* #141, p. 26), he had just the right project for using it. His client didn't mind paying premium prices to get a set of Federal shield-back dining chairs (six side chairs and two armchairs) to go with an antique two-pedestal table he had already bought.

These chairs are copies of a design based on originals (from the Kaufman collection of American furniture once exhibited at the National

Gallery of Art in Washington, D.C.) that were made of Cuban mahogany. Shortly after completing the chairs, LaGattuta received an order from another client for 14 more.

From his custom furniture shop in Torrington, Conn., LaGattuta turns out about three dozen chairs a year. Peter Aleksa, one of his employees, accomplished all the carving by hand; and Bob Renzullo, a local tradesman, completed all the upholstery work.

Photos: Michael Pekovich (above); Matthew Teague (left)