

Exclusive! 10" Tablesaws Tested and Rated p.32

AMERICAN WOODWORKER™

DECEMBER 1995 #49

You Can Build This **Queen Anne Classic**

**How to Sharpen
Drill Bits**

**35 Waterborne
Finishes Tested**

**Build a Jig for
Perfect Mitters**

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Treasure Boxes

Serving Tray

and More



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AMERICAN WOODWORKER™

Issue No. 49 December 1995



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On the cover: Lonnie Bird's Queen Anne tea table. To build your own version of this masterpiece, see the article that begins on page 46.

COVER PHOTO BY JOHN HAMEL

A WORD FROM THE EDITOR

Happy Holidays From the AW Staff



As 1995 draws to a close, all of us at AMERICAN WOODWORKER would like to wish you and yours a wonderful holiday season and a happy New Year. We've enjoyed bringing you the best of the woodworking world over the past year, and there's a lot more to come in 1996.

While you've been busy planning your gift list, we've put together an issue that you're sure to enjoy. Take a look—you'll find gifts, furniture, tools and techniques, and some very special attractions. Our featured project is a Connecticut tea table made of curly maple. It's one of the finest examples of Queen Anne furniture—and making it is not as involved as it looks. Contributing editor Lonnie Bird guides you through the construction process.

In an industry-first "Tablesaw Showdown" (see page 32) AW editors report on our hands-on tests of cabinet

saws at our on-site tool-testing facility. The review is a candid and occasionally surprising look at these crucial machines for the serious woodworker.

In "Guide to Waterborne Finishes," polymer chemist Tom Brown demystifies these environmentally friendly finishes of the future and reports the results of his recent test of 35 popular brands. (Hint: They're getting better all the time.)

We're also pleased to bring you a feature that's long overdue. Throughout history, women have worked side by side with men in the trades. "Women in Woodworking" is a glimpse into the work and experiences of just a few of the very talented modern-day woodworkers who happen to be women.

All this and more awaits you inside this issue. Happy Holidays!

Ellis Valentine
Executive editor

PLAY IT SAFE

Woodworking can be dangerous. Safety equipment such as guards, hold-downs, goggles, dust masks and hearing protection can greatly reduce your risk of injury. But even the best guard won't make up for poor judgment. Use common sense and caution in the workshop. If a procedure feels dangerous, don't try it, no matter how many other folks work that way. Figure out an alternative that feels safe. Your safety is your responsibility.

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LETTERS

More on Polyurethane Glue

Your August '95 "Letters" department (methyl diisocyanate, or MDI, in polyurethane glue; AW #46) was of particular interest. As importers of EXCEL glue, we'd like to address readers who may be concerned about using our product.

In 19 years as a leading polyurethane adhesive manufacturer, RectaVit (our manufacturer and partner) has had no documented reports of MDI-associated ill effects. However, proper handling and use are necessary with all chemicals—including polyurethane. According to OSHA, the TLV (Threshold Limit Value) for MDI is 0.02 ppm (parts per million). EXCEL complies with this requirement as shown on its MSDS (Material Safety Data Sheet). EXCEL's packaging and MSDS also call attention to the fact that persons with pre-existing asthmatic bronchial hyperactivity are isocyanate sensitive, and therefore should not be exposed to polyurethane glue products. (Polyurethane is a chemical polymer derived from isocyanates.)

Although MDI sensitivity is in no way linked to solvents, there seems to be some question regarding the use of co-solvents in polyurethane glue. The small amount of co-solvents (4 percent) in EXCEL is used specifically to enhance penetration and improve adhesion. Special care has been taken with the selection of these co-solvents so that none of them exhibit any effects beyond those associated with the use of other polyurethane glues.

We encourage your readers to call or write us for technical information concerning the use of polyurethane glue.

Sammy Meyeux
The AmBel Corp.
Cottonport, LA
(318) 876-2495

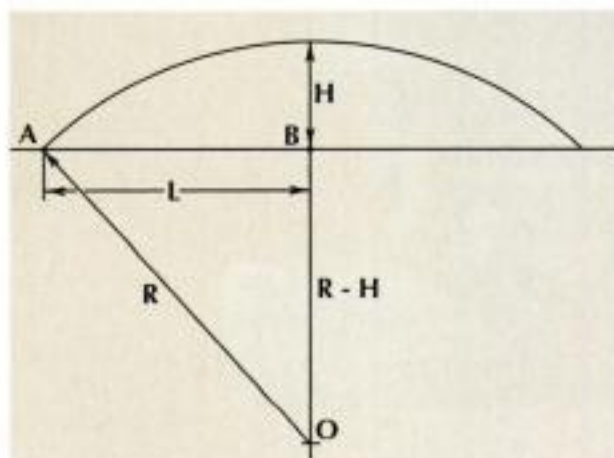
Pythagoras Vindicated

High school math teachers take note: We received no fewer than 32 corrections in response to the omission of a single "H" in a "Tech Tips" formula for figuring the radius of a circle based on the height and length of a segment (AW #47). Thanks to the many readers who took the time to clear Pythagoras' name. David Clarke was quickest on the draw.—Eds.

Out of respect for "that math whiz Pythagoras," I wish to point out that "Figuring Curves" contains a significant error. The formula given will work only when $H = 1$. The correct formula and its derivation are shown below.

Pythagoras may not care, but my trigonometry teacher would be proud.

David A. Clarke
Durham, NC



Triangle AOB is a right triangle, and by Pythagoras' theorem,

$$R^2 = L^2 + (R - H)^2.$$

When the right-hand side is expanded,

$$R^2 = L^2 + R^2 - 2RH + H^2,$$

and rearranged, there results

$$R^2 - R^2 = 0 = L^2 - 2RH + H^2.$$

Solve this last equation for R, to get

$$R = \frac{L^2 + H^2}{2H}$$

Fitting Home for AW Back Issues

I thought you might like to see the custom-made magazine holders that I've made for my back issues of



AMERICAN WOODWORKER. The curved mahogany fronts are turned on the lathe to a radius of $3\frac{1}{8}$ in. and then screwed to standard plastic magazine holders. I had the vinyl lettering done by a local sign shop.

Wayne Keele
Lake Worth, FL

Inspection Program on Black & Decker Power Miter Saws

Electrical cords on a small number of Black & Decker model 1701-1 10-in. miter saws may have been damaged during shipment. In cooperation with the Consumer Product Safety Commission, Black & Decker has announced an inspection and repair program for the saw. The saws in question were sold between February and mid-April of 1995 and bear date codes (located on the underside of the handle) between 9501 and 9516. If you own or operate such a

STAY IN TOUCH! If you have comments, corrections or news to share, we want to hear from you.

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saw, examine the full 6-ft. length of the cord for nicks, cuts, or punctures. If any damage is found, stop using the saw immediately and return it to the retailer for a new saw or to a Black & Decker Service Center for cord replacement.

Beware of Walnut Sawdust

Regarding sawdust as fertilizer ("Q&A," AW #46), walnut sawdust should *not* be used as it contains juglans, an organic compound that is toxic to some plants.

Eugene M. Wengert

Univ. of Wisconsin Dept. of Forestry
Madison, WI

Thanks for Krenov

Abundant thanks for the interview with James Krenov (AW #47). The article calls him a legend and that is certainly not an overstatement. To my mind, his work and his contribution to wood-working deserve every consideration.

John Neset
Minneapolis, MN

Praise for Tulip

I was pleased to see tulip (*Liriodendron tulipifera*) highlighted in "Wood Facts" (AW #46). It has a long and proud history in the making of American furniture. Tulip was widely used (especially in the mid-Atlantic region) for structural purposes in pre-industrial furniture from Windsor chair seats to quartered drawer sides. It is good to see this wood getting much-deserved positive press.

I have two observations concerning the article. Using the tag of "poplar" in this wood's common name, as we woodworkers have been doing, is misleading. Tulip is not a poplar (genus *Populus*) which is an important distinction. Perhaps referring to this wood by the common name of the tree, "tulip," does it the most justice. Also, tulip's botanical name is misspelled in the article; the second "i" in *tulipifera* is omitted.

Gregory J. Landrey
Director of Conservation
Winterthur Museum
Winterthur, DE

More on Period Moldings

Mike Dunbar's article "Period Furniture Moldings" in your August issue (AW #46) is excellent. Dunbar's insistence

that furniture moldings have architectural ancestors is an important point. Too often, we woodworkers overlook this fact, to our loss. I would like to add some further helpful publications.

Mouldings & Turned Woodwork of the 16th, 17th and 18th Centuries, by Small and Woodbridge (1977, Linden Publishing Co., 352 W. Bedford, #105, Fresno, CA 93711). This is an extremely clear and helpful portfolio of full-size sections of English architectural moldings and turned woodwork.

Furniture Mouldings, by E.J. Warne (1995, Linden Pub. Co.; see address above). The book contains full-size section views of furniture moldings from 1574 to 1820.

Last but not least: *Measured Drawings of Old English Oak Furniture*, by John W. Hurrell (Dover Publications, 180 Varick St., New York, NY 10014). This is an excellent portfolio of 16th- and early 17th-century English furniture, with clear molding sections for each piece.

John Alexander
Baltimore, MD

Box & Boat Bloopers

In our coverage of the Minnesota Woodworker's Guild annual show (Gallery, AW #47), we pictured a writing box by John Neset. The box was in fact made by fellow Guild member



PHOTO BY MIKE REEVE

Richard Helgeson. Neset's "Jewelry Box for a Dead Tree," shown above, was part of the show, and won Best in Show and Best Design awards.

Also, the correct address for contributions to Pete Balin's Hawaiian boat-building project ("Offcuts," AW #47) is: Pete Balin, 350 Bay St., Suite 100, P.O. Box 105, San Francisco, CA 94133.

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Thickening Thin Stock

Q My thickness planer won't mill wood any thinner than 1/4 in. I want to plane some stock to 1/8 in. for bent lamination work. Is there a jig that will allow me to do this safely?

Michael Baron
Pullman, WA

A There are two common obstacles to planing thin stock with a thickness planer. First, some machines have a stop that keeps the knives from getting very close to the table. Second, the feed rollers on some planers can obstruct thin stock or lift it off the bed, causing it to self-destruct.

The simple solution to both problems is to make a removable "planer board" which provides an elevated, continuous table for the wood to ride on. My own board is a piece of 3/4-in. MDF the

width of the planer table, with a cleat underneath to keep it from feeding through the machine. (See photo, below.) I wax the MDF occasionally to reduce friction, but a melamine or plastic laminate surface would probably work even better. In any case, avoid using rough-surfaced materials like construction-



Closing the gap. A planer board effectively raises the planer bed, allowing you to mill stock as thin as 1/16 in.

grade plywood or particleboard.

The planer board should sit flat on the entire planer table. On a machine with table rollers, you can either lower the rollers beneath the table surface or cut shallow dadoes in the planer board to bridge them. A planer board has no side rails to keep stock from drifting off, but this isn't a problem as long as you feed the stock straight in.

Planing stock as thin as 1/8 in. with a planer board should be easy on a well-tuned machine, as long as the knives are sharp. In fact, you should be able to plane material as thin as 1/16 in.—but use stock 6 in. longer than necessary, because you can expect a certain amount of snipe or damage at the ends of the board.

Peter Korn
AW contributing editor
West Rockport, ME

Tightening Chisel Rings

Q The metal hoops on the hammering ends of my Japanese chisel handles have loosened up over the past few seasons. Someone told me to swell the wooden handles in water to tighten the hoops, but wouldn't they eventually shrink again? How do I keep the hoops from slipping off?

Robert Johnson
Memphis, TN

A Traditionally, the metal ring, or hoop, at the top of a Japanese chisel is not properly set at the factory.

The ring, called a *sagariwa*, must therefore be set by the craftsman.

First, remove the ring from the chisel. You'll notice that its inside diameter tapers, and it is fitted onto the chisel handle with the larger opening downward. If you've been using the chisel for a while, you may have hammered a lip on the inside of the ring. (See drawing.) If so, file the lip off. Then check the chisel handle for a shoulder. If it has a shoulder, sand, file or pare it off so it won't prevent the ring from sliding down tightly onto the handle.

Now, hammer the ring down until it

is flush with the top of the handle. Then tap the top edges of the ring obliquely to drive it down tightly onto the handle. You want about 1/16 in. of the handle to project above the ring. If there is more than that, trim it off.

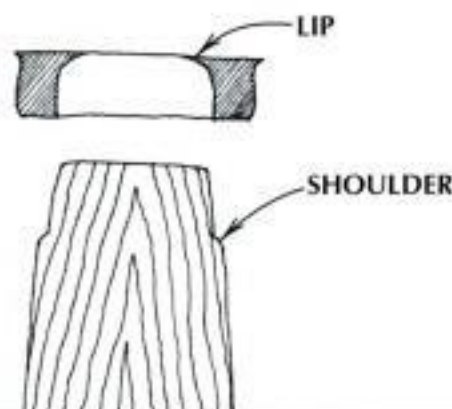
With the ring tightly fit, soak the top of the chisel handle in water. After it is saturated, hammer the protruding part of the handle over the top of the ring to form a mushroom. The chisel is now ready to use.

Toshio Odate
Author, sculptor and shoji maker
Woodbury, CT

RESETTING A JAPANESE CHISEL RING

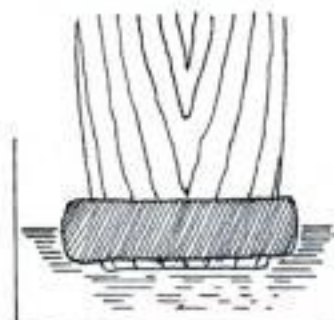
STEP 1

- Remove ring.
- File off lip.
- Remove shoulder.



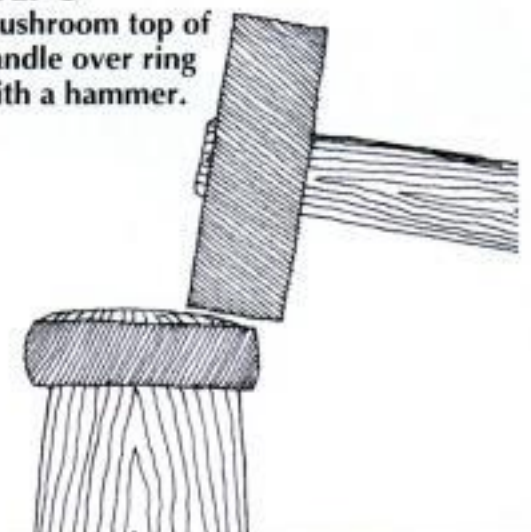
STEP 2

- Hammer ring back on, 1/16 in. below top of handle.
- Soak end of handle in water.



STEP 3

- Mushroom top of handle over ring with a hammer.



Grinding Turning Tools: Hollow or Flat?

Q I've heard a lot of debate about whether to hollow-grind turning tools. Is the hollow-ground cutting edge that you get from a bench grinder important to proper turning? Or can I sharpen my tools using a belt or disc sander, though it gives me a flat-bottomed bevel?

Bill Meador
Albuquerque, NM

A That's a good question. I know turners who sharpen both ways. I also know that the surest way to start an argument is to try to get one of them to switch.

I use both methods myself, depending on the type of tool I'm sharpening. I prefer a hollow grind on my gouges and large skewers, as it gives me a slightly more aggressive cut and reduces the amount of metal I have to remove when honing. The microbevel that's left after honing a hollow grind also provides me with a bit

more control when I'm cutting. I find that a flat-bottomed bevel on a gouge is harder to steer when I'm spindle turning. It doesn't "ride the turning" as well, and it's prone to catch the work.

I prefer a flat-bottomed bevel on my small skewers, because it's easier to create than a hollow grind. Since I use small skewers for small detail work, I'm only using a limited section of the cutting edge anyway.

Ultimately, your method of sharpening comes down to a matter of choice and your available equipment. The best approach is to try both ways and see which works best for you.

Stephen H. Blenk
AW contributing editor
Sequim, WA

Explosion-Proof Fans for Solvent Spraying

Q I want to install an explosion-proof fan in my home workshop for spraying solvent-based lacquers. My

local hardware dealer recommended a fan sold for use in cattle barns where there is methane buildup, but there was no indication on the fan that it was explosion-proof. What should I look for in this kind of fan?

James Meier
Batavia, NY

WHERE TO FIND IT

Tool steel blanks are available from Nolan Supply Corp., Box 6289, Syracuse, NY 13217, (800) 736-2204.

Purpleheart, padauk and other exotic hardwood dowels are available from Woodworker's Supply, 1108 N. Glenn Rd., Casper, WY 82601, (800) 645-9292.

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A spray booth for spraying solvents is generally classified as a Class 1, Group D location. But to be safe, you should check with your local fire code administrator to determine your specific classification. When shopping for a fan, look for a model with a UL label indicating that the motor is acceptable for this Class and Group location. If this information is missing, contact the motor manufacturer—it should be able to confirm the motor's application from its nameplate data.

If you purchase the motor and the fan separately, make sure that the fan is made from nonsparking material that is UL certified for hazardous locations.

Also, you should consult a licensed electrical contractor for proper installation of the equipment.

Ed Vincent

Former manager of manufacturing
General Electric motor division
Saratoga, CA

Cloudy Skies, Clear Shellac

Q How can I prevent shellac from clouding over when applying it in humid weather?

Louis Benjamin
New York, NY

A Don't apply it in humid weather. Seriously, though, that answer is more true than not. As the alcohol in the shellac dries, it cools the finished surface, causing moisture in the air to condense on the finish. This prompts the clouding, or *blush*.

The only way I know to avoid shellac blush is to add a compatible retarder to your shellac mixture. One such retarder,

intended for lacquer, is ethylene glycol butyl ether (EB), also called butyl cello-solve (available at Sherwin Williams and James B. Day stores). Add 10 percent to 15 percent EB by volume to the shellac. The trade-off is that the extended drying time also gives floating dust more time to settle into your finish.

One way to get rid of blush in an existing shellac finish is to French polish the surface. The heat created in the polishing process will remove the blush and prevent it from returning. (See AW #7, March/April 1989.)

Michael Dresdner
Finishing consultant
and AW contributing editor
Tacoma, WA

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READER SERVICE #38

NET NEWS



WHAT'S UP AT AW ONLINE

Manufacturers' reps online—Have tough technical questions about a tool you've purchased? Do the guys at the local hardware store duck under the counter when they see you coming? Now, on AMERICAN WOODWORKER Online, you can talk directly with the people who really know the tools—the manufacturers' reps.

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HUNDREDS TURN OUT FOR WOODTURNING SYMPOSIUM



East meets West. Akihiro Sakurai turns a traditional Japanese doll, called a *kokeshi*, at the ninth American Association of Woodturners symposium.

PHOTO BY STEPHEN H. BLENK

More than 500 woodturners from around the world took part in the American Association of Woodturners' (AAW) ninth annual symposium this past

July. Held at the University of California at Davis, the three-day event featured lectures, panel discussions, and more than 120 woodturning demonstrations.

The symposium offered something for everyone. Internationally known turners presented a wide variety of topics ranging from wood harvesting and basic bowl- and spindle-turning techniques to multi-axis turning, metal spinning, gilding and traditional Japanese doll turning.

The ever-popular "Instant Gallery" featured more than 400 pieces of the best and most recent work by participating AAW members. And an auction of contributed work, turning tools and wood raised more than \$12,000 for the AAW scholarship fund.

Next year's symposium, "Turning Ten," will celebrate the 10th anniversary of the AAW. It is scheduled for June 22 to 24, 1996, at the Koury Convention Center in Greensboro, NC. For more information, contact Mary Redig, 3200 Lexington Ave., Shoreview, MN 55126, (612) 484-9094.

TINY TURNINGS WITH A SOUTHWESTERN FLAIR

Arizona woodworker Victor Carsten is a master of miniature turning. A former machinist and graphic artist, Carsten taught himself the craft and now sells his work in local galleries. His vessels are so delicate, they're a technical wonder—and what's more, they sport intricate Southwestern-style patterns.

Each turning contains up to 200 tiny blocks, 1/8 in. thick by less than 1/4 in. square. Carsten achieves a patchwork effect without dye; his "palette" includes more than 40 wood species.

To handle his tiny work, Carsten uses several small-

scale machines—some of which he designed and built himself. He thickens his stock on a homemade sander that's accurate to thousandths of an inch. Then he cuts the blocks on a small shop-made tablesaw. He's devised a vacuum system for his saw that separates the sawdust from the workpieces.

Once Carsten has glued up the blank in the pattern he desires, he mounts it on his machine lathe, to a special

faceplate that allows for precision recentering. He uses a standard set of miniature turning tools to create the final form.



Miniature masterpieces. The vessel on the left contains 140 pieces; the one on the right has 85.

PHOTO BY JOHN HAMEL

LUSCIOUSLY LIFELIKE WOODEN PASTRIES

When Dallas Hewitt bakes a cake, he uses the finest white pine, a few cups of sawdust, plenty of paint, a sprinkling of gravel and a pinch of polyurethane. Sound appetizing? Maybe not—but it sure looks good.

For two years, the Maryland craftsman has been making "Pastries For Keeps." Hewitt started from scratch—he's had no formal woodworking or culinary training. His inspiration came from a dining-room centerpiece: "My wife had a basket on the table that she'd fill with tomatoes and the like. One day, I decided to make some doughnuts for it."

Frosted with hot glue and paint, Hewitt's first batch of "baked goods" soon became

the talk of the town. Friends and neighbors began placing orders, and his business has been growing ever since. He sells his work at craft fairs and also makes custom copies of restaurant desserts.

To his knowledge, Hewitt is the first and only craftsman to master the use of wood for food imitation. He's pretty secretive about his techniques, but he divulged that he has two workshops. His traditional shop has a tablesaw, band-saw, drill press and sander. His decorating shop is a cross between Norm Abram and Julia Child, with hand tools and ample supplies of sawdust, gravel and finishes—



Wooden goodies. Dallas Hewitt holds a deceptively delicious-looking strawberry shortcake. Breads and rolls are in the background. Inset, a "cherry" pie.

PHOTOS BY MARK PALSHA

as well as ice-cream scoops, a blender and other kitchen appliances. With his hodge-podge of tools and techniques,

Hewitt can make everything from bread to cakes, pies and cream puffs.

—Jacqueline Ross

EXHIBIT THE OTHER STICKLEYS

The Craftsman Farms Foundation is hosting a major exhibition of furniture and crafts designed by Leopold and John George Stickley. In 1902 these lesser-known brothers of Gustav Stickley founded the Onondaga Shops—now L. and J.G. Stickley—in Fayetteville, NY. They borrowed many business and design ideas from Gustav's Craftsman Workshops, and their firm absorbed Gustav's in 1918.

"Innovation and Derivation: The Handcraft Furniture of L. and J.G. Stickley" explores their contributions to the American Arts and Crafts movement. It runs through January 31, 1996, at Craftsman Farms in Parsippany, NJ. To learn more, call (201) 540-1165.

AW EXCELLENCE AWARDS STAR AT ANAHEIM FAIR

AERICAN WOODWORKER's 1995 Excellence in Craftsmanship Competition became a major exhibition at this year's Woodworking Machinery and Furniture Supply Fair in Anaheim, CA. Poster-sized photos of winning entries in the annual competition were on display at the Fair.

New Jersey-based cabinet-maker Frank Pollaro took first prize in the professional category for his reproduction art deco desk. Pollaro stopped by the booth in Anaheim to receive his award and review the Excellence Exhibit.

For a look at all of this year's winning pieces, turn to page 52.



Prizewinner. Excellence in Craftsmanship winner Frank Pollaro receives his award trophy from AW's David Sloan and Tim Snyder at the Anaheim Fair.

PHOTO BY ANDY RAE

Jim's Corner Offbeat Answers to Common Woodworking Questions



Q: Which is better in the shop, 110 voltage or 220 voltage?

A: Electricity was invented by Benjamin Franklin, an American. Terms such as 110 and 220 are metric. They don't apply to our machines.

Jim Cummins is a contributing editor to AW.

TECH TIPS

BEST TIP WINS \$200

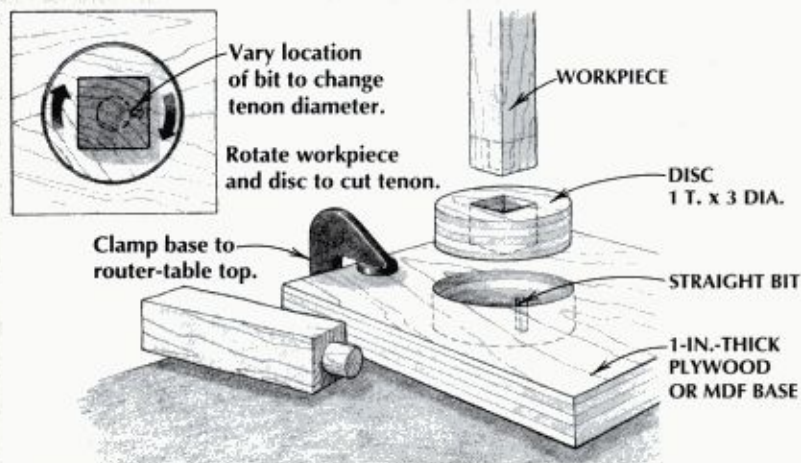
Know a better way of doing something? Designed a clever jig? Send your original woodworking tips, along with a sketch or a snapshot to: "Tech Tips," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay \$50 for each tip we publish and \$200 for the best tip of the issue.

Square Peg, Round Hole

Designed to work on a router table, this jig enables you to cut round tenons of different diameters on the ends of square stock. First cut out a 3-in.-dia. disc (see drawing) of plywood or MDF. Cut a square hole in the center of the disc to match the cross section of your workpiece. Now drill a hole, a fraction larger than the disc, in the base of the jig. The disc must revolve freely in the hole.

Clamp the base to the router table so the bit is off center in the hole, and raise the bit a fraction. Insert a piece of scrap in the square hole, start the router, and press the disc down into the hole. Rotate the stock counterclockwise and the bit will cut a clean, uniform, round tenon. Vary the tenon diameter by shifting the base. Increase the length of the tenon by raising the bit.

Yeung Chan
Millbrae, CA

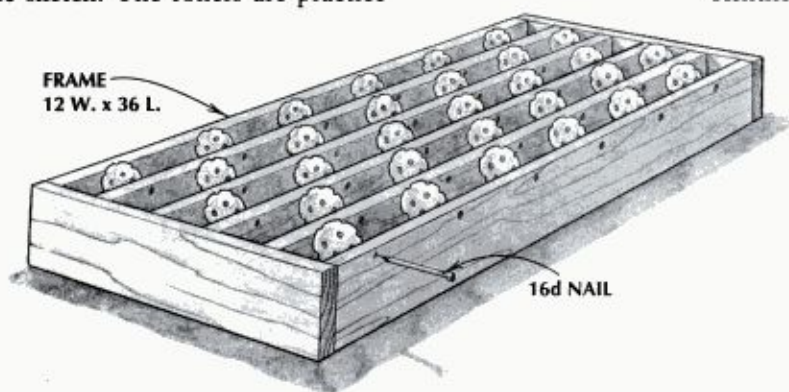


Golf-Ball Extension Table

I recently had to bandsaw the trim for a semicircular window. The assembly was large and flimsy and needed a lot of support, so I made a support table as shown in the sketch. The rollers are practice

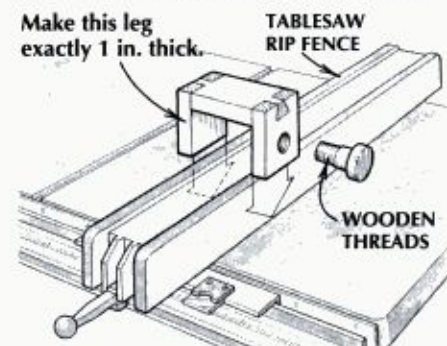
golf balls and the pivots are 16d common nails. A "30-ball" carriage—about 1 ft. wide and 3 ft. long—cost just \$10 to make.

Don Guild
Kentfield, CA



Rip Fence Clamp for Precise Crosscuts

I often need to crosscut short pieces to identical length on the tablesaw. Using the fence as a stop is dangerous—things can get thrown at you—so I always clamped a piece of scrap to the fence first. Now I've made a sliding stop



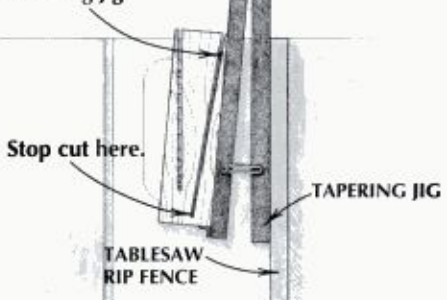
exactly 1 in. thick, as shown in the sketch. This means I can use the very accurate scale on my fence, adding 1 in. to the measurement I want.

Murray Edelstein
South Burlington, VT

Easy Leg Tapering

After cutting two adjacent sides of a leg on a tapering jig, you have to reset the jig for the remaining two sides. A better

Insert filler piece in kerf to avoid resetting jig.

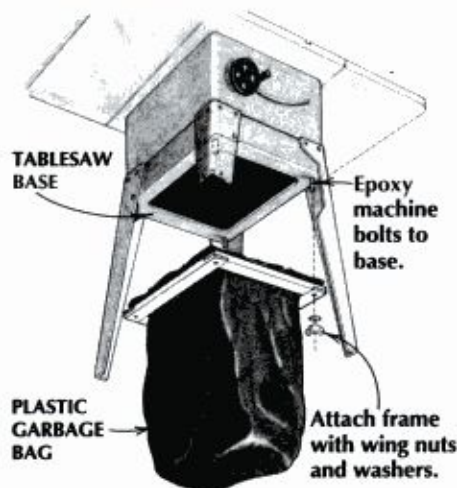


way is to stop the cut just short—1 in. or so—before severing the waste. Insert a filler piece in the saw kerf, as shown in the drawing, to prevent the workpiece from flexing as you make the remaining cuts. This can be done using the same setting for all four sides. The final cuts are easily made with a handsaw and cleaned up with a plane.

Suminosuke Kawase
Japan

Bag on Base

After years of sweeping under my contractor-type tablesaw, I finally devised a way to collect most of the sawdust *before* it hits the floor. I made a bridle-jointed frame out of 1x2s with inside dimensions matching those of the

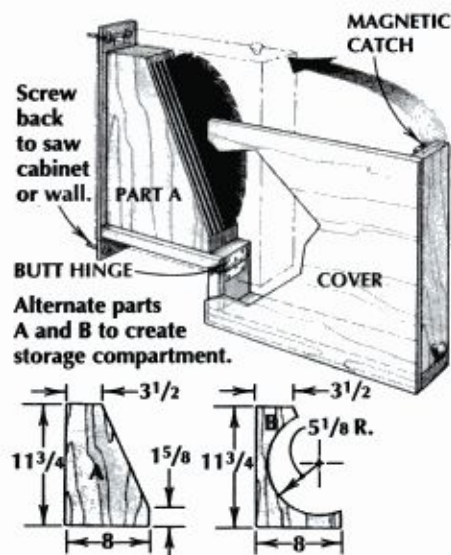


opening in the tablesaw base. Then I drilled holes for machine bolts in the frame and base. I epoxied the machine bolts in the base holes, as shown in the drawing. Four washers and wing nuts and a standard kitchen garbage bag, and the job was complete.

Stephen Drummer
Kasota, MN

Saw-Blade Storage

The drawing shows a compact, convenient cabinet that stores six 10-in. saw blades. It's easy to make. From 3/16- or 1/4-in.-thick hardboard, cut seven A

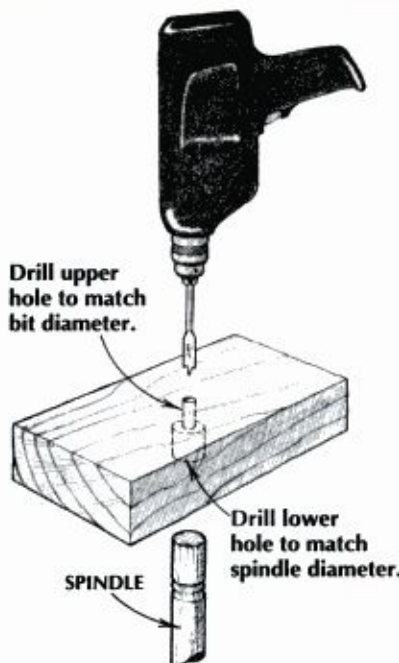


parts and six B parts. Glue these together in alternating order as shown in the drawing, and mount the storage compartment on a back and bottom piece. The optional cover is hinged at the bottom. A magnetic catch holds it closed. I attached the box to the left side of my steel saw cabinet.

John Ericson
Rexford, NY

Drilling Spindles

Being in the chair repair business, I often need to repair turned spindles with broken or damaged tenons. The simple jig shown in the sketch is made on the drill press in just a minute or two. It automati-



cally gives me a centered hole along the axis of the spindle. I glue a piece of dowel into the spindle hole, then cut it to the length of the original tenon.

Voicu Marian
Alliance, OH

Long-Wearing Templates

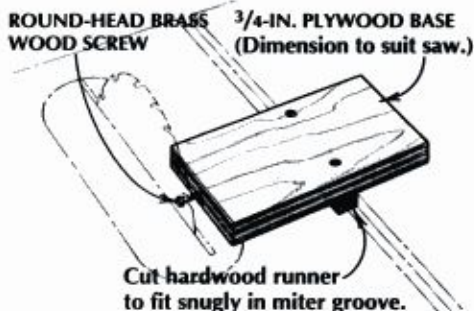
I make templates out of posterboard because it's cheap and easy to cut. However, with frequent use the edges begin to wear and accuracy diminishes. My solution is to take a dab of glue and smear it into the edge of the pattern.

The glue soaks the fibers, hardens the edge and extends the life of the pattern.

Yosh Sugiyama
Redding, CA

Low-Tech Alignment Tool

This simple jig enables you to align your saw blade with either miter slot quickly and accurately. Make the jig as shown, then mark one tooth on your tablesaw blade. Move the marked tooth to the forward position and back out the brass



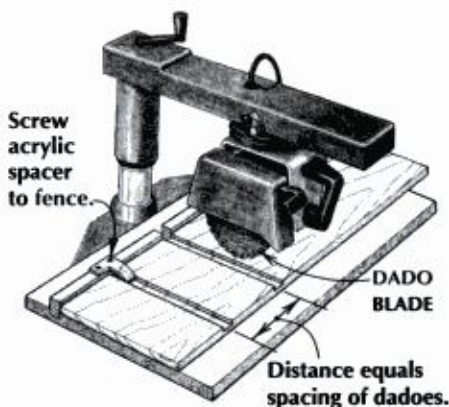
screw until it *just* touches the blade. Rotate the blade backward and repeat, using the same tooth as a reference. If the screw just touches the blade, alignment is correct. If not, you'll need to loosen and adjust the tabletop or trunnions. (See AW #43.)

Jeff Fagan
Grants Pass, OR

Equally Spaced Dados

Cut from 1/8-in.-thick acrylic, this little spacer makes quick work of cutting accurately spaced dados with a radial-arm saw. Here's how to make and use it: Cut an L-shaped piece of acrylic so that the "working" leg of the L is the same width as the dados you plan to cut. Mount the acrylic on the saw fence as shown in the drawing, positioning it at the desired distance from the blade. Spring the leg of the acrylic down into each dado slot to align the next dado cut.

Don Stutzman
Johnstown, PA





Bevy of brutes. AW editors conduct side-by-side tests on nine popular 10-in. cabinet saws, comparing performance, features and price.

TABLESAW SHOWDOWN

AMERICAN WOODWORKER Tests Nine Leading Cabinet Saws

The cabinet saw is the Rolls-Royce of table saws. Heavier, more powerful and more ruggedly built than contractor-type saws (see AW #48), cabinet saws can rip and crosscut thick chunks of hardwood all day without bogging down. And with their massive cast-iron trunnion and arbor assemblies, these machines transmit power from motor to blade with minimum vibration. They're not only powerful; they're precise.

But what makes one cabinet saw better than another, and how do you choose the

saw that best suits your needs? To find out, we tested nine popular cabinet saws from nine different companies. All saws were ordered in standard "base-model" form, with two exceptions: The Powermatic and Jet saws came with optional extension tables and legs. Sticker prices ranged from just under \$800 for the Grizzly and Enlon machines to a hefty \$2,000 for the Powermatic 66.

We uncrated and assembled the saws, then tuned them and installed identical blades—Freud's LU84M, a 50-tooth, carbide-tipped combination blade. Then

we put these big fellows to work. Our rigorous, hands-on testing approach gave us plenty to talk about, haggle over, and finally quantify on the pages ahead. Read on to see who came out ahead in the great cabinet saw showdown.

What's Important?

We identified six major factors to consider when buying a cabinet saw: power, fence operation, controls, fit and finish, the blade guard and, of course, cost. Here are some thoughts on these important factors:



Inside story. The boxlike trunnion-and-arbor assembly on the Powermatic (left) did a better job of dampening vibration than the Enlon's yoke-type assembly (center), which copies that of the Unisaw. At right, Sunhill's lighter-weight trunnion-and-arbor design is typically found on contractor-type saws.

Power—A cabinet saw's ability to rip and crosscut thick stock without bogging down is what distinguishes it from contractor and benchtop tablesaws. While most of the saws in our test were equipped with 3-HP motors, we didn't want to rely on a manufacturer's horsepower rating to indicate cutting power.

Sure enough, our ripping tests revealed significant differences in power. (See chart, page 34.) When ripping 3-in.-thick hardwood at a constant feed rate, the Powermatic was the strongest performer. The Kity and Craftsman saws slowed significantly. The Sunhill's blade speed dropped as the two drive belts slipped on their pulleys. These three saws are rated under 3 HP, and we considered their power marginal for cabinet saws.

Fence—If you're in the market for a top-of-the-line saw, don't settle for a second-rate fence. A good fence must be straight and lock square and solidly to the table. Ease of use and precise adjustment are also important.

While most of our base-model saws had adequate fences, the two saws that came standard with Biesemeyer fences—Powermatic and Jet—were in a class by themselves. The Biesemeyer fence is sturdy, straight and square. The read-out scale is accurate and easy to read, and aligning the fence parallel to the blade is foolproof. We also like the fact that you can easily lift the Biesemeyer off the saw to clear the table when cross-cutting long stock.

A fence upgrade will give your cabinet saw the precision, capacity and convenience it merits. (For a review of aftermarket tablesaw fences, see AW #28.) General supplies the Biesemeyer as an option, and Delta offers its premium-quality Unifence as an option for the Unisaw. (See the "Standard and

Optional Equipment" column on the chart.) For most other models you can purchase an aftermarket fence "package": fence, rails, extension table and legs.

Controls—Like the levers and dials in the cockpit of an airplane, smooth-working handwheels and switches are important for convenience and safety.

We liked the smooth action, large diameter and heft of the cast-iron wheels on the Jet, Powermatic and Enlon saws. The Sunhill's small plastic wheels felt flimsy and were harder to operate than larger, heavier wheels. The Kity's raise-lower and tilt mechanisms took too many turns to adjust.

Accessible on-off switches that your fingers can distinguish by feel make it easier to start and stop the machine while keeping your eyes safely on the blade. We liked the switches on the Grizzly, Enlon and Kity saws best. The switches on the Kity and the Jet can be easily mounted in the location of your choice. And the Craftsman saw had a unique, separate "panic button"-style off switch—a very useful safety feature.

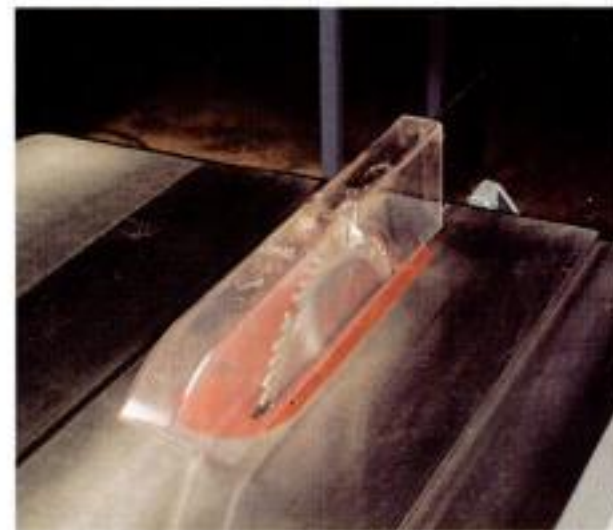
Fit and finish—You're going to spend many hours at your saw, so you'll appreciate things like friendly edges,

throat inserts that fit well, polished handwheels and the like. The General was best in this category, right down to its gleaming, car-quality paint job.

Table flatness is important for accuracy. All the saws were respectably flat, but the Jet had the flattest surface of all.

Blade guard—The blade guard is an important feature on any tablesaw. It's your best defense against accidentally cutting yourself. Unfortunately, most tablesaw manufacturers cut corners on blade guards instead of designing guards that work well and are convenient to use.

On three of the saws we tested—the Powermatic, Delta and Grizzly—blade changing was a hassle because the guards had to be propped or held out of the way to provide access to the arbor. The European-style guard on the Kity was the easiest to use, and it can be hooked up to a dust-collection hose. The General, Kity and Powermatic guards were better made than the rest. But until the industry makes guards that woodworkers will want to leave on their saws, we recommend that you equip your saw with one of the well-designed aftermarket guards, like a Brett-Guard or a Biesemeyer. (See AW #36.)



Two types of guards. The two-piece blade guard on Powermatic's saw is steel (left). Some guards, like Delta's (right), are flimsy plastic and not suitable for extended use.

10-IN. CABINET SAWS

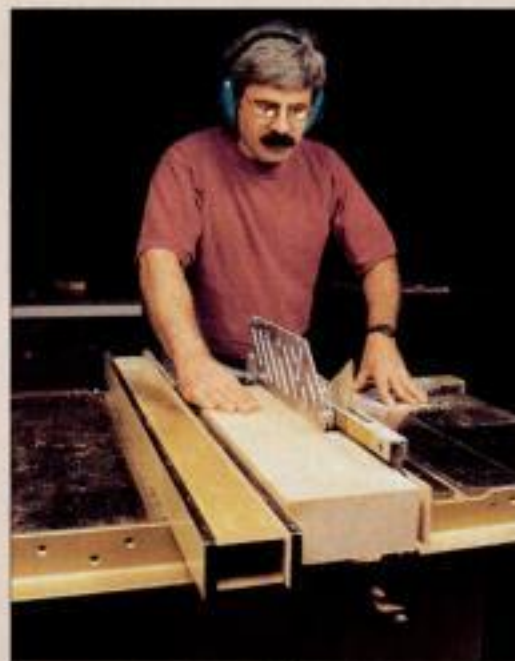
Brand & Model	Street Price (as tested)	PERFORMANCE RATINGS				OVERALL RATING	SPECIFICATIONS		
		Power	Fence	Controls	Fit & Finish		Rated HP	Amps @ 230V	Table Size D x W (in.)
Grizzly G1023 (800) 541-5537 Circle #605	\$795	●●●●●	●●	●●●	●●●	77	3	18	27 x 36
Kity 619 (800) 872-5489 Circle #606	1,295	●●●	●●●	●●●	●●●●	81	2½	11.2	28 x 34½
Sunhill MS-10TK (800) 929-4321 Circle #607	849	●●●	●●●●	●●●	●●●●	82	2	15	27 x 40¼
Craftsman 22654 See your local Sears store. Circle #608	1,499	●●●	●●●●	●●●●	●●●	82	2	9	27 x 36
Enlon EN-3202 (800) 888-9697 Circle #609	795	●●●●●	●●●●	●●●●●	●●●●	87	3	15	27 x 36
Delta 34-763 (800) 438-2486 Circle #610	1,599	●●●●●	●●●●	●●●●●	●●●●●	90	3	12.4	27 x 36
General 350-1 (819) 472-1161 Circle #611	1,579	●●●●●	●●●●	●●●●	●●●●●	92	3	14	28 x 36
JET JTAS-10PFX-1 (800) 274-6848 Circle #612	1,519*	●●●●●	●●●●●	●●●●●	●●●●●	95	3	19	27 x 40**
Powermatic 66 (800) 248-0144 Circle #613	2,000*	●●●●●	●●●●●	●●●●●	●●●●●	96	3	15	28 x 38**

KEY: Performance Ratings: ●●●●● = Excellent; ●●●● = Good; ●●● = Fair; ●● = Poor; ● = Unacceptable. **Overall Rating:** Scores above 85 are
 *Includes 50-in. Biesemeyer fence with extension table and legs. **W = 74 in. with extension table. ***Optional position for mounting fence rails.

HOW WE TESTED

Before kicking up sawdust, we gave each saw a thorough tune-up. (See AW #39 and #43.) With the tops removed, we adjusted stops on the trunnions so that blades would tilt precisely to 90° and 45°. We set the miter-gauge slots and fences parallel to the blades, and adjusted the throat plates flush with the tabletops. We checked our adjustments with precise instruments like the TS-Aligner (see photo, far right) and the Infinitii gauge. We also measured runout at the arbor and the arbor flange.

Then we started cutting. We ripped, crosscut, beveled and mitered plywood and solid wood, noting vibration and overall feel. We rated the convenience and operation of the control mechanisms, switches, fences and blade guards. To test the real-world power of the saws, we ripped 3-in.-thick boards of oak, mahogany and birch at varying feed rates, looking for signs of slowing or strain. Then we correlated the surface quality of the sawn edges with our measurements of arbor runout and our observations of vibration. The performance ratings in the chart take into account all these observations.



Power testing. Ellis Valentine rips 3-in.-thick birch to test the mettle of the Powermatic 66.



Getting in tune. To align the miter slots parallel to the blade, Dave Sellers uses a TS-Aligner gauge.

Table Material	Max. Cutting Depth (in.) at 90°, 45°	Rip Capacity Right, Left (in.)	Dust Port Dia. (in.)	Weight (lbs.)	Standard and Optional Equipment
CI	3 1/8, 2 1/8	26, 11	4 (OPT)	420	STD: Access door; dado insert; 1 arbor wrench, wrench flats on arbor. OPT: Metal motor cover.
AL	3 1/4, 2 1/8	26, 8	3 7/8	200	STD: Micro-adjusting fence; dado insert; 1 arbor wrench, 1 rod, hole in arbor. OPT: Sliding table; outfeed roller support.
CI	3 1/4, 2 1/8	30, 12	4	335	STD: Metal motor cover; dado insert. OPT: Fence upgrade.
CI	3, 2 1/8	25, 15 1/2	4	490	STD: Metal motor cover; dado insert; 1 arbor wrench, 1 pin spanner, holes in arbor flange.
CI	3 1/8, 2 1/8	36, 0 / 26, 9***	4 (OPT)	425	STD: Access door; dado insert; 2 arbor wrenches, wrench flats on arbor. OPT: Hinged motor cover; sliding table; micro-adjusting fence; outfeed roller support; movable switch.
CI	3 1/8, 2 1/8	25, 15 1/2	5 (OPT)	437	STD: Hinged motor cover; fence, miter-gauge and wrench storage hooks; 2 arbor wrenches, wrench flats on arbor. OPT: Unifence; dust collection port; sliding table; dado insert.
CI	3 1/8, 2 1/8	25, 15 1/2	4 (OPT)	440	STD: Access door; 1 arbor wrench, wrench flats on arbor. OPT: Biesemeyer fence; fiberglass motor cover with dust port; sliding table; dado insert.
CI	3 1/8, 2 1/8	50, 12	4	438	STD: Hinged motor cover; choice of Biesemeyer, Vega or Excalibur fence; 1 arbor wrench, wrench flats on arbor. OPT: Dado insert.
CI	3 1/8, 2 1/8	50, 12	4	600	STD: Plastic motor cover; dado insert; 1 arbor wrench. OPT: Sliding table; scoring saw attachment.

considered excellent, between 75 and 85 good, under 75 fair. **Table Material:** AL = aluminum, CI = cast iron.

GRIZZLY G1023 \$795

OVERALL RATING: 77

PROS: Plenty of power, ruggedly built, super-low price.

CONS: Aggravating fence, cranky blade-height adjustment, meager miter gauge, dust-collection hookup is a pain.

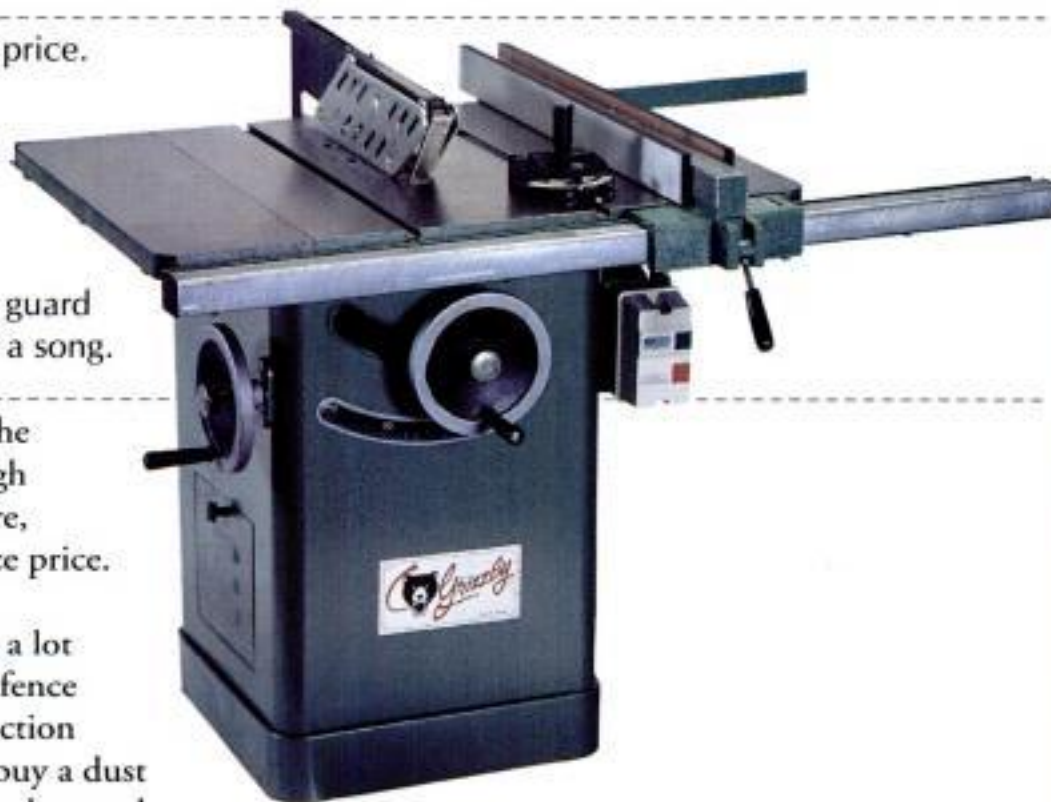
FINAL CUT: Replace the stock fence and blade guard with quality aftermarket parts, and you're sawing for a song.

The Grizzly saw reminds us of the tough guy on the block: a muscle-bound bruiser who's a little rough around the edges. There's no shortage of cast iron here, plenty of power, minimal arbor runout and a very nice price.

But the Grizzly lost points on account of its fence. We couldn't align it parallel to the saw blade without a lot of troublesome shimmying. Ditto for the replacement fence we asked Grizzly to send. Other problems: Dust collection shouldn't be this hard on a cabinet saw. You have to buy a dust port and cut a hole in the cabinet for the port. The blade guard was also a disappointment. It looks like Powermatic's, but is stamped out of lightweight steel.

The Grizzly offers plenty of power at a bargain-basement price. But to really have a worthwhile machine, you'll want to scrap the fence and blade guard, and replace these components with better-quality aftermarket versions.

Note: As we were going to press, Grizzly officials informed us that they are introducing a new model cabinet saw in early 1996 that will replace the G1023.



KITY 619 \$1,295

OVERALL RATING: 81

PROS: Least arbor runout of any saw; well-designed parts, good dust collection, nice miter gauge.

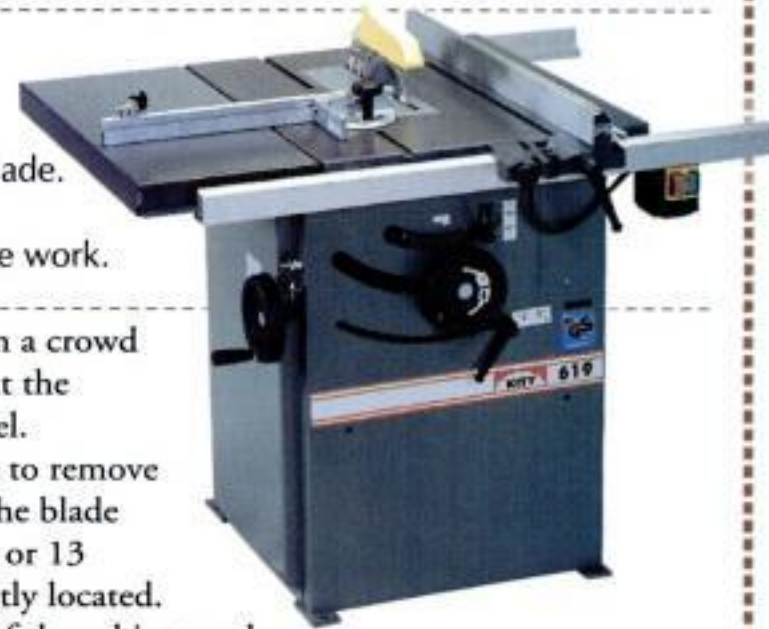
CONS: Anemic power, fussy blade changes, too many turns to tilt the blade.

FINAL CUT: Precise and well-engineered; a good saw for smaller-scale work.

Our lone European entry, the Kity stood out like a dapper gentleman in a crowd of bodybuilders. Machining and attention to detail are impressive, but the aluminum fence and coated alloy top give this saw a lightweight look and feel.

In our heavy cutting test, the Kity bogged down noticeably. And you have to remove and reinstall a stack of shim washers to change blades. Other beefs: Tilting the blade from 90° to 45° required 95 revolutions of the handwheel, as opposed to 12 or 13 revolutions on most other saws. And the blade's locking lever is inconveniently located.

The Kity is designed for good dust collection. There's a port on the back of the cabinet and another on the blade guard. The movable switch is a plus. And though prone to deflection under heavy loads, the rip fence worked smoothly and easily. The miter gauge is unconventional, but it comes with a long fence and an adjustable flip-down stop. This isn't the saw for cutting thick hardwood. But it's worth considering for small-scale woodworking.



SUNHILL MS-10TK \$849

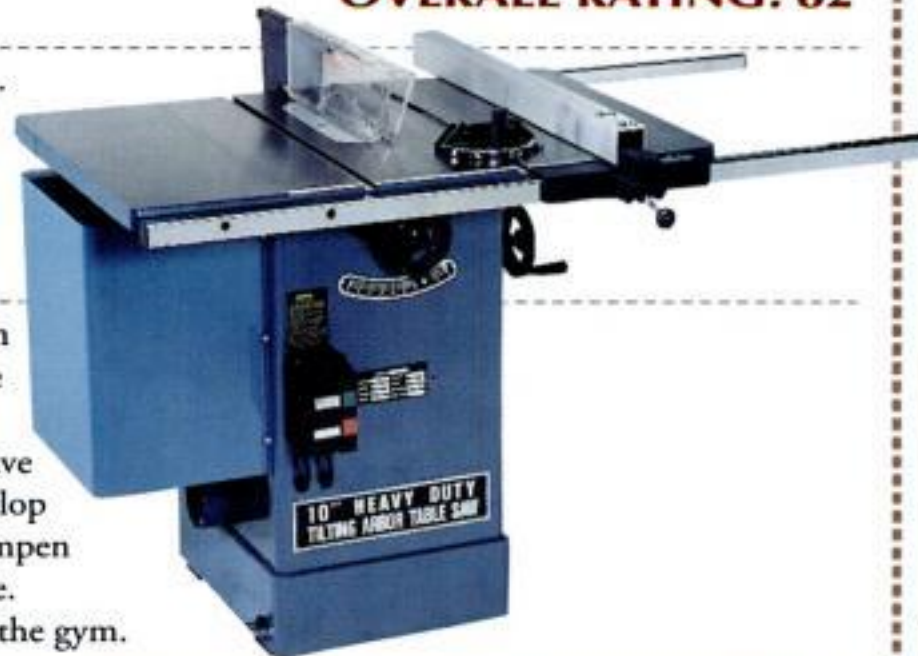
OVERALL RATING: 82

PROS: Flat table, minimum arbor runout, solidly locking fence.

CONS: Poor power, skimpy handwheels, sloppy miter gauge.

FINAL CUT: A contractor's saw in sheet-metal dress.

The Sunhill is a cabinet saw in appearance only. Under the skin it's built like a contractor's saw: The trunnions and motor are hung from the tabletop instead of the base. (See top right photo, page 33.) Because of this, tuning this saw was a challenge—you have to grope for the bolts inside the cabinet. There's a fair amount of slop in the tilt mechanism and not enough beef in the trunnions to dampen vibration under load. On the plus side, we liked the Sunhill's fence. But compared to the other saws, this machine needs more time at the gym.



CRAFTSMAN 22654 \$1,499

OVERALL RATING: 82

PROS: Nice fence, flat table, "panic button" off switch.

CONS: Poor power, harsh fit and finish.

FINAL CUT: Safe but underpowered.

The most noticeable feature on this saw is the big red panic button—if you had to, you could turn the machine off with your knee. And the cabinet has external bolt holes so you can easily bolt the beast to the floor. So this model gets high marks for safety, if you're willing to overlook the poorly made blade guard. And we found that the fence worked well, too. It moves smoothly along its rails and locks down firmly. There's a scale along the front rail, and a magnifying lens on the fence that makes precise readouts easy.

What this saw needs is a 3-HP motor. The 2-HP powerplant bogged down in our tests. Fit and finish were also disappointing. And you'd need a full weekend to set this saw up—it has more parts than a jigsaw puzzle. Sears designers, take note: The protective end caps on the fence rails pop off every time you slide off the fence. Aggravating.



ENLON EN-3202 \$795

OVERALL RATING: 87

PROS: Good power, smooth-working fence, great price.

CONS: Dust collection costs extra.

FINAL CUT: A gutsy, unpretentious machine with good performance for the price.

The Enlon saw was a pleasant surprise. Fit and finish are about what you'd expect for the price, but Enlon paid attention where it counts: in power and rip fence design. The saw had plenty of power, though it tended to vibrate a little more than the Powermatic, Delta and General saws.

The fence worked well, distinguishing this saw from the otherwise comparable Grizzly. Dust collection costs extra—\$50 for a motor cover, \$7.50 for a dust port. These features should be standard.

With its relatively nice feel, good fence and low sticker price, this is the saw for the woodworker on a tight budget. The Enlon earns our Best Buy award.



DELTA 34-763 \$1,599

OVERALL RATING: 90

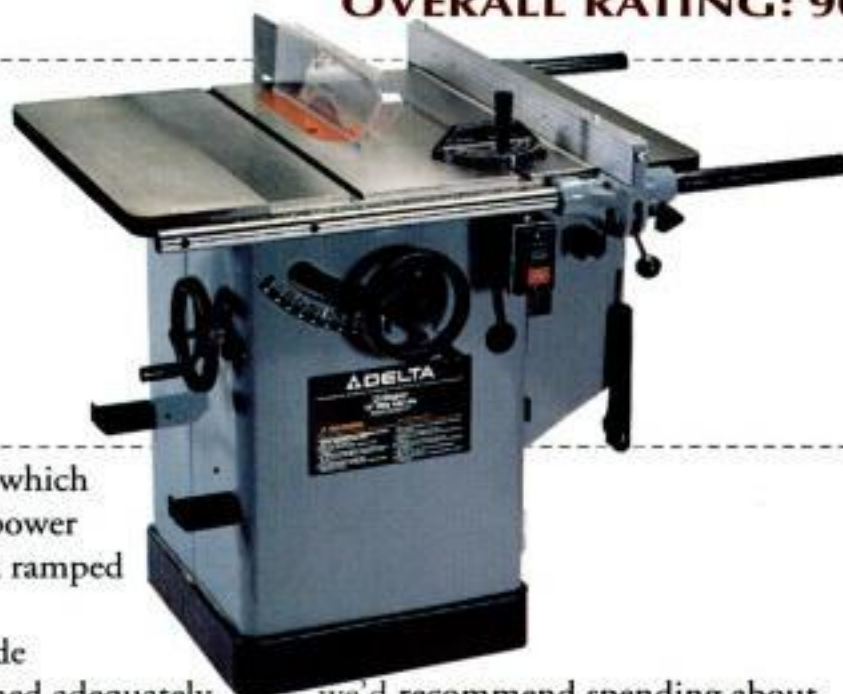
PROS: Good power and dust collection, smooth controls, nice fit and finish.

CONS: No access door in cabinet front; flimsy blade guard, clumsy plastic latches on motor cover.

FINAL CUT: A solid, dependable saw, but it pays to buy the optional Unifence or an aftermarket fence.

Introduced in 1937, Delta's Unisaw remains the benchmark by which other cabinet saws are measured. The current model has good power and solid controls. An improved dust-collection system includes a ramped floor inside the cabinet. The 5-in.-dia. dust port is optional.

On the downside, Delta's blade guard was flimsy and made blade changing difficult. And while the standard Jet-Lock fence performed adequately, we'd recommend spending about \$100 more for the optional Unifence. The built-in holders for wrenches, miter gauge and the rip fence are nice, but we sure do miss the handy front access door found on older Unisaws. The Unisaw is still a great saw with an impressive track record of reliability, parts availability and resale value. But it's no longer the only great saw in the game.



GENERAL 350-1 \$1,579

OVERALL RATING: 92

PROS: Smooth-working controls; the best fit and finish of the saws we tested; classy miter gauge.

CONS: Plain-Jane fence, chintzy fiberglass motor cover.

FINAL CUT: They *do* make 'em like they used to.

When it comes to fit and finish, the General is top dog. And the miter gauge is the best of the lot. There's even a polished handle on the front access door. The rip fence works well, but it's no match for the Biesemeyer, which you can buy for as little as \$100 more.

The large, comfortable controls raise and tilt the blade smoothly. Powerwise, the General performed almost identically to the Delta. The optional motor cover (with dust port) is a bit flimsy, but it gets the job done and looks good, too.



JET JTAS-10PFX-1 \$1,519

OVERALL RATING: 95

PROS: Good power; choice of fences; silky-smooth controls, good fit and finish; blade guard better than most.

CONS: Sloppy pivot pin in miter gauge could allow the work to wobble.

FINAL CUT: Good features, performance and value. Delta and Powermatic, watch out!

The folks at Jet have thrown down the gauntlet. They set out to build a better Unisaw and then sell it for less.

Jet did their homework. This saw has all the amenities: clean castings, flat table, low runout and superb fit and finish. Included in the price is your choice of three premium fences: Biesemeyer, Excalibur or Vega. (We tested the Biesemeyer.) Good looks are part of the deal, too.

The powder-coated finish on the cabinet rivaled the paint job on the General.

The Jet has plenty of power, although it vibrated slightly more than the Delta, Powermatic and General. The smooth, matte surface on the table produced the least friction of any of the saws we tested. We also liked the accessible, movable switch and the smooth operation of the controls. This saw, priced almost \$100 less than the entry-level Delta and nearly \$500 less than the Powermatic, clearly establishes Jet as a major contender.



Shown with optional extension table and leg set.

POWERMATIC 66 \$2,000

OVERALL RATING: 96

PROS: Most powerful saw we tested; built like a battleship, virtually vibration free; comes equipped with a top-notch fence.

CONS: Lightweight miter gauge; motor cover impedes clamping feather boards on left side of saw table; platinum price.

FINAL CUT: Sumo-wrestler status in the cabinet saw category; expensive but worth it for heavy-duty production work.

Weighing in at over 600 lbs., this golden-hued monster packs a powerful punch. And it's got the fine fit and finish that you'd expect for \$2,000.

The Powermatic was unstoppable in our cutting tests.

And the mirror-polished table surface suggests precision and attention to detail. It's not necessarily the ultimate table surface, however. Some of us thought that reflections of shop lights off the surface could get annoying.

A peek under the hood reveals that Powermatic's trunnions, arbor and motor mount assembly are heavier than those on other saws. The design is also different. (See top left photo, page 33.) Instead of being suspended from a yoke-type arm, the arbor assembly is supported inside a massive, box-type trunnion. This configuration makes for rock-solid, vibration-free power transmission.

The Powermatic's Biesemeyer fence operated flawlessly. While the left-tilting blade took some getting used to, it's a good safety feature because beveled stock can't become wedged between the blade and fence. If price were no object, this is the saw we'd buy. Powermatic gets our Editors' Choice award as best cabinet saw of the bunch.



Shown with optional extension table and leg set.

Good Service

A Spline-Mitered Tray You Can Make in a Day

by Jeff Greef



Simply beautiful. Graceful lines enhance the wood grain in this padauk serving tray. Invisible splines at the corners make the miter joints strong.

A while back, a friend of mine stopped by my shop with a small piece of padauk. "Can you make me a serving tray from this?" she asked as she held up the skimpy-looking board. After some head scratching, I came up with the design shown here. (See photo, above.)

Made from only 2 bd. ft. of wood, this elegant tray can make a serving of crackers and cheese seem fit for a king. Building the tray involves a pleasing combination of hand and machine work. Shaping the gentle curves of the sides gives you a chance to sharpen your hand-tool skills. The corners of the tray are made with spline miters cut on the tablesaw—joints that you can use in all sorts of woodworking, from picture frames to small boxes. ([See sidebar, page 41.](#))

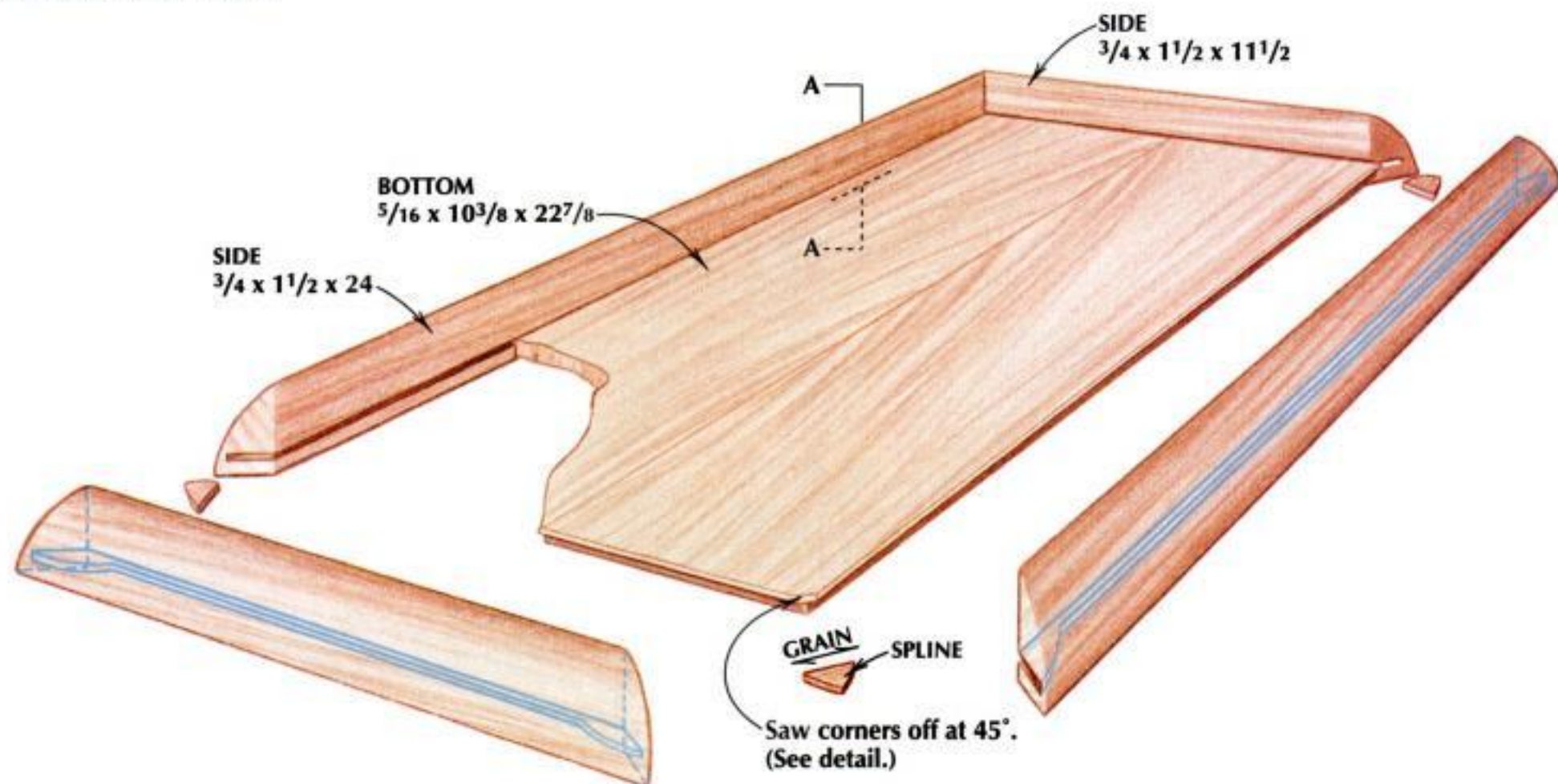
The drawing on page 40 shows how the tray goes together. Since the tray is simple in form, here's an ideal opportunity to add some visual complexity by using that special board you've

stashed away. Once you've picked out the wood you want, there are some general construction points to consider when making the tray. I'll discuss these below.

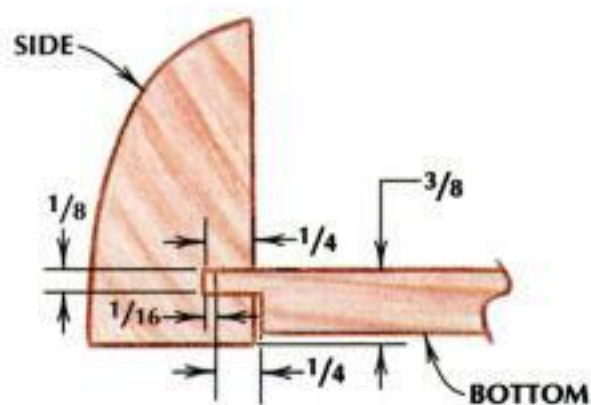
Shaping the sides—The gently curved surfaces of the sides can be shaped with a combination of power and hand tools. Cut the sides to rough length, then draw the curve on the end grain of each piece. Set your tablesaw's blade for a bevel cut and adjust the fence so the blade just grazes the edge of your drawn curve. Since the blade on my saw tilts to the right, I set my fence on the left side of the blade and used a push stick to make this rip cut safer.

Once you've sawn the bevels on all four side pieces, clamp each side in a bench vise and shape the curve with a block plane. ([See photo, page 40.](#)) Judge the curve by eyeballing your pencil lines on the ends of the stock, and pass your fingers over the surface occasionally to make sure your curves are

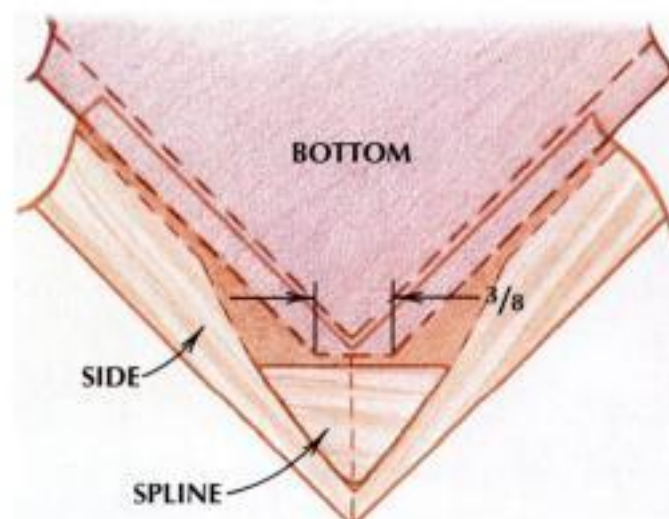
SERVING TRAY



SECTION THROUGH TRAY A - A



SPLINE DETAIL



Shaping the curves. Greef uses a block plane to round the bevel-cut faces of the tray sides.

fair. A little sanding will smooth the narrow, flat areas left by your block plane.

Mitering the sides—I used a shop-made mitering jig on my tablesaw to cut the miters on the ends of the sides. (See top photo, opposite page.) The key to this jig's accuracy is the exact 90° angle formed by the two fences. Use one fence to cut one side of the joint and the other fence to cut the other side.

Grooving the sides—When grooving the sides to hold the bottom, you can take advantage of the tablesaw setup and mill all the slots for the splines at the same time. (See sidebar.) I did this joinery work with a carbide-tipped combination blade that leaves a 1/8-in.-wide kerf.

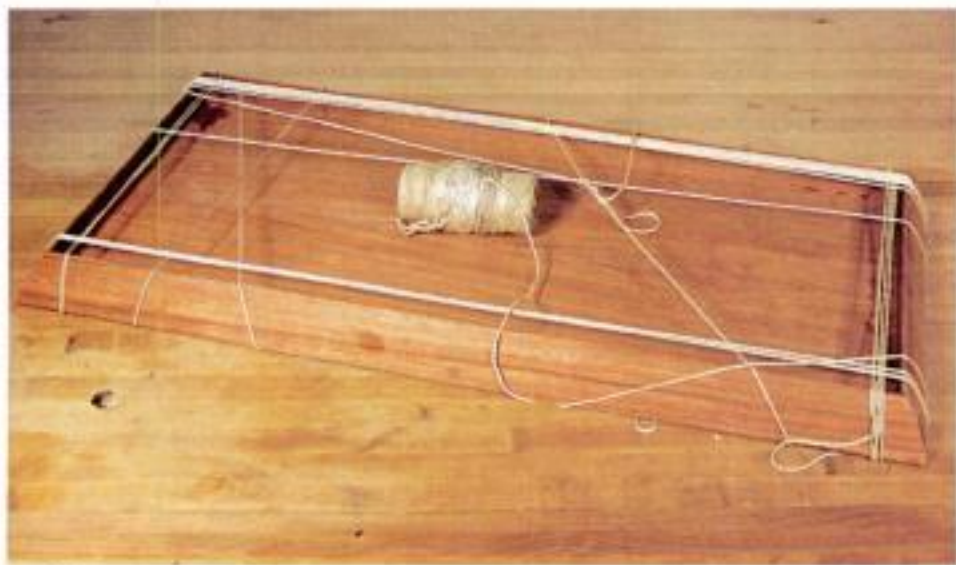
Making the bottom—To find the size of the bottom, dry assemble the sides of the tray and add 3/8 in. to the inside dimensions of this rectangle. This will leave a healthy 1/8 in. of expansion space all around.

I used my tablesaw to resaw the two halves of the bottom from one piece of 3/4-in.-thick stock. Then I glued the halves together and thickened the bottom to 5/16 in. (See drawing.)

Also on the tablesaw, cut a 3/16-in. by 1/4-in. rabbet on the



Sawing miters. Greef uses a homemade mitering jig to miter the ends of the sides. The jig has wooden runners that ride in the table saw's miter grooves.



Pulling it together. To glue the splined miters together, wrap the sides with nylon string.

bottom, then saw the corners off to allow room for the splines in the miter joints. (See drawing.)

Assembling the tray—The tray's curved sides make it difficult to pull the miters together with standard shop clamps. I used thin nylon string that has just enough elasticity to provide effective clamping force. I applied glue to the splines and the miters, assembled the tray, then clamped by wrapping the string around the tray several times. (See bottom photo, above.) Be careful not to get any glue on the tray bottom or in the grooves, or the tray may split when it shrinks during dry spells.

Finishing Up

Once the glue has dried, sand the sides smooth, and round over the sharp corners slightly. An oil finish looks very nice on a small project like this, but if you plan to get the tray wet with a lot of bubbly, you're better off protecting the surface with a couple of coats of satin polyurethane. ▲

JEFF GREEF is a woodworker and writer in southern California.



SPLINE MITERS ON THE TABLESAW

Because end grain doesn't glue well, miter joints need some sort of reinforcement. Using wooden splines solves the problem. Here's how I go about making the spline-reinforced miter joint that appears in the serving tray.

First, I groove the sides to accept the tray bottom. I set my table saw's blade $\frac{1}{4}$ in. high and run the stock over the blade with the inside face down on the table. (See Step 1, below.)

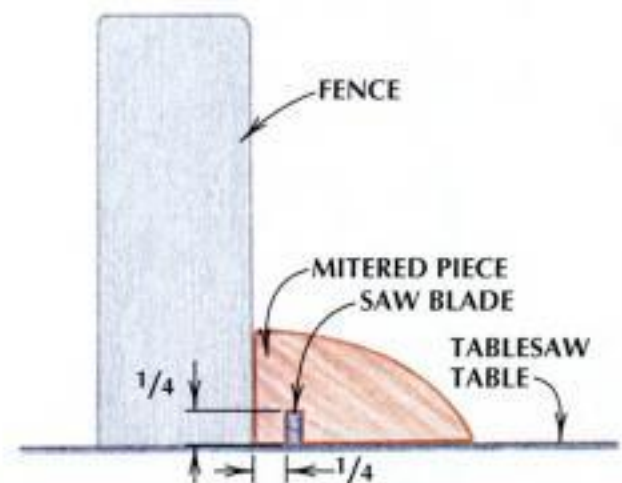
Then, without changing the fence location, I deepen the groove at four of the eight mitered ends by raising the blade and pushing the stock into the blade. (See Steps 2 and 3.) To cut the slots in the remaining miters, I move the fence so that the tray grooves on these pieces line up with the blade. Then I push the stock into the cut as before.

Next, I make the splines to fit the grooves, orienting the grain on the splines perpendicular to the line of the miters for strength. To assemble the joint, I apply glue only to the mitered surfaces and on the splines. It helps if you rub a little candle wax on the corners of the panel before gluing up so wayward glue won't have a chance to stick.—J.G.

STEP 1

Raise saw blade $\frac{1}{4}$ in. above table. Cut groove for tray bottom on all mitered pieces.

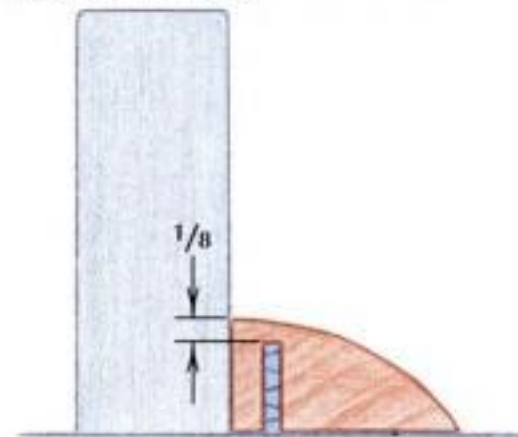
FRONT VIEW



STEP 2

Adjust blade height to $\frac{1}{8}$ in. below height of mitered piece.

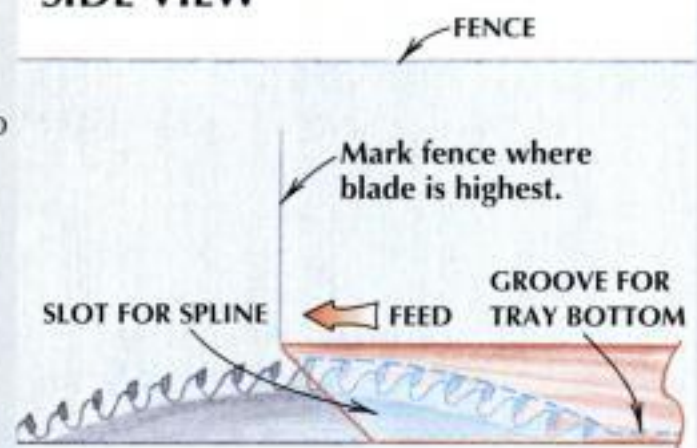
FRONT VIEW



STEP 3

Cut slots in four mitered ends, stopping when tip of miter reaches mark on fence. Adjust fence so it lines up with grooves in the four uncut miter ends, and cut slots as before.

SIDE VIEW



Drawknives

An Expert Tells How to Select, Sharpen and Use this Venerable Tool

by Mike Dunbar



Drawing away the waste. A drawknife removes large amounts of wood quickly and quietly. Here, the author shapes the underside of a Windsor chair seat by locking his wrists and pulling the knife toward him with a skewed, slicing motion.

There was a time when every woodworker owned at least one drawknife. This simple yet effective hand tool was considered indispensable for fast stock removal. It's too bad the tool is no longer so well regarded, as many woodworkers today often perform the same job in far more complicated and awkward ways.

Essentially an open blade with a handle on each end, a drawknife can be pulled with great force to remove thick slices of wood. With the proper techniques, you can use this tool to make straight and curved cuts on both edge grain and end grain. You can also whittle chair spindles and other round or faceted parts with it.

In this article I'll discuss these tech-

niques as well as the fine points of selecting and sharpening a drawknife. It's worth getting to know this time-honored tool; it's pleasant to use and more efficient than you might imagine.

Selecting a Drawknife

Drawknives come in different configurations. In the past, manufacturers made uniquely shaped drawknives for coopers, coachmakers and other specialists. Most woodworkers, however, used a standardized type of drawknife which is still in use today. This type has a flat blade that is either straight or "bellied" (curved toward the user). Its two handles are in the same plane as the blade but set at right angles to it. This is the most useful configuration and the type I recom-

mend. (See photo, above.) Although I use drawknives of various lengths, the one I find the most useful has a cutting edge about 7 in. long.

You can buy a new drawknife from a tool store or through a mail-order supplier but, in my opinion, most new drawknives are poorly designed. I suggest trying to locate an old one in good shape. Many are still available through used tool dealers or at antique stores or flea markets.

Good secondhand knives are usually 50 to 120 years old. When searching for a secondhand drawknife, reject any that are not in excellent condition. Avoid those that show abuse, that have little blade left or that are rust-pitted. Don't get one with broken or bent handles:

Although it is possible to replace handles, I don't think it's worth the effort, given the number of old drawknives still available in good shape. There is a fairly easy fix for a good knife with loose handles: Simply inject some cyanoacrylate adhesive into the handle.

I also recommend against the type with folding handles designed to store compactly in a toolbox. This design places the handles too far apart for good cutting control.

When looking for a drawknife, avoid ones with egg-shaped handles or dropped handles (handles set lower than the plane of the blade). I'd also reject those with handles not at right angles to the blade; these can be hard on your wrists.

I wouldn't buy a drawknife with a blade thicker than about 1/4 in. or with a bezel (see below) steeper than about 25°. Many drawknife blades need to be reshaped, and thick knives with steep bezels require removing a lot of metal. Avoid knives that have been coarsely surface ground—unless you want to spend a lot of time dressing the surfaces.

Among drawknives currently available, I like the Sorby (available from Woodcraft, 210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26102, 800-225-1153), though its blade is too long for my taste and its cutting edge must be reshaped.

Sharpening a Drawknife

The cutting edge of a properly shaped drawknife is formed by the intersection of two rounded surfaces properly called *bezels*. The primary bezel is on the face of the blade. The secondary bezel is on the back and is very small. The geometry of properly shaped bezels gives the blade great maneuverability. (See drawing, below.)

Unfortunately, most modern manufacturers flat-grind a bezel on only the



Reshaping a bezel. Dunbar drawfiles the edge of a modern drawknife to convert its factory-ground bezel to a smooth, rounded shape.

face of a drawknife, leaving a cutting edge similar to that found on a chisel. You must then reshape the drawknife's cutting edge to the proper profile.

I shape a drawknife's cutting edge using files, sandpaper and stones. I never use a bench grinder or belt sander for this because it's too difficult to achieve the right bezel on a grinder, and a sander can send sparks and metal filings flying.

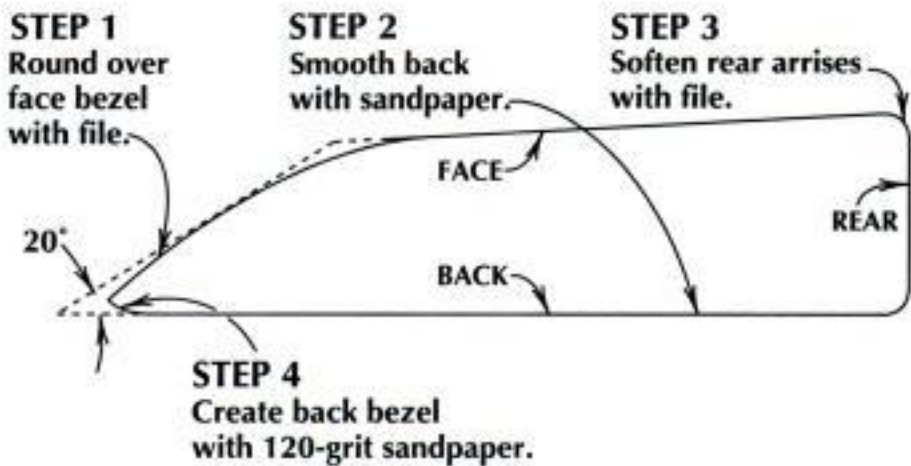
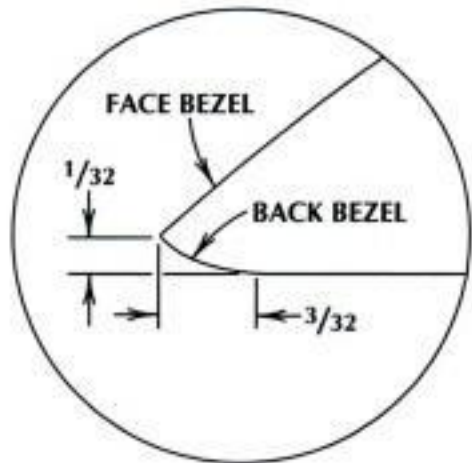
I grip the knife in a vise and create the proper profile by *drawfiling*—pushing the file aggressively while holding it at an angle. (See photo, above.) I begin by rounding over the face bezel near the cutting edge. Then I smooth the filed bezel using adhesive-backed, open-coat

sandpaper on a wooden block about the size of my palm. (Adhesive-backed paper is available from The Woodworkers' Store, 4365 Willow Dr., Medina, MN 55340, 800-279-4441.) I start with 80 grit, then move to 120 grit.

Next, I remove the surface grinding on the back of the blade using the same 80-grit and 120-grit sandpaper. I also soften the sharp corners, or *arrises*, at the rear of the blade so they won't cut skin. Finally, I use the 120-grit sandpaper to produce the smaller, rounded bezel on the back of the blade.

Once the blade is properly shaped and smoothed, it needs honing. I start with 320-grit paper on a wooden block,

SHAPING A DRAWKNIFE BLADE



DRAWKNIFE TECHNIQUE

To establish the correct cutting angle, place the drawknife on your workpiece with the face bezel up. Then, slowly pull the drawknife toward you, lowering the handles until the cutting edge engages the wood.

To make a cut, maintain the cutting angle while holding the blade skewed (with one handle closer to you than the other). Lock your wrists to keep the blade from teetering, and pull the tool toward you using a slicing motion. A bellied blade (one that curves toward the user) slices better than a straight blade. Cut close to your final line, then clean up with a plane or spokeshave.

As with any edge tool, it's important to cut with the grain rather than against it. (See drawings.) —M.D.

MAKING CONVEX CUTS



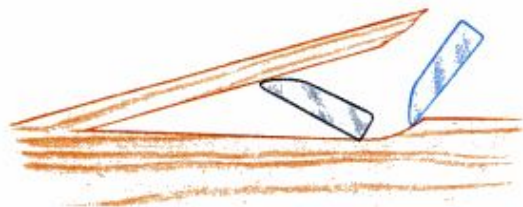
To cut a convex curve, begin at the center of the curve and cut outward in opposing directions, following the slope of the grain.

MAKING CONCAVE CUTS



Begin a concave cut at one outer end of the curve and slice inward. Then slice in from the other end of the curve until the cuts meet at the bottom.

SPLITTING



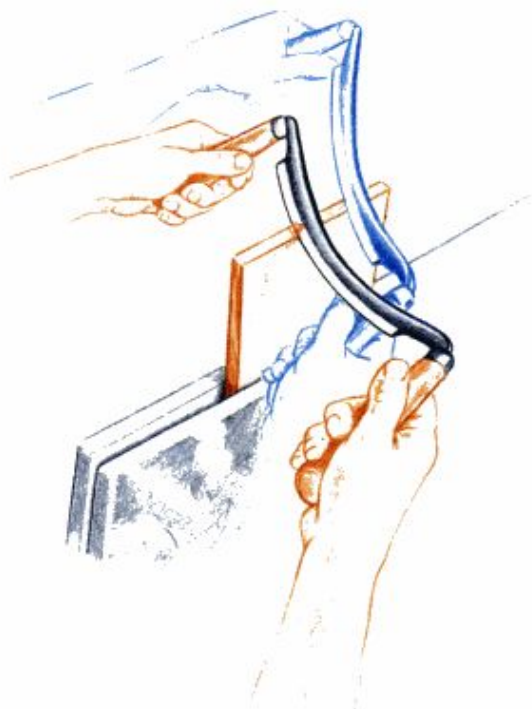
To remove a lot of waste quickly, slice into your cut, then raise the drawknife handles to lever out the waste, which will split along the grain forward of the blade. Make sure the grain to be split doesn't cross into the area of your finished workpiece.

CUTTING EDGE GRAIN



On edge grain, begin the cut at one end of the skewed blade and make full slices using the entire cutting edge.

CUTTING END GRAIN



On end grain, a drawknife cuts more effectively if you hold the blade at a more pronounced skew and make a series of short slices.

polishing both the front and back bezels. You can hone in circles or a figure-eight motion, but I prefer to go back and forth along the blade.

I achieve the final edge by honing with ceramic stones—first medium, then fine. The heavy filing may have produced a wire edge that is chased back and forth by the stones. This can be removed with a leather hand strop or by lightly passing the edge over a buffing wheel.

Using a Drawknife

A drawknife, unlike a spokeshave or plane, has an *unregulated* blade—that is, there is no sole to guide it. This gives the tool its ability to remove stock quickly, but also the ability to ruin your work if you don't control the cuts. So, before you start on an actual workpiece, practice on some scrap stock of the same species to get the hang of it.

To start a cut, lay the blade on its back on the workpiece, then slowly pull the drawknife toward you, lowering its handles until the cutting edge engages the wood. If you practice doing this, you'll eventually find the correct cutting angle automatically.

Cutting with a drawknife is different from cutting with most other edge tools in that you use a skewed, slicing motion rather than cutting straight forward. Slicing distributes the cut over the length of the blade, preventing a hollow from wearing in one section of the blade. It's easier to slice with a bellied blade than with a straight blade. The downside of slicing is that any time you skew a blade, you are effectively reducing its cutting angle, making the wood more prone to tearout.

Start the cut with the corner of the blade nearest you. As you slice through the wood, draw the knife toward you, keeping the blade skewed. Lock your wrists so the blade won't teeter. With a little practice, you can make a cut that needs only a few passes with a plane or spokeshave to clean up.

Some woodworkers use a drawknife face down as this helps prevent the blade from diving, particularly if it has a chisel edge that was not properly reshaped. Although it is safer, using a drawknife this way also limits the depth-of-cut you can take. So you end up sacrificing the very quality that makes a drawknife so useful: its ability to be as aggressive or as gentle as you wish. Using a drawknife face down is like riding a bicycle with

training wheels—you can't go as fast or maneuver as well. Using the drawknife face down also creates a steeper cutting angle, which produces more friction and dulls the edge more quickly.

The proper cutting approach depends on whether you're making a straight or curved cut and on whether you're cutting edge grain or end grain.

When cutting edge grain, follow the slope of the wood grain as you would with any edge tool. To make a straight cut, take a series of full slices until you're near your cut line. Make the final cut down to the line with a plane or spokeshave. To make convex cuts—such as those on the outer edges of a chair seat—use the same slicing procedure as you pull the blade around the curve. (See sidebar, opposite page.)

Concave cuts require a slightly different approach because you run into opposing grain at the bottom of the cut. To make a concave cut, you'll need to make a series of opposing slices. (See photo, above.) Begin at one end of your cut line and slice in as deeply as you can, stopping at the bottom of the curve. Then switch directions and cut in from the other end of the cut line until you meet your first slice. Alternate back and forth until you've removed most of the waste. The raggedness at the bottom of the curve where the last two cuts meet can be cleaned up with a spokeshave or compass plane.

When cutting end grain, hold the drawknife with a more pronounced skew. Slice in short arcs, instead of pulling the blade along its entire length.

Whittling with a drawknife is done to make straight, round parts such as chair spindles, ladder rungs and wheel spokes. The blanks for these parts are generally *riven* (split along the grain) before being whittled. Riving creates a strong piece with straight grain that produces long, thin shavings when cut. Because one end of the piece has to be clamped in a vise



Making a concave cut. Slice in from opposing ends of a concave cut to prevent cutting against the grain. The small bezel on the back of the blade allows the drawknife to follow the curve smoothly without diving into the wood.

or shaving horse, you'll have to start your cuts at the center of the piece, slicing out toward the end.

Splitting is an advanced technique that is used only on edge grain. It allows you to remove a lot of waste very fast by levering the wood apart rather than cutting it. (See sidebar.) To use this technique without ruining your workpiece, make sure the grain direction does not cross your cut line. To split with a drawknife, slice into the wood, then lift the drawknife's handles up to lever out the waste. The wood will split ahead of the blade, following the grain. It's a good idea to practice splitting on scrap before attempting it on a project.

Some final advice: Don't chop with a drawknife; it's not a two-handed hatchet. And never hammer a drawknife into wood. This can damage the blade's trailing edge, causing it to scar your workpiece. ▲



MIKE DUNBAR is a contributing editor to *AW*. He teaches Windsor chairmaking in New Hampshire.

Connecticut Tea Table

*Building this Queen Anne Classic Calls For a Rewarding Combination
of Machine and Hand Work*

by Lonnie Bird



Picture perfect. This graceful Queen Anne tea table reflects the best design elements of three Connecticut-style pieces. The author has improved on the original design by accommodating the expansion and contraction of the top.

One of the challenges in reproducing period furniture is getting your hands on suitable antiques. Many antiques were poorly designed and proportioned, and simply aren't worth reproducing. Unfortunately, the best examples are either hidden away in private collections or carefully guarded in museums. Since most museums aren't receptive to ruler-toting woodworkers, I had to take a different route to derive the dimensions of my Queen Anne tea table.

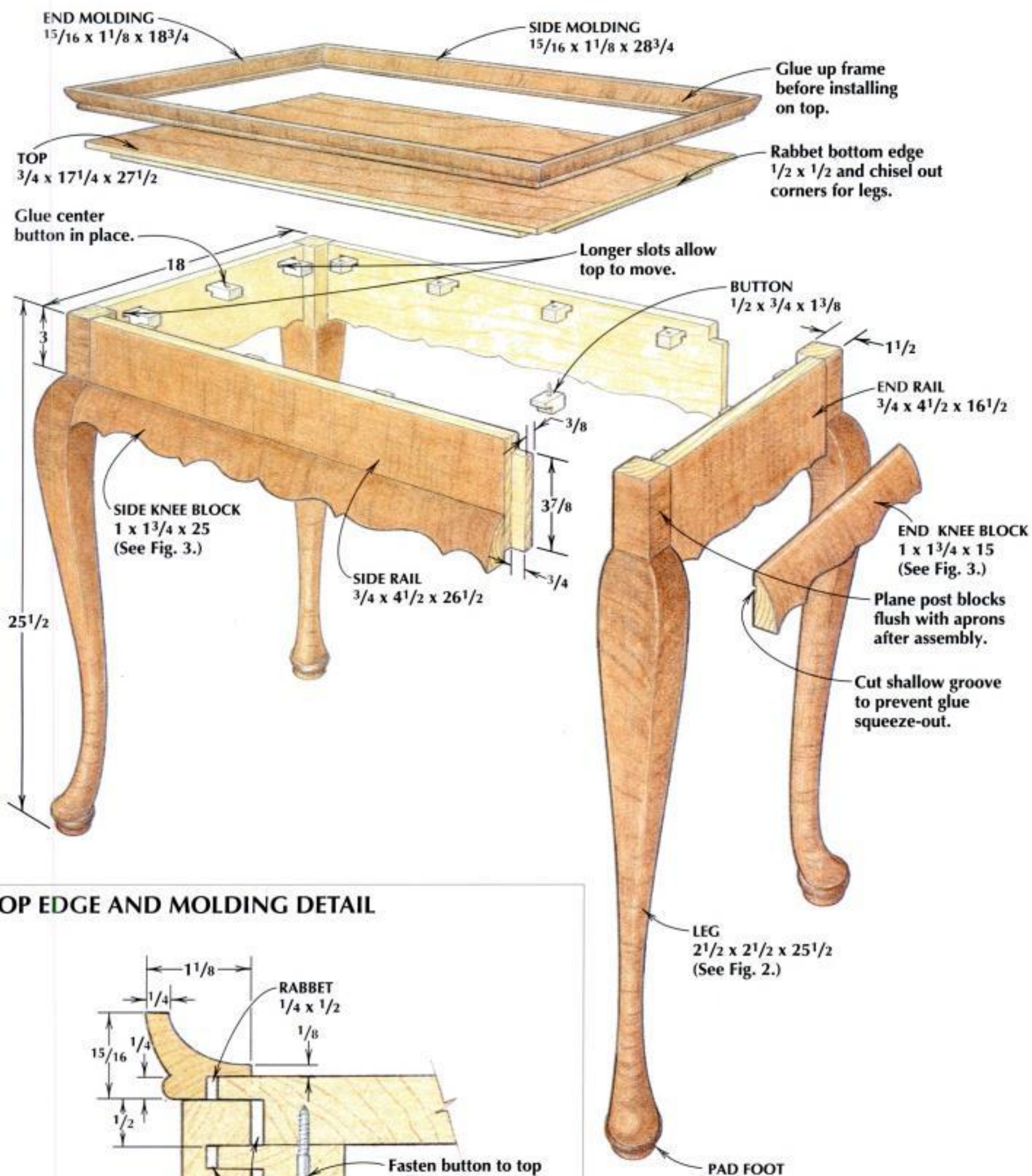
Made of curly maple, my table is based on photographs of not one, but three 18th-century Connecticut examples. I scaled all three photographs to come up with my own design that includes the best elements from each.

The tea table measures 20 in. wide by 30 in. long, a 2:3 ratio. Whole-number ratios were commonly used by Colonial craftsmen to achieve pleasing proportions. The table features a top surrounded by a delicate molding, and graceful cabriole legs with pad feet. Because my "originals" were only photographs, I made full-size poplar mock-ups of the legs and moldings to make sure everything looked right before committing my design to curly maple.

Improving the Original

In designing and building 18th-century furniture, I strive for authenticity; however, I'll change construction details when I believe the original methods fall short. For example, tray moldings were typically glued and nailed directly onto the top. This didn't allow for seasonal wood movement, which resulted in unsightly gaps. To eliminate these open

FIG. 1: QUEEN ANNE TEA TABLE



TOP EDGE AND MOLDING DETAIL

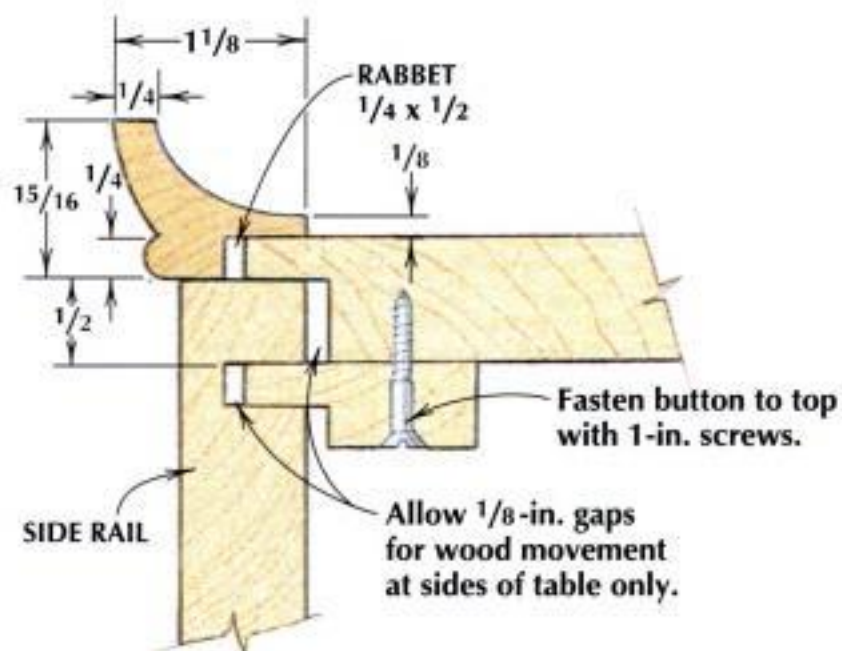
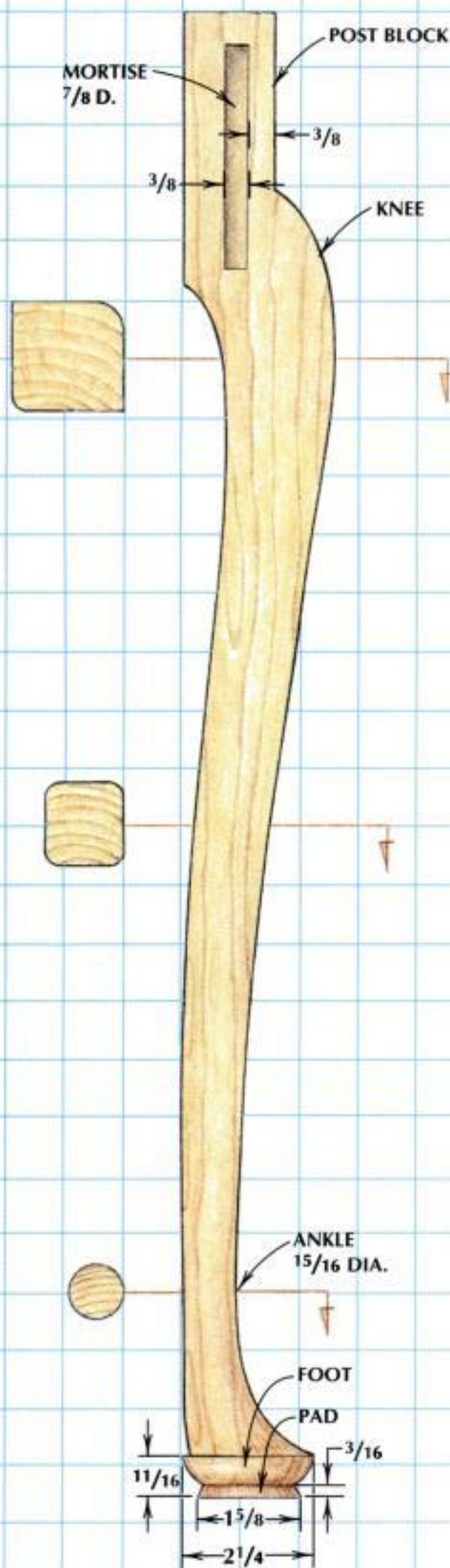
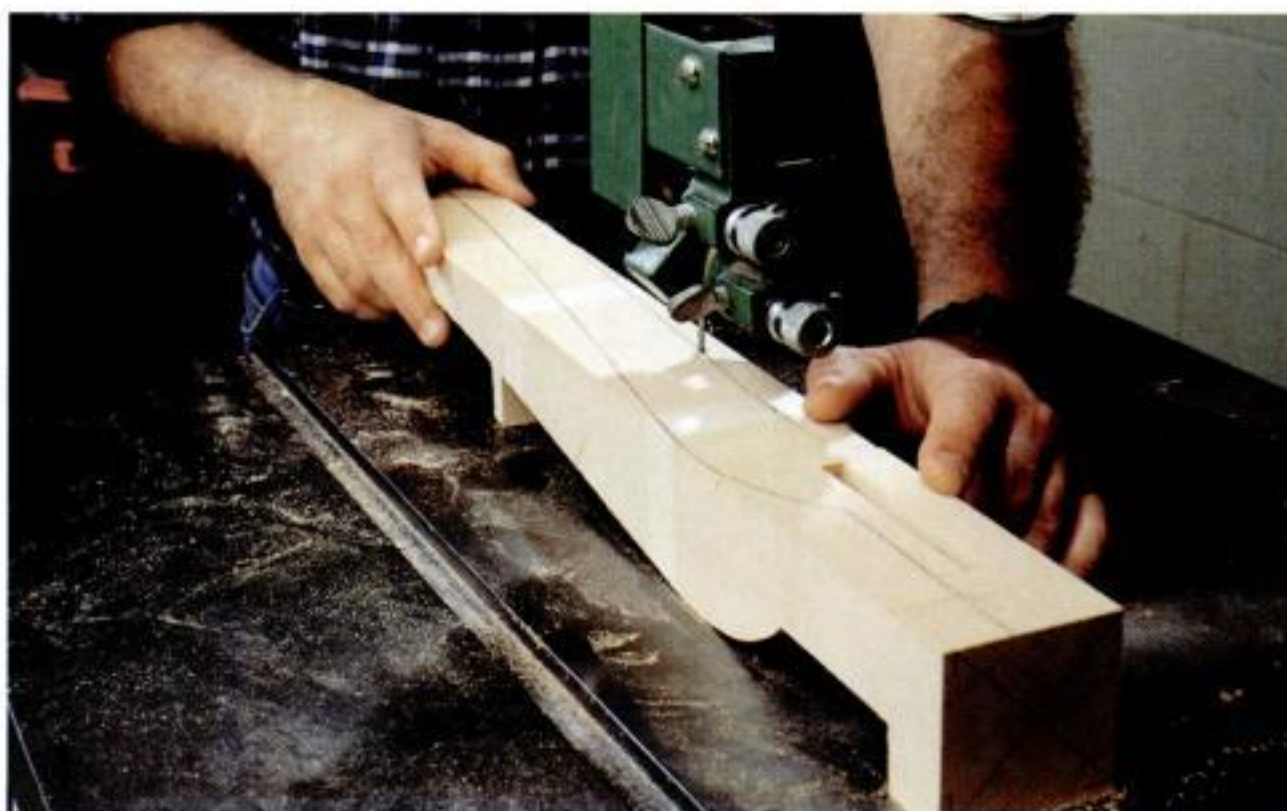


FIG. 2: LEG DETAIL



1 SQUARE = 1 IN.



Sawing a shapely leg. After the first two cuts, Bird tapes the offcut with the pencil lines back onto the workpiece and makes the other cuts.

joints on my table, I used a tongue-and-rabbit arrangement between the top and tray molding. (See detail, Fig. 1.) Additionally, I fastened the top to the apron with wooden buttons instead of nails to allow the wood to move and to prevent it from cracking.

Making the Legs

Many woodworkers are afraid of cabriole legs. In reality, shaping the legs is one of the most enjoyable aspects of this project. And it's not as difficult as you might think. To develop a little confidence, I suggest you try making a sample leg with a cheap practice blank of pine or poplar.

The first step in carving the leg is selecting the wood. Begin by squaring up four 26 1/2-in.-long blanks of 12/4 stock (available from Randle Woods, Box 96, Randle, WA 98377, 800-845-8042). This length includes an extra inch for the lathe's drive center. Avoid using glued-up stock because it's almost impossible to hide glue lines, especially in figured wood. Once the blanks are dimensioned, arrange them so that the best curly grain will face outward on the finished legs.

Next, clamp the four blanks together and draw all the layout lines. Mark out the tops and bottoms of the finished legs, the tops of the feet, and the locations of the mortises. Make a full-sized leg template from thin plywood and trace it onto the blanks. Position the template flush with the inside corner of each blank and trace the leg on two

adjoining faces. (The intersecting corner will be on the inside of the leg.) Finally, locate the centerpoints for turning, and mark the points with an awl to keep the leg from drifting when you mount it on the lathe.

I prefer to mortise the legs next, while the blanks are still square and easy to work with. I use a mortising attachment on my drill press, but you could also mill the mortises with a plunge router and then square the ends with a chisel. Cut the mortises about 7/8 in. deep so the tenons won't bottom out.

The next step is to cut the cabriole curves. I use a 1/4-in.-wide bandsaw blade to rough out the legs. Leave the top 1 in. of each post block full size, to mount the lathe's drive center. When sawing the cabriole curves, I try to keep the cuts close to the layout lines. This saves me a lot of hand work when it's time to shape the legs. After making the first two cuts, I tape the offcut with the other two pencil lines back in place so I can saw the adjacent faces. (See photo, above.)

After bandsawing the basic leg shapes, the next step is to turn the pad feet. Because the leg is off balance, I turn at a low speed (600 rpm or less) on the lathe. You don't need a large lathe, but make sure your machine is firmly anchored to withstand the vibration caused by an off-center turning. Mount the foot at the tailstock end to avoid striking the drive center with your turning tools. It's a good idea to rotate the leg once by hand to make sure that the ankle clears the tool rest.



Turning the foot. Using a $\frac{3}{8}$ -in. spindle gouge, the author turns the curve of the foot, starting at the top of the foot and working toward the pad.

Begin turning by first rounding the foot to its $2\frac{1}{4}$ -in. diameter with a gouge, taking care not to cut into the ankle. Once the foot is round, I mark to the top of the foot and make a shallow "V" cut with my skew to create a boundary line for shaping the leg later on. Then, I use a parting tool to establish the diameter of the pad, checking the dimensions with a caliper. The last step is to shape the curve of the foot which begins at the "V" and ends at the pad. (See left photo, above.) I treat this cut as a bead and roll it over with a $\frac{3}{8}$ -in. spindle gouge, but if you are unfamiliar with this technique you can use a scraper. After sanding the foot, I remove the leg from the lathe and bandsaw off the top 1 in. of the post block.

Once the feet are turned, I begin shaping the legs. This involves removing any irregularities from bandsawing and rounding all four corners of each leg. To prevent backache, I mount the leg at the height of my elbow. I find it handy to mount the leg in a pipe clamp and secure the clamp in my bench vise. (See right photo, above.)

One key to creating a graceful cabriole leg is to remove wood gradually from all four surfaces. When shaping curly maple I prefer a Nicholson No. 49 patternmaker's rasp over a spokeshave. A rasp removes a lot of wood quickly, yet it doesn't wreak havoc on the grain. It can also get into the tight curves of the leg. Keep in mind that the profile of the leg changes as you work down the leg. At the top where the knee meets the post

block, the corners are slightly rounded. At the ankle, the leg is circular in section. Use the cross sections in Fig. 2 as a guide, and blend in the rest of the leg.

As I'm shaping, I stop periodically and carefully examine the curve at arm's length. I rotate it slowly to check for any dead spots in the curve and rasp them away. At the foot I use a chisel to blend the lines of the curve into the "V" cut which I made earlier on the lathe.

Once I'm satisfied with the overall shape of the leg, I switch to a half-round second-cut file and finally to a smooth file. The files remove the rasp marks and eliminate a lot of tedious sanding. Finally, I scrape and sand each leg before setting it aside.

Making the Rails and Knee Blocks

Making the rails is simple process of dimensioning the lumber and cutting the tenons. I cut the two shoulders of each tenon on the tablesaw with a dado head, aiming for a friction fit with the leg mortises. You'll also need to cut slots in the rails for the buttons that secure the top. I use my hollow-chisel mortiser here, but a router with a $\frac{1}{4}$ -in. slotting bit will work just fine. Note that I make the outside slots on the end rails $\frac{1}{4}$ in. longer than the width of the buttons, to allow for seasonal movement of the top.

The knee blocks on most Queen Anne pieces function visually as transition pieces between the legs and the apron. On this table, the knee blocks are glued to the apron around the entire perimeter.



Filing it fair. Legs gain their final form with hand work. Bird starts with a rasp and file, then moves on to scrapers and sandpaper.

The faces of the knee blocks are curved to match the contours of the legs, and they must be shaped before you glue them to the rails. I use custom-ground shaper knives (see AW #35), but you can also create the curved profiles by hand. To do this, cut the blanks for the knee blocks, fit them between the legs and transfer the profiles directly onto the end grain of the stock. (See top photo, page 51.) Rip off most of the excess stock on a tablesaw. Then, shape the curve by hand with a block plane. If the block plane tears out the curly grain, use a rasp.

After you've shaped the knee blocks, the next step is to bandsaw the scalloped edges of the rails and knee blocks. (See Fig. 3.) I use cardboard templates to trace the scalloped patterns onto the blocks; then I cut them out on the bandsaw. After fairing the curves, I dry assemble the legs and rails and trace the knee-block shapes on the rails while holding the knee blocks about $\frac{1}{8}$ in. above their final positions. This way, when I cut the rails, the scalloped curves will be recessed above the finished scallops of the knee blocks.

Assembling the Base

Once you've made all the base parts it's time to start gluing everything up. Begin by gluing the two end rails to the legs. Once the glue has dried, glue the other two rails in place to form the apron. Check this completed apron and leg assembly for squareness by taking diagonal measurements; a minor difference can be corrected by placing a clamp across the

MAKING THE TOP MOLDING

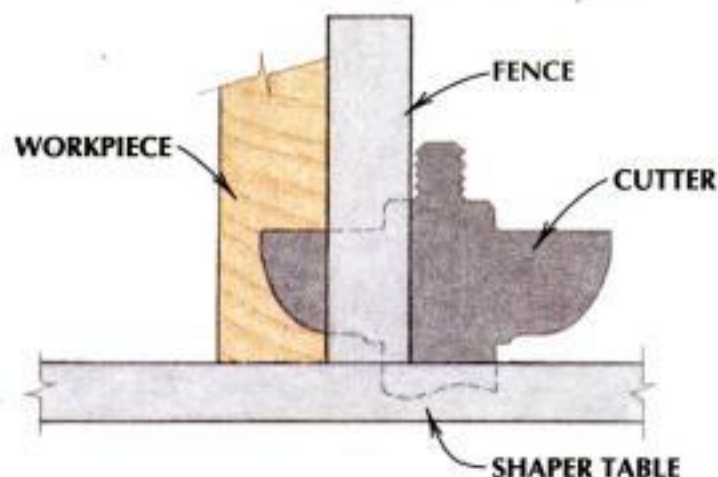
Eighteenth-century craftsmen would have used molding planes to make the top molding for my tea table. Not having their tools at my disposal, I decided to grind a set of custom knives for my shaper. (See AW #35.) You can also use a router table, but you'll need to make a scratch stock (see AW #37) to duplicate the profile on the outside edge.

When making small moldings, it's safer to shape larger stock and then rip off the finished molding, as shown below. Test the setup of your shaper or router on some scrap stock to ensure correct fence and cutter positions.

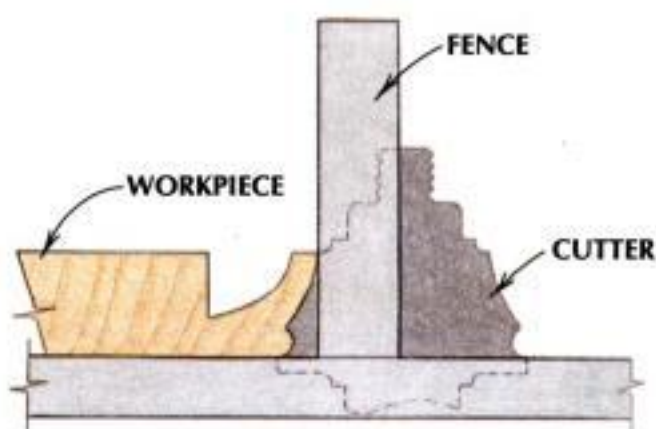
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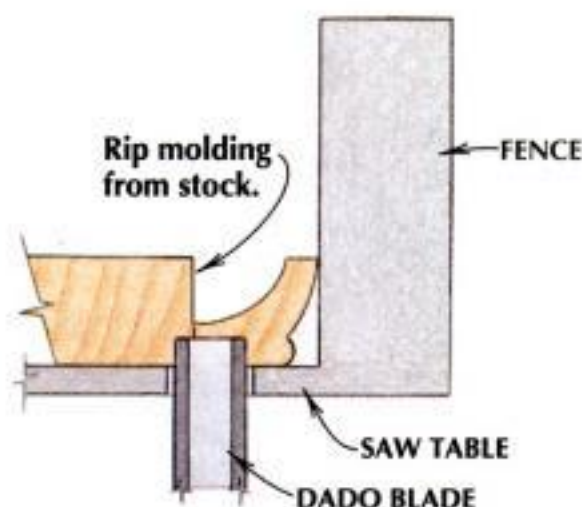
Using the Shaper



Step 1: Stand the stock on edge and cut the cove first. Because the maple is so dense, I made the cut in three passes.

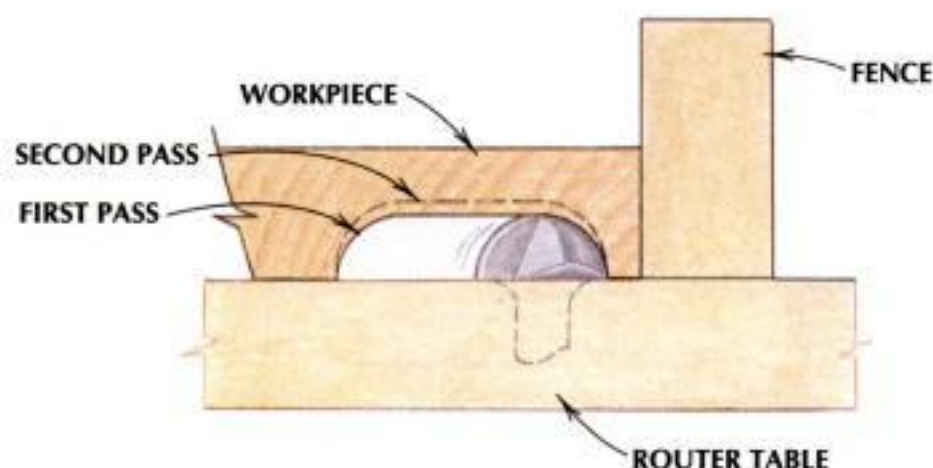


Step 2: Cut the outside edge of the molding.

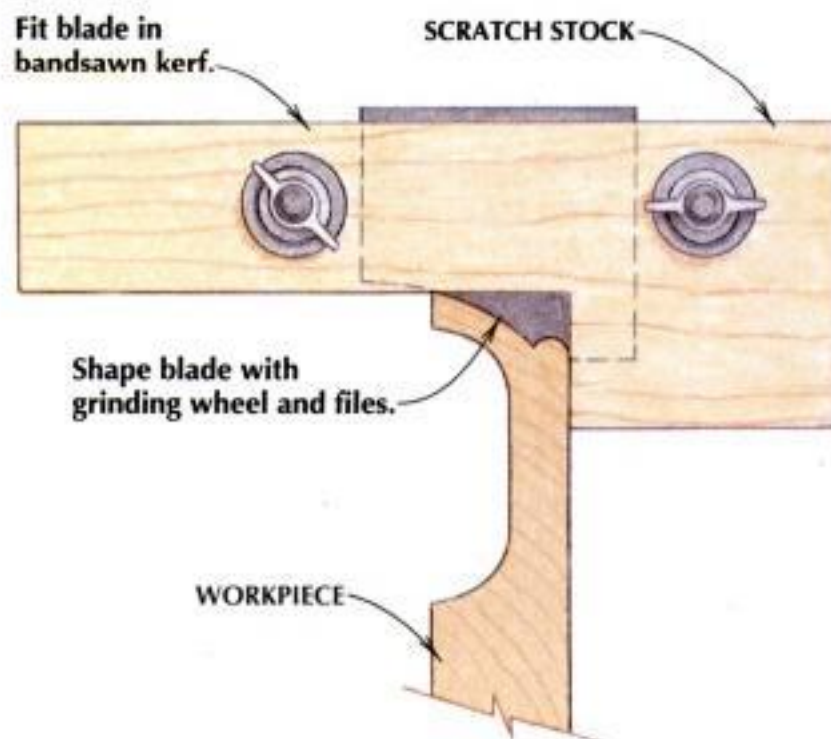


Step 3: Using a dado blade on the tablesaw, cut a 1/4-in.-deep groove on the underside of the molding to fit over the edge of the top. Then rip the molding strips free of the stock.

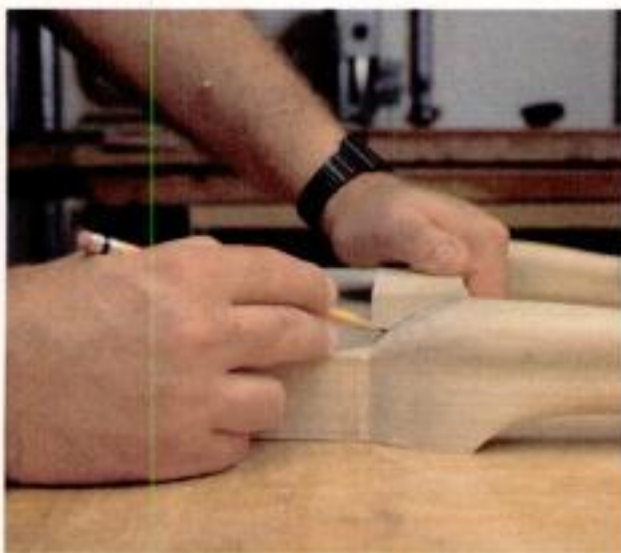
Using the Router



Step 1: Use a 1-in.-dia. core-box bit to hog out the inside edge of the molding. If necessary, clean up the cove with a curved scraper or sandpaper.



Step 2: Grind a steel blade to match the outside edge of the molding. With the workpiece held in a vise, press the scratch stock tightly against the workpiece and scrape it back and forth. Tilt the scratch stock slightly when starting to scrape the profile. For the final pass, hold the tool perpendicular to the workpiece. Then follow Step 3 at left.



Laying out the knee-block profile. Bird traces the outline of the leg directly onto the end grain of the knee-block blank.

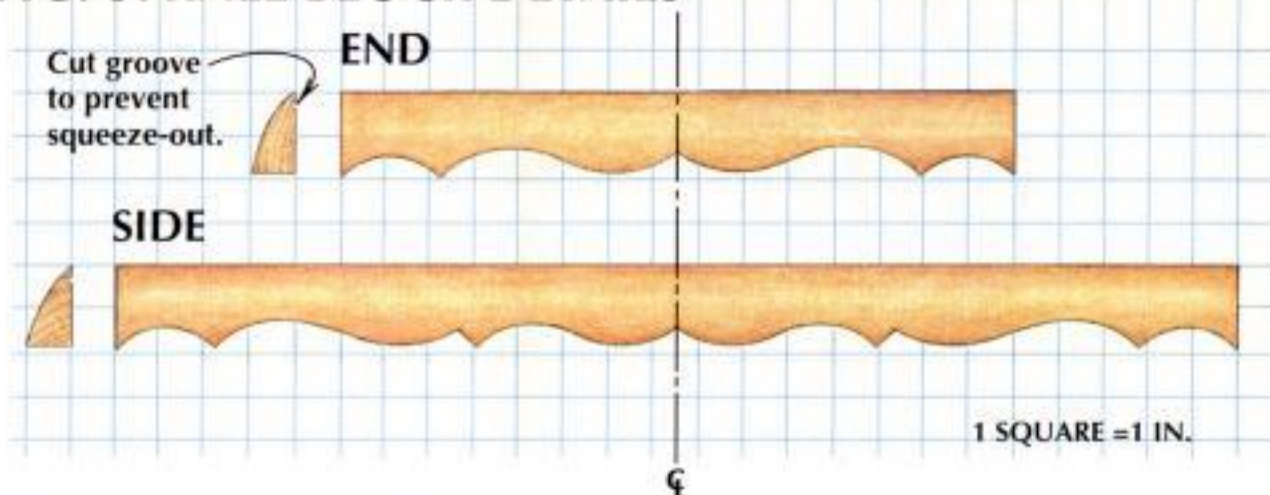


Glue-up. A brush helps to spread an even coat of glue on the back of the knee block. The groove along the back edge will catch excess glue, helping to prevent squeeze-out.



Blending the curves. Bird uses a patternmaker's rasp to smooth the leg flush with the knee block.

FIG. 3: KNEE BLOCK DETAILS



long diagonal. Once the glue has dried, use a low-angle block plane to work the post blocks flush with the apron.

Next, fit the knee blocks to the apron. Before gluing the knee blocks in place, cut a shallow groove on the back of each on the tablesaw to catch any squeeze-out. Otherwise, it's a tedious job to clean the hardened glue out of the joint where the knee block meets the apron. (See center photo at left.) After the glue has dried, I use a patternmaker's rasp and sandpaper to smooth each joint between knee block and leg. (See bottom photo at left.)

Making the Top

For the sake of authenticity and appearance, the top should be made from the fewest number of boards possible. Even though I had a board wide enough for the entire top, I opted for two narrower boards with more dramatic grain. Note that to accommodate wood movement, the top is sized to allow $\frac{1}{8}$ in. clearance on each side but none at the ends. I glued, planed and sized the top, then I rabbeted the edges and fastened the top to the base with wood buttons.

Making the Top Molding

The last construction step involves making and applying the molding around the top. Once again I ground shaper cutters for this purpose, but you can also cut this molding profile with a router. (See sidebar, opposite page.)

Next, miter the molding strips and attach them to the table. I glued the molding together first. Before I glued the molding frame to the top, I stained the top's edges so there wouldn't be bare spots if the top contracted. Then I attached the molding frame.

Finishing

A formal table deserves a formal finish. I used a multi-step finish that takes a little extra effort but isn't difficult to apply:

Before you finish, remove any dents and lightly sand the entire piece with 180-grit paper, then give it a going-over with a damp rag or sponge to raise the grain. Let the wood dry overnight, then sand off the whiskers with 240-grit paper.

Now you're ready to apply your stain. I used "honey amber maple" water-based dye stain from Lockwood (available from Woodcraft, 800-225-1153). Aniline dye does an excellent job of bringing out the dramatic curly grain pattern without obscuring the wood.

Let the table dry overnight again, and then lightly sand any remaining rough spots with 320-grit steatite sandpaper. At this point I decided to wipe on a thinned oil varnish to make the wood shimmer and give it depth. After allowing a day for this varnish coat to dry completely, I sprayed on two coats of 2-lb.-cut orange shellac.

Next, to emphasize the molding and give the table some added depth, I used a glaze that I made simply by allowing the pigment to settle in a can of "Moorish teak" stain from Zar (for the distributor nearest you, call 800-272-3235) and pouring off some of the solvent. I wiped the thickened stain onto the wood and then wiped off most of the excess, allowing some to remain in the corners and crevices. I allowed this glaze to dry overnight, and then I applied two more thin coats of shellac. Finally, I rubbed all the table surfaces lightly with 0000 steel wool and a coat of wax to give the piece its authentic patina. ▲



LONNIE BIRD

is a contributing editor to *AW*. He teaches furniture making at the University of Rio Grande in Ohio.

AMERICAN WOODWORKER 1995 Excellence in Craftsmanship Awards

Welcome to the winner's circle. The fourth annual AMERICAN WOODWORKER Excellence in Craftsmanship Competition began early in 1995, as envelopes and packages arrived from points as distant as England and Hawaii. Editors were treated to a remarkable range of woodworking—everything from doll houses and musical instruments to sculpted torsos, clocks and, of course, furniture of all shapes, sizes and styles.

To select the winning entries in amateur, student and professional categories, AW editors gave each finalist scores for design excellence, degree of difficulty and quality of workmanship. There were plenty of tough decisions, and scores were

AMATEUR

First Prize Chinese Dining Table Edwin P. Sheriff Birmingham, AL

Ed Sheriff still uses the the 8-in. Delta tablesaw that his wife bought him for their first Christmas back in 1952. "I normally specialize in making intricate jewelry boxes," says Sheriff, "but a book on Chinese furniture inspired me to design this 'extendable Chinese dining table.'"



Measuring 40 in. wide and 62 in. long with its leaf installed, the top is made from bookmatched walnut burl, with accents of ebony inlay. Stiles and rails are mahogany; legs, aprons and notch boards are walnut. Typical of Chinese furniture, the ledge under the top is covered with gold leaf under the filigree molding.

Second Prize Newport Blockfront Three-Shell Bureau Charles Martin East Sandwich, MA

Charlie Martin didn't get serious about furniture making until he turned 40. That's when he decided to enroll in the woodworking program at Boston's North Bennet Street School. He now specializes in Queen Anne and Chippendale style furniture.



This bureau was inspired by a three-shell bureau built by Colonial cabinetmaker John Townsend and currently on display at the Metropolitan Museum of Art in New York. "I realized that Townsend's work was far superior to that of other craftsmen," claims Martin. "His furniture just sings from across the room."

On Martin's reproduction, all three carved shells are the same size—a very unusual treatment for a four-drawer bureau.

Martin made his bureau from South African mahogany, duplicating the construction of the original as closely as possible. He did, however, change some of the interior joinery slightly, to make the bureau stronger and to better allow for seasonal wood movement.



First-prize awards. First-prize winners in the three award categories—amateur, student and professional—each receive an engraved Excellence in Craftsmanship Award in addition to the \$1,000 cash prize. Second-prize winners receive a cash prize of \$300, and third-prize winners receive \$200 each.

very close. In fact, as you'll see on the following pages, there were two ties for third prize.

From everyone here at AW headquarters, a heartfelt thanks to the hundreds of readers who took the time to photograph their work (or have photos taken) and enter the contest.

Congratulations to this year's winners in amateur, student and professional categories. For a look at other pieces that made it to the championship round, see page 106. And don't forget to enter the 1996 Excellence competition. Entries are due June 1, 1996. Details will appear in the next issue, or call AW at (610) 967-5171 for information. ▲

Third Prize (Tie)
Connecticut Valley
Queen Anne Highboy
Michael J. Kluesner
Anderson, IN



Michael Kluesner's love of Connecticut-style Queen Anne furniture has been strong and longstanding. "I must have been a cabinetmaker in a past life," he contends. That love, and the 140 bd. ft. of tiger maple that "showed up" at his local lumberyard, compelled him to tackle this highboy; it's by far his most challenging project to date.

Kluesner confesses to building this piece "by the book," referring to Norm Vandal's *Queen Anne Furniture* (1990, Taunton Press, Newtown, CT 06470). The highboy features hand-shaped cabriole legs and hand-carved shell detailing. The most challenging feature was the solid bonnet top, which Kluesner shaped from one piece of 8/4 curly maple using a router and a home-made jig. Kluesner plans to continue working in this style and dreams of the day he'll be able to do it full time.

Third Prize (Tie)
St. George Reef
Lighthouse
Stephen D. Knight
Santa Rosa, CA

Stephen Knight specializes in marquetry and in making miniature models that require painstaking detail. "I need a challenge, and the more difficult it is, the more I enjoy doing it," he explains. Knight started making lighthouse models to keep their historic importance alive. To him, they're symbols of the days when lighthouse keepers risked their lives so sailors could pass safely.

This particular lighthouse, the best of 20 working models that he's made to date, is carefully scaled from the St. George Reef Lighthouse, built off the coast of Oregon in the 1870s. The principal wood is Hawaiian koa. Metal parts, lenses and

reflectors were all made from scrap that Knight salvaged from various places. He claims that the biggest challenge was milling the miniature lumber to make the model look authentic. "It's a study in curved cuts and compound miters," he says.



STUDENT

First Prize Tool Chest William Clayton Newburyport, MA

Helping his father restore the family's old Victorian house got William Clayton started as a woodworker. He later worked as a contractor, but yearned to become a professional furniture maker. When he fell off a roof during a renovation job, Clayton took it as a sign to pursue his dream of building furniture.

Completing his studies at Boston's North Bennet Street School last spring was a big step toward that dream, but Clayton still feels like a beginner. "Learning the art of woodworking is a lifelong quest—the more you grow in skill, the more you realize how much there is to learn."

Inspired by the Arts and Crafts style, Clayton's tool chest is made from quarter-



sawn white oak and bird's-eye and curly maple. It contains more than 150 hand-cut dovetail joints. The pewter and copper inlay is taken from a design by Harvey Ellis, an architect who worked for Gustav Stickley. Clayton hammered the drawer pulls from bar stock and shaped them with a file. The chest is finished with tung oil.



Second Prize Krenov-Style Cabinet Rene Almon Exeter, NH

At age 12, Rene Almon made a simple toybox and knew she'd found her calling. "I was fascinated with tools and woodworking," she recalls. Almon worked in a cabinet shop and for a boatbuilder (logging some time on Dennis Conner's America's Cup sailboat) before enrolling at the College of the Redwoods. She graduated last spring.

Almon's prizewinning cabinet was inspired by a design in one of Krenov's books. "I wanted the finished piece to be gentle, graceful and fluid," she explains. Made from European cherry and cypress, the cabinet sits atop a base of teak. The cabinet's door rails, drawer fronts and top are bent laminations.

PROFESSIONAL



First Prize Ruhlmann Reproduction Art Deco Desk Frank Pollaro East Orange, NJ

Frank Pollaro first saw this design in a book and later examined the real thing at New York's Metropolitan Museum of Art. The original art deco masterpiece was made in Paris in the 1920s by Emile-Jacques Ruhlmann. "In my opinion," says Pollaro,

"this desk is one of the most technically difficult pieces of furniture ever built."

The reproduction is constructed of plywood bent over a carcass form, then veneered with amboyna burl. Each "torpedo" leg is a 10-sided, tapered form, veneered and accented with a delicate string of holly inlay at each arris. The drawer handles, inlaid dots and dentil moldings are hand-made from faux ivory.

Second Prize Chippendale-Style Tea Table John Bartosh Malden, MA

Before attending Boston's North Bennet Street School from 1992 to 1994, John Bartosh worked as a carpenter in suburban Philadelphia.



"I wanted to make a piece of furniture honoring the style that the area is famous for, and this tea table is the result," he explains. It's inspired by a Thomas Tuft table made in 1775 and considered to be a supreme achievement in the Philadelphia Chippendale style.

Bartosh restores 18th- and 19th-century furniture, and for this piece he used traditional techniques whenever possible. For example, he employed hide glue for its reversibility, and gave the mahogany its rich tone by treating it with a light oxidizing wash of potassium permanganate, followed by dark shellac, orange dye and linseed oil.



**Third Prize
Writing Desk
Michael Carrol
Ft. Bragg, CA**



Michael Carrol started wood-working at an early age, when his father gave him a saw, a hammer, a chisel and some wood scraps one Christmas. He was working as an electrician when he chanced to hear a lecture by famed woodworker James Krenov. "His artistry and craftsmanship blew me away," remembers Carrol. Carrol attended the

College of the Redwoods from 1993 to 1995; now he hopes to make a living building one-of-a-kind gallery furniture like this writing desk.

The idea of a simple desk with curved edges and drawers appealed to Carrol as an alternative to the square, clunky forms of conventional desks. The top of his desk is veneered with bookmatched

Claro walnut. Pecan inlay accents the darkness of the walnut top. The side rails and drawer fronts are formed from bent laminations of black walnut. Carrol used maple for the drawers and dividers, and designed a secret compartment behind the center drawer. He cast the bronze drawer pulls himself, using the lost-wax technique.

**Third Prize (Tie)
Acanthus Leaf Bowl
Ron Fleming
Tulsa, OK**

As a painter, carver and illustrator, Ron Fleming was looking for a faster way to work when he saw a book of turned wooden objects. The proverbial lightbulb came on: "I was amazed at the artistic potential in turning. Here was a way to use a new tool and produce work I couldn't do by carving alone."

Fleming began to learn by trial and error, and he eventually specialized in hollow vessels. One of his pieces is currently on display in the White House.

With an acre of flowers on his property, Fleming often looks to nature for inspiration. "I can go for a walk and come up with a dozen ideas



for a bowl." The challenge in this pink ivory vessel was to create a vase entirely of leaf forms, following the grain wherever possible. He purposely left openings to invite the eye inside the vessel and to permit light to cast shadows around the foot.

To create the delicate leaf shapes, Fleming uses power carving tools, files, rasps and sandpaper.

**Third Prize (Tie)
Contemporary Chair
Ejler Hjorth-Westh
Elk, CA**

Ejler Hjorth-Westh credits his fourth-grade woodshop teacher in his native Denmark for his devotion to woodworking. But although he grew up in Denmark, Hjorth-Westh believes that destiny brought him to northern California. He met his wife there while hitchhiking, and he also rediscovered woodworking when he worked there as a boatbuilder.

Upon graduating from the College of the Redwoods in 1992, Hjorth-Westh opened his own woodworking business. His motto: "Make things that work well in use and look attractive even when not in use."

"In boatbuilding, there's a strong correlation between

form and function," explains Hjorth-Westh. His bubinga end chair, part of a set, echoes that ethic, conveying both strength and grace. For instance, he took special care to ensure that the grain of the original log ran continuously through the chair.



Bandsawn Box

Simple Joinery, Exquisite Wood and a Bright Finish Make a Beautiful Gift

by Jay O'Rourke



Great grain. The wood itself is a major design element in these boxes. The O'Rourkes make the box sides from bookmatched pieces. The front, bottom, back and lid are all bandsawn from the same blank.

My wife, Janet, and I make wooden boxes—lots of them. The inspiration for our boxes comes from ancient architecture, Asian art, art deco, and lately from the ever-changing patterns in the sky. Working the wood from its raw form and bringing out the beauty of different colors and grain patterns is a reward in itself—like working with fine gemstones.

When I first began making wooden items for a living in 1970, I concentrated on flatware—chopsticks, crochet hooks, turned bowls and plates. Occasionally I would make a box for a set of flatware or some other project and it would always

seem to sell. I became interested in finding a design for a small box that would be simple and elegant, with a unique but familiar feel. I came up with a design for a bandsawn box with a top that swings open on a wooden dowel hinge.

When I met Janet and we began working together, her background in art brought a new sense of color and design to our boxes. Now we make hinged boxes in many different sizes and styles. Our basic bandsawn box (see photo, above) remains one of our most popular designs. If you build your own version of this box, feel free to vary the dimensions to suit your needs.

Choosing Your Wood

When building a box like this one, the first place to start is with the wood. For most of our boxes, we like to use exotic species such as purpleheart, wenge, cocobolo, ebony, and lacewood. We also sometimes use bird's-eye maple. In a small box with simple joinery, the wood itself takes on great importance, so we select lumber with intense color and dramatic grain patterns.

To make the body and lid of the box you'll need a blank about 2 in. thick, 2½ in. wide and 3 in. long. The grain on the blank should run along its 3-in. length, or front to back. For the sides,

FIG. 1: BANDSAWN BOX

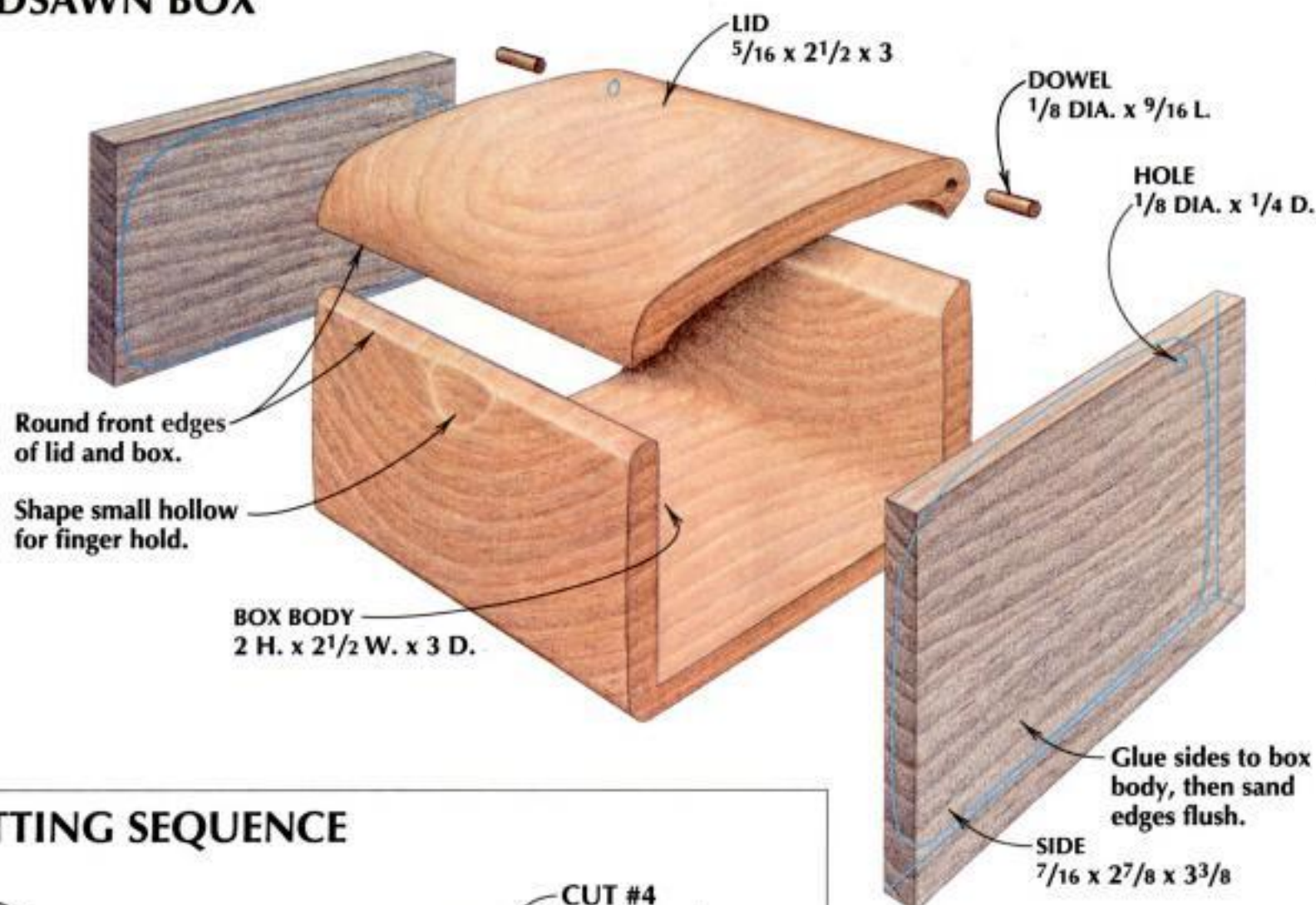
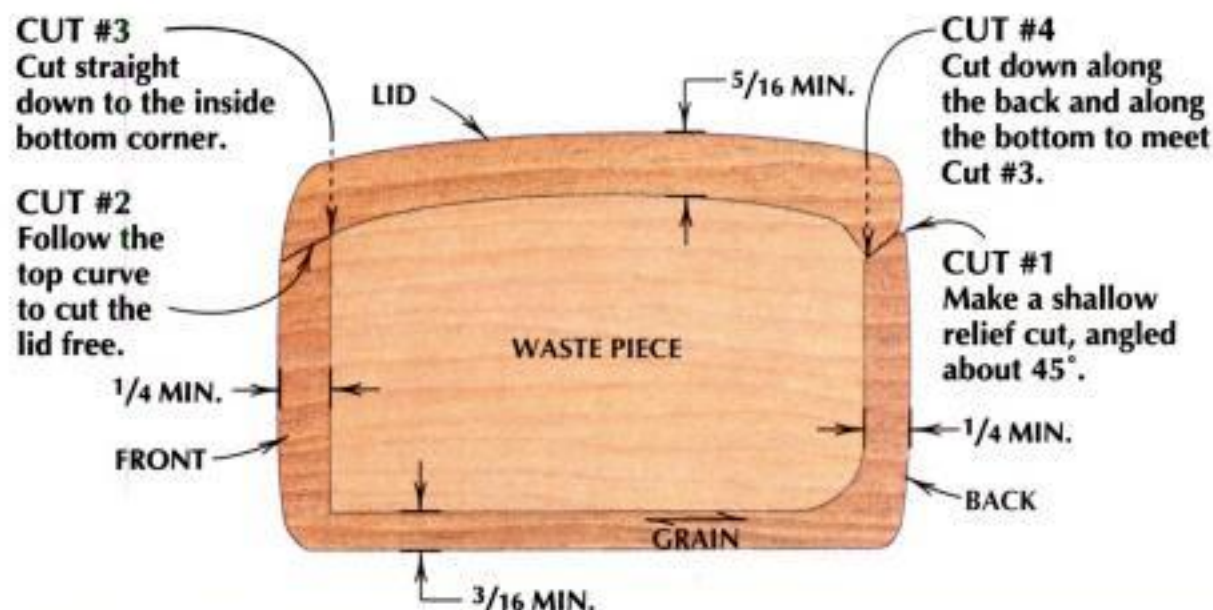


FIG. 2: CUTTING SEQUENCE



start with a single piece of contrasting wood about 1 in. thick, 2 7/8 in. wide and 3 3/8 in. long. You can make the box all out of one type of wood if you like, but we prefer the dramatic effect you get with contrasting wood.

You'll also need a short length of 1/8-in.-dia. dowel rod for the hinges, and a small piece of suede-type fabric (available at fabric stores) for the lining. We don't recommend lining with real suede leather. Chemicals remaining in the leather from the curing process can react with the metal in jewelry, rings and other stored items.

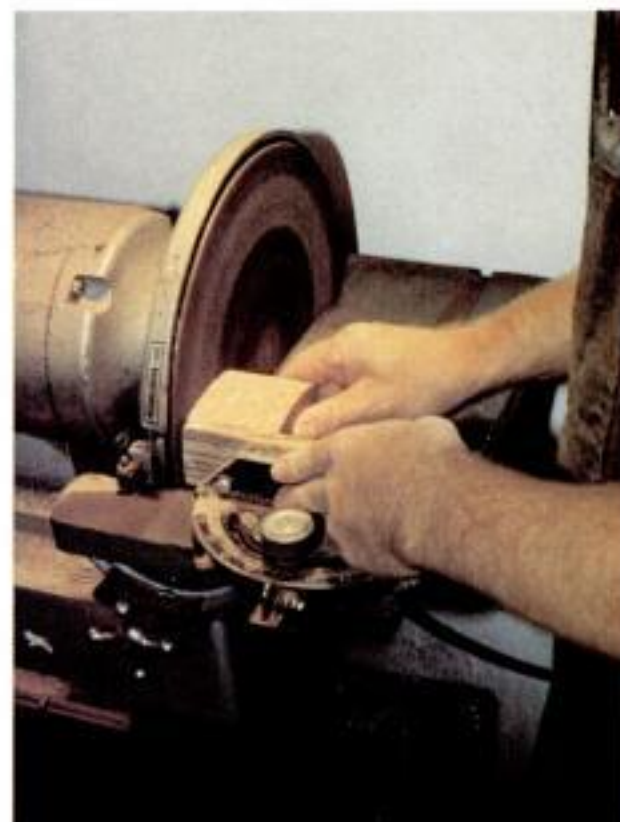
Making the Box Parts

One of the key construction features of this box design is that the box body—which includes the bottom, front, back and lid—is bandsawn from a single block of wood. (See Fig. 1.)

Start by cutting your blank to its 2-in. by 2 1/2-in. by 3-in. size. Then go to the stationary belt-disc sander to square it up and create the soft profiles on the top, front and back. It's best to use 40- or 60-grit sandpaper for this work. A slightly domed top will give your box the look of a small trunk; a gentle curve on the front and back will give a nice soft feel to the box.

Once I've contoured the outside surfaces of the box, I square up the ends of the blank on the disc sander, guiding the workpiece with the miter gauge. Make sure that your table is square to the sanding surface for this operation, to assure flat ends that are square to the faces of the blank.

To make the sides, I select a 1-in.-thick piece of contrasting wood and resaw it into a pair of bookmatched pieces on the bandsaw. Each piece



Flattening the ends. Jay O'Rourke guides the workpiece against a miter gauge to disc-sand each end of the blank flat and square.

should be about 7/16 in. thick, and should measure about 2 7/8 in. wide by 3 3/8 in. long at this stage.

When the box is assembled, I want the bookmatched faces of the sides visible on the outside. So, I disc-sand the inside faces—the outside faces of the original blank—flat and smooth. You can wait until after glue-up to sand off the band-



Dowel hinges. The box lid and sides are drilled for fitting a pair of 1/8-in.-dia. dowel hinges. Test-fit the sides, lid and box body before proceeding with glue-up.



Suede lining. Janet O'Rourke glues suede fabric in the U-shaped cavity of the box body. Excess suede is razored off after the glue dries.



A single C-clamp. Taking care to keep the lid free of glue, join the sides to the box body. Glued up oversize, the sides will be sanded flush after the glue dries.

saw marks on the bookmatched faces.

Once these basic parts are made, I bandsaw the blank to free up the lid and create the U-shaped body of the box. I draw cutting guidelines on one end of the blank. (See Fig. 2.) Although the dimensions aren't critical, the lid, front and back for a box this size should be no less than 5/16 in. thick, and the bottom should be no thinner than 3/16 in. To cut the box out, we use a 3/16-in.-wide, 10-tpi blade. Make sure that your bandsaw blade is square to the saw's table before you start cutting.

The order of cuts is shown in Fig. 2. Cut #1 is a short relief cut, made on an angle from the back of the box. Cut #2, from the front of the box to the first cut, frees the lid. Cut #3 is also a relief cut, and it defines the inside face of the front of the box. Cut #4 will free up the plug.

When making Cut #4, saw parallel to the back of the box, then make a tight curve where the back meets the bottom. Continue cutting parallel to the bottom until you meet the bottom of Cut #3. Don't throw away the plug—you can use it to make another, smaller box. Note: Before you attempt Cut #4, it's a good idea to practice on some scrap-wood to see how tight a radius you can cut with your blade.

Assembling the Box

Now that all the parts are cut out we can prepare them for assembly. First use some 120- or 150-grit sandpaper to sand all the bandsaw whiskers—we call them "fuzz"—from the edges of the box. Then sand the inside of the lid by hand, being careful not to change the shape so that it won't close evenly. I like to sand the lid's inside edges slightly, just enough to remove any sharpness. Then, using a round rasp followed by 220-grit sandpaper, I make a thumbnail-size hollow along the top edge of the front of the box. This small depression makes the lid easier to open.

Now lay out the hole centers for the dowel hinges. First, I mark the centers of the lid holes on the thickness of the lid, 3/16 in. from the back edge. Transferring these centers to the sides is a bit tricky: Holding the lid on the box body, I place both these pieces against a side, and trace the outline of the lid onto the side with a sharp scribe or knife. Then I measure from this reference outline to mark the hole center.

Once all four centers are marked, I drill the holes with a 1/8-in.-dia. bit on the

drill press, 1/4 in. deep in the sides and 3/8 in. deep in the lid. Into each lid hole I tap a 3/4-in. length of 1/8-in.-dia. dowel. Then I trim each dowel to show 3/16 in.

Before gluing the box together, pre-assemble it to make sure your dowels are not too long. If you want to line the box with suede, now is the time to do it. Take a piece of suede a little larger than the inside of the box, paint the inside with a thin coat of white glue (keeping the glue off the edges) and carefully roll the suede into the box. (See center photo at left.) Smooth it out with your fingers and allow it to dry. Then trim any overhanging suede with a sharp razor blade and scrape away any excess glue.

We use yellow wood glue to glue the box together. Apply the glue carefully to the ends of the box body, making sure to avoid the lid. Use only a thin film of glue to avoid unnecessary squeeze-out on the inside. Fitting the lid's protruding dowels into the side holes will effectively locate the sides on the body of the box and ensure smooth hinge action. The entire assembly can be clamped with a single C-clamp. (See bottom photo at left.)

Trimming and Finishing

Once the glue has dried, we go to the belt-disc sander and grind down the oversized sides so they're flush with the box body. Open the box and remove any excess glue. If necessary, sand the edges of the lid so that it opens and closes evenly. We do final sanding on the disc sander, starting at 80 grit and stepping down all the way to 600 grit.

After sanding is complete we like to use a Danish oil finish on our boxes. Smaller, unlined boxes can be dipped in finish and then buffed. For lined boxes, apply the oil carefully by hand. When the oil dries, we use a linen buffing wheel with a little tripoli compound to remove dried oil spots and bring up a luster on the outside of the box. We finish up with a coat of carnauba-based wax buffed out with a wool bonnet on the disc sander. The only thing left to do is to sign and date the box, and enjoy its beauty. ▲



JAY AND JANET O'ROURKE are partners in Jay O Boxes, based in Oregon.

Women in Woodworking

Eight Female Perspectives on the Craft

Women in woodworking? It's not so remarkable anymore. While the sight of a woman planing a plank or hefting a cabinet might still raise an occasional eyebrow, it's no longer the novelty it once seemed. What is remarkable is that women woodworkers should ever have seemed an oddity. Although wood-

working has probably always been a male-dominated craft, it has always had a strong female component.

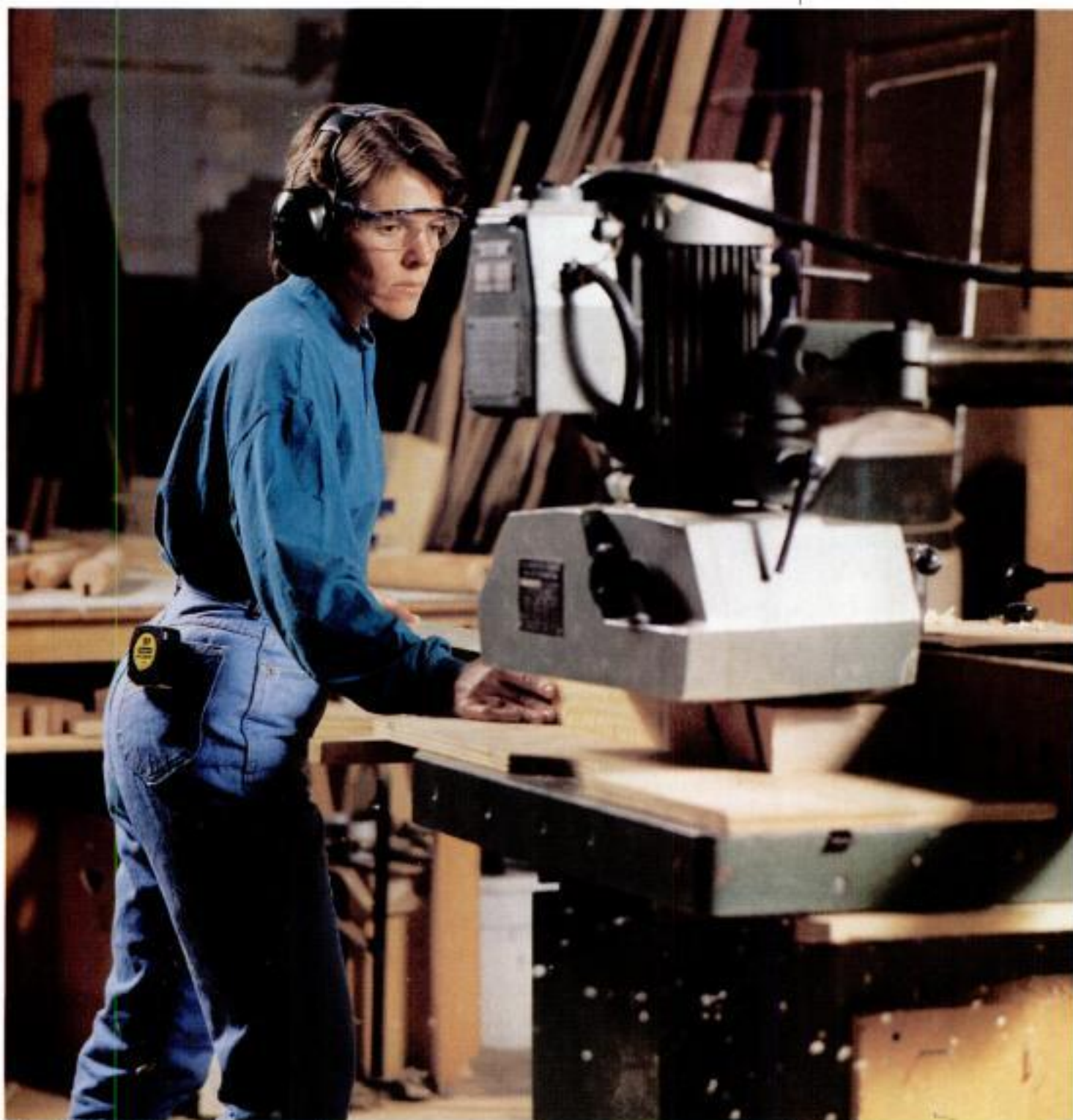
From ancient times up until the mid-1800s, women often worked shoulder-to-shoulder with men, both at the drawing board and in the workshop. Women and men crafted furniture and built houses together. They fashioned wagon wheels, barrels and looms. But then the Industrial Revolution came along. Faced with choosing between factory and family, many women left the trades.

The last generation, however, has seen a significant number of women picking up saws and planes once more. According to the latest "Woodworking in America" study sponsored by AMERICAN WOODWORKER, there are at least four million women woodworkers in this country—and 242,000 of them have been practicing the craft for more than 30 years. That's a considerable amount of sawdust.

So, who are these women? How did they get started in woodworking, and how do

they operate within such a gender-lopsided profession? What kind of woodworking philosophies have they developed over the years?

To find out, we charged editors to explore and expand our network of women woodworkers. Along the way, we accumulated an impressive collection of experiences, opinions and stories—enough to fill a book, in fact. We're grateful to the many woodworkers who helped in this research. We're also grateful for the opportunity to share some of this information and inspiration on the following pages. ▶



The love of woodworking knows no gender. There are four million women woodworkers in the U.S. Although less visible than their male counterparts, these determined women are producing everything from architectural millwork (above) to furniture, carvings and marquetry.

Barbara Simpson

Rockport, MA

Simpson, now retired, has behind her a 45-year career as a professional cabinetmaker and furniture restorer.



"When I was five years old, my father made me a toolbox. He filled it with small, good-quality tools and then included me in his various projects around the house. In college, I studied architecture. The engineering classes I took required using the woodshop for patternmaking, and I discovered that I liked woodworking more than architecture. I learned furniture making from the wonderful old gentleman who ran the shop.

I was the only girl in his class and he just loved it.

"In 1946, after a wartime stint in New England as a mechanical engineer, I headed out west with a friend. We found ourselves running a woodshop in Taos, New Mexico, learning Spanish Colonial furniture making from the shop owner. I moved back to Rockport a year later. It was a real arts colony; everyone was doing something different. And they were all as unconventional as me. I don't recall any obstacles due to the fact that I was a woman. I created a niche for myself right away, mending precious heirlooms, and became like the family doctor. I never lacked for work.

"In my business, I found that women customers are generally more comfortable talking to a woman woodworker. A number of my female clients observed that men often seem to do as they please regardless of what the customer wants. I think women and men just speak a different design language. Although some men are doing beautiful things, many don't understand the delicacy and practicality women need from their furniture."



Hutch. Eastern pine.
W: 60 in. D: 20 in. H: 84 in.

PHOTO BY MARGE STORY

Debey Zito

San Francisco, CA

Twenty-three years a woodworking professional, Zito specializes in Arts and Crafts style furniture. She also teaches woodworking classes to women.



"I got into woodworking because I hated my sewing teacher in high school, so I switched over to woodshop. I just fell in love with the craft and, in the early '70s, I went to San Diego State to study woodworking and metalworking.

"I was one of only five women in the Industrial Arts Department there and the first woman to take metalworking in over a decade. The attitudes were hard to take.

Instructors would ask me if I was there to catch a husband. In large part, I got into teaching woodworking as a result of those experiences. I think it's important for women to see women teaching woodworking.

"For more than a decade, I've been making Arts and Crafts style furniture. The Arts and Crafts philosophy suits me. I think that well-designed, strong furniture made to last a long time is good for the environment. Woodwork should last at least a hundred years. It took a tree that long to give you the lumber; out of respect, what you make from it should last as long. Every piece you make that lasts longer than your lifetime is like a prayer to the future."



Chest of drawers. Cherry.
W: 46 in. D: 22 in. H: 42 in.

PHOTO BY JOYCE OUDKERKPOL

Judy Gale Roberts

Lufkin, TX

Roberts is a nationally recognized intarsia master and the author of several books, including Easy to Make Inlay Wood Projects—Intarsia.*



"I grew up surrounded by art. My father, a freelance artist, worked for designers and architects on commercial projects. To me, his studio was a wonderland—filled with everything from clay and wood to mismatched shoes used for a sculpture model. When I was old enough to work, I chose to apprentice with him rather than enroll in art school or college.

"At one point, he was commissioned to create some large wooden wildflowers for a bank atrium. These rough-cut, dimensional designs led to similar commissions for low-relief panels made up of roughly sanded pieces of wood. We didn't know that what we were doing already had a history and a name: intarsia.

"I began working with Jerry Booher in the mid-1980s, producing smaller intarsia panels and marketing the work at arts-and-crafts fairs. At first, almost everyone complimented him on 'his' work, even though my name was on every piece. It was amazing to me that some men would refuse to ask me 'how-to' questions, simply because I am a woman. But now that my name is better known, it doesn't happen very often.

"I love the tactile aspects of sculpture. When you take wood and shape it to an image in your mind's eye, it really comes to life. The forms, the grain patterns, colors and textures all add up to a wonderful effect."

*1993, Fox Chapel Publishing Co. Inc., Box 7948, Lancaster, PA 17604.



"Muh-Deer." Western red cedar, zebrawood.
W: 35 in. H: 43 in.

PHOTO BY CURTIS DOOLIN

Carol Reed

Ramona, CA

Reed is a furniture designer and maker who specializes in ecclesiastical woodwork. She has been working wood professionally for 14 years, full-time for the last three.



"My grandfather, a farmer who made things of necessity, started me at woodworking when I was seven. During an era when most girls were restricted to the kitchen, he let me help him with woodworking and other projects around the farm. Once I smelled those pine shavings, I was in love.

"In high school, the shop teachers wouldn't even let me peer in the woodshop door, let alone take a class. But I stuck with woodworking anyway, learning from books and trial and error. A couple of years ago, I completed a woodworking course at Palomar College in southern California. I still take and teach classes there occasionally, but have learned to basically be my own woodworking mentor.

"As a woman woodworker, I tailor my marketing to females, who frequently make the decisions regarding furniture purchases, even for churches. I point out to them that a woman's perspective regarding furniture design, use and care is something only a woman woodworker can offer. The fellow down the street simply doesn't have that viewpoint.

"But, regardless of gender, I think every person should do what they do best, and what makes them happiest, regardless of anyone's opinion. There's nothing to stop you except you."



Altar. Mahogany.
W: 60 in. D: 36 in. H: 42 in.

PHOTO BY CAROL REED

Desiree Hajny

Wichita, KS

The author of *Mammals: An Artistic Approach*,** Hajny is in demand nationwide as a carving instructor. She also produces commissioned and speculative sculpture.



"As an art teacher years ago, I got hooked on carving while trying to teach high-school boys an art form that they wouldn't consider too 'sissy.' I had never carved before and, in an effort to keep ahead of the kids, bluffed my way through by inventing all sorts of weird techniques, some of which I still use.

"Many people at arts-and-crafts shows assume my husband does the carving. Sometimes he'll grin and say, 'Yep, I did them all,' knowing they'll probably find out otherwise. Sometimes, when he says, 'My wife did them,' their eyes get really big and they ask how I find time to do my housework or take care of the kids. But that just takes teamwork. This has become a full-time business for Bernie and me. He does the things that I hate to do and I do the things he hates to do. It works out well.

"As a carver, I've had to relearn some techniques over the years but, in the process, I've discovered there is more than one right way to do something. In general, I prefer to carve mammals, but I do caricature carvings as well. Whatever I'm working on, I usually start with the head and face. That way, if I don't like what develops, I can put the carving aside, not having wasted too much time on the rest of it. Life's too short not to enjoy what you're doing."

**1994, Fox Chapel Publishing Co. Inc., Box 7948, Lancaster, PA 17604.



"Rainforest Peak." Basswood.

W: 10 in. D: 13 in. H: 12 in.

PHOTO BY MIKE HUTMACHER

Vicki McCracken

Pittsburgh, PA

A partner in Wilson & McCracken since 1984, McCracken produces architectural millwork, doors, molding and custom cabinetry for the company.



"My woodworking beginnings were in construction, making and installing prefabricated walls. I had always been interested in shop woodworking—I just didn't know much about it, but I finally took a community college woodshop course. Then, in 1982, while looking for more work, I ran into Jerry Wilson, who needed temporary help on a big job. I've been working with him full-time ever since.

"I don't have to deal with gender problems on the job. I've always been treated as an equal. And because I work in the shop, I don't have a lot of contact with outside people in the field, so I don't have much of a problem with acceptance. We're a small shop with three guys working for us now and we're pretty close-knit.

"They call me the 'shaper queen.' I've done curved handrails, template shaping, and ground my own knives. When I'm done shaping a particularly difficult project, that's when I'm most pleased. I also get satisfaction from showing my daughter she can be anything she wants to be."



Japanese interior. Quartersawn Douglas fir.

PHOTO BY WILSON & MCCracken

Cheryl Scott

Los Angeles, CA

The daughter of an amateur woodworker, Scott was the second woman to complete the California Cabinetmakers' and Millmen's Union Apprenticeship Program.



"I've always loved wood—the way it smells, the way it feels—the whole romantic bit. I taught myself the woodworking basics at a pretty young age, and then I worked my way through college renovating antebellum houses in New Orleans.

"I moved to Los Angeles in 1987 and applied for a state-sponsored apprenticeship program—the catch being that you first had to find someone willing to hire you. Every

shop I applied to reacted as though I had no arms. I found California less progressive than the Deep South, where guys had worked for me without a problem.

"The owner of a large union cabinet shop finally hired me. I worked there for five years, trying to roll with the daily hassling and insults that came with being in that 'boys' club.' I eventually reached my limit, though, and left. It's not my job to change people, but I also didn't want to be changed into an angry, resentful person by staying there.

"These days, I'm dealing person-to-person with clients and suppliers who respect me professionally. My philosophy is to just do the best work I possibly can, even if it cuts into profits. I'm sure that many of my referrals have come from clients for whom I've gone the extra mile."



Wall system. Mahogany and maple.
W: 16 ft. D: 30 in. H: 96 in.

PHOTO BY PHILLIP THOMPSON
DESIGN BY DHANA SOLISH

Julie Shenk Godfrey

Easthampton, MA

A furniture maker and marquetry specialist, Godfrey produces both commissioned and speculative pieces.



"My early interest was in graphics but, in college, I changed my focus to sculpture. After seeing a pair of chairs at a Frank Lloyd Wright exhibition, I was inspired to make a chair myself. And from then on, I focused on furniture.

"I first learned marquetry at the College of the Redwoods in northern California, then moved to Massachusetts to pursue an informal apprenticeship with Silas Kopf.

Both of our shops are in a building that houses dozens of other woodworking shops. The supportive atmosphere is a big inspiration to a craftsman like myself, who is just starting out.

"I suppose I'm faced with trying to prove myself as a woman woodworker because there aren't many out there. But I think the bigger issue—for both men and women—is just proving your technical competence when you're young and beginning in the craft. I do like the fact that, as a woman woodworker, I can perhaps change some people's attitudes about women in nontraditional fields. I am finding that many of my clients, especially women, want a piece made by a woman.

"I'm excited by marquetry and plan to continue pursuing it. Marquetry—as opposed to so much meticulous cabinetry—provides a freedom to basically paint with wood, choosing from an amazing palette of colors and textures."



Display cabinet. Cherry and maple, with assorted marquetry woods. W: 30 in. D: 13 in. H: 59 in.

PHOTO BY JULIE SHENK GODFREY

Turn a Tazza!

A Traditional Project
that Shines as a Holiday Centerpiece

by Mike Dunbar



Turned out for the holidays. The author's cherry tazza offers six circular shelves for displaying or serving festive fare. A graceful finial tops off the shaft, which is turned in diminishing diameters.

Centuries ago, the banquet tables of wealthy Europeans were decorated with elaborate objects designed to display food as well as to serve it. The *epergne*, for example, was a treelike device with small dishes and bowls hanging from its branches. And the *tazza* displayed its wares on circular shelves of graduated sizes.

While these table ornaments were made in fine materials such as silver or ceramic for the European aristocracy, woodworkers in Colonial America creat-

ed their own more affordable versions. This tazza is patterned after an antique original made shortly after the American Revolution. During holidays and on other festive occasions, this five-tiered tree becomes the centerpiece of our dining room, festooned with decorative objects, hors d'oeuvres, or sometimes both. In its off-duty mode, the tazza can be taken apart easily, simply by lifting its shelves free and unscrewing the shaft from the base. I made my tazza entirely out of cherry. But you could just as easily turn it from other hardwood stock, as

long as your wood is clear and dry.

The tazza has four major components: the central shaft, the base, the five shelves and the finial. It will test a variety of basic lathe-turning skills: The shelves and base are faceplate turnings; the shaft and finial call for spindle turning.

Making the Base and Shelves

With a thickness of 2 in., the base anchors the piece visually and physically. Make sure to start out with a workpiece that's flat on both sides. Trace the base circumference onto the workpiece and

cut it roughly to size, taking care to saw outside the line. Then glue a waste block to the bottom of the blank and attach the block to your faceplate.

Since the base is visible even when the tazza is fully adorned, it's a bit more ornamental than the shelves. You can copy the details I used, or make up your own. (See drawing.) After turning the "show" side of the base, I hollowed out the underside slightly around the waste block. Then I marked the centerpoint on the top of the base, and removed the base from the lathe. I used a gouge to shave off the waste block and to finish hollowing the underside. This slightly concave surface promotes stability.

I used my drill press to drill out the center of the base for the threaded tenon hole. If you don't have a tap-and-die set, you can turn a tenon on the shaft and glue it into a hole in the base. I prefer a threaded joint because it allows me to dismantle the tazza. I drilled a $\frac{5}{8}$ -in.-dia. hole for my $\frac{3}{4}$ -in. tap. (Tap-and-die sets are available from AMT, Box 70, Royersford, PA 19468, 610-948-0400.)

Turning the shelves is like turning the base. Each shelf is just $\frac{3}{4}$ in. thick, and the shelf profile has a thin lip along its outer edge. (See drawing.) This recesses the top surface slightly, to prevent items from rolling off the shelf.

As with the base, I glued a waste block to each shelf in order to mount it on the faceplate. After turning a shelf, mark its centerpoint, remove it from the lathe, and then hand-plane off the waste block. Finally, drill the proper diameter hole on the drill press.

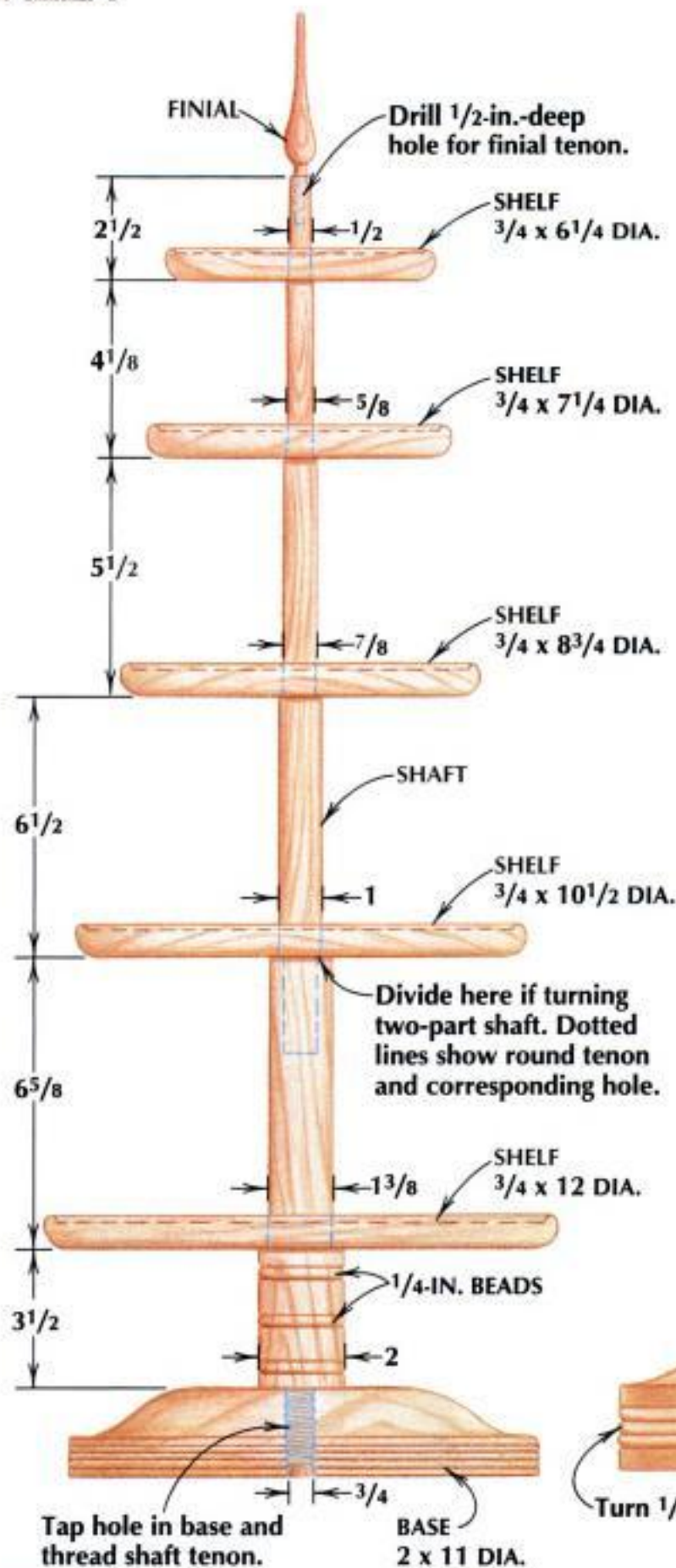
Shaft, Finial and Finish

The central shaft starts out as a blank 2 in. square and about 31½ in. long. The shaft is essentially a spindle that narrows in steps from bottom to top, containing six different diameters and a 2-in.-long tenon that is threaded to fit in the base. (See drawing.)

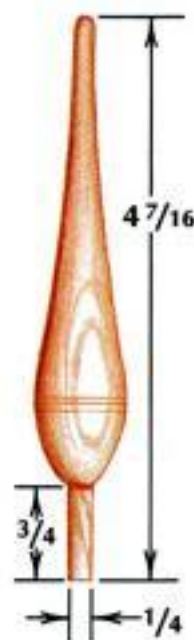
I turned the shaft from a single piece of wood, but this requires the use of a steadyrest to prevent chatter. If you don't have a steadyrest, or if your lathe is too small to handle the full length of the shaft, it's possible to make a two-piece shaft. Make the joint at the second shoulder, as indicated in the drawing. You'll have to turn a round tenon on the upper part of the shaft, and drill a corresponding hole in the lower shaft.

After rounding the entire shaft to a diameter of 2 in., I used a parting tool

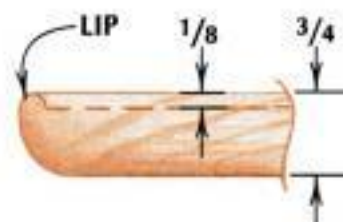
TAZZA



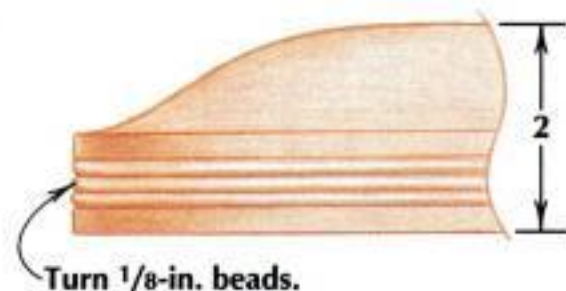
FINIAL DETAIL



SHELF SECTION



BASE DETAIL



and caliper to cut the shoulder of the first step. I made several successive parting cuts to the 13/8-in. diameter along the length of this shaft section. I pared off the waste to the parting depth, and kept paring along the entire length of the shaft. Then I made a parting cut at the next shoulder, and repeated the paring and parting process until I'd pared the top of the shaft to its ½-in. diameter.

The last part I turned was the tenon that joins the shaft to the base. Once this was done, I removed the shaft, threaded its tenon, and tapped the hole in the base to receive the tenon.

The finial tops off the tazza. You can turn it to the profile shown or design

your own. Drill the hole for the finial's tenon in the top of the shaft, and set the finial in place after fitting the shelves.

I finished my tazza with a solution of five parts boiled linseed oil to one part paint thinner. I applied it with a brush and then rubbed it down with a clean rag after it set for a few hours. ▲



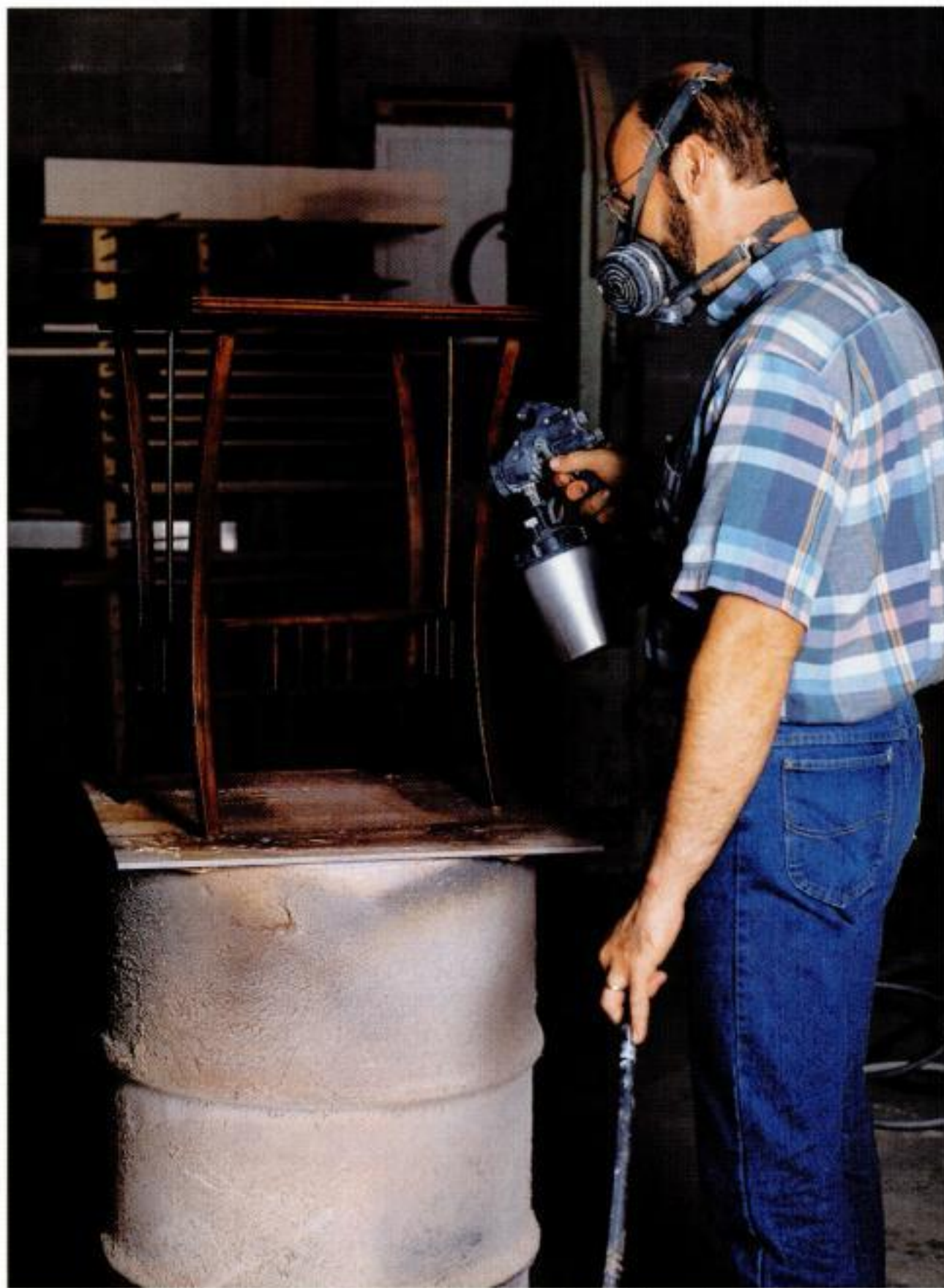
MIKE DUNBAR

is a contributing editor to AW. He teaches Windsor chairmaking at his workshop in New Hampshire.

Guide to Waterborne Finishes

An Expert Tells How to Choose and Use These Finishes of the Future

by Tom Brown



Spray it safe. Waterborne finishes look and perform like solvent-borne finishes, yet they are less hazardous to you and the environment.

In any discussion of finishing these days, the subject of waterborne materials is bound to come up—most often accompanied by pained expressions and lots of questions: How do they look? Can I spray them with my regular spray equipment? Can I brush them? How safe are they really? In this article, I'll provide the answers to many of those questions and tell you how 35 of the popular waterborne finishes compared in actual tests on standard wood samples.

About Waterborne Finishes

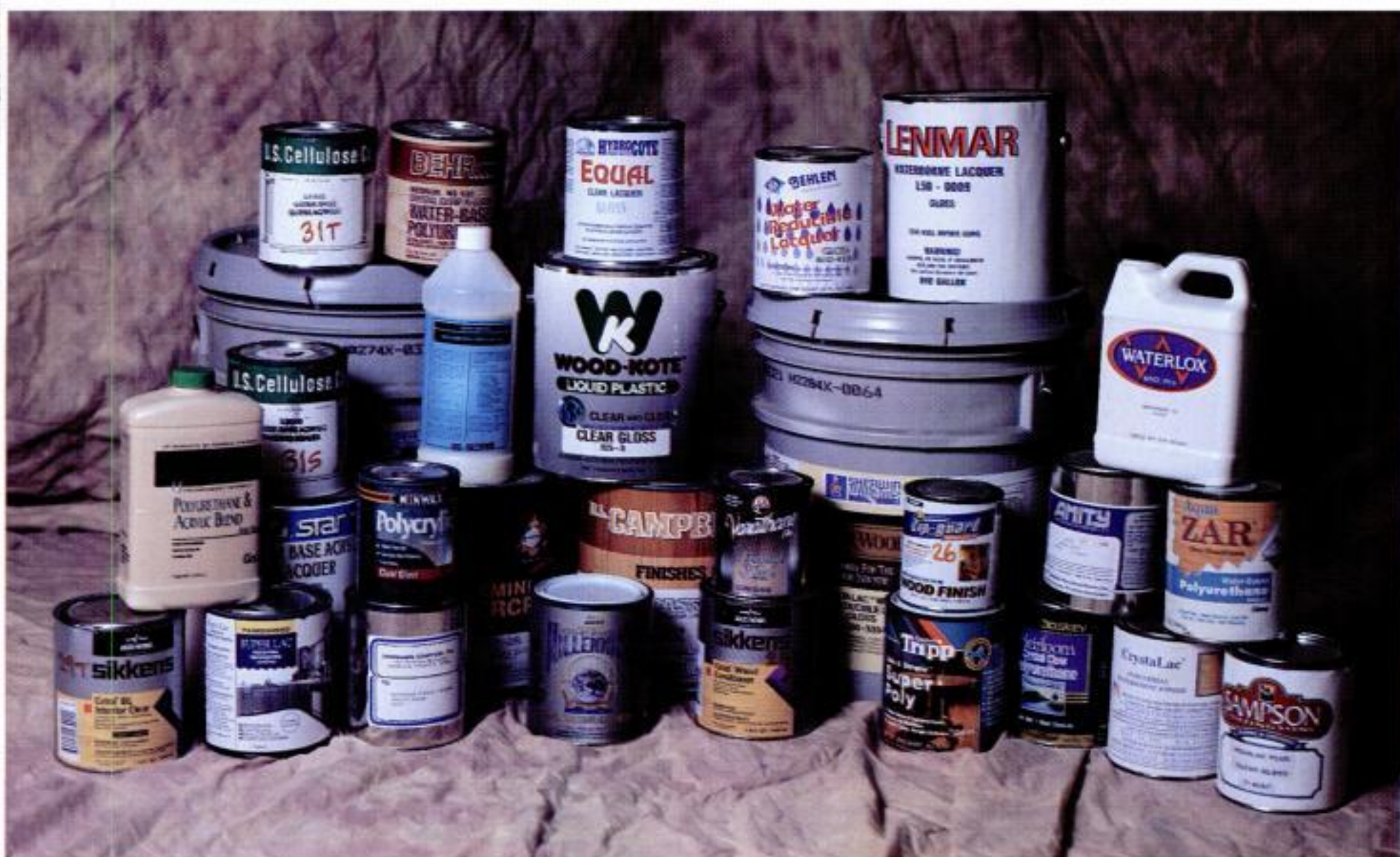
Waterborne finishes have some very distinct advantages, as well as a few drawbacks. In addition to the obvious ease of cleanup, waterbornes help you rest easier, knowing that you haven't dumped half of your material into the environment as solvent vapor, and that the vapors you have produced aren't going to turn your shop into an inferno if the furnace kicks on.

Despite these advantages, waterborne finishes aren't totally hazard free. Though they overcome many of the safety problems of solvent-borne products—such as flammability, excessive solvent release and high solvent toxicity—waterbornes contain small amounts of surfactants (foam-control agents) and organic solvents that require prudence.

Caution: Always wear eye protection when mixing, transferring and applying waterborne finishes. Wear gloves and skin protection in case of spills or contact. And wear an organic vapor mask when spraying or brushing, or when good ventilation is not possible.

Characteristics of Waterbornes

Although waterborne and solvent-borne finishes both contain similar resins—acrylics or polyurethanes—they differ in several important ways:



Lots of choices. Many manufacturers now offer waterborne finishes and sealers, in a variety of sheens and formulations.

Appearance—In their early years, waterborne finishes acquired a reputation for appearing milky or bluish on dark woods and slightly amber on light woods. A few years of refinement have made a big difference. Today's waterbornes are hard to tell apart from their solvent-borne counterparts, and from one another as well. I was pleasantly surprised at the uniform clarity of the brands I tested. (See chart, page 68.)

Adhesion—Unlike solvent-borne coatings, which "bite" into the previous layer of finish, waterbornes have only enough solvent to hold the film-forming polymer in solution and to make sure that it flows out into a continuous film when the water evaporates. There isn't enough solvent left to bite into the previous coat of finish. As a result, it's necessary to scuff-sand lightly between coats with 320-grit sandpaper. This produces a surface the finish can adhere to mechanically.

Sealers and sanding—Most finishes, especially waterborne ones, require sanding to remove "nibs"—those pesky little whiskers that appear on the surface after the first coat of finish, no matter how diligently you've sanded. Some manufacturers offer sealers—often called "sanding sealers"—that are specially designed

for use with their products. These sealers are formulated to sand easily. Many of these sand as well or better than solvent-based sanding sealers. Others (see the "Comments" column in the chart) are quite prone to gumming your sandpaper—an annoying and time-consuming problem.

Shellac is also a good sealer, for two reasons. First, it is alcohol-based, so it won't raise the grain. Second, it is softened slightly by the water and solvents in waterbornes, so they adhere to it well. Shellac is particularly good for sealing surfaces that have been stained or treated with oil or solvent-based materials. Be sure to use only super-blond dewaxed shellac (available from Woodworker's Supply, 800-645-9292) that has been made fresh with alcohol and shellac flakes.

Drying time—Most waterborne finishes dry more slowly than solvent-borne lacquers but much faster than oil-based varnishes and enamels. Speed of drying is important, because until a finish has dried to the touch it is receptive to airborne dust, which can easily become embedded in the film. The resulting roughness must be leveled with sandpaper before recoating—

a minor inconvenience if you finish only occasionally, but a serious issue for production finishers.

High-humidity application—With solvent-borne finishes, you can adapt to high-humidity spraying conditions chemically—by adding retarder (to a lacquer) or drier (to an oil or varnish) to make the finish dry properly. With a waterborne, however, the water is supposed to evaporate before the solvent. But, if the relative humidity is above 70 percent, the solvent is likely to evaporate before the water. When this happens, you end up with a gummy mess technically known as *conversion*.

Take heart, though. There are things you can do to avoid this sticky situation, short of moving to Arizona. Since waterbornes aren't flammable, you can use a heater or a heat lamp to artificially lower the relative humidity on or around your work and prevent conversion.

Foaming—Waterborne finishes are susceptible to foam formation, both before and during application. Foaming results in air bubbles being trapped in the finish. To prevent foaming, the container should be stirred, not shaken, prior to finishing. And, when you are applying one of these finishes, avoid

WATERBORNE FINISHES

Name of Finish	Resin Type	Overall Rating*	PERFORMANCE							Comments
			Appearance and Color	Resistance to Foaming	Resistance to Abrasion	Hardness	Grain Raising	Ease of Sanding	Adhesion	
Sherwin Williams KemLac W (800) 622-8468 Circle #636	A	95.2	5 N	3.5	4.5	4	3.5	5	5	
Crystalac (800) 998-0971 Circle #637	P/A	92.5	5 N	4.5	4	4	4.5	4.5	5	
Waterlox Waterworks II (800) 321-0377 Circle #638	P/A	92.5	5 Y	4	4.5	4	4	3	5	Slow drying; good for brushing.
■ Sherwin Williams CABAcrylic Circle #636	A	89.7	5 Y	5	3	4.5	5	5	5	Extremely fast drying; sands nicely; no foaming.
ML Campbell Ultrastar Clear Lacquer (800) 289-7728 Circle #639	P/A	89.3	4 N	3.5	4	3.5	3.5	5	5	Fast drying; sealer sands well.
UGL Aqua Zar Poly (717) 344-1202 Circle #640	P	88	5 N	4	4	3	4.5	4	5	Fast drying.
Gemini Gemcoat Clear (800) 262-5710 Circle #641	A	87.6	5 N	3	3.5	5	3	5	5	Very hard finish; sealer sands well.
Hydrocote Resisthane Clear Poly (800) 229-0934 Circle #642	P	86.8	4 B	4.5	3.5	5	4	4	4	Must be thinned for spraying; very hard finish; fair adhesion.
Velvit Products (414) 722-8355 Circle #643	A	85.8	4 N	4	4	5	4	4.5	5	Very hard finish.
Clearly Superior Water Based Topcoat (800) 558-7437 Circle #644	P/A	85.2	4 N	4.5	3.5	4	4	4.5	4.5	Fastest drying time tested; slight "fisheyes" in sealer coat.
Lenmar Waterborne Lacquer (800) 966-7020 Circle #645	A	85.2	4 Y	4.5	3.5	3	3	4	5	Fast drying; excellent surface quality.
Waterlox Waterworks Circle #638	P	84.8	3 N	4	4	4.5	2.5	4	5	Good brushing; bubbles slightly when sprayed.
Amity Clear Gloss (800) 733-1776 Circle #646	A	84.8	4 N	4	3	4.5	3	4.5	5	Fast drying.
US Cellulose L-9100 Gloss Acrylic (408) 295-0104 Circle #647	A	84.8	4 N	3	4.5	3.5	2	4.5	5	
Deft Millennium (800) 544-3338 Circle #648	P	84	4 N	4	4	3.5	5	3	5	Top coat clogs sandpaper.
McCloskey Heirloom Acrylic Varnish (800) 328-8044 Circle #649	A	83.6	3 N	4.5	4	4	3	4	5	
Hydrocote Equal Clear Lacquer Circle #642	A	83.6	4 N	4.5	3	4.5	4	4.5	4	Fast drying.
Wood-Kote Liquid Plastic (800) 843-7666 Circle #650	P	83.6	4 N	3.5	4	3.5	3	4	5	
Famowood Superlac Industrial (800) 349-4667 Circle #651	A	83.6	4 N	3.5	3.5	3.5	4	4.5	5	
Behlen's Water Reducible Lacquer (800) 545-0047 Circle #652	A	83.6	4 N	4.5	3	3.5	4	4.5	5	Fast drying.
Landmark Waterborne Acrylic Lacquer (800) 394-4900 Circle #653	A	82.3	4 B	4	3	4.5	4	4.5	5	Slight "orange peel" texture.
Crystalac Brushable Circle #637	P/A	82.3	4 Y	4.5	4.5	3.5	2.5	3	5	Fast drying; sealer clogs sandpaper.
Sampson Coatings Aqualac Plus (800) 368-2677 Circle #654	P/A	82.3	4 N	3	3.5	3.5	2.5	4.5	5	
Star Water Base Acrylic Lacquer (800) 323-5390 Circle #655	A	82.3	4 Y	3.5	3.5	3.5	3	4.5	5	Slow drying; good surface quality.
Guardsman Enviro + Plus SC (616) 248-4636 Circle #656	A	81.1	4 N	3.5	3	4.5	2.5	4.5	5	
McCloskey Heirloom Polyurethane (800) 423-0310 Circle #649	P	80.3	3 B	4.5	3.5	3	3	4	5	
Flecto Varathane Elite Diamond (800) 635-3286 Circle #657	P/A	79.9	4 N	2.5	3.5	3.5	2	4	5	Excessive grain raising and foaming.
General Finishes Urethane (800) 783-6050 Circle #658	P	78.7	4 B	4	3	3.5	2.5	5	5	Moderately slow drying; sealer sands well.
Behlen's Water Base Urethane Circle #652	P	78.7	4 B	3	3.5	3	4	4.5	5	"Fisheyes" in top coat.
Sikkens (Akzo Co.) Cetol BL (800) 833-7288 Circle #659	A	78.3	3 N	4.5	3.5	3	3	4	5	Slight "orange peel" in top coat.
Carver Tripp Clear Poly (800) 225-8543 Circle #660	P	78.3	4 B	3.5	3	3	2.5	4.5	5	
General Finishes Poly & Acrylic Blend Circle #658	P/A	77.9	2.5 N	4	3.5	3.5	3	5	5	Moderately slow drying; top coat sands well.
Star Bronze Zip Guard Urethane (800) 533-9332 Circle #661	P	76.2	4 N	3	3	3.5	2	4.5	5	Slow drying; excessive grain raising.
■ UGL Zar Polyurethane (800) 845-5227 Circle #640	P	76.2	4.5 A	5	4.5	3	5	2	5	Extremely slow drying; poor sanding.
Minwax Polycrylic (800) 526-0495 Circle #662	P/A	75.8	3 N	3.5	3	3.5	2.5	4.5	5	Moderately slow drying; brushes nicely.
Carver Tripp Super Poly Circle #660	P	75	2.5 B	2.5	3	3.5	2	4	5	Excessive grain raising and foaming.
Behr 630 Water Based Poly (800) 854-0133 Circle #663	P	71.2	4.5 N	3.5	5	3.5	2.5	4.5	1	Nice appearance; very poor adhesion.

KEY: *Overall ratings above 85 are considered excellent, between 75 and 85 good, under 75 fair. ■ = Solvent-borne control sample for comparison.
 Resin Type: P = polyurethane, A = acrylic, P/A = mixture of both. Performance Ratings: 5 = Excellent, 4 = Good, 3 = Fair, 2 = Poor, 1 = Unacceptable.
 Appearance and Color: A = amber, B = slightly blue, N = neutral, Y = slightly yellow.

TESTING THE FINISHES

How exactly do waterborne finishes compare, not only to each other but to solvent-borne polyurethanes and lacquers? To find out, I tested the gloss versions of 35 commonly available waterborne products plus two typical solvent-borne finishes. The results are summarized in the chart on the opposite page.

For my wood samples, I chose birch veneer plywood. Veneer is particularly susceptible to grain raising, a major concern when working with waterborne materials. I cut the plywood into 1-ft. by 2-ft. pieces and sanded them to 220 grit.

I sprayed two coats of finish on each plywood sample, using an HVLP conversion gun. If a particular sealer was recommended by the manufacturer, I used the sealer instead of the first coat of finish. Where no sealer was recommended ("self-sealing" systems), I sprayed the first coat of finish directly onto the sanded plywood.

After this initial coat had dried, I sanded the surface lightly with 220-grit wet-or-dry paper to remove the nibs before spraying the top coat. I measured the drying time (see photo, top right) and set the samples aside to cure for seven days before proceeding with the rest of my tests:

Appearance and color—This rating was subjective, taking into account the clarity, smoothness and color of the final finish.

Resistance to foaming—During brush application, I noted the comparative foaming of the finishes. Some of the waterbornes performed better than others, but none were immune to foaming problems.

Resistance to abrasion—By pulling a weighted sanding block across the fully cured finishes (see photo, center right), I determined which showed the least abrasion. The lower the rating (see chart), the more likely the finish is to show scratches in heavy use.

Hardness—I measured the hardness of the film with a modified "pencil hardness" test. I drew lines on the finish using pencils of differing hardnesses. The designation of the pencil that first dented the finish was recorded as the film hardness.

Grain raising—As expected, all the waterborne finishes raised the wood grain to some degree. Those that raised

grain excessively are noted in the "Comments" column in the chart.

Ease of sanding—Unsurprisingly, the sanding sealers performed best in this test. See "Comments" for the products that were easy or troublesome to sand.

Adhesion—For this test, I first scored through the finish in a crosshatch pattern. Then I pressed a piece of clear tape over the scored area and removed it quickly to gauge the amount of film loosening. (See photos, bottom.) —T.B.

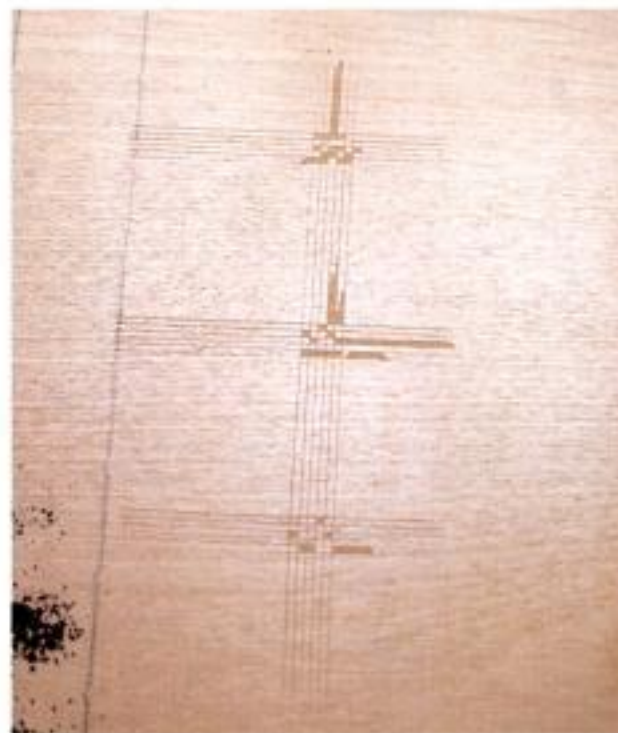


Making drying time visible.

The author dropped small amounts of Carborundum powder onto the drying finish at timed intervals (right to left: two, three, four and six minutes), brushing off the excess after the finish dried. Here, the drying time was recorded as six minutes since no embedded powder remains.



Abrasion test. Sandpaper attached to a weighted block (left) is pulled across a test sample (right) to determine how well the finish resists abrasion.



Adhesion test. Tape pulled from the scored surface of a test sample (left) shows how well the finish adheres to the wood (right). Most finishes did well in this test.

techniques and tools that are likely to create or enhance foaming. I'll discuss these later.

Reactivity—Waterbornes can react corrosively with steel, brass, aluminum and galvanized containers and spray equipment. If you spray, use equipment with fluid-path components made from plastic or stainless steel.

Selecting a Waterborne Finish

Although there's a bewildering selection of waterborne finishes available for the small shop today, selecting one is not difficult. Most of these products fall into one of two familiar categories—acrylic lacquers and polyurethanes—and a few are blends of both. (See chart.) They have approximately the same characteristics as their solvent-based counterparts. If you need the toughness of a urethane, choose a waterborne urethane. If you want the non-yellowing clarity and rubbing characteristics of acrylic lacquer, use one of those.

Applying Waterborne Finishes

Before you apply a waterborne finish, check the can for an expiration date. Many manufacturers recommend using their products within six to 12 months of the date of manufacture.

There are many ways to apply waterborne finishes. The most popular methods use a brush, spray gun or applicator pad. Whichever method you use, be sure to strain the finish through cheesecloth first to remove any globs of polymer that may have congealed in the can.

Brush application—For waterborne finishing, choose a brush with 100 percent nylon bristles. Unlike natural bristle, nylon doesn't lose its stiffness when wet. Make sure the bristles are "tipped," not "flagged." (See drawing.) Tipped bristles are less likely to create foam when applying and leveling the wet film.

CHOOSING THE RIGHT BRUSH

YES: TIPPED BRISTLES



NO: FLAGGED BRISTLES



Always pre-wet bristles in water before starting. This makes the finish flow out better and reduces cleanup work later.

Spray application—Spraying produces the finest finish, and it is your best choice if you'll be doing large amounts of finishing. Spraying waterbornes is very similar to spraying solvent-borne finishes. However, the spray conditions that gave you great results with nitrocellulose lacquer or polyurethane varnish may need to be adjusted to give optimal results with waterbornes. Higher atomization pressures, smaller fluid tips, and larger air caps are often required to atomize waterborne products effectively. Follow the finish manufacturer's recommendations.

As with thick solvent-borne finishes, thicker waterbornes are prone to that dimpled appearance called "orange

peel." You can often minimize or eliminate this effect by reducing the finish prior to spraying. Follow the manufacturer's guidelines and experiment a bit to achieve optimum surface quality.

When you're using an HVLP sprayer with waterborne finishes, whether turbine or compressor driven, don't skimp on the air source; you'll need at least a two-stage turbine for best results. Waterbornes need all the air they can get to atomize properly. Most HVLP manufacturers recommend specific settings for spraying waterborne products.

Pad application—Paint applicator pads—the short-nap, plush variety—are a wonderful, if unusual, way to apply waterbornes. This stands to reason, since latex paint is also a waterborne coating. Paint pads hold an amazing amount of material, and they dispense it evenly onto your work, for quick work on large, flat surfaces.

A word about cleanup: If your finish goops up on brushes, spray tips, or pad edges, and it won't rinse out readily in water, try a solution of three parts acetone to one part clear (not cloudy) household ammonia.

The Wave of the Future

Waterborne finishes are the future of finishing for the small shop. As environmental regulations become more restrictive, manufacturers will respond with an even greater variety of environmentally friendly finishes. Stay tuned to this segment of the finishing market. It's where the action is, and that means a steady supply of new products. ▲



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WATERBORNE "OIL" FINISHES

At present, there are two new waterborne materials that are being marketed as "oil"-type finishes. Hydrocote Danish Oil Finish is a pre-polymerized tung oil formula, while Amity Aqua Oil is formulated from an acrylic polymer base. As a result, Hydrocote's Danish Oil Finish should be expected to look and act more like an oil finish, with greater enhancement of wood figure, minimal resistance to moisture and low surface build. Amity Aqua Oil will perform more like its acrylic lacquer cousins, with better surface build and protection and greater resistance to moisture.

The beauty of both of these materials is that they may be applied with a rag, but don't expect either of them to perform like your favorite oil finish. They're thicker, they build more of a surface film and they dry much faster than real oil finishes.

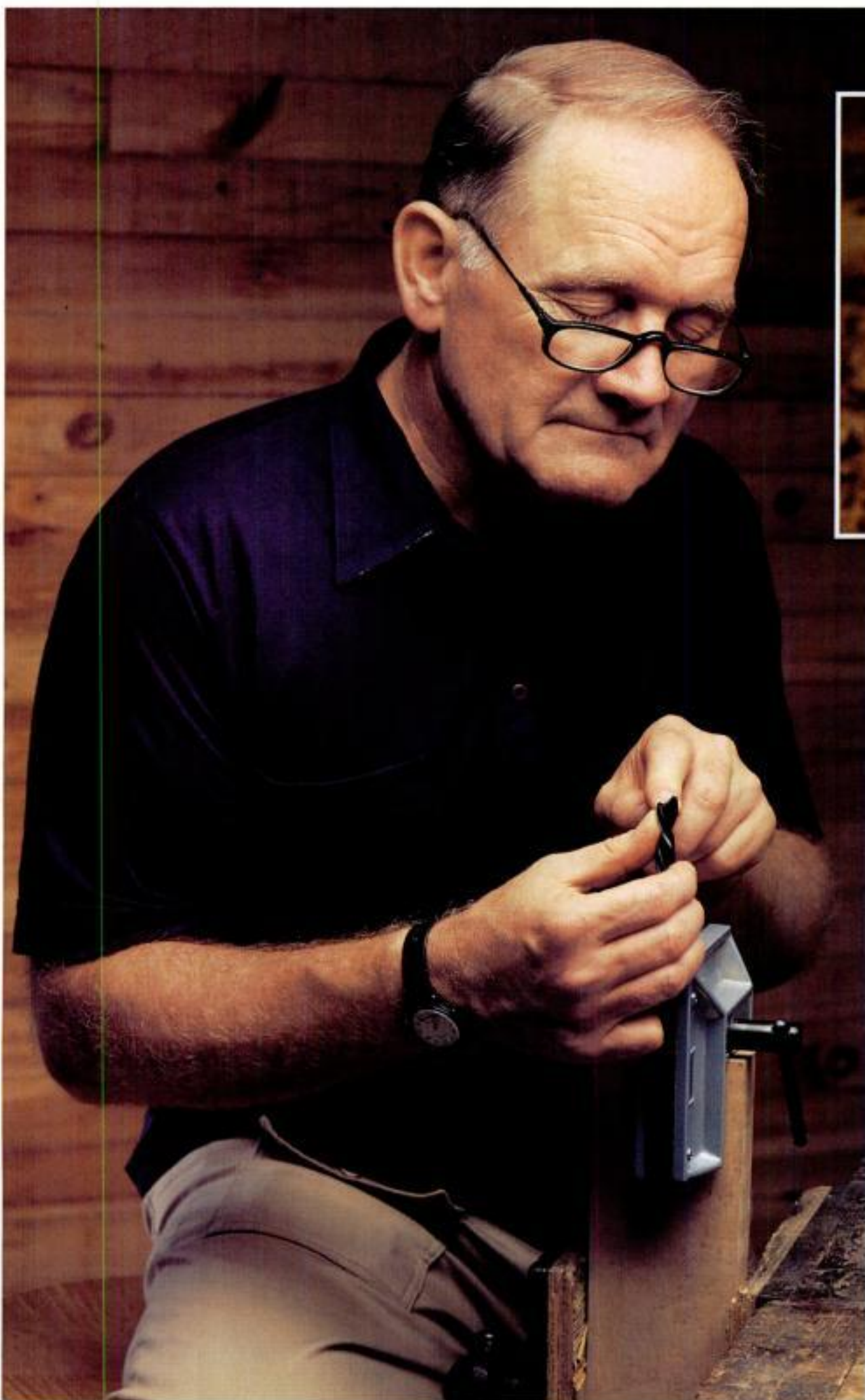
If you like the control afforded by rag application, but want to venture into the realm of waterbased finishes, give these new materials a try.

—T.B.

Sharpening Drill Bits

Use Files, Sticks and Stones to Make Old Bits Cut Like New

by Leonard Lee



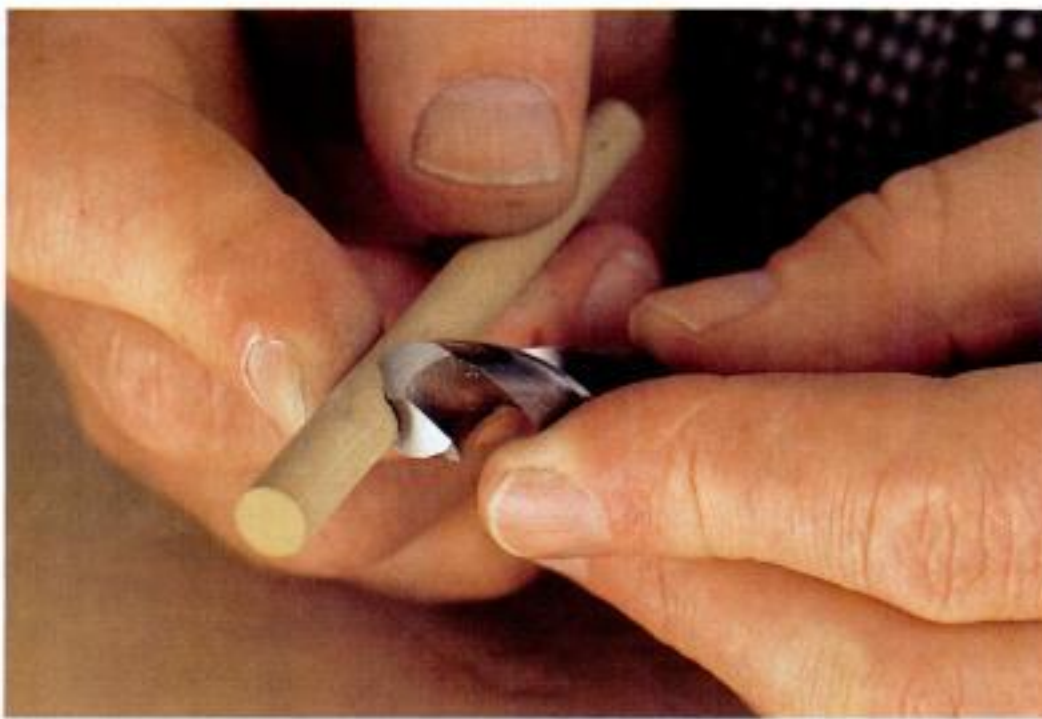
Don't be dull. A few basic tools and the right approach are all you need to keep your bits sharp. Above, Lee uses an auger-bit file to bring the edges of a utility brad-point bit back to life.

You can make your woodworking both easier and less expensive if you learn how to sharpen your own bits. Most woodworkers shy away from sharpening common shop bits like twist drills, brad points, Forstners, and sawtooth bits for fear of ruining them. You shouldn't.

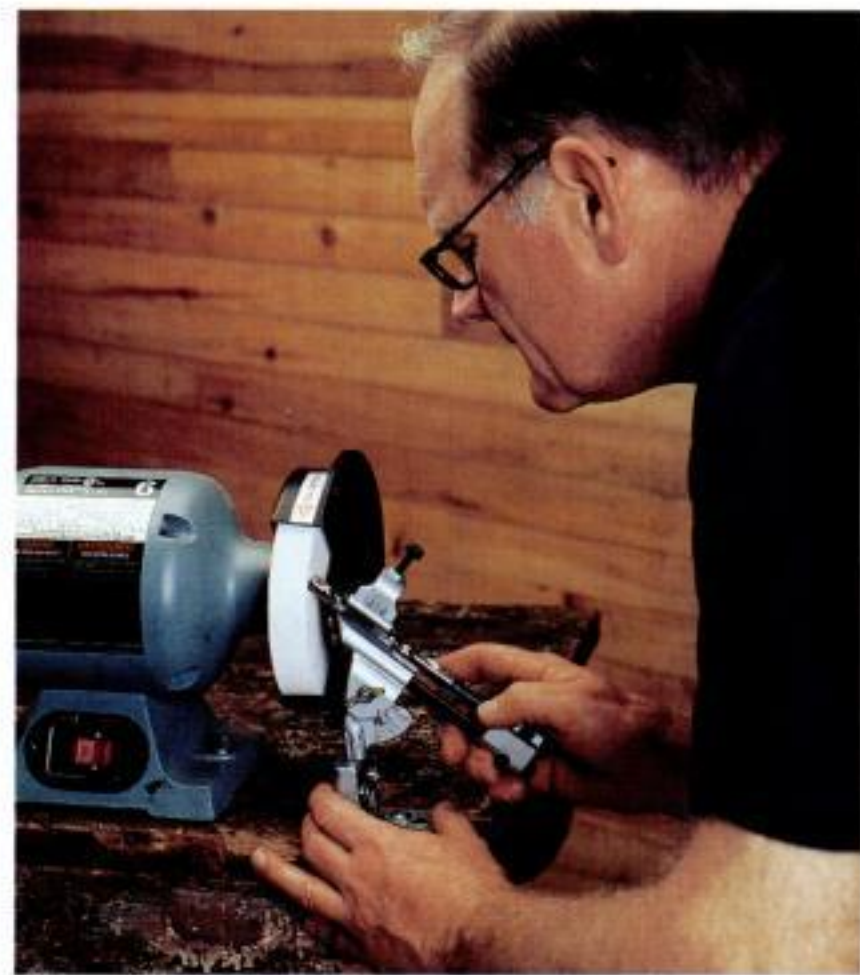
Although each type of drill bit requires specific techniques, all can be sharpened without fear if you follow two rules: Keep the center of the bit centered, and don't fool with the bit perimeter. These guidelines will keep your bits drilling accurately sized holes.

Sharpening Twist Bits

Twist drills are probably the most common bits found in any shop. Usually made from high-speed steel, they are used for drilling wood, metal, plastic and virtually anything that needs to be perforated around the shop.



Do the twist. Touch up a twist bit with an abrasive rod by honing the flutes (above). At right, Lee uses a commercial grinding jig to maintain consistent pressure and angle when regrounding the bevels.



To keep a bit cutting like new, it's important to maintain the various grind angles produced by the manufacturer. Knowing the geometry helps. The majority of twist drills are manufactured with a point angle of 118° , a rake of 30° and a clearance angle of 12° . (See Fig. 1.) Forget the web angle. If you keep the chisel edge centered and have the right point and clearance angles on the bit, the web angle is already determined. A word of caution: Never try to hone the margin of a twist drill. You will change its size.

If your bit is dulled slightly at the cutting edge, causing a rough cut, you can

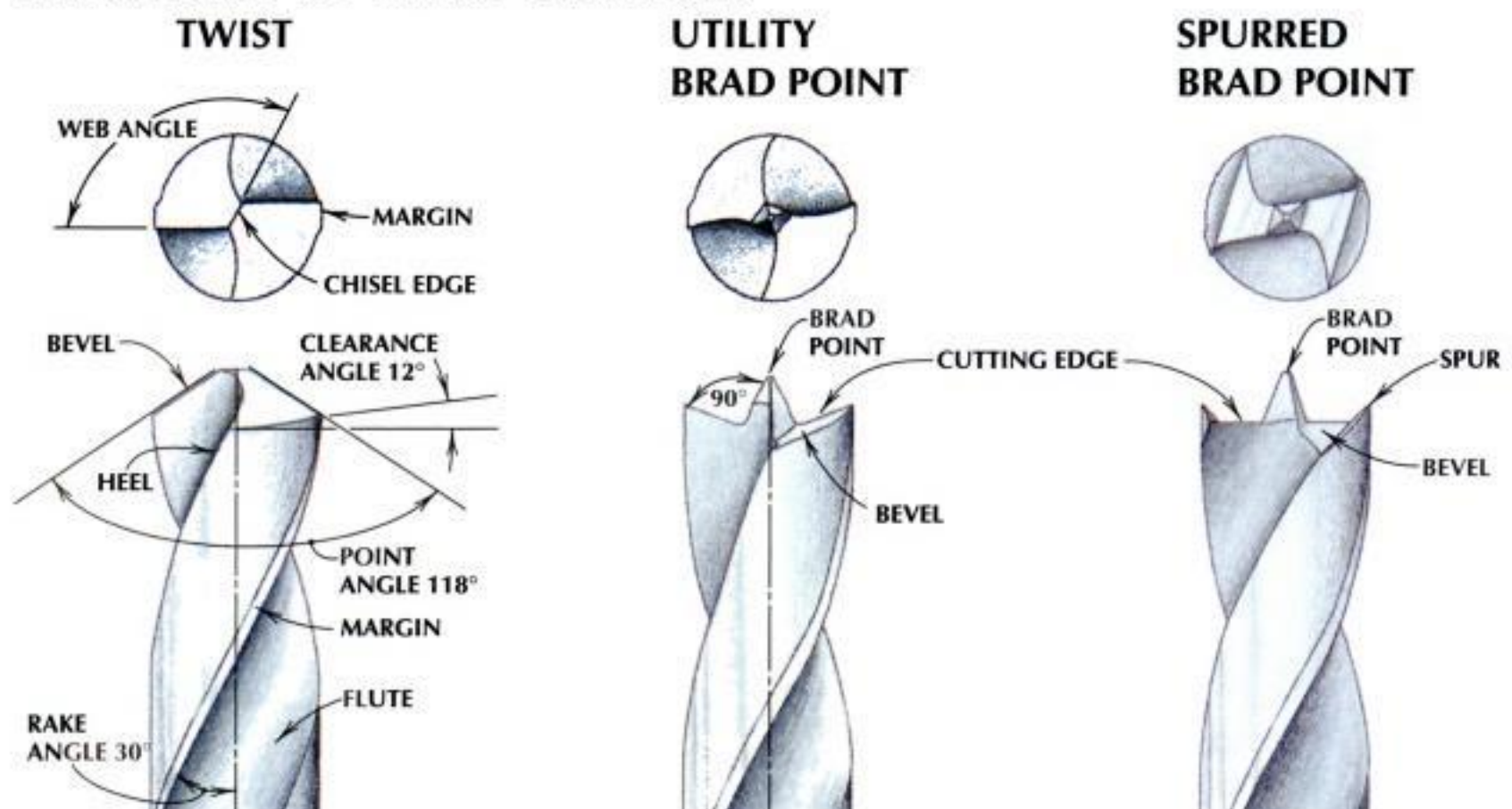
hone the flutes with a round, 220-grit stone or ceramic rod. (See Sources, page 75.) The rod should be equal to or smaller than the diameter of the flute. Hone by sliding the rod with firm strokes toward the cutting edge. (See left photo, above.) This method is good for touching up a bit, but honing too often will steepen the cutting angle and make the cutting action less effective.

If your bit shows more serious symptoms such as burning or smoking, or if it drills oval or oversized holes or requires heavy pressure to drill through stock, you need to attack the bevels. I

recommend using a commercial grinding jig. While many woodworkers may be tempted to sharpen a twist bit free-hand on a grinding wheel, I don't advise it. Although you can use a notched tool rest to ensure that the bevels are of equal angle with the axis, chances are you'll grind the tip off-center, which will cause the bit to drill an oval-shaped hole. Also, it's important to relieve the back of the bevel so that the bit will penetrate, not just rub the work. A commercial grinding jig solves these problems.

There are many drill sharpening jigs on the market. (See Sources.) While

FIG. 1: ANATOMY OF TWIST DRILL BITS





A few good strokes. The author uses a diamond file to sharpen the bevels of a spurred brad-point bit (left). He hones the insides of the spurs with a wooden stick covered with 600-grit abrasive (above).

each operates differently—some work in conjunction with an electric hand drill, some function by holding the bit as you rub it over sandpaper—most maintain centrality and provide the necessary relief on the bevel if you follow the instructions that come with them.

One jig, the General, works on the side of your bench grinder's wheel for bits up to 1/2 in. For safety reasons, I usually avoid grinding on the side of a wheel, but sharpening drill bits is one of the lesser sins because you will be applying negligible pressure. As a precaution, place yourself well to the side as you

sharpen, out of the line of fire of a possible broken stone.

To use the General jig, first bolt it on the bench next to your grinder. (See right photo, opposite page.) With the bit clamped in place, you sweep the jig across the spinning wheel to sharpen one bevel. Then you reposition the bit in the jig and repeat the grinding process to sharpen the other bevel.

Sharpening Brad-Point Bits

These are the workhorses of the wood-working world. They enter and exit wood very cleanly, and their relatively

long centerpoints allow you to drill with pinpoint accuracy.

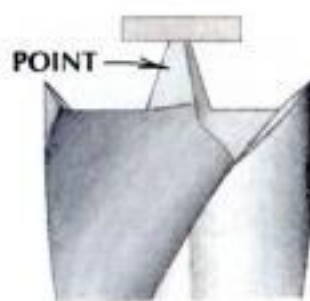
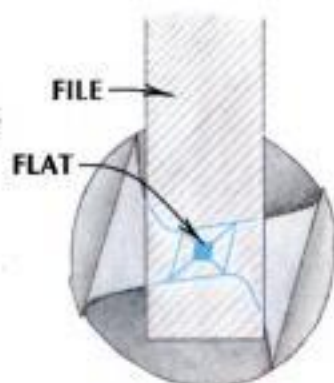
Brad-point bits come in two styles: *utility* and *spurred*. The less expensive utility brad point has a point and outlining spurs. (See Fig. 1.) The spurred brad point has a somewhat slimmer point with more defined spurs. In use, the spurred bit enters the wood more cleanly than the utility model, but a slight hesitation as the spurs touch the wood will give a clean hole with either type.

Utility brad-point bits are usually made from carbon steel and are soft enough to sharpen with an ordinary file.

FIG. 2: SHARPENING A POINT

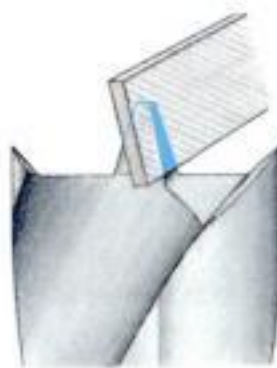
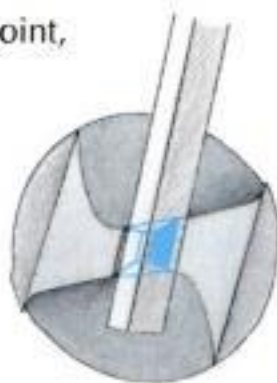
STEP 1

File a small flat on top of point. Use diamond file on high-speed-steel (HSS) bits.



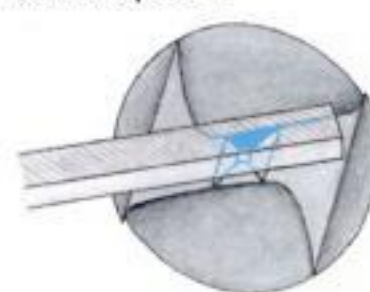
STEP 2

Following angle of point, file away one-third of flat on one side. Then file one-third from opposite side.



STEP 3

Repeat filing process on other two faces of point.



The best type of file to use is an auger-bit file. (See Sources.) This double-ended file is single-cut only on the faces of one end, while the other end is cut only on the edges. This provides "safe" uncut edges so you can file a surface without damaging an adjacent edge.

To sharpen a utility bit, first clamp it in a bench vise so the bevel you'll be working on is roughly parallel to the surface of your bench. If the bit has a round shank, make sure you protect it by using padded jaws.

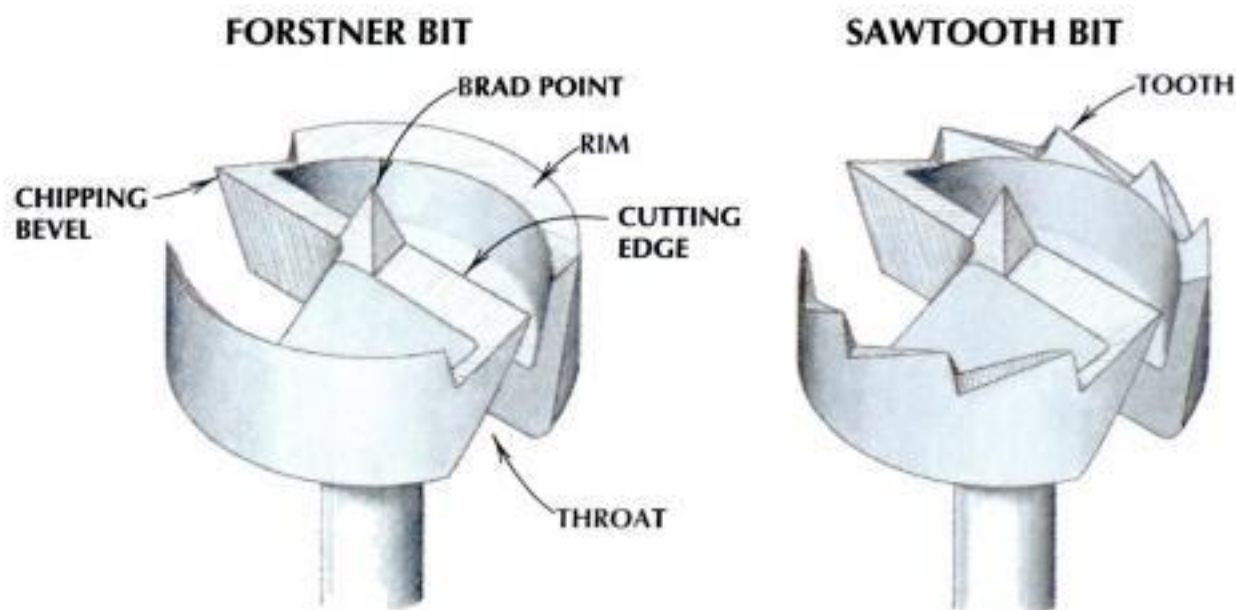
There are two areas to file on a utility bit: the bevels and the point. Start with the bevels. Using the face of the auger file, hold it at the same angle (20°) as the original bevel, and file from the back, or *heel*, toward the cutting edge. (See lead photos, page 71.) File until all nicks are gone and the edge is sharp. A few strokes should do it. Then rotate the bit 180° in the vise and repeat the filing process on the other bevel. To maintain equal bevel height, use the same number of strokes on each bevel. Once the bevels are sharp, follow by honing the flutes with a honing rod to remove any burrs at the cutting edge.

If the brad point is in good shape, you're done. But if the point is blunt, you'll need to file this area too. Here, it's critical to keep the tip centered or the bit won't cut properly. Start by filing a small flat on the top of the point with the face of the auger file. (See Fig. 2.) Then carefully file the sides of the tip in the sequence shown in Fig. 2. Stop filing when the small flat at the top of the point is almost gone.

A brad-point bit doesn't need a sharp point to work well—just a centered tip. Test the bit for centricity by pressing the tip into a piece of wood and rotating the side of the bit against a dial indicator or against the end of a small ruler. If the bit is at all off-center, file away the offending side of the tip.

Spurred brad points are a bit trickier to sharpen than utility bits, because of their delicate outlining spurs. Most spurred bits are made from high-speed steel (HSS). To tell if the bit is HSS, stroke the bevel with an ordinary file. If the file skips over the surface without cutting, your bit is HSS. For carbon steel, use an auger file for sharpening. For HSS, you'll need a diamond file. (See Sources.) Another option is to make your own abrasive hones. I make mine from Popsicle sticks. I cut a stick to the width of the bevel I'm honing

FIG. 3: ANATOMY OF FORSTNER & SAWTOOTH BITS



and glue 600-grit wet-or-dry sandpaper to one side.

Regardless of the type of file or hone you use, the technique for sharpening the bevels on a spurred bit is similar to that used on a utility bit: Work each bevel from the heel to the cutting edge, using the same number of strokes per bevel. (See left photo, page 73.) If you're using a diamond file, take care not to cut into the spurs as you work the bevels. Once the bevels are sharp, deburr the edge by honing the flutes.

Next, file or hone the inside edge of each spur, again cutting from the heel out to the cutting edge. (See right photo, page 73.)

Once the spurs are sharp, very carefully remove any burr on the outside of the bit with light strokes from a hard stone such as an Arkansas slip. If you take off more than just the burr, you'll unbalance the bit action, causing the bit to overheat as it cuts.

Sharpening Forstner Bits

Forstner bits make very clean, flat-bottomed holes. With their sharp rims and center brads, Forstners can be used to drill overlapping holes, such as when drilling out a mortise.

But Forstners are temperamental. They should be used at high feed rates and low speeds—especially for large-diameter bits—or the rims will overheat. To minimize rim heat, it's important to maintain the correct height relationship between the rim and chipping bevel when sharpening a Forstner. The chipping bevels should be no more than 0.005 in. (twice the thickness of typing paper) below the rim height. (See Fig. 3.) To check for the proper relationship, drill a small hole in a piece of flat wood or particleboard, deep enough to accommodate the brad point.

Then, with the rim of the bit sitting on the surface, check the clearance under the bevels with a feeler gauge or pieces of paper. (See photo, below.)

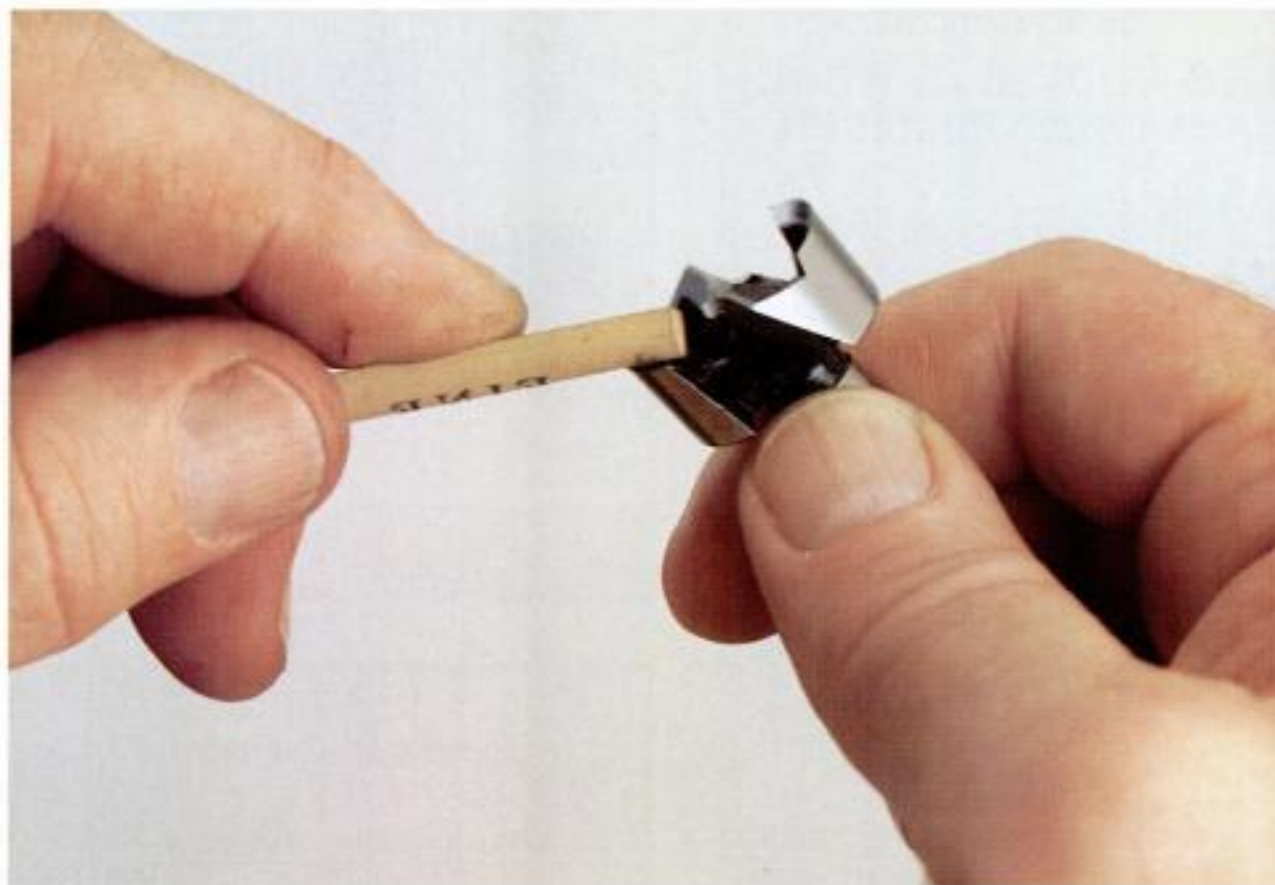
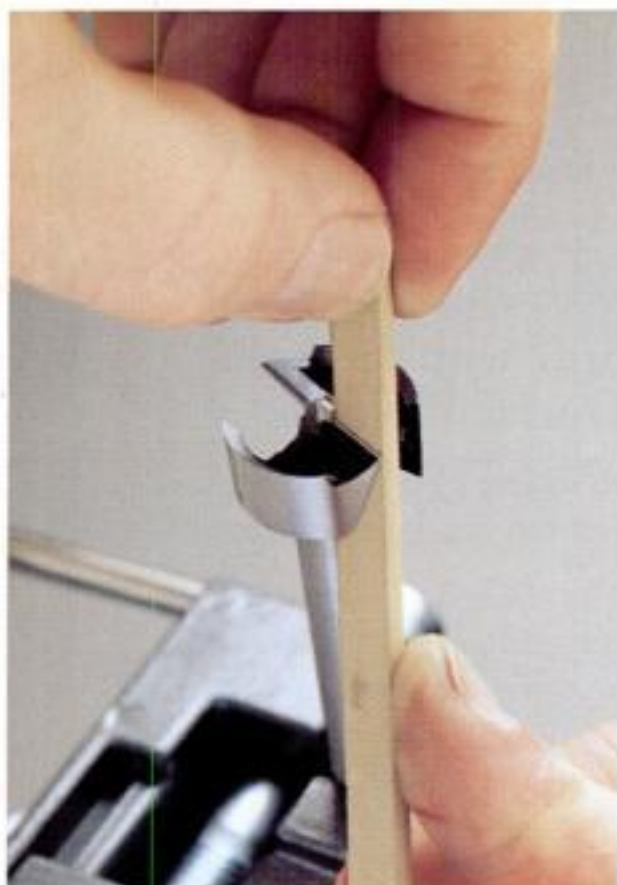
To sharpen a Forstner, clamp it vertically in a bench vise and start with the chipping bevels. You can use a single-cut file for this, or a shaped stone. In addition to the round style, stones come in triangular, rectangular or half-round shapes and in several materials. (See Sources.) I recommend a 220-grit half-round because of its versatility.

Start by honing the face of the chipping bevel through the throat of the bit. (See top left photo, opposite page.) Keep the stone firmly on the surface as you hone and, as before, stroke toward the cutting edge. If the rim of the bit is in good shape, you're done when the cutting edge is sharp.

If honing through the throat isn't aggressive enough to bring the cutting edge back to life, you can file the tops of the bevels with a small needle file. (See Sources.) File only what is absolutely



Feel it out. To check the rim-to-bevel relationship on a Forstner or sawtooth bit, slide a feeler gauge under the chipping bevel while the rim contacts a flat surface.



Inside the throat and rim. To sharpen the chipping bevel on a Forstner, hone through the throat with a half-round abrasive rod (left). Sharpen the rim by sweeping a round rod around the inside of the bit (above).

necessary, because everything you take off the bevel will have to come off the rim as well, to maintain the right rim-to-bevel relationship.

Honing the rim is not fun, but a little patience will get you there. Working on the inside of the rim, hold the bit in your hand and use a half-round or round stone in a sort of sweeping motion. (See right photo, above.) Use steady pressure as you stroke, and keep the stone in full contact with the bevel of the rim. If the rim is nicked, remove the burr on the inside with the stone, then very carefully hone the outside with an Arkansas slip-stone. Make sure you don't take off anything but the burr.

Generally, it's best to leave the center brad on a Forstner bit alone. But if the brad is dull, treat it like you would on a brad-point drill bit, being careful to maintain centricity.

Sharpening Sawtooth Bits

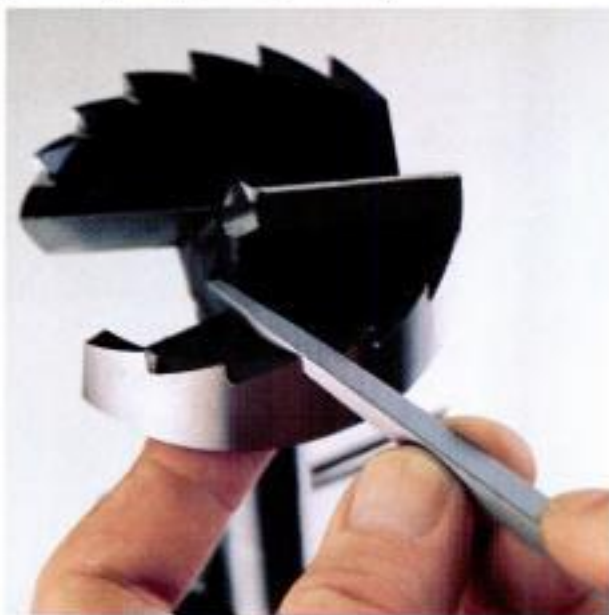
Sawtooth bits, sometimes called "multi-spur" bits, are similar in geometry to Forstners. The difference is that sawtooth bits have rows of teeth around their rims. (See Fig. 3.) I prefer sawtooth bits to Forstners for several reasons: They run cooler, they cut faster, and they're easier to sharpen.

Sawtooth bits enter wood cleanly if you hesitate for a split second just as the teeth touch the wood—similar to spur bits. These bits don't have the same rim-holding abilities as Forstners, but they

can drill overlapping holes if you work in a logical sequence by first drilling individual holes and then drilling out the bridging material.

Sharpen the chipping bevels and the brad point as you would on a Forstner. Because you don't have to worry so much about rim heat with sawtooth bits, you don't have to be so finicky with the rim-to-bevel differences.

If the teeth are dull, you'll need a triangular saw file to sharpen them. (See Sources.) These come in various sizes; pick one that fits the teeth you're working on. (See AW #33, page 35.) File across the leading edge of each tooth, aiming the file just behind the bit's point. (See photo, below.)



Sharp teeth. On a sawtooth bit, use a triangular saw file to sharpen the leading edge of each tooth, as shown above.

If the teeth on your bit are badly chipped or worn down, you'll need to joint them before filing. This is easily done on the drill press. Chuck the bit in the press and clamp an old bench stone to your drill press table. Then adjust the drill press to its lowest speed and lower the spinning bit until it just kisses the stone. Stop when the teeth are all the same height. Then file as before until the jointing flats disappear and the points of the teeth are sharp. ▲



LEONARD LEE
is a woodworker
and toolmaker,
and president of
Veritas Tools and
Lee Valley Tools.

SOURCES

Files, drill sharpening jigs and shaped stones are available from the following mail-order suppliers:

Garrett Wade

(800) 221-2942 Circle #601

Lee Valley Tools

(800) 267-8767 Circle #602

Woodcraft

(800) 225-1153 Circle #603

Woodworker's Supply

(800) 645-9292 Circle #604

WOOD FACTS

Eastern Red Cedar

by Paul McClure



In 1755, French settlers were thrown out of a region in eastern Canada called Acadia. While making their way to the Louisiana bayou, these ancestors of the modern-day Cajuns noticed a tree in their new land with red bark and red wood. They called it “red stick”—in French, *baton rouge*—and named their capital city after it. And so eastern red cedar found its way into our American heritage.

Eastern red cedar is not a true cedar; it is a juniper. Also called “aromatic cedar” because of its strong fragrance, it’s found in southern Ontario and the eastern United States. It’s a slow-growing tree that can live 300 years. In good growing conditions it can reach a height of 100 ft. and a diameter of about 4 ft. but it generally peaks at about 50 ft. with a 2-ft. diameter.

Appearance

The heartwood is bright red to reddish purple when freshly worked. Exposure to sunlight and air will darken it over time to a reddish brown. The white sapwood, which yellows over time, is sharply demarcated from the heartwood and is generally not sawn away when making lumber.

Eastern red cedar has a very smooth, fine texture, but it tends to be knotty because most of it today comes from small trees. The grain in knot-free areas is fairly straight.

Workability

Eastern red cedar works easily with both hand and power tools, but it has a tendency to chip when machined against the grain. The lumber is fairly weak and brittle but very stable once it is seasoned. The knots can be troublesome to tools; however, they are also a major source of fragrance.

The wood sands to a very smooth surface and glues very well. It’s wise to pre-bore for screws and fasteners to prevent splitting. The wood is not well suited to steam bending.

If you wish to maintain the fragrance, don’t apply a finish. Once your project is complete, you can revive the aroma occasionally with a light sanding. If you do want to finish the wood, I suggest using lacquer or oil finishes. Polyurethane may not cure properly due to an adverse reaction with the wood’s resin.

Uses

Eastern red cedar is used for blanket chests, hope chests, closets, cigar boxes, jewelry boxes and novelties. Because of its fragrance, the wood has long had a reputation for repelling moths, but this is highly disputable. The shavings and chips are distilled into an essential oil for perfume. ▲

EASTERN RED CEDAR

SPECIES AND COMMON NAMES	<i>Juniperus virginiana</i> —eastern red cedar, juniper, aromatic cedar, pencil cedar, Tennessee red cedar
GROWING REGION	Maine and southern Ontario to South Dakota, south to eastern Texas and east to Georgia
SPECIFIC GRAVITY	0.53
DENSITY	33 lbs. per cubic ft.
WOOD MOVEMENT ¹	Tangential (flatsawn): very small ($1/8$ in. per ft.) Radial (quartersawn): very small ($3/32$ in. per ft.)
DURABILITY	Highly resistant to insect and fungal attack
SUSTAINABILITY	Sustainable at current harvest levels
AVAILABILITY	Hardwood lumber dealers; home supply centers sell packages of aromatic cedar closet lining
SIZE: THICKNESSES	4/4
WIDTHS	3 to 7 in.
LENGTHS	8 ft.
COST: LUMBER	\$1.55 to \$1.85 per bd. ft.
VENEER	\$3 to \$3.45 per sq. ft.

¹ Indicates wood movement across the grain from 6 to 12 percent moisture content.



EASTERN RED CEDAR

JUST FINISHING

Burn-In Sticks

Melt Your Way to a Perfect Finish
by Michael Dresdner



An old finisher once told me that the difference between a good finisher and a great finisher is how well he hides his mistakes. And when it comes to hiding mistakes, burn-in sticks are a must.

Burn-in sticks—sometimes called “shellac sticks” or “lacquer sticks”—are solid bars of heat-sensitive shellac or lacquer that melt and flow at fairly low temperatures. Applied with special heated knives, they are designed to fill small dings and dents in a finish, but in a pinch they will also fill small chips in raw wood. Burn-in sticks are available in a wide range of opaque primary colors and wood tones and also in clear and tinted transparent colors.

Equipment for Burning In

To melt and control burn-in sticks, you’ll need two types of special burn-in knives. (See lead photo.) The knife used to melt and apply the stick to the work looks like a bent-tip grapefruit knife without the serrated edge. Its partner, the “dragaway”



Burn-in gear. For professional-looking finish repairs, you’ll need burn-in sticks in several colors, a burn-in knife, a “dragaway” knife, a cotton rag and a heat source such as an alcohol lamp or a burn-in oven. The oven heats the tips of several knives at a time—especially useful for extended repair sessions.

knife, is used to drag away excess burn-in stick and level the surface after filling. Burn-in knives range from do-it-yourself versions—bent butter knives or old files with their teeth ground off—to manually

and electrically heated versions available through common mail-order catalogs.

To heat the knives, you’ll need a heat source—typically an alcohol lamp or an “oven” sold specifically for this purpose.

REPAIRING A FINISH WITH A BURN-IN STICK



Step 1: Load the knife. Melt a small spot of stick onto the tip of the burn-in knife. If the molten stick bubbles, allow it to cool for a moment before proceeding to Step 2.



Step 2: Fill the defect. Press the melted spot into the defect with a smooth sweep of the burn-in knife. Repeat Steps 1 and 2 until the spot is filled slightly above the surface of the finish.



Step 3: Drag off the excess. Level the repair with a heated “dragaway” knife, dragging the excess stick onto a piece of thin masking tape. A quick touch-up with a tiny brush and pigments makes the repair invisible.

JUST FINISHING

(See lead photo.) Alcohol burns with an almost invisible blue flame and won't leave carbon soot on your knife. But a burn-in oven holds as many as six knives at once, so you can work as fast as you like, simply switching knives as they cool.

Caution: Be very careful with any open flame in a woodworking or finishing area.

Burning In

The burning-in process moves very quickly, so good technique is important. I suggest practicing on scrap until you feel comfortable with the process.

First, select a burn-in stick whose color matches the lightest background color in the wood. Later, you can paint in the darker grain lines with a fine touch-up brush to make the repair almost invisible. (See "Just Finishing," AW #28.)

Heat your burn-in knife to a temperature that melts the stick easily. If the knife is too hot, the stick will bubble and burn. Melt a tiny spot of stick onto the tip of the knife. (See left photo, page 82.)

Use as little stick as possible to avoid building it too thickly. If it bubbles, let it cool a few seconds until it flows smoothly. Then, press the spot into the void with one confident sweep of the knife.

(See center photo, page 82.)

Repeat this process until the void is just barely overfilled. Each time you reheat your burn-in knife for another pass, wipe off any stick residue with a cotton (not synthetic) rag.

Then, remove the excess with a heated dragaway knife. Tilt the flat edge of the knife at a 45° angle and pull it across the surface of the repair. (See bottom right photo, page 82.) The knife should be just hot enough to move the excess without burning the finish around it.

Now, level the surface with 600-grit

wet-or-dry sandpaper, using a few drops of soapy water as a lubricant. I back up the sandpaper with a small block of rubber cut from the heel of an old shoe.

Once the repair is sanded flush, I seal the spot with a thin coat of the surrounding finish. On older furniture, I use a flourish of French polish instead. Then I touch up the repair with a fine red sable brush and finely ground pigments dissolved in a small amount of finish. (See AW #28.) Finally, I apply another thin coat or two of the same finish, taking care not to smear my touch-up work.

A word about using lacquer over burned-in repairs: The solvents in lacquer may partially dissolve the stick material, and may result in puckering or a depression in the surface of the repair. ▲



Join Michael Dresdner live on America Online Sunday nights from 9:30 pm to 10:30 pm eastern time for answers to your finishing questions. From AMERICAN WOODWORKER Magazine Online, click the "Shop Talk" icon to enter the finishing chat room.

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TOOLBOX

Showtime Favorites

*Twenty-Two New Tools
From Two Major Trade Expositions*

Every year, two blockbuster tool shows play back-to-back just as summer turns to fall. The first, sponsored by the Association of Woodworking and Furnishings Suppliers, was held in August in Anaheim, CA. Just a week later, the National Hardware Show took place in Chicago. At both extravaganzas, tool companies from the U.S. and around the globe displayed their varied wares—from drill bits to million-dollar CNC machines. AW editors attended in force to get a first-hand look at new products. Here's a sampling of what caught our attention. Note: The prices quoted are manufacturers' list prices; actual prices will vary.

Euro-Design Saw for the U.S.

Long known for precision Swiss-made machinery, Inca has introduced a new tilting-arbor tablesaw (unlike their previous model, which had a tilting table). Though the saw arrived too late to be included in our "Tablesaw Showdown" (see page 32), it's notable for being designed with the American market in mind. It takes standard 10-in. blades and has two standard $\frac{3}{8}$ -in. by $\frac{3}{4}$ -in. miter-gauge slots milled into its anodized aluminum tabletop. Other standard features include a multi-featured FastTrack miter gauge, two-position fence, 2½-HP motor, Forrest 40-tooth combo blade and European-style splitter and blade guard with integral dust collection. An Inca mortising table and drop-in router-table extension are available as accessories. Price: \$1,995. Available from Garrett Wade, (800) 221-2942. **Circle #614**

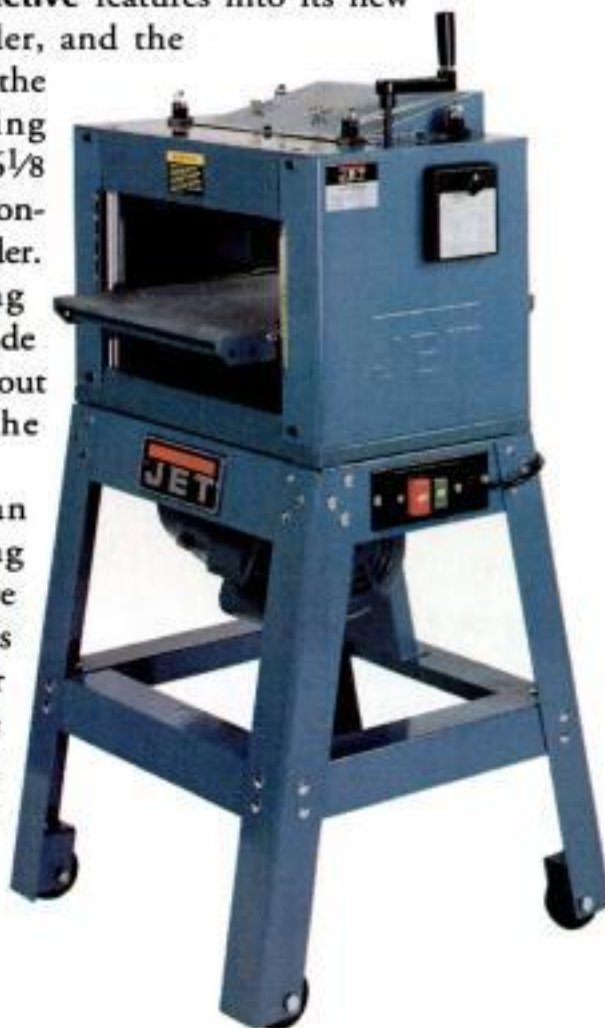


Quick-Change Planer-Molder

Jet packs some attractive features into its new JPM-13 planer-molder, and the \$799 price increases the tool's appeal. Planing capacity is 13 in. by $6\frac{1}{8}$ in., and the machine converts easily into a molder. You can fit molding cutters up to 2 in. wide in the cutterhead without having to remove the jointer knives.

Jet has more than 40 different molding profiles available; there are three knives for each profile. Other features include rubber-covered feed rollers, two feed speeds, and a 1½-HP motor. Jet, (800) 274-6848.

Circle #615



Mortise-and-Tenon Jig

RouterTrac, a new jig produced by Centerline Tool, will appeal to furniture makers who need to cut mortise-and-tenon joints at compound angles. The jig consists of a sturdy aluminum platform positioned above a clamp that can tilt to hold the workpiece at various angles. You cut tenons using a router and a 1-in.-long pattern-routing bit (included) that rides against different tenon templates. To cut mortises, you clamp the stock under the platform and remove waste with a spiral bit. With the basic kit, you can make tenons up to $\frac{1}{2}$ in. thick and 3 in. wide. The jig also includes a drilling fixture and bits to mount the templates. Price: \$527. Centerline Tool, (800) 717-8722. **Circle #616**



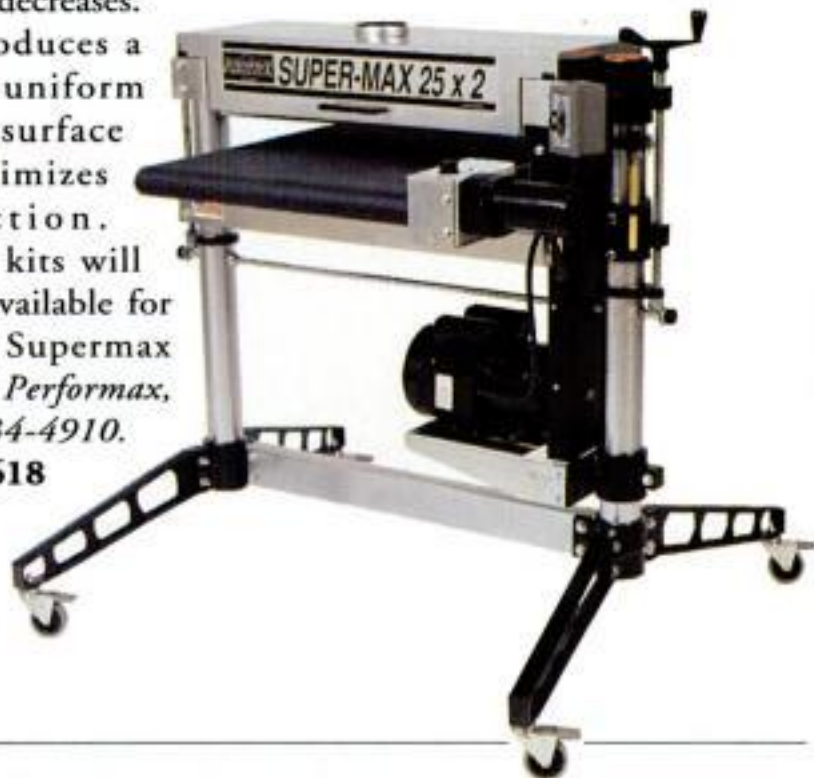
Souped-Up Sanders

Bosch went back to the drawing board to improve an already successful line of random-orbit sanders. The result: a new 5-in. model (3725DVS) and 6-in. model (3727DVS) with aggressive cutting action. Both sanders use a pair of bearings in the pad mount to eliminate wobble. Other features include a pad dampening system (which limits rpm when you lift off the work), an auxiliary front handle, wide-range electronic variable speed and through-the-pad dust extraction. In addition to the standard reusable cloth dust bag, these sanders will accept a new biodegradable, disposable paper dust bag. Price: 5-in. model, \$256; 6-in. model, \$266. *S-B Power Tool Co., (312) 286-7330. Circle #617*



Speed Control for Performax

A well-established name in abrasive planers, **Performax** has upgraded its Supermax machines with a new SandSmart electronic control system. SandSmart automatically adjusts the feed rate based on the abrasive load, slowing when the cutting gets tough (due to thicker or denser stock) and speeding up when the load decreases. This produces a more uniform sanded surface and optimizes production. Retrofit kits will also be available for existing Supermax sanders. *Performax, (800) 334-4910. Circle #618*



Batteries for Biscuits

Cordless technology is coming to biscuit joinery, and **Lamello** is leading the pack. With its 12-volt battery, the Lamello "Dynamic" biscuit machine can cut up to 200 slots between charges. The cordless tool has six cutting depths, a fully adjustable fence, and a disposable paper dust bag system. Price: \$675 with plastic case. Available from *Colonial Saw Co., (800) 252-6355. Circle #619*



New Clamps

The **Bessey FLEX K clamp** is designed for gripping irregular shapes or flat surfaces that aren't parallel. The FLEX K is similar to Bessey's popular K-body clamp, but its square jaws can pivot to conform to angled surfaces. The clamps are available in throat depths from 3 in. to 5 1/2 in. and with jaw openings from 6 in. to 24 in. Price: \$28.50 to \$63.35. *Circle #620*



Also new from **Bessey**: "Quick-release" Lever Clamps that can apply varying levels of clamping pressure through a ratchet-and-lever mechanism. Lever Clamps are available with throat depths from 2 in. to 5 1/2 in. and lengths from 4 in. to 12 in. Price: \$39.95 to \$64.95. Available from *American Clamping Corp., (800) 828-1004. Circle #621*



With the new **Quick-Star** bar clamp from **Gross Stabil**, you can position and tighten using only one hand. The secret is the spring-loaded, 3 1/2-in.-deep, fiberglass-reinforced nylon jaws. You hold the jaws open, then let go of the bottom jaw and the spring closes it automatically on the work. Then you just tighten the jaw screw for a custom fit. Price: 8-in. length, \$23.90; 12-in. length, \$27.50. *Gross Stabil, (800) 671-0838. Circle #622*



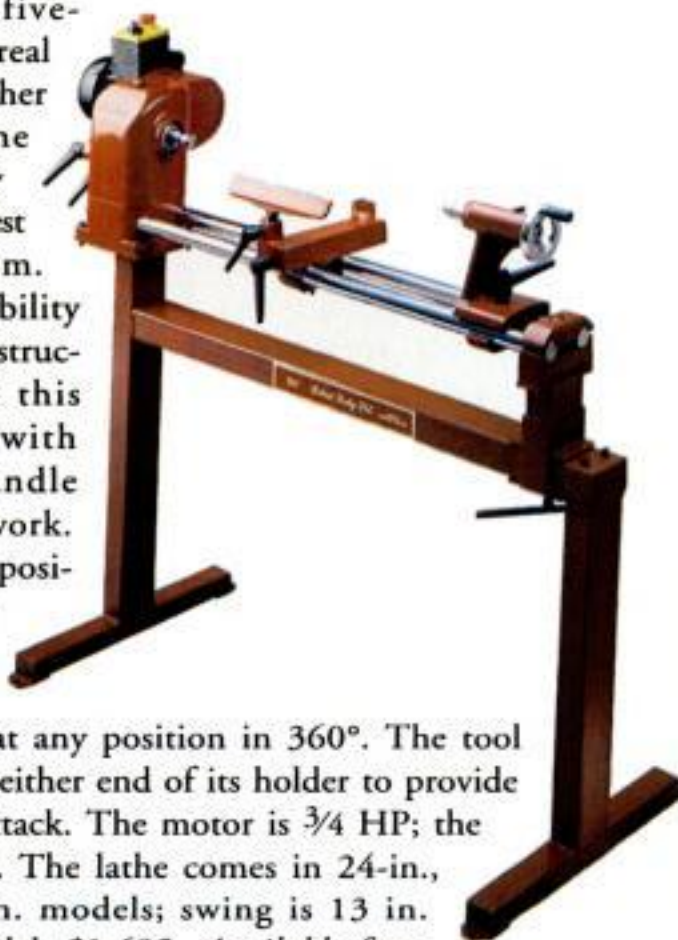
Cordless Detail Sander

Black & Decker's VP510T is the first detail sander that's not tethered to a power cord. Its triangular sanding head takes hook-and-loop paper. Power is provided by two 3.6-volt "VersaPak" batteries—part of a new interchangeable power system from Black & Decker. You purchase the VersaPak batteries and three-hour charger separately, and they can be used to power a whole new line of cordless Black & Decker tools. Price: Detail sander, \$35; VersaPak starter kit, \$23. *Black & Decker, (800) 762-6672. Circle #623*



Slow-Hand Lathe

Sorby's new five-speed lathe is a real slowpoke. No other step-pulley lathe can turn as slowly as the Sorby's lowest speed of 265 rpm. Slow speed capability and cast-iron construction will make this lathe popular with turners who handle large-diameter work. Adjustable head position is another unique feature: The head can swivel and lock at any position in 360°. The tool rest mounts into either end of its holder to provide more angles of attack. The motor is ¾ HP; the stand is optional. The lathe comes in 24-in., 36-in. and 48-in. models; swing is 13 in. Price: 24-in. model, \$1,695. *Available from Farris Machinery, (800) 872-5489. Circle #624*



Repeat Carvings with a Router

With a plunge router and CMT's new Router Carver System, you can create intricate, repeatable carvings on doors, panels, drawers, or any flat wooden surface. The key to this router carving system is a new "V" groove router bit that has a unique 45° guide bushing. The bushing rides in a carving template supplied by CMT. A total of 46 different templates are available. The bit, templates and template frames are available in sets, or as individual pieces. Price: Sets range from \$117 to \$229. *CMT, (800) 531-5559. Circle #625*



Detail Sander Extraordinaire

Porter-Cable's new Profile Sander is designed to smooth just about any shape or contour you can imagine. And it does so using an in-line motion to avoid cross-grain scratches. The sander kit (model 944) includes a dust-collection attachment, 17 interchangeable sanding pads in a variety of shapes, a flat pad that takes hook-and-loop paper, and a carrying case. Getting into corners and contours is easy with this new tool. Kit price: \$205. *Porter-Cable, (800) 487-8665. Circle #626*



Four New Sliders

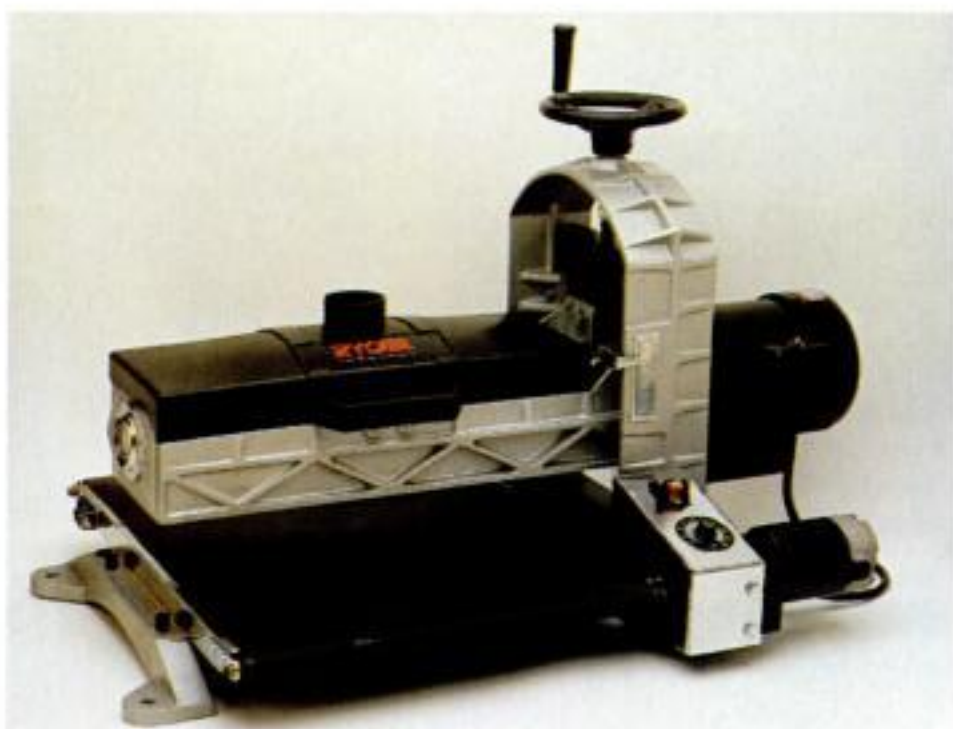
The competition heats up among sliding compound-miter saws with the addition of four new models. Delta's 36-250 and Freud's TR215 were on display in Anaheim and Chicago. In Chicago, we saw Milwaukee's model 6496 (shown below) and Bosch's model B3915—both due out early in '96. Of all four saws, we liked the Milwaukee best because of its powerful 15-amp motor and extra-tall fence. Watch for an in-depth AW test of these machines in 1996.

- **Bosch**, S-B Power Tool Co., (312) 286-7330. *Circle #627*
- **Delta**, (800) 438-2486. *Circle #628*
- **Freud**, (910) 434-3171. *Circle #629*
- **Milwaukee**, (414) 781-3600. *Circle #630*



Benchtop Drum Sander

Ryobi's WDS1600 benchtop drum sander has a sanding width of 16 in. and can handle stock up to 3 in. thick. With its open-sided design, the machine can sand to the centers of panels as wide as 32 in. The feed rate is adjustable up to 10 ft. per second. Price: \$600. *Ryobi*, (800) 525-2579. *Circle #632*



Veritas Scraper Plane Kit

This scraper plane insert from Veritas converts any standard metal bench plane (No. 4 to No. 8) into a scraper plane. After you remove the plane blade, the plane's lever cap holds the insert in place. The insert includes a tilt mechanism for fine adjustment of the standard 2-in.-wide, 0.015-in.-thick scraper blade. Optional wider and thicker scraper blades are available. Price: \$25.95. *Veritas*, (800) 667-2986. *Circle #631*



QUICK PICKS

Finger Joints for Leigh Jig

A new finger-joint template offered by Leigh Industries will fit all 24-in. Leigh D-model dovetail jigs. The template lets you cut box joints in nine different sizes ($\frac{1}{16}$ in. to $\frac{1}{2}$ in.) with infinite fit adjustment. Price: \$260. *Leigh Industries*, (800) 663-8932. *Circle #633*

Pinless Moisture Meter

Wagner's new L609 moisture meter uses electromagnetic waves that "scan" large areas of wood and provides an instant LED readout of moisture content. The meter's "pin-free" sensor pad is smaller than on previous models, making it ideal for narrow stock. With a price of \$129, this meter is the most affordable in Wagner's line. *Wagner*, (800) 944-7078. *Circle #634*

Tougher Jigsaw Blades

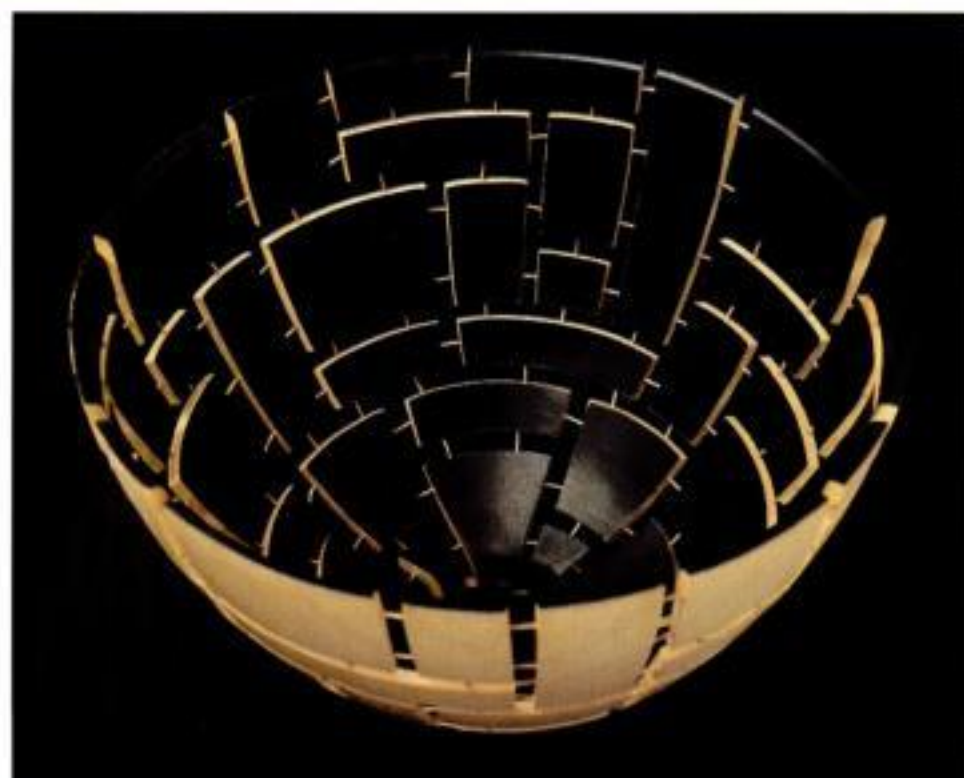
New jigsaw blades from DeWalt can last up to 20 times longer than conventional blades, according to the manufacturer. The blades are made with cobalt-reinforced steel and have a new tooth configuration for faster cuts in most materials (including hidden nails). The blades are also designed to minimize splintering and chipping when cutting laminates and other man-made materials. Price: pack of three blades, \$7.50. *DeWalt*, (800) 433-9258. *Circle #635*

Excellence Award Finalists

From exquisite furniture and extraordinary sculpture to art deco and Chippendale, our 1995 Excellence in Craftsmanship entries covered a wide range of fine works in wood. While winning pieces appear on page 52, here's a sampling of some runners-up in the professional, student and amateur categories.

▼
"Black and White #2" segmented vessel by Robert J. Lufrano, Staten Island, NY. Professional. Maple segments held together with copper wires. Dia: 10 in. H: 7 in.

PHOTO BY JOSEPH PACIFICO



▼
"Twisted Torso" sculpture by Larry Scaturro, Brooklyn, NY. Professional. Walnut. W: 13 in. at widest point. H: 33 in.

PHOTO BY LARRY SCATURRO

▼
Federal Sheraton card table by Sean P. O'Rourke, Randolph, MA. Student. Walnut, satinwood. L: 38³/₈ in. W: 18 in. H: 29³/₈ in.

PHOTO BY LANCE PATTERSON





▲
 Dry flower vases
 by Berle Miller, Nanoose Bay,
 British Columbia, Canada.
 Amateur. Vancouver Island
 yellow cedar, black lacquer.
 Dia: 3 in. H: 14½ in.
 Dia: 5 in. H: 18½ in.

PHOTO BY GORDON LAFLEUR

▲
 "Little Tough-Guy Chest"
 display cabinet by
 Thea M. Gray, Oakland, CA.
 Student. Fijian vesi wood,
 handmade hardware.
 W: 14⅝ in. D: 11¼ in.
 H: 18¼ in.

PHOTO BY DAVID WELTER



▲
 Ukulele by T.J. Thompson, Concord, MA.
 Professional. Curly koa, mahogany, Brazilian
 rosewood, ebony, abalone pearl.
 W: 6¼ in. D: 2¼ in. H: 21½ in.

PHOTO BY BARRY BERENSON



▲▲
 Ladies' vanity and writing box
 by G. Usher, Cornwall,
 United Kingdom. Professional.
 Mahogany, sugar maple,
 with mahogany, sycamore,
 boxwood and ebony veneers.
 W: 18½ in. D: 23 in. H: 7 in.

PHOTOS BY HOWARD SPIERS



Want to see your work in "Gallery"? Send color slides or
 color transparencies to: "Gallery," AMERICAN WOODWORKER,
 33 E. Minor St., Emmaus, PA 18098. Please include materials,
 dimensions, name of photographer, your name, address,
 and phone number. We'll pay you \$35 per entry published.
 If you want your photos returned, enclose a self-addressed
 stamped envelope.

SHOP SOLUTIONS

Mitering and Splining Jig

Make Spline Miter Joints with this Simple Setup

James Hartlage designed this jig so he could keep his tablesaw blade set at 90° and still cut perfect miters. The jig also lets you cut spline grooves in miters.

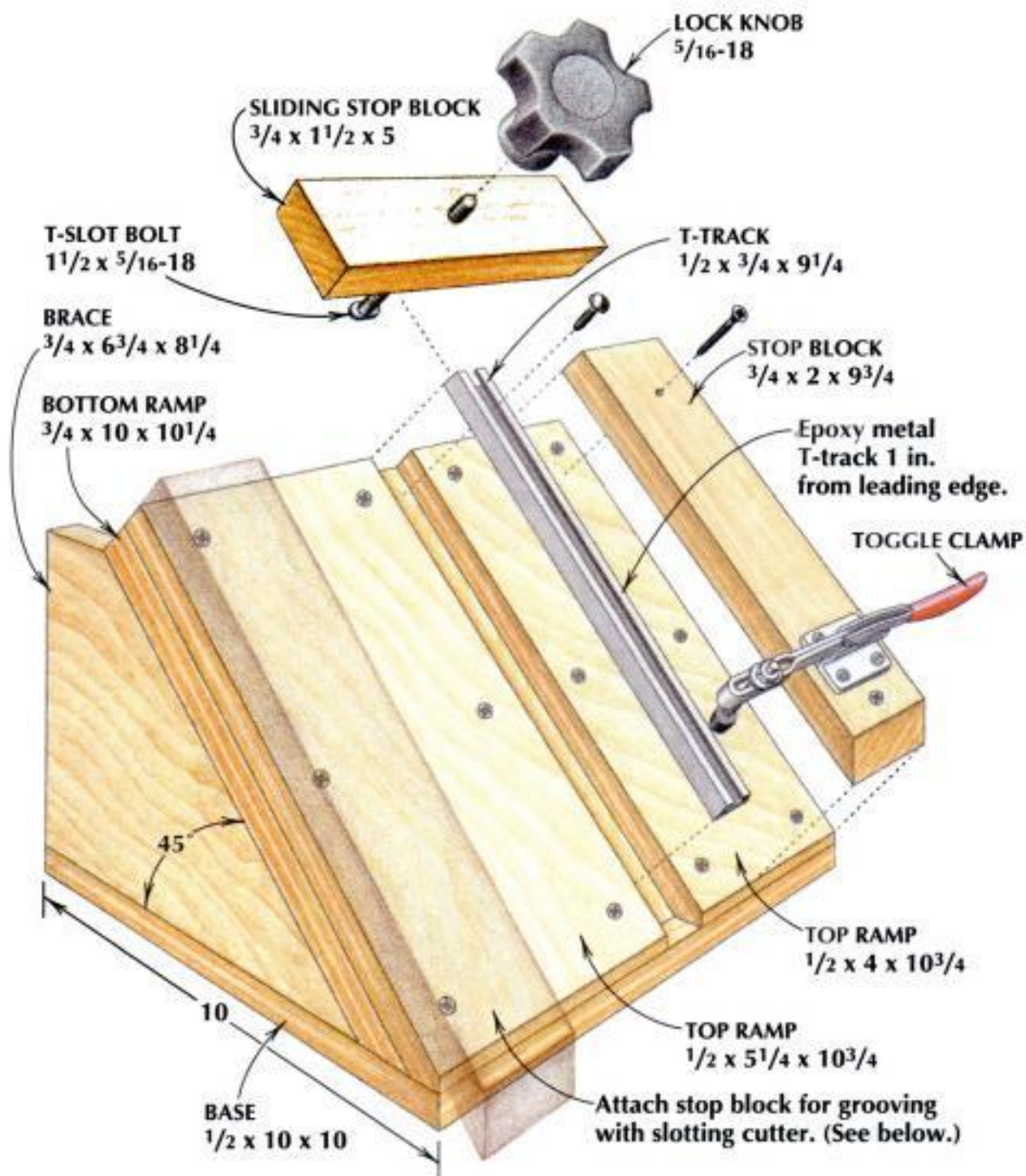
To miter, set the rip fence 10 in. from the blade, then clamp the workpiece against the jig's stop block, and guide the jig against the fence to make the cut. You can also use the jig to groove a miter on the tablesaw or router table.

The sliding stop block enables you to cut multiples up to 8 1/4 in. long without



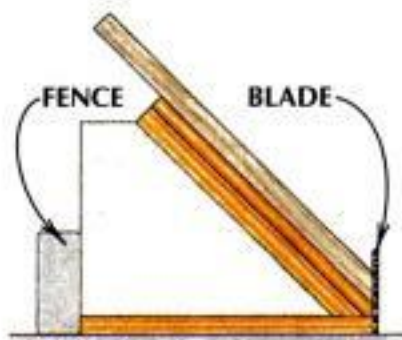
Miter maker. Use this jig to cut and groove stock for perfect spline-miter joints.

remeasuring. To use the stop block with larger workpieces, simply increase the lengths of the top and bottom ramps and the T-track. T-track, T-slot bolt, lock knob and toggle clamp are all available from *The Woodworkers' Store*, (800) 279-4441. ▲

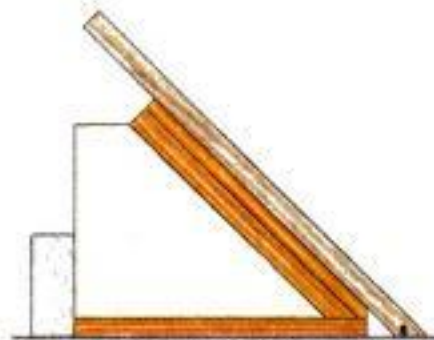


USING THE JIG

MITERING ON TABLESAW



SPLINE GROOVING ON TABLESAW



GROOVING ON ROUTER TABLE



BEST SOLUTION WINS!

Send photos, sketches and an explanation of your fixture to:
AMERICAN WOODWORKER,
33 E. Minor St., Emmaus, PA 18098.

Next issue's contributor will receive this Chicago Pneumatic 6-in. random-orbit sander, value price \$208.

