

SHOP TESTED: 11 SLIDING COMPOUND MITER SAWS

AMERICAN WOODWORKERTM

AUGUST 1996 #53

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**for Better
Cabinets**

Spray a



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On the cover: John Jackson, of Jackson Woodworks in West Reading, PA, assembles a base cabinet joined with biscuits.

PHOTO BY MITCH MANDEL



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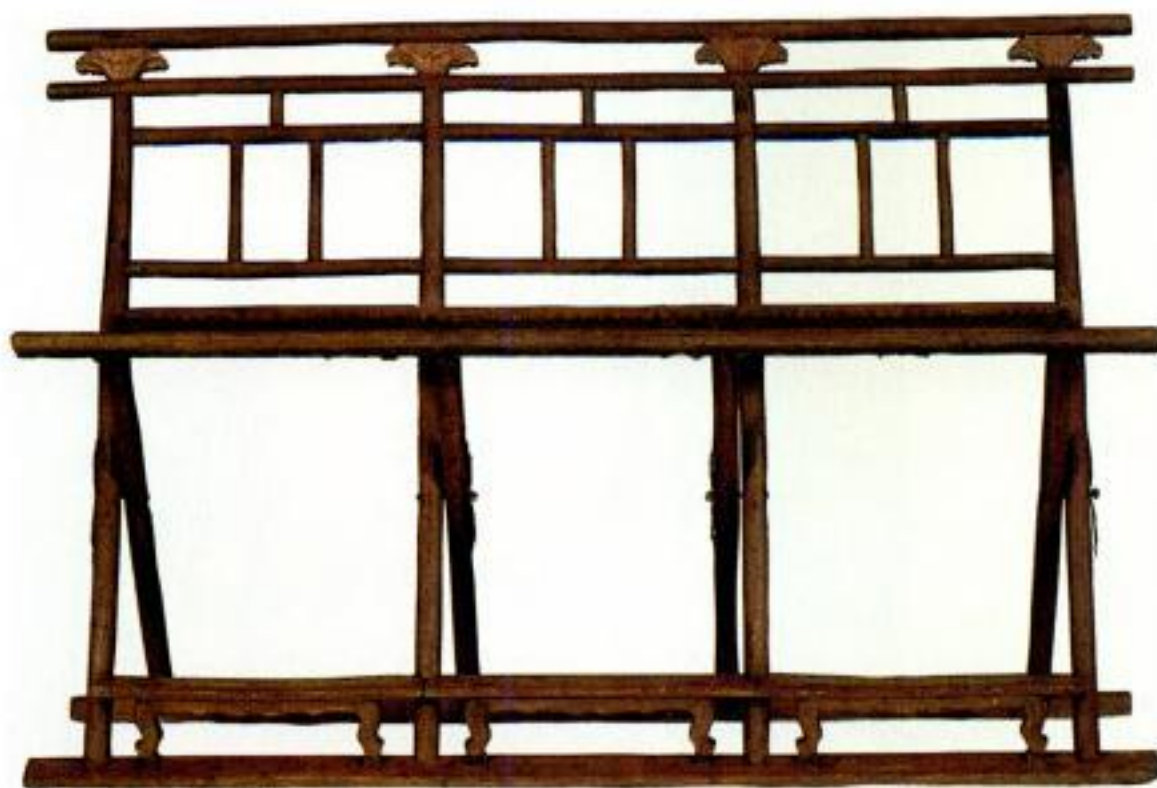


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A RODALE PRESS PUBLICATION

AMERICAN WOODWORKER



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AMERICAN WOODWORKER

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AMERICAN WOODWORKER (ISSN 1077-7997) is published seven times a year in February, April, June, August, October, November, and December by Rodale Press Inc., 33 E. Minor St., Emmaus, PA 18098, (610) 967-5171. ©1996 by Rodale Press, Inc. J.I. Rodale, Founder; Ardath Rodale, Chairman of the Board; Robert Teufel, President of Rodale Press. SUBSCRIPTION RATES: U.S. one-year, \$21.88; two-year, \$47.76. Single-copy, \$3.95. Canada, one-year, \$31.88; two-year, \$63.76 (Canadian funds) GST #R122988611. Foreign, one-year, \$35; two-year, \$70 (U.S. funds). U.S. newsstand distribution by Curtis Circulation Co., Hackensack, NJ 07610. SECOND-CLASS POSTAGE: paid at Emmaus, PA and additional mailing offices. POSTMASTER: Send address changes to AMERICAN WOODWORKER, P.O. Box 7591, Red Oak, IA 51591. CONTRIBUTOR GUIDELINES: Available upon request. (610) 967-8315. Printed in USA.



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AMERICAN WOODWORKER Magazine
Box 7591

Red Oak, IA 51591-0591

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Hitting Your Stride

Quick, how is woodworking like a nuclear reaction?

Time's up. The answer is that they both must reach a "critical mass" before anything happens. I know it's a bit far-fetched, but see if this doesn't sound familiar:

Let's say you've started a project that will take days or weeks to complete—a table, a dresser, etc. You know how some days you just can't seem to get started? By the time you find the tools you need and ponder your game plan, it's time to call it a day, and you have nothing to show for it.

Other days, after struggling for an

hour or two, everything suddenly becomes easier. All the obstacles melt away. Every move you make, every chop of the chisel, is decisive, fluid, natural. Chips fly; parts come together; everything fits. At this point, when you're completely immersed in your work, you've reached that critical mass—you've hit your stride.

The point is this: Don't give up if everything isn't going exactly right. Think of it as waiting to hit your stride. It's the best investment you can make in your work. The payoff is vastly

improved productivity and better quality workmanship. Best of all, when you hit your stride, you'll enjoy every minute of your woodworking.

Ellis Valentine
Executive editor

Frank Klausz joins AW staff

Please join me in welcoming famed cabinetmaker, Frank Klausz, to the post of contributing editor to *AMERICAN WOODWORKER*. We look forward to sharing Frank's wealth of woodworking knowledge in coming issues of AW.

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.

TOOLS OF THE TRADE

Any woodworker knows that using the right tools for a project makes all the difference. That's why the Titebond® Family of Wood Glues has been the choice of professionals for more than 35 years. Recognized as the premier name in wood glues, Titebond has five specially-formulated glues for your next woodworking project.

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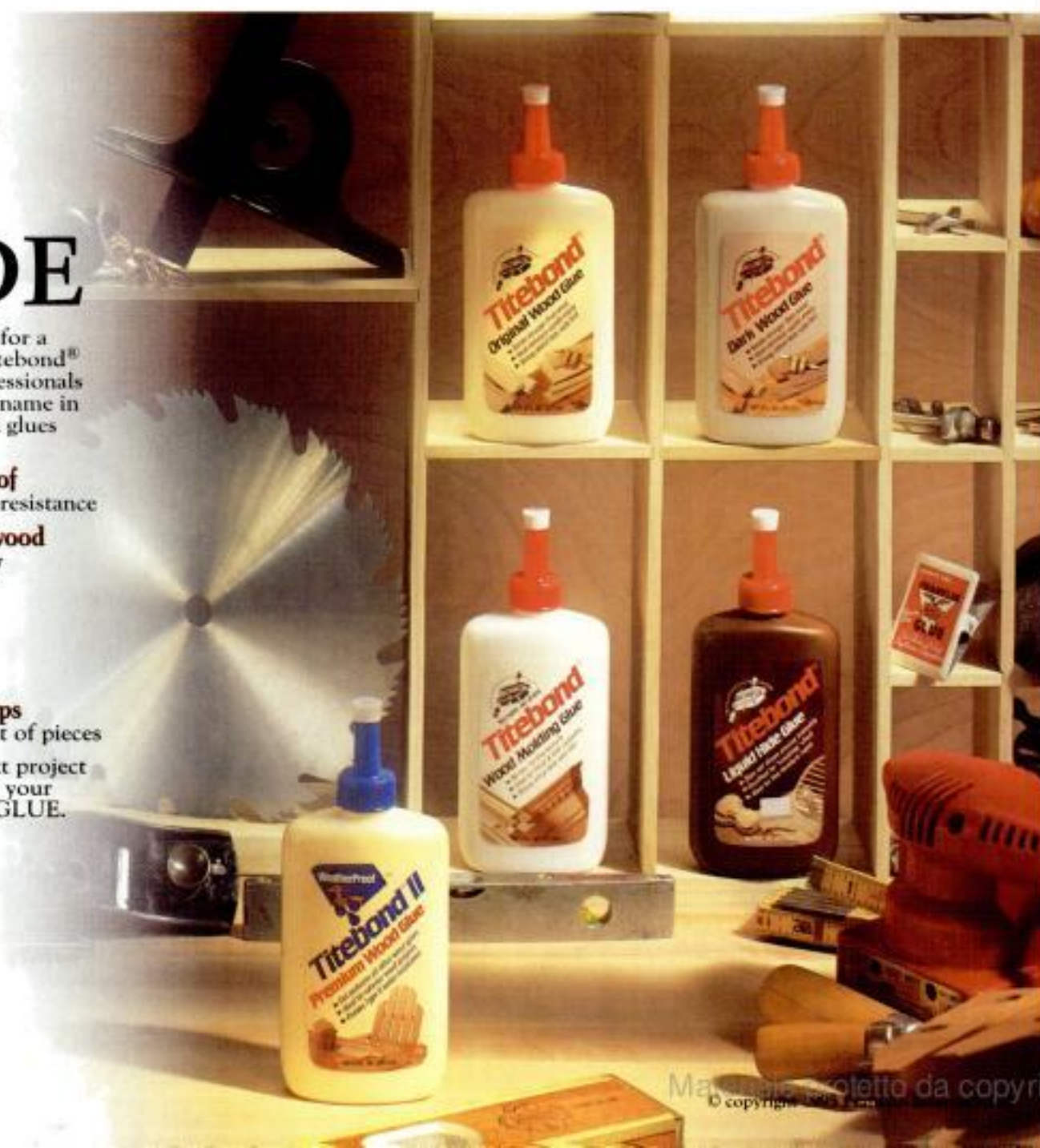
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More on Jack Planes

I enjoyed the recent article about hand planes (AW #51) and I agree that it is difficult to live without a well-tuned No. 5 jack plane. But it occurred to me that a crucial factor was not mentioned. I have found (unfortunately from experience) that when flattening the sole of any hand plane, it is very important to maintain normal tension upon the casting.

I once spent hours flattening the sole of my first flea-market Bailey plane. I disassembled the plane completely and then lapped the sole on some silicon-carbide paper stuck to the jointer. I excitedly reassembled the plane only to discover that the tension created by clamping the plane iron in place had caused the cast-iron body to flex. The sole was no longer flat. Now, whenever I'm flattening the sole of a plane, I do so with the plane fully assembled, and with the iron locked in place by the lever cap. It makes a difference, I swear.

Andy Buck
Artist in Residence
Peters Valley Craft Center
Layton, NJ

In our tests, we looked for the kind of deflection you mention, but we didn't detect any appreciable differences when the lever cap was tightened. Still, you have a good point—it's a good idea to flatten the sole with the cap tightened down.—*Eds.*

When I was visiting my son last spring, he showed me a box of old tools he had been given by his mother-in-law. He asked me if I wanted any of "this junk" before he threw it away. I looked through the box and found a couple of planes I liked. I took them—not because I needed them, but because I can't pass up something for nothing. I brought the planes home, cleaned them

up and put them in the workshop. When I read Joe Wajszczuk's sidebar on antique planes (AW #51) I decided to have a closer look at my newly acquired planes. Sure enough, one was a Bed Rock. Then I checked out another plane I bought 20 years ago at a garage sale for \$2. It was a Bailey. I guess I've got a good eye for good tools.

Kenneth Oakley
St. Cloud, FL

Thanks for the Magic

I enjoy the magazine very much. I want to thank Frank Klausz for sharing his Magic Coin Bank (AW #51). I'm sure that my grandchildren will enjoy the banks that I made as gifts for them after reading the article.

Robert M. Murray
Elizabethtown, PA

Biscuit Door Queries

 Where can I get the large-size "S-6" biscuits that Sven Hanson and Chuck Ring use to make their "biscuit based" entry doors? (See AW #50.)

Paul Masterson
St. Paul, MN

S-6 biscuits are available from Select Machinery, (800) 789-2323. The price for 250 S-6 biscuits is \$21, not including shipping. Other bulk discounts are also available.—*Eds.*

I'm writing in reference to the "Easy Entry Door" article in your February issue. It's my understanding that the biscuit joint obtains its strength when the compressed wood biscuit absorbs moisture from the adhesive (usually common yellow glue) and swells in its slot, making tight contact with the surrounding wood. Urethane glue needs moisture to cure properly (as mentioned in the article). While this glue expands as it dries

and fills gaps in the joint, there is no structural strength in the filled voids.

Hanson and Ring mention moistening the joints with a plant mister before glue-up, which obviously provides moisture for the urethane. But once the wood has been coated with glue, is the necessary moisture available to the biscuits? Please enlighten.

Michael F. Chrobot
Kingston, NY

Sven Hanson replies: We haven't experienced any weakness in biscuit joints glued with urethane adhesives, but you've raised some valid concerns. The gap between the biscuit and the walls of the slot is very negligible, at least with our biscuit joiner and the biscuits we use. If your biscuits fit too loosely, so that they wobble in their slots, I recommend making your own tighter-fitting biscuits. If you do, make sure the grain in each biscuit runs at a 30° angle to the joint, as it does in a factory-made biscuit. We agree: It's a good idea to moisten the biscuits as well as the rest of the joint before applying the urethane glue.

Helpful Information on Exterior Finishes

 I recently finished making a rack for the back of my new pickup truck. The three rails and single cross-piece on each side are all Philippine mahogany. The wood looked so beautiful, I figured I had to put a better finish on than I'd originally anticipated. I took a break one evening and started to poke around on America Online, where I found Michael Dresdner's refresher course on clear exterior finishes. (See "Just Finishing," AW #51.) The timing couldn't have been more perfect. I just had to write and say thanks.

Anson Stelmak
Manhattan Beach, CA

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

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- ❖ You can fax us at **(610) 967-7692.**
- ❖ Too busy to write? Call our Letterline: **(610) 967-7776.**
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Like a well-designed tool chest...



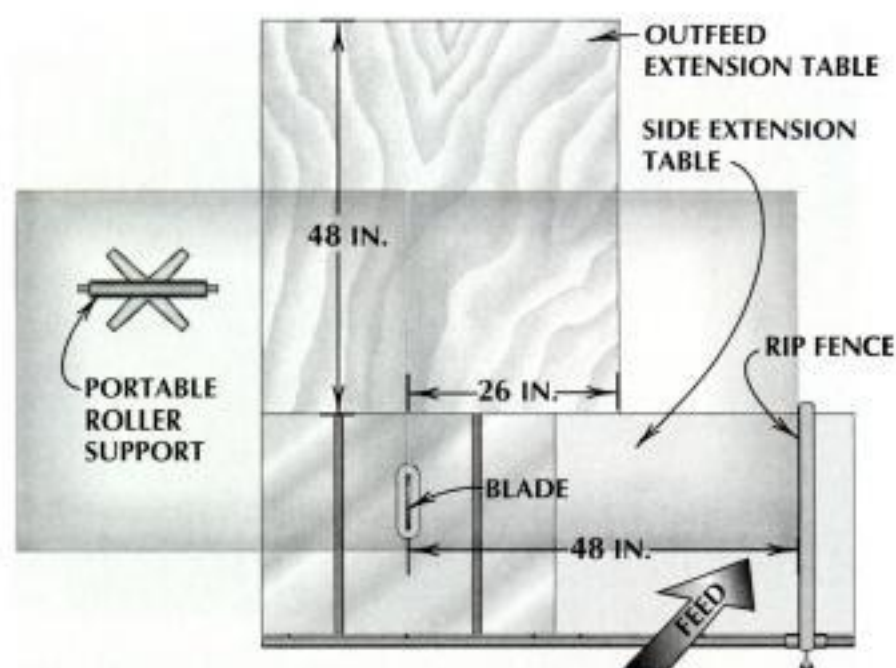
Cutting Panels on a Tablesaw

Q What is the best way to set up my tablesaw for cutting 4x8 plywood panels and other large-size sheet goods?

Bijan Mobasseri
King of Prussia, PA

A With the right setup, a tablesaw can make cutting panels easier and more precise. Without it, you're in for a dangerous and difficult job. Start with an extension table on the outfeed side of the saw that's large enough to support at least half a 4x8 panel after you push it through the blade. (See drawing.) If you want to make wide cuts, you'll also need an extension table to the left or right of the blade. For a "roving" support, buy or make a portable, height-adjustable roller stand. Sometimes you'll use this as a side extension; other times you'll want it on the outfeed side. It depends on the panel size and where you're making the cut.

Since heavy panels can easily knock a light-duty rip fence out of alignment, it's best to equip your tablesaw with a high-quality rip fence if you plan on cutting panels regularly. Aftermarket rip fences are readily adaptable to side table extensions, and most of these



Direct feed pressure diagonally, toward rip fence.

fences are longer than standard models. This means you'll have more of a guiding edge to work against.

Even if you have extension tables and a premium rip fence, it's still a good idea to precut a full-size panel with a circular saw—especially if you're working solo. Cut your "good" piece oversize by 1/8 in. or so, and you'll have a lot less weight and size to pass through the blade.

When you're guiding a panel against the rip fence to make a cut, remember to direct your feed pressure diagonally, as shown in the drawing above. Don't just push the panel straight ahead. Instead, "aim" your pressure at a point on the rip fence that's just an inch or so ahead of the spot where the saw blade enters the wood.

Tim Snyder
AW managing editor

Designing a Tool Chest

Q I'm planning to build a tool chest to hold my chisels, planes and other small tools, and I need some good design ideas. I want to make sure I'll have enough space in the chest for any tools that I buy in the future. What do you suggest?

Keith Mealy
Cincinnati, OH



Basic but beautiful. Designed and built by Claire Fruitman, this cherry and maple tool chest fits under a workbench. A pull-out door locks in front of the drawers, keeping them in place when the chest is moved.

A Hand tools and layout tools really belong in a tool chest, to protect them and retain their sharpness and precision while leaving them accessible. We encourage students to build chests that can fit on the workbench or under it. You want a chest that can hold a lot, but it shouldn't be too big to move around.

If you stick to hand tools and tools for layout, it's not difficult to design a tool



chest that can accommodate future acquisitions. Talk to other woodworkers, and compare their list of commonly used tools to your own. Figure out where the gaps are, and allow for the right amount of space in your design.

Consider making a chest with drawers. Drawers protect tools from each other, and they can be redivided to accommodate newly acquired tools. Make a bunch of thin wooden divider strips to fit in your drawers. Tap brads into the ends of the strips, then nip the brads off, leaving short spurs. When you spring the strips into place, the spurs lock them in, but you can change the spacing whenever you want.

WOODWORKING QUESTIONS?

Send them to: "Q&A," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Or e-mail them to: AWQA@aol.com

For appearance and function, design your chest with the shallowest drawers at the top and the deepest at the bottom. Flat items like layout tools and cabinet scrapers can live in the shallow drawers; bench planes can occupy the deep ones. In between, size your drawers for commonly used hand tools like chisels, screwdrivers, spokeshaves, and files. Groove or drill small blocks of wood to separate items like chisels and gouges. Fit these blocks unglued between the drawer sides.

Drawers need to slide in and out easily and stand up to everyday use. We've found that runners let into drawer sides don't stand up as well as frames that divide the case into discrete openings.

Finally, it's a good idea to have one or two doors that can slide and lock into place in front of your drawers. This protects your tool investment and ensures that drawers don't spill their contents when the chest is moved. You can design your chest with a single door that swings down from a top pocket. Another option is to build pockets on both sides of the chest, and have a pair of doors that pull out and swing closed. Good luck.

Will Neptune
Instructor, North Bennet St. School
Boston, MA

Buying a Starter Lathe

Q I've recently become interested in woodturning, and I'd like to buy a lathe. What should I look for in choosing a machine, and what should I avoid?

Helen Stafford
Oskaloosa, IA

A First you need to decide what sort of items you want to turn. Spindle turners planning to make furniture parts will need a machine with a bed at least 36 in. long to accommodate most leg and post stock. A bowl turner will want a heavy machine with at least a 16-in. swing capacity (spindle height 8 in. above the lathe's bed), a minimum 1/2-HP motor, and speeds as low as 200 rpm. A model maker would be well served by one of the new mini lathes. (See AW #52.) Production-oriented pros should consider a duplicating lathe. In short, match the machine to the job.

If you're not sure what you want to make, you might want to start with a general-purpose lathe. I'd look for at

least a 12-in. swing capacity and a distance of about 36 in. between centers. Some manufacturers—including Delta, Jet, Record, Sorby and Woodfast—offer lathes with headstocks that swivel away from the ways, allowing outboard turning of larger bowls.

If you can afford it, get a lathe with a variable-speed drive. Stepped belt drives are OK, but they won't give you the infinite speed control of mechanical or electronic variable-speed drives. Plus, step pulleys take precious time to switch speeds. I recommend a low speed of 400 rpm (for general bowl turning) and a top speed of about 2,000 rpm (for smaller spindles.) A 1-HP motor will provide enough power; I consider a 3/4-HP motor the bare minimum for a general-purpose machine.

Look for easily operated locks on the tool rest and tailstock, and positive locking on the tailstock quill. Get a machine with a common thread such as 1 by 8 tpi on the headstock spindle; avoid oddball metric threads. With #2 Morse tapers in the headstock and tailstock, you'll be able to use numerous aftermarket accessories. Cast iron is the material of choice for a lathe; I avoid lightweight steel machines because the vibration factor is terrible.

Lathes range in price from about \$200 for a mini lathe to well over \$3,000 for a monster with a 16-in. swing. (See AW's 1996 Tool Buyer's Guide.) Don't forget to check your local classified ads. Many fine old lathes are sold for a fraction of their value.

Steve Blenk
Turner and AW contributing editor
Sequim, WA

Rip vs. Combination Blades

Q Is it worth it to buy a ripping blade for my 10-in. tablesaw? I've been getting good results ripping and crosscutting with my 40-tooth, carbide-tipped combination blade, but I'm going to be dimensioning a lot of hardwood over the next several months.

Carl Anderson
Columbus, OH

A I'd go ahead and invest in the ripping blade, especially if you'll be ripping much hardwood. When used for ripping, a 40-tooth combination blade works much harder than it needs to.

Examine the sawdust and you'll see that it's extremely fine—proof that the blade is cutting the same wood fibers again and again. Yes, you'll get a nice edge, but you'll also dull the teeth much faster.

A good-quality, carbide-tipped ripping blade rips much more efficiently, allowing you to use a faster feed rate than you could with a combination blade. Save your premium combination blade for crosscutting, occasional ripping, and plywood. For ripping hardwood, get a carbide-tipped ripping blade with 18 to 24 teeth. I've had good results with CMT, Freud and Delta ripping blades.

Matt Ver Steeg
Carbide blade designer
Newton, IA

Mixing a Little Shellac

Q What's the best way to mix a small amount of a 2-lb. cut of shellac? The usual ratio (2 lbs. of flakes per gallon of alcohol) is difficult to adjust down.

Darla Krause
Wheeling, WV

A Mark a line on a lidded, clear glass jar showing the volume of shellac you want. Fill the jar with flakes about halfway to the line, then pour in alcohol all the way to the line. This is a good approximation of a 2-lb. cut. Shake or stir the mixture every few hours; it will be ready to use in about a day.

Michael Dresdner
AW contributing editor
Tacoma, WA

WHERE TO FIND IT

Spoked wooden wheels for tea carts and toys are available from Van Dyke's Restorers, Box 278, Woonsocket, SD 57385, (800) 843-3320.

Tagua nuts, an "ivory substitute" for small turnings, are available from Packard Woodworks, Box 718, Tryon, NC 28782, (800) 683-8876.

Machine knobs, handles and handwheels are available from Reid Tool Supply, 2265 Black Creek Rd., Muskegon, MI 49444, (800) 253-0421.

NET NEWS



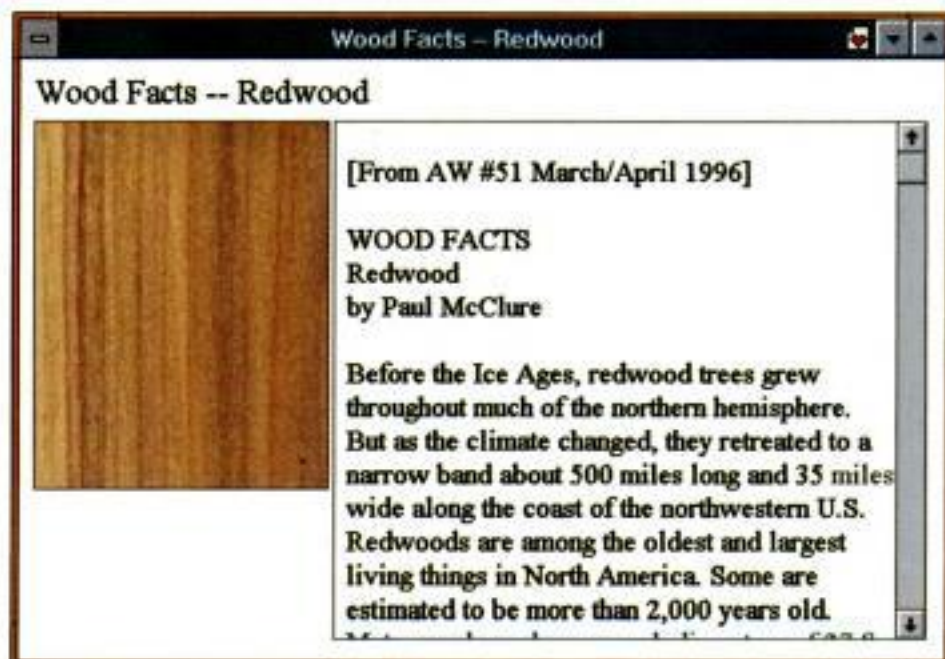
Direct Web connection—

Now you can enter the World Wide Web right from AMERICAN WOODWORKER Online, and access woodworking web sites instantly! AW's Website Express takes you straight to the best of the Web—no bothersome searching and browsing. From the AW Online main screen, click on "Woodworking Web Links."

Hot new graphics—

We've upgraded our graphics so you can view text and photos at the same time in selected areas. For example, take a look at the new "Wood Facts" format, below.

AW Online is part of the America Online computer service. Call (800) 764-4400 for free software and 15 free hours of online time.



Jiaju, or "home tools," is the Chinese term for furniture. The Peabody Essex Museum exhibit includes this "childminder," an ornate crib.

PHOTO COURTESY OF THE PEABODY ESSEX MUSEUM

EXHIBIT: FOLK FURNITURE OF OLD CHINA

Friends of the House: Furniture from China's "Towns and Villages" is the first U.S. exhibit of 18th- and 19th-century furniture made by China's common folk. It runs at the Peabody Essex Museum in Salem, MA, through August 7.

Rural Chinese craftsmen produced some of the fancy lacquered furniture that Westerners often associate with China, but they also made practical pieces to fill the needs of common people. They used many natural

materials, including bamboo and tree roots. And though they were capable of the same sophisticated styles as their urban counterparts, they often chose to interpret classical forms in whimsical ways—or to preserve earlier styles that had fallen out of favor in cities. Curious constructions include beds embellished with giant fish, signifying fertility, and chairs with bat-shaped crest rails.

For exhibit information, call: The Peabody Essex Museum, (508) 745-1876.

WORKSHOP ON WHEELS FOR KIDS

Sheila Dawson didn't pick up a saw until she was 30. Today, the 50-year-old former secretary is making sure the woodworkers of tomorrow get an earlier start. Dawson teaches woodworking to children ages four to 10, and she does it in a mobile workshop housed inside a transit bus. The four-wheeled workshop has 10 height-adjustable benches and a wide variety of hand tools.

Dawson's first student was her son, who tinkered by her side from the age of two. She enjoyed teaching him so

much, she began to explore it as a career. The idea for a mobile workshop for kids came about after Dawson found that most preschools and elementary schools in her native San Diego did not have fully equipped woodshops.

Dawson's classes emphasize construction, using basic hand tools. Students saw, hammer, drill, glue and sand pine boards into toys and desk accessories.

Some children, Dawson says, are afraid to proceed for fear of goofing up. Others "freeze" when they make a

mistake. Sometimes she has to make light of errors in order to get the child's ego back on track. But safety is no joking matter in her shop: Students learn safe techniques from the first lesson.

Over more than 20 years, Dawson has taught an estimated 10,000 children. Most of her students come from kindergarten through fourth grade. Roughly one-third are girls. She doesn't track her students and has no way of knowing if one of her alumni will be the next Sam Maloof. But she doesn't care. Her gift is the joy of wood—and the joy of creation.

—Elizabeth Tarnove



ABCs of woodworking. Aboard her woodmobile, Sheila Dawson helps Garrett Martini saw a board.

PHOTO BY ELIZABETH TARNOVE

THERE'S MORE THAN ONE WAY TO BUILD A BOAT...

European style—AW's West Coast editor, Simon Watts, has teamed up with a group of wooden-boat enthusiasts to start the Arques School of Traditional Boatbuilding, in the San Francisco Bay Area. The school is sponsored by the Arques Maritime Preservation Foundation.

Classes range from weekend tool-sharpening seminars to a one-year marathon in which students build a complete boat—from initial lofting to final finishing, launching and sea trials. All courses emphasize proper use of hand tools, respect for materials, and careful workmanship.

The school is currently located in an Arques Shipyard building; it hopes to eventually build its own waterfront workshop and museum. For more information, write: The Arques School, Box 2010, Sausalito, CA 94966. Call or fax: (415) 331-7134. E-mail: arqueschl@aol.com or visit the web page at: <http://www.arqueschl.com>



Whatever floats your boat. At left, Arques School students work on the bent-laminated hull of a traditional English boat. At right, David Gidmark pilots a 13-ft. Native American canoe made from a single sheet of birch bark.

LEFT PHOTO BY SIMON WATTS. RIGHT PHOTO COURTESY OF DAVID GIDMARK.

Native American style—The birchbark canoe is the primordial North American woodcraft; it was here when the first Europeans arrived. But very few are being made today. David Gidmark has dedicated many years to preserving the art of birchbark canoemaking, and he leads an intensive course each summer.

Students begin by harvesting and preparing a sheet of birch bark. Then they gather cedar for ribs and sheathing, and spruce roots for lashing the gunwales. Nearly all the splitting, carving and construction work is done with an axe and a crooked knife.

Gidmark's 16-day summer course in birchbark canoe building, held on the Wisconsin shore of Lake Superior, costs \$750 including lodging. For more information, write: David Gidmark, Dept. AW, Box 26, Maniwaki, Quebec, Canada J9E 3B3.



A NEW LIFE FOR OLD FAVORITES

Years ago, craftsmen relied on a handy, pocket size Stanley tool for odd jobs like squaring, leveling,

depth-gauging, marking and layout. Now, SMTC offers a high-quality replica of the No. 1 "Odd Jobs," originally

Old and new. The Stanley No. 1 "Odd Jobs" was a cabinetmakers' favorite 100 years ago (left rear). SMTC's replica has a tougher ruler and finer machining (right rear, \$49.95). SMTC also offers "leg calipers" for turning (right front, \$18.95 ea.).

PHOTO BY SUSANNAH HOGENDORN.
ANTIQUE TOOLS COURTESY OF BILL PHILLIPS

manufactured from the 1880s to the 1930s. SMTC precision-casts the replica in magnesium bronze. And the ruler—a weak link on the original Odd Jobs—is redesigned to last, with a maple body and solid brass edging. (See photo, left.)

Also available are traditional "leg calipers" for turning, and a "carving spoon" for shaping concave surfaces. For more information, write: SMTC, 619 Good Intent Rd., Gettysburg, PA 17325. Or call: (717) 334-7758.

LEICHTUNG IS SOLD

Woodworker's Supply, Inc., has acquired Leichtung Workshops®, a well-known mail-order merchant.

Dr. John Wirth, Jr., President and owner of Woodworker's Supply®, said the company plans to continue Leichtung's popular catalog business.



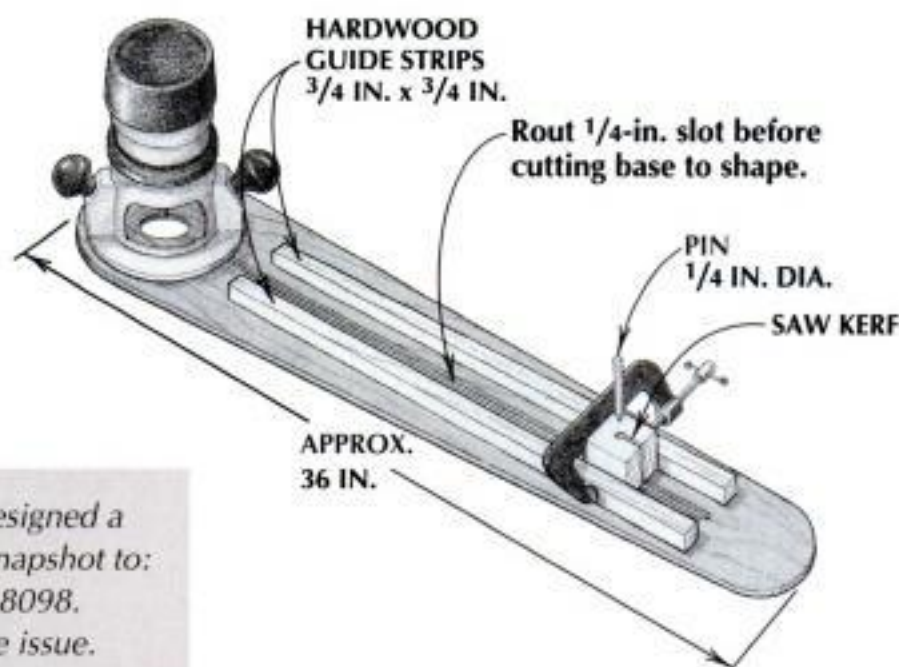
Circle-Routing Jig

Best tip of the issue

With this simple jig and a router, I can cut accurate circles or arcs of any diameter up to 60 in. The jig pivots around a pointed, 1/4-in.-dia. steel pin set in a kerfed hardwood block. To lock the block and pin in position, I clamp the block between a pair of hardwood strips.

I used 1/4-in. plywood for the base of this jig and glued a 3/4-in. by 3/4-in. hardwood strip on each side of the slot.

Bill Whitsitt
Rosharon, TX



Best tip wins \$200. Know a better way of doing something? Designed a clever jig? Send your original woodworking tips, 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.

Quick Offset for Biscuits

Adjusting a biscuit-joiner fence for multiple cuts can be time-consuming and inaccurate. A quick and simple way to get an accurate offset is to clip a spacer block to the fence using clips made from a wire coat hanger.

Brian DeLillo
Batavia, NY



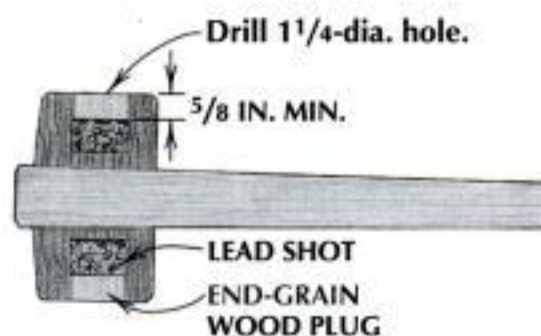
Moving Plywood

Moving 4x8 sheets of plywood or particleboard alone is awkward at best. You can make the job easier by attaching C-clamp "handles" to the panels you need to move. C-clamps 4 in. or larger work best. To protect the panel surfaces, pad them with scrapwood.

Claude Belleau
Troy, MN

A Mightier Mallet

To add heft to my wooden mallet, I converted it to a deadblow mallet—common in machine and automotive shops. I drilled two 1 1/4-in.-dia. holes in the head and half-filled them with lead shot. I plugged the holes with end-grain discs that I turned on my lathe. I find

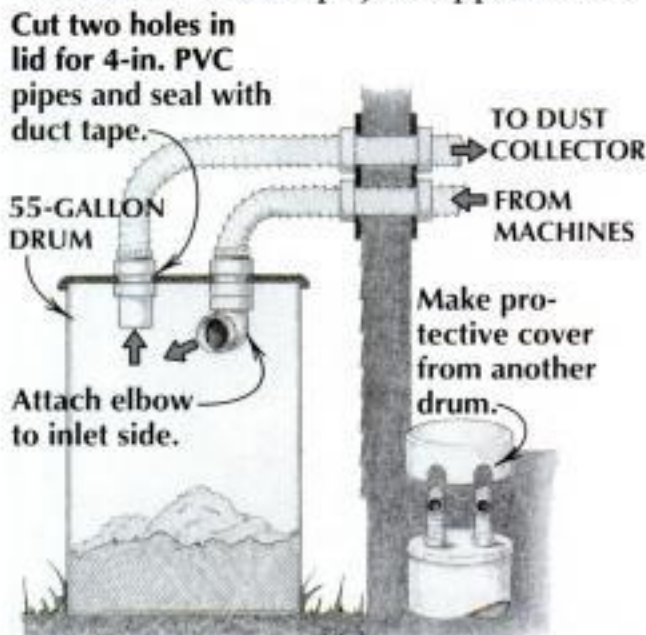


the performance greatly improved. The only problem is getting the tool away from my two-year-old: She likes the sound it makes.

Thorvild Hrapp
Pelican Lake, MN

Outdoor Chip Collection

I recently made a 55-gallon plastic drum into a chip collector for my single-stage, 2-HP dust collector. To save precious workshop space, I put the drum on the outside of the shop, just opposite the



interior location of the collector blower. Since the air recirculates, I'm not heating the great outdoors. Adding an elbow to the inlet pipe creates a cyclone effect that helps separate the chips from the dust.

Lawrence Heinonen
Union City, MI

Gluing Segments

When I'm cutting mitered segments to glue up for bowl turning, I leave a small flat along the edge of each segment, as shown below. When I glue up the blank,



glue can squeeze out into the cavity without messing up the band clamp. Another advantage: The flat (and not a knife-edge) provides a positive stop against the fence when I'm cutting the miters.

Arnold Nichols
Simsbury, CT

Hot Batteries Revisited

I agree that overheated batteries can be a fire hazard ("Tech Tips," AW #50). Instead of relying on a red light to jog my memory, I plug my charger into a 60-minute timer that turns it off and leaves it off. I use model #IB161C from

Intermatic (4720 W. Montrose, Chicago, IL 60641, 312-282-7310). There's no wiring necessary with this model. Price is \$11.95 plus shipping.

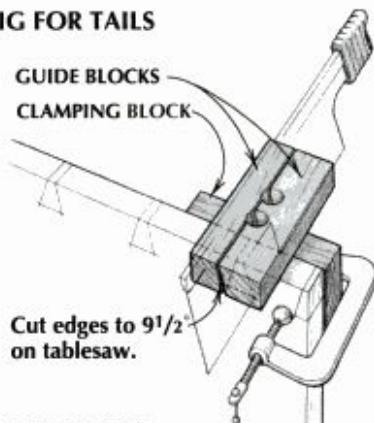
Jim Schaefer
Stillwater, MN

Dovetail Saw Guide

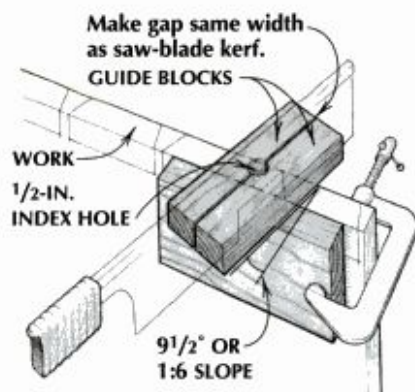
I made these jigs to cut through dovetail joints with my Japanese saw. A pair of hardwood guide blocks, glued to a clamping block, keep the saw blade from wandering as I make each cut.

You'll need to make three jigs in all:

JIG FOR TAILS



JIG FOR PINS

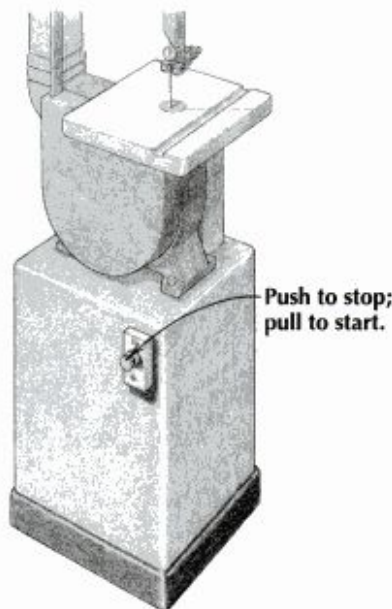


one for cutting the tails, and two for cutting the pins. Drill holes as shown, so you can see layout lines when positioning each jig. Before using each jig, place your saw in the kerf and make a cut into the clamping block, then line up the cutline with your layout line.

Willard Anderson
Chapel Hill, NC

Hands-Free Quick Stop

For a hands-free quick stop, I mounted a push-button emergency switch on my bandsaw. I placed it at knee height so I can stop the machine without looking.



I'm mounting similar switches on my tablesaw and drill press. Industrial emergency stop switches are available from most electrical supply stores; wire them in series with the original switch.

Armour McCarthy
Erierville, NY

Marking Cylinders

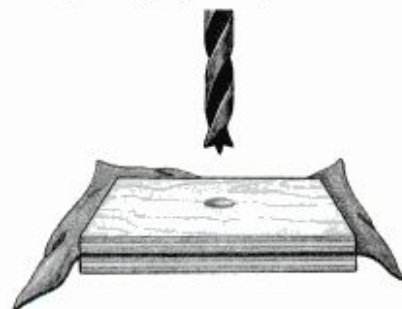
To mark a line parallel to the axis of a cylinder, lay a length of angle iron on it and draw along one edge.

Alice and Robert Tupper
Canton, SD



Drilling Soft Materials

To drill holes in soft materials like sheet rubber or leather, first I make a sandwich by clamping two pieces of 1/4-in.

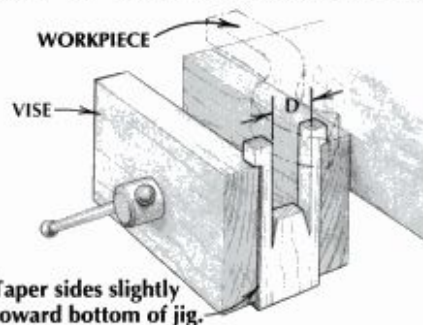


plywood on the outside. Then I drill through the entire assembly. I use a brad-point bit for the smaller holes and a Forstner bit for the larger ones. If hole spacing is critical, I mark the centers of each hole on top of the board.

Albert Richter
Houston, TX

Vise Helper

Odd-shaped pieces are sometimes hard to hold in a conventional vise. So I bandsaw this holder, making the distance "D" equal to the width of the

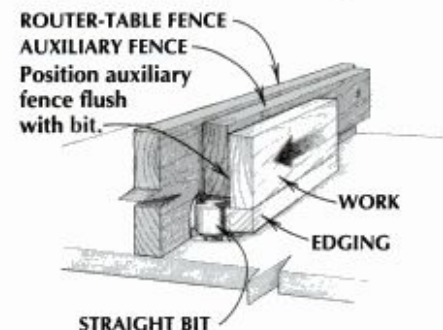


workpiece I need to clamp. I vary the amount of spring by making the arms longer or shorter. The lipped ends keep the holder from dropping on the floor when pressure is released.

Yeung Chan
Millbrae, CA

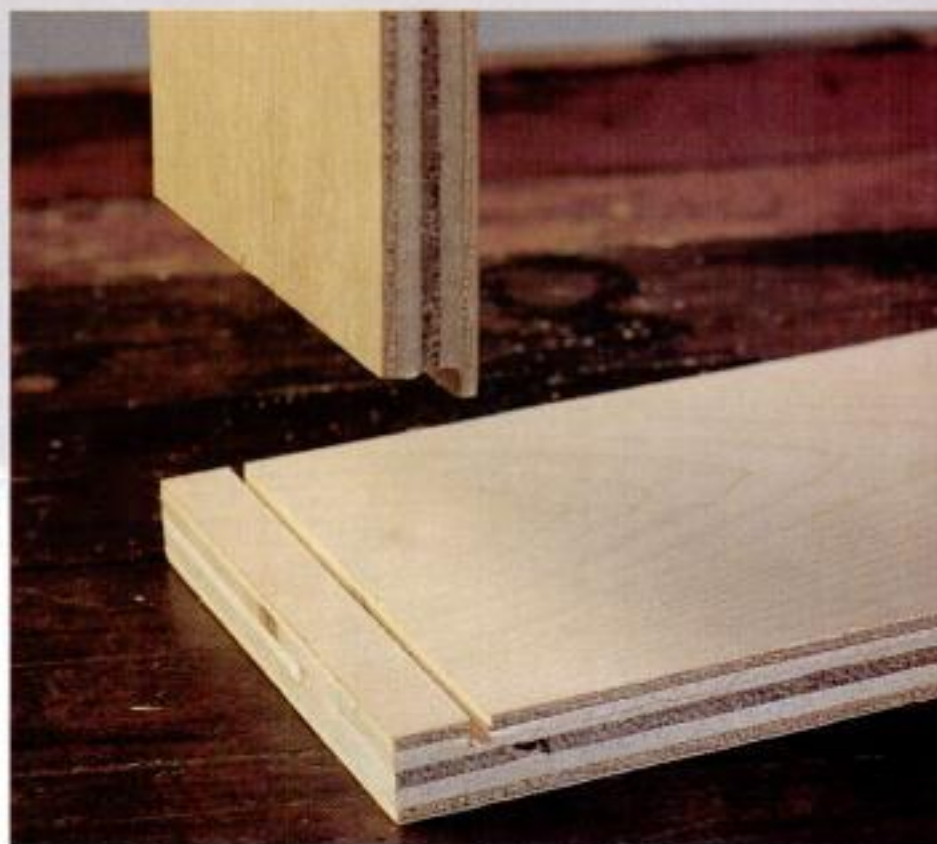
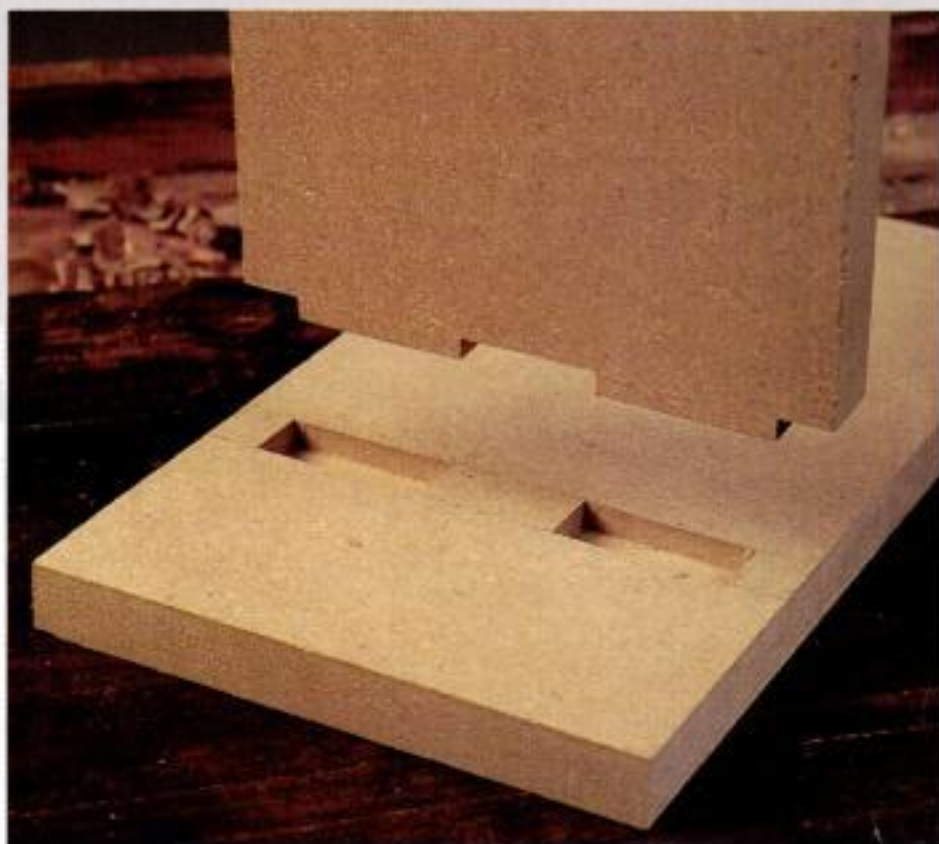
Trimming Edges—In Wood or Plastic Laminate

After you put edging on sheet materials such as plywood or particleboard, there's always some surplus to trim. I use a straight carbide bit mounted in a router table, as shown in the drawing. I attach



an auxiliary fence so it just clears above the edging. I've found that this technique works equally well with solid wood edging and plastic laminate.

John Grew-Sheridan
San Francisco, CA



A few good joints. Intermittent joints, such as mortises (left) and biscuit joints are the best choice for joints in man-made boards, because they leave the surface intact. Tongue-and-groove joints (right) are best reserved for flush corners.

Designing Joints in Man-Made Boards

It's not the same as solid wood

by Ian J. Kirby and John Kelsey

Man-made boards—primarily plywood, particleboard and medium-density fiberboard (MDF)—are not inferior to solid wood, but they are different. They are very strong and stable, but only when their surfaces remain more or less intact. Consequently, you can't use many of the joints you'd use in solid wood, and the ones you can use—tongue-and-groove, inserted spline or biscuit, and barefaced tenon—are totally concealed, as shown in the photos above and on the opposite page.

Since there are only a few useful joints, and no opportunity to show off intricate joint-making, what is there to interest the creative woodworker? Because their dimensions are hardly

EDITOR'S NOTE

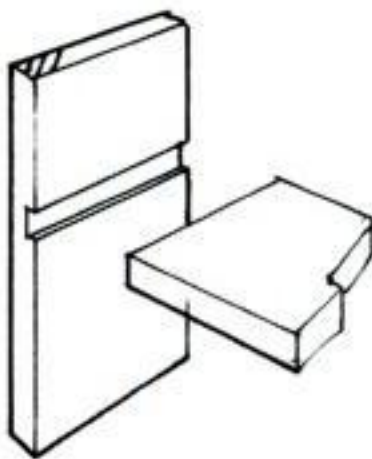
This is the final article in a four-part series on designing joints. Previous articles (in AW #50, #51 and #52) have covered edge joints, rail joints and corner joints in solid wood.

FIG. 1: JOINTS FOR SHELVES AND PARTITIONS

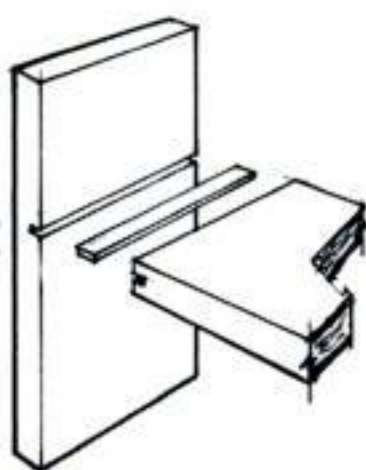
EASY BUT WEAK

A dado or groove completely across a man-made board is easy, but it makes a weak joint. The board may bend or break if a tight partition or spline is inserted.

THROUGH DADO



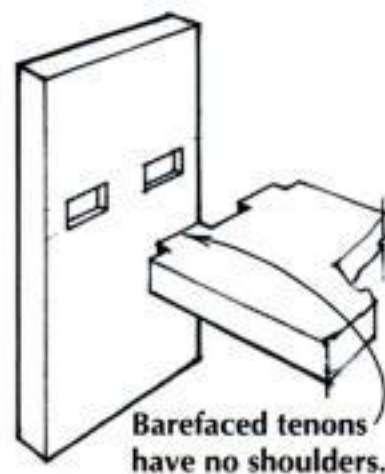
THROUGH SPLINE-GROOVE



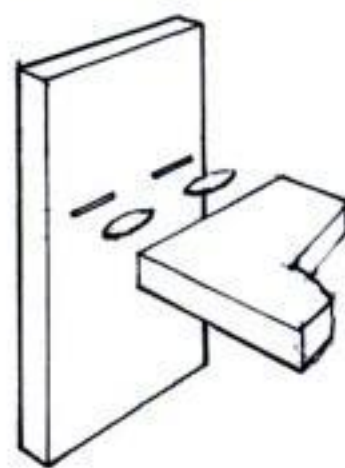
STRONG

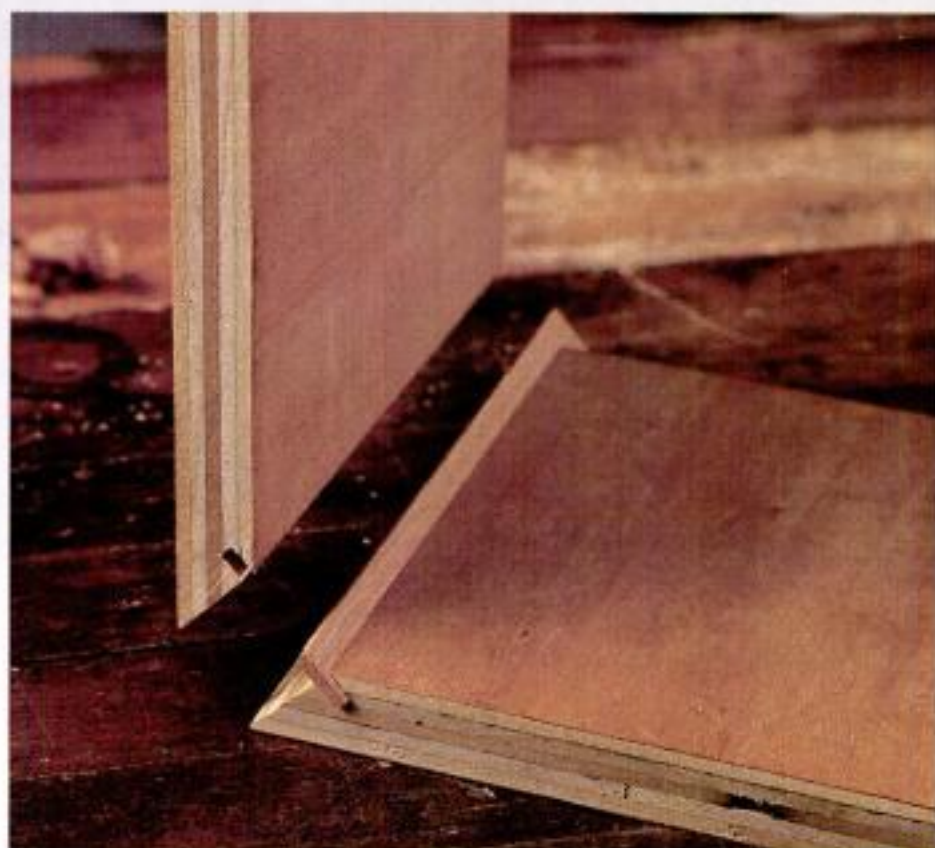
A row of mortises or biscuit slots preserves the continuity of the board's skin because it doesn't cut all the way across.

INTERMITTENT MORTISES



BISCUIT SLOTS





Mitered corners. Biscuits (left) and splines (right) make the simplest and strongest mitered corners in man-made board. To avoid weakening the board, splines are located near the inside face.

affected by changes in humidity, man-made boards offer design freedom from wood movement. And because they are such excellent substrates for veneers, the design palette expands to wood species no longer obtainable as lumber.

Solid Wood vs. Man-Made Board

In solid wood, joint design responds mostly to grain direction and wood movement. In man-made board, there is no grain direction, and wood movement doesn't matter. Joint design answers to the structure of the board itself, and to the final surface: veneer, plastic laminate, or paint.

MDF and particleboard are not uniform materials. They're sandwiches of two stronger, harder surfaces separated by a softer center. While they are stiff and dimensionally stable, they are not always *geometrically* stable. A sheet of plywood won't change in length and width, but rarely is it truly flat, and sometimes it's liable to twist like a potato chip. Particleboard is more stable than plywood, and MDF is the most stable of these materials—until it gets wet, whereupon it puffs up in thickness.

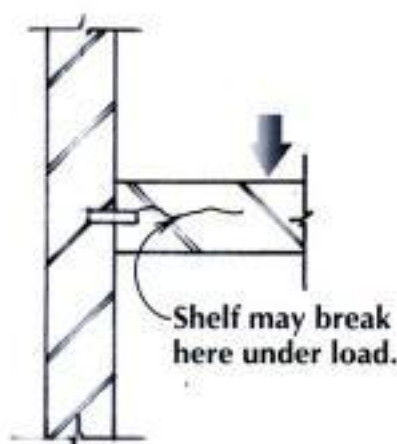
Working down into solid wood releases the final surface. The color and pattern are already there; the woodworker just lets them out. With man-made

board, not only is there nothing to release, but working down into the material destroys it. Instead, the final surface has to be applied in the form of a film coating of paint or lacquer, or a skin such as veneer or plastic laminate. Some boards come with veneer or laminate already in place, but it can always be glued on in the workshop—generally before finally dimensioning the parts. Adding veneer or laminate to both sides of the board dramatically increases its stiffness.

Particleboard is manufactured for two different purposes. One is building construction, and the other is the furniture making and architectural woodworking

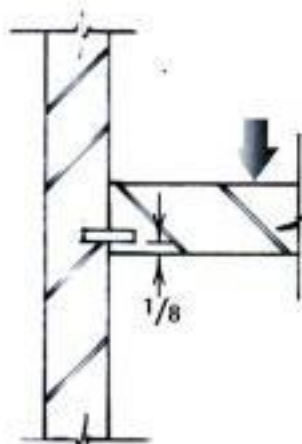
WRONG

Centered splines or biscuits may break out under load.



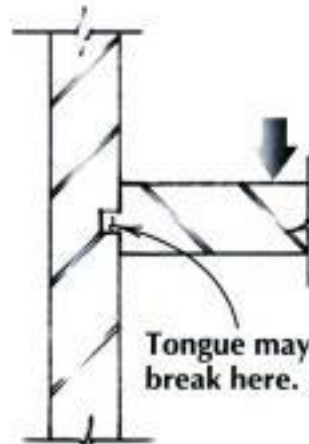
RIGHT

Off-center splines or biscuits can support a heavier load without breaking.



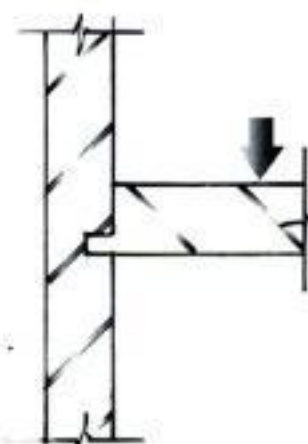
WEAK

A centered tongue has no strength.



STRONG

A tongue flush with the underside of the shelf will not break under heavy load.





Clamping tongue-and-groove. Tongues and grooves work fine for corner joints. Shop-made blocks squeeze joints tight for glue-up.

industries. You'll generally find "construction" boards at the home center, and "industrial" boards at the plywood supplier. Plywood and construction particleboard come in exactly dimensioned sheets: 4x8, 4x10, etc. MDF and industrial particleboard, on the other hand, are always an inch oversize in both dimensions. This is because the manufacturers do not guarantee straight edges or square corners, and also because industrial customers require 100% yield with no dinged edges. Board manufacturers therefore deliver enough material for the customer to square his own edges. Unlike plywood, there's no "good face" on particleboard and MDF. Both surfaces are the same quality.

Joint-Making Properties of Man-Made Boards

When it comes to making joints, man-made boards are much less forgiving than solid wood. It's very difficult to patch or recut inaccurately machined parts. On the other hand, since the universe of appropriate joints is both smaller and simpler, it's possible to perfect your techniques.

The strength of particleboard and MDF comes from the integrity of their outer layers; cutting a groove or dado in

these materials can create serious weakness. (Because of its structure, with thin, alternating layers of a softer wood, plywood doesn't behave quite this way.) For particleboard and MDF, intermittent slots are better than continuous grooves—they don't disrupt the continuity of the board's skin. This is why the most useful joints are the spline or biscuit, and the barefaced tenon. Industry has also evolved the 32mm doweling system, but it requires expensive equipment beyond the reach of the small shop.

The grainless structure of man-made boards is a real advantage when gluing up. Grain direction is never an issue, and every configuration includes some long-grain gluing area. However, because the material is more porous in the center, it is important to brush or roll glue onto all mating surfaces, and not to expect it to transfer from one surface to the other. It also helps to paint the edge with glue and let the joint stand open for a few minutes. Add a fresh layer of glue just before you close the joint; ordinary yellow glue is excellent. A good glue joint in man-made board should be about as strong as the board itself, because that's what the board itself is: bits of wood, glued together.



Clamping miters. Spline miters are another corner option. Clamp with pairs of 45° blocks.

Joints for Shelves and Partitions

A row of " housings," or mortises—essentially an intermittent dado—is the basic method for making a joint for a shelf or partition, especially with particleboard and MDF. (See Fig. 1.) If the housing were cut right across, the panel could bend when the mating piece was pushed home, especially if the fit was tight. If the groove penetrated too far into the board, it might even break as the joint was clamped home.

Because of the construction of the board, the corresponding tenons should be barefaced—no shoulders. Make them the full thickness of the board, as shown in the lead photo. Without the outer skin, the material in the middle is weak and liable to crumble. Tenons don't have to be very deep. A quarter-inch of penetration is plenty.

Like tenons, splines also should be intermittent, and biscuits in a row should be spaced at least an inch apart. When splines or biscuits join a shelf to an upright, the board's resistance to top-loading can be increased by putting the splines or biscuits below center, as shown in Fig. 1.

Corner Joints

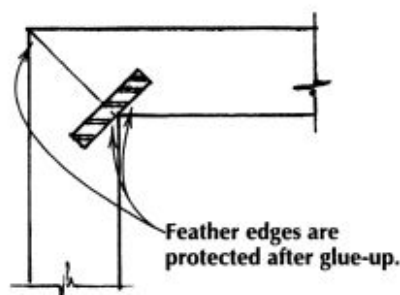
The simplest corner joint, strictly speaking, is a plain butt joint glued well, but it is extremely difficult to clamp. A tongue-and-groove is better: It not only locates the parts (see photos, above) but also increases the gluing area. Because the joint is so close to the end of the board, you don't have to make it intermittent. However, an easy fit is very important. The joint should push together, and just hang together dry.

Make tongues flush with one surface

FIG 2: MITERED CORNER JOINTS

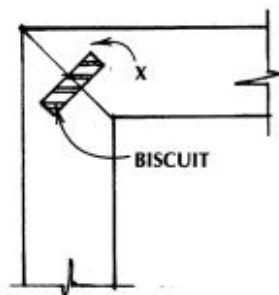
SPLINED MITER

Make spline groove at inside edge of miter with saw blade.



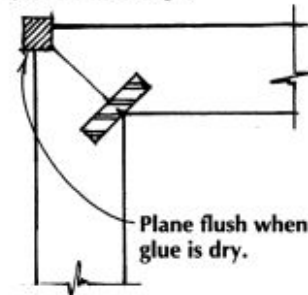
BISCUIT MITER

Biscuit slots are not continuous so board is not weakened at X.



MITER WITH SOLID-WOOD CORNER INSERT

Insert protects fragile corner and lets you form an edge.



of the board, not centered. (See right photo, page 26.) They should be the thickness of the saw kerf and no longer than one-third the board's thickness. There's nothing to be gained by making thicker or longer tongues, and going too far creates serious weakness.

A tongue-and-groove corner joint in solid wood is mostly end grain. It doesn't contain any long-grain gluing area, so it's not very effective. In man-made board, the same joint is nothing but useful glue surface. However, you must direct clamping pressure right over the outboard portion of the grooved piece. To do this, make a set of clamping blocks, as shown in the photos on the opposite page. Wax the inside faces of the blocks so they resist glue squeeze-out.

The tongue-and-groove joint can be made in raw board and then veneered or covered in plastic laminate after assembly. However, if the board is pre-veneered, a solid-wood corner block makes a better joint. (See Fig. 3.) You'd have to put a lip on the end outboard of the tongue before you could cut a tongue-and-groove joint.

A miter, located and reinforced with splines or biscuits, is also suitable for joining pre-veneered boards. (See Fig. 2.) You can apply plastic laminate or paint to mitered boxes of raw board before or after assembly. Veneer, however, has to go down before you saw the miters. Mitered corners also require clamping blocks, as shown in the right photo on the opposite page. It seems like a lot of work to make up a set of four clamps for each size of carcass, but it doesn't take long and the results are well worth the effort.

As with solid wood, put splines right at the inside corner of the miter, in

order to leave the maximum thickness to the outside. (See Fig. 2.) Biscuits fall farther up the miter, but since they are intermittent, they don't introduce the same weakness.

Figure 2 also shows a miter with a solid-wood corner insert. This wood strip fits a rabbet sawn into the mitered corner after assembly. The solid-wood insert makes the corner durable and is a good way to detail pre-veneered boards.

Adding corner elements of solid wood gives you a lot more design choices and opportunities for detailing. Figure 3 shows the basic situation: a corner block glued to the edge of the board, located by splines or biscuits. This is not an easy construction to assemble, because the clamps tend to pull the corner blocks askew. It's best to glue the corner blocks onto both ends of two panels, plane or rout the surfaces flush, and then glue in the other two panels. To clamp up all four panels and corner blocks at once, make sure the box goes together dry, and enlist a helper.

You can make your corner block thicker than the board so that it stands proud, creating a shadow detail. You can mold the corner block or shape it. You can also extend its length, making a leg or a support...the design possibilities begin to unfold.

Note: A back panel plays a critical structural role in the design of all kinds of case furniture. Once it's glued in place, the back panel takes care of racking stress, which otherwise would break joints in these materials.

Tools and Techniques

Whereas the tools and techniques for making joints in solid wood have evolved over many centuries, man-made

boards as we know them have been developed only since World War II. Since the most useful boards are industrial materials, the machines for working them come with an industrial-size price tag. Small-shop woodworkers have had to adapt their regular methods to these new challenges.

Whether in solid wood or man-made board, joints can only be cut from flat, square and dimensioned stock. But the differences begin with the very first saw cut. Since industrial boards are manufactured oversize, there's no reference edge to use as a guide. The factory edge is not bad, but it's not good enough for furniture making. Industrial users reduce the material with vertical panel saws, sliding-bed tablesaws, or sliding-beam saws. Unlike the standard table-saw, these machines can create a straight edge without the use of a fence, so they don't have to refer to the existing edge of the workpiece.

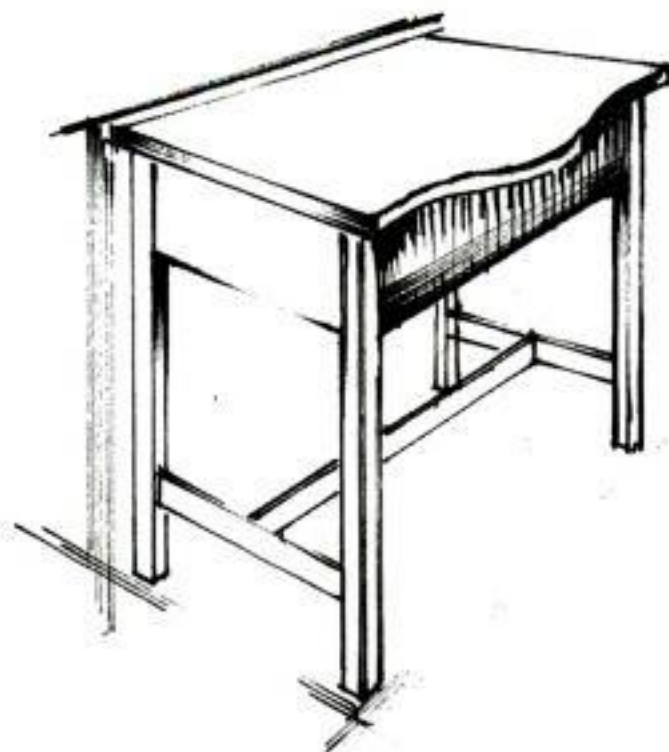
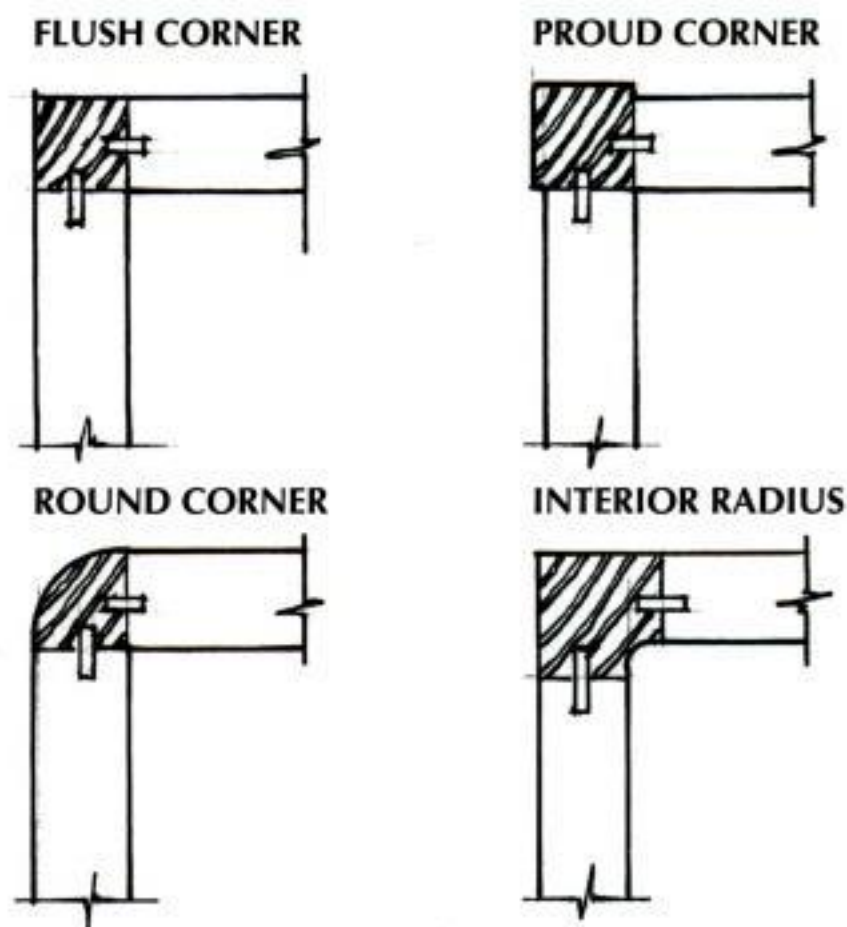
For the small shop, one solution would be to joint a face edge, the same as with solid wood, but the glues in the board are abrasive and very hard on jointer knives. It's better to square and dimension the sheet on the tablesaw, but make three cuts instead of the usual two.

Cut man-made boards with carbide saw blades. I prefer the alternate-top-bevel (ATB) configuration, 40 teeth on a 10-in. blade for raw boards, or 80 teeth for boards with veneered faces. A blade with negative rake on the teeth will reduce splintering of fragile veneers. **Caution:** The glues in particleboard and MDF release fine and irritating dust when they're sawn. You should have dust-control equipment, and you must wear a dust mask and eye protection.

Begin by breaking the sheet down into

FIG. 3: SOLID-WOOD CORNER BLOCKS

Corner blocks let you form an edge, and they protect the corner joint. Biscuits and glue join corner blocks to panels. Extended corner blocks may become cabinet legs.



Solid-wood corner blocks. Biscuits and glue join solid-wood corner blocks to man-made panels for a strong joint. Here, the lengthened corner block will form a cabinet leg.

manageable but oversized pieces, on the tablesaw or with a portable circular saw. Straighten one edge by sawing a thin slice off it, keeping the bulk of the board between the blade and the tablesaw fence. Flip the board over and adjust the fence to saw the other edge straight. Flip the board again, and adjust the fence again, to re-saw the first edge to final

size. Make every cut far enough into the board to leave an offcut of $\frac{1}{8}$ in. to $\frac{1}{4}$ in. If the blade just kisses the board, the edge will not be square. I follow this routine with plywood as well as with particleboard and MDF.

Making joints in man-made board is almost entirely machine work. Cut the tongues, grooves and miters on the table saw. Rout the mortises and tenons. Locate the solid-wood corner blocks and "lippings," or edge banding, with biscuits, and shape them by routing.

For veneering, the plastic vacuum-bag presses that have come onto the market in the last few years are a real advance. They are efficient, and unlike the screw veneer press, they fold up and store in a small space.

Once the raw parts have been cut to size, the general routine is to edge them with a solid-wood lipping, or edge banding, plane or rout the lipping flush with the board surface, then veneer over both board and lipping. It's important to keep control of the width of the lipping. If it's too wide, its normal movement will show as a line on the surface of the veneered panel. For square-edged panels, $\frac{1}{4}$ -in. lippings are plenty wide enough. If you add lippings after veneering, they will show as a line.

It's not such a great leap to adapt your

woodworking techniques to man-made boards. It's well worth the trouble because of the two big advantages you'll gain. First, you'll be able to work with rich veneers and unusual figures that you simply can't obtain in solid wood. All the best wood gets made into veneer, which is as it should be, because it stretches so much further. Second, since man-made boards are dimensionally stable, you can design furniture without regard to shrinkage or expansion, so you can forget about wood movement. This is totally liberating. ▲



IAN J. KIRBY is a furniture designer, woodworker and teacher with studios in Connecticut.



JOHN KELSEY is a writer and occasional woodworker in Connecticut.

Their new book, *Making Joints*, will be published by Rodale Press this year.

GLUING UP WITH TAPE

Man-made boards glue up so well that in some situations you can actually do without clamps: You can use tape instead. Since glue is what holds man-made boards together, a glued miter is just as strong as the surrounding material.

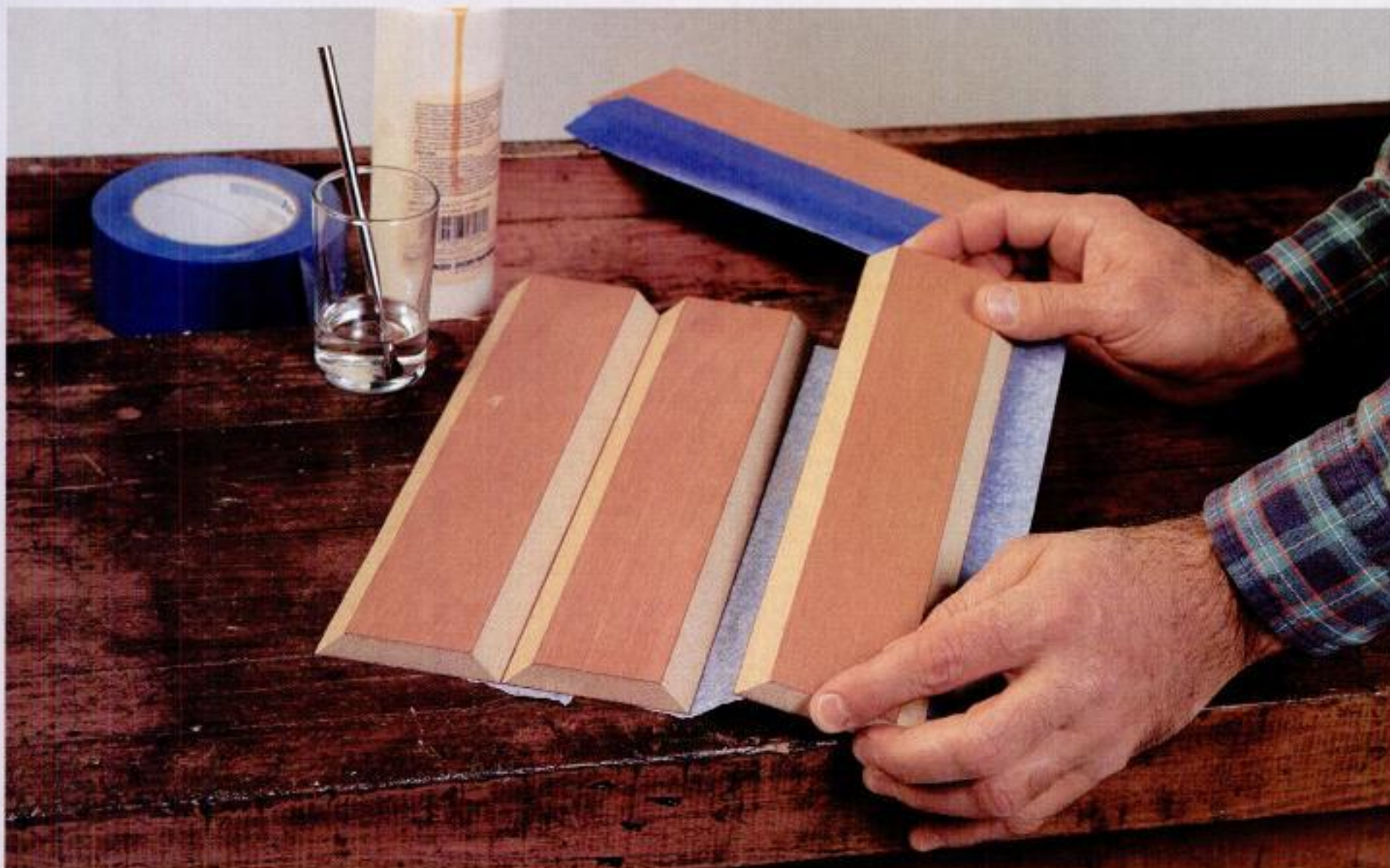
To glue up with tape, first miter all the pieces. Apply tape all along one outer edge of each piece, as shown in the top photo below. Lay the first piece on its back, and bring the second piece

up to it, with the feather edges of the miters precisely aligned. Press the pieces onto the tape, then carefully turn them over so you can rub the tape down hard. Repeat the maneuver with the rest of the pieces.

Now brush glue onto all the mating surfaces, and roll the box together. Pull the tape tight around the last corner. Check for square, nudge the assembly into square as necessary, and hold everything in position while the glue dries.

I prefer the blue-colored, low-tack masking tape that is available at most hardware and paint stores. It has a surface similar to crepe paper, and just the right amount of stretch. If you can't find blue tape, you can use 2-in. masking tape instead.

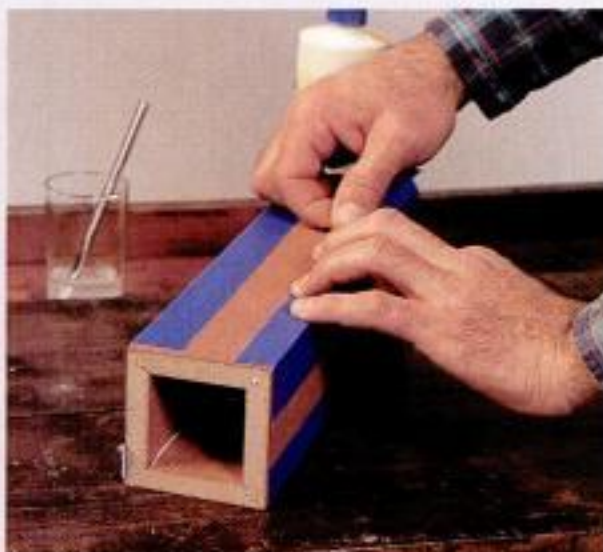
But take note: The longer you leave the masking tape on the work, the harder it is to get off. Cheaper tape is also tougher to peel, so remove it as soon as the glue sets. —I.K.



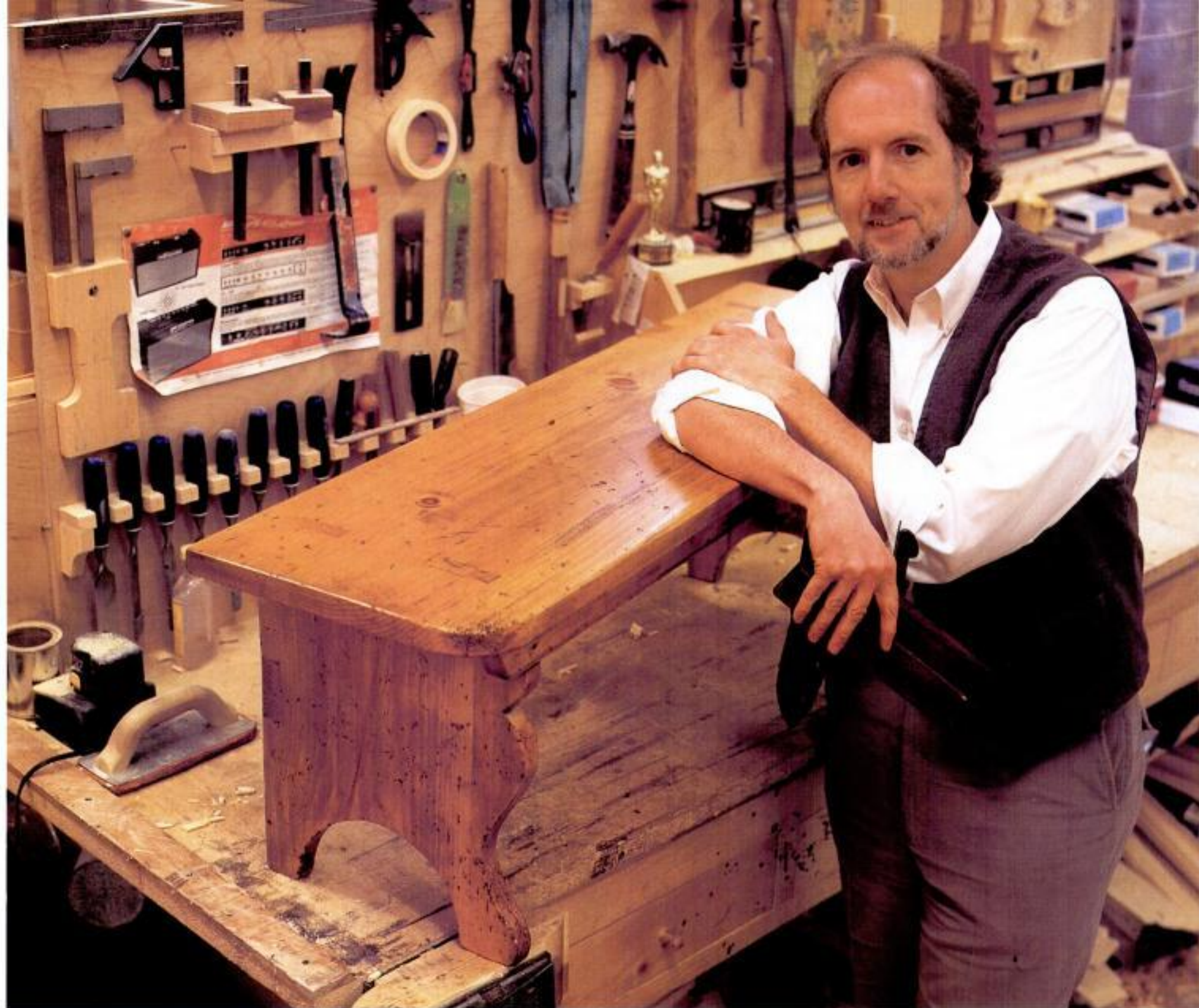
Tape it up. Masking tape is strong enough to clamp a miter in MDF. Position the parts and run a strip of tape down the outside of each joint.



Glue it up. After brushing glue on the miters, roll up the box (left) and pull a strip of tape across the last corner (center). Remove the tape as soon as the glue sets.



Protect the corner. A solid-wood corner insert protects man-made board from marring and lets you form a crisp edge at the corner.



Amish Country Bench

Wedged tenons and dovetailed braces make a bench that can stand the test of time

by William Draper



In our shop, we specialize in making new pieces of furniture that look like fine antiques. This pine bench is a nice example, and it's a great hand-tool project. The bench is a very close copy of an antique that I discovered on a farm in Lebanon, PA—the heart of Amish country. The original dates to the first German settlers who settled this region in the 18th century. The plank legs are joined to the seat with pairs of through tenons. The tenons are held fast with wedges, guaranteeing a tight joint even if the glue should fail. At the back of the bench, a pair of diagonal braces are dovetailed into the top and legs, for even greater strength.

Built to last. The secret to this bench's long life is its sturdy, wedged through-tenon joinery. And the joints are easy to lay out, using the author's template technique.

LAYING OUT MORTISES & TENONS WITH A TEMPLATE



Legs and tenons. First use the plywood template to transfer the leg and tenon profile to your workpiece.



Seat mortises. Then use the template to mark mortises on the seat. Lay out the mortise widths across the centerlines.

But strength isn't everything. The front apron and the curved front edges of the legs keep this piece from looking too austere. And the proportions are pleasing to the eye. You can alter the length and width to suit your needs, but for comfort's sake, I'd stick close to the 17-in. height.

Start with the Template

I strongly suggest making a leg template from $\frac{1}{4}$ -in. plywood to build this piece. The template does more than just transfer the curves of the leg—it helps you lay out the leg tenons and seat mortises.

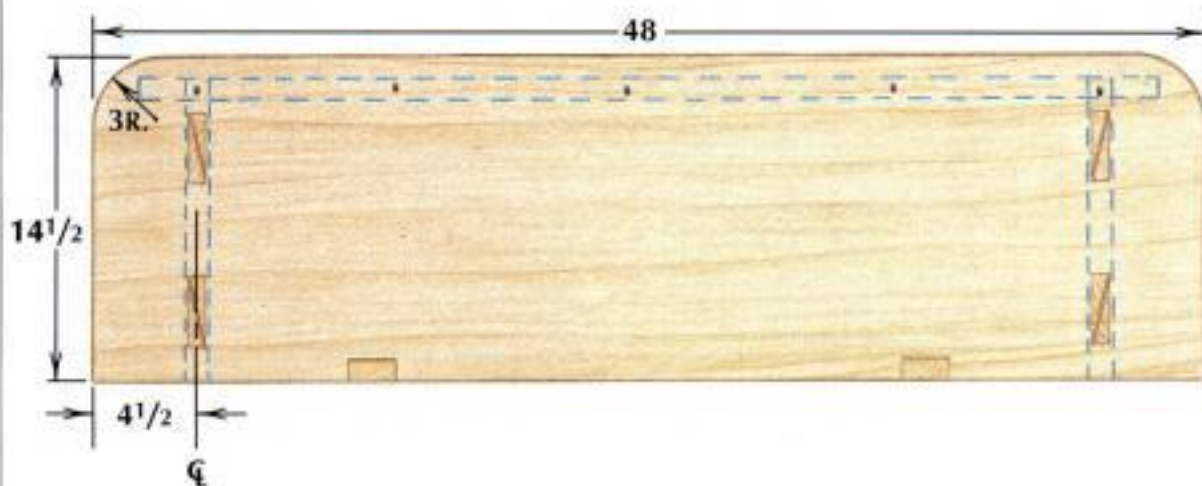
Legs and tenons first—Once you've cut the bench parts to rough size, rout

or saw matching rabbets along the top edge of each leg, to create a tongue that's $\frac{3}{4}$ in. thick and $1\frac{1}{16}$ in. long.

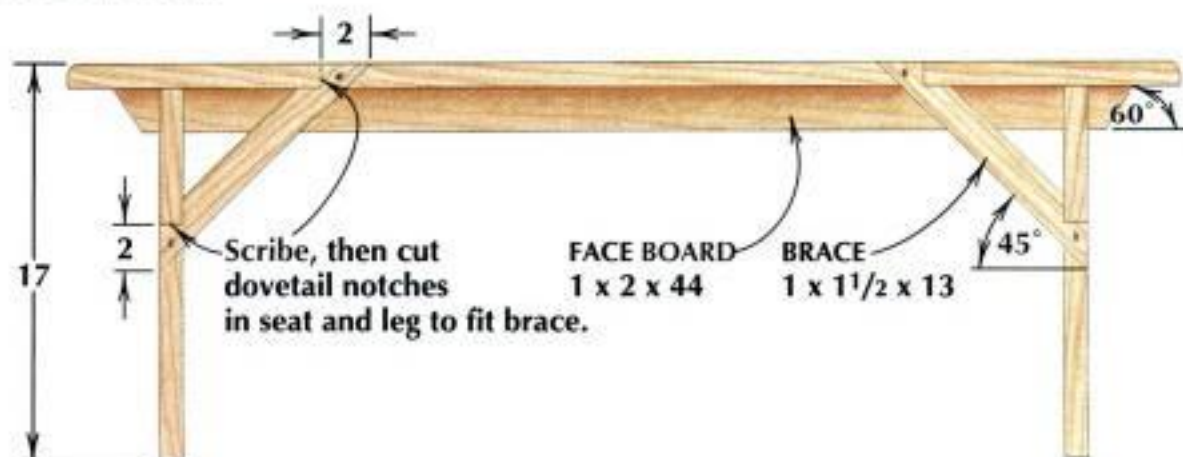
Now place your template flush with the back edge of each leg, and trace the tenon profiles and the front curves onto the leg. (See photo, above left.) I cut the sides of the tenons with a dovetail saw

FIG. 1: BENCH

TOP VIEW



BACK VIEW



SIDE VIEW

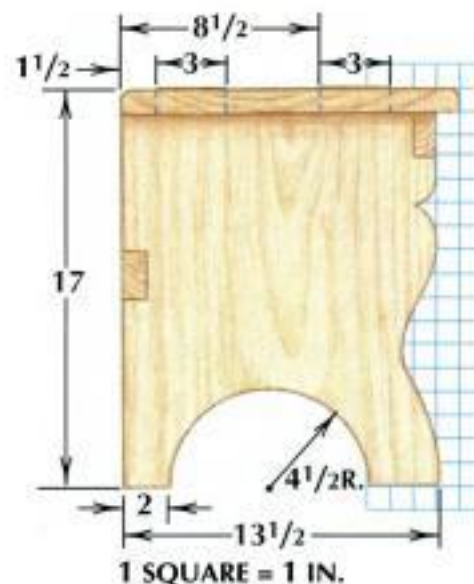
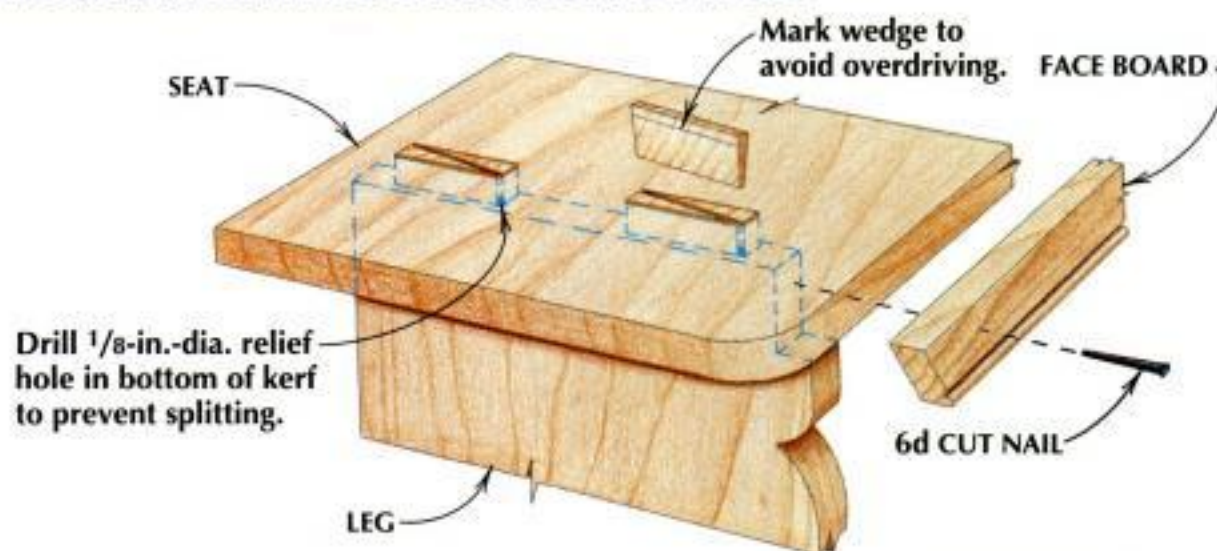


FIG. 2: MORTISE & TENON DETAIL



and remove the waste on a bandsaw. You could also use a jigsaw or a coping saw.

Seat mortises next—Use the leg template to lay these out. Mark the mortise centerlines on the top face of the seat. With the template flush against the back edge of the seat, mark across the centerlines to locate the mortises. (See right photo, page 33.) Finally, mark the sides of the mortises $\frac{3}{8}$ in. from each side of the centerline.

Drill out the waste with a Forstner bit on the drill press. To reduce tearout, drill into a scrap beneath the workpiece. Next, chisel the mortises square. Paring goes quickly if you get your weight behind the chisel and lean into the cut.

When you're making wedged through-tenon joints, the tenons shouldn't fit too tightly in their mortises. If they do, you won't have any room for wedges and glue. Pare or sand off just enough material from each tenon cheek so the joints slide together without binding. Then use a dovetail saw to cut a diagonal kerf in each tenon for the wedge. Drill a relief hole through the bottom of each kerf as insurance against splitting. The diameter of the relief hole should be two to three times the width of the kerf.

Then the wedges—Cut each of the four tenon wedges about 1 in. long, and make a depth mark at $\frac{3}{4}$ in. so you don't overdrive them. Once the wedges are made, you can dry-fit the seat. Don't drive the wedges home; you just want to hold the seat and leg assembly together to lay out the dovetail braces. Place the assembly on a flat work surface, with the back edges facing up. Clamp the legs square to the seat.

Dovetailed Braces

Lay out the tails on the ends of each brace, then cut them with a dovetail saw. Pare the notches smooth with a

chisel, then position each brace against the back edge of the seat and leg, and scribe the dovetail outlines. (See photo, below.) Use a marking gauge or a combination square to mark the depth-of-cut. Then cut the notches with a dovetail saw. Saw out the waste on the bandsaw or with a coping saw, and pare to the line with a chisel.

The face board is the last part to make. The original face board didn't have a beaded edge, but I'd just picked up an antique beading plane, and I felt it would be a fitting detail. (Maybe the original craftsman couldn't afford one!) You can recreate this detail with a "scratch beader" made from a screw and a scrap of wood. (See AW #44, page 57.)

Once all the pieces have been cut to size, I use my No. 4 bench plane to round over sharp corners, ease edges and give the surfaces a hand-planed look.



Scribe for notches. To ensure a tight-fitting joint, lay the dovetailed brace in place on the leg and rail, then scribe the notch locations.

Grinding the plane iron to a very slight radius will leave the same subtle, scalloped surface found on many country antiques. I don't worry about minor tearout or other imperfections; they contribute to the bench's hand-crafted feel.

Assembly

Start your assembly by applying glue to the tenons and wedge slots. Join the legs to the seats and drive the wedges in to the $\frac{3}{4}$ -in. mark. Once they've had time to dry, you can trim the wedges and tenons flush with a block plane.

Next, use glue to attach the braces and face board. I drive a single, old-fashioned 6d cut nail (available from the Tremont Nail Co., 508-295-0038) at each connection point—not for strength but for historical accuracy. You could use resin-coated box nails instead, and hammer the heads square. Set the nail heads just below the surface of the wood, so they'll be visible in the finished piece.

An Antique Finish

This simple three-step finish recreates a century's worth of patina in a few hours. First, stain the bench with a light-colored, pigment-based stain such as Behlen's "maple" (available from Woodworker's Supply, 800-645-9292). Then seal with two coats of shellac. Scuff the shellac lightly with 280-grit paper.

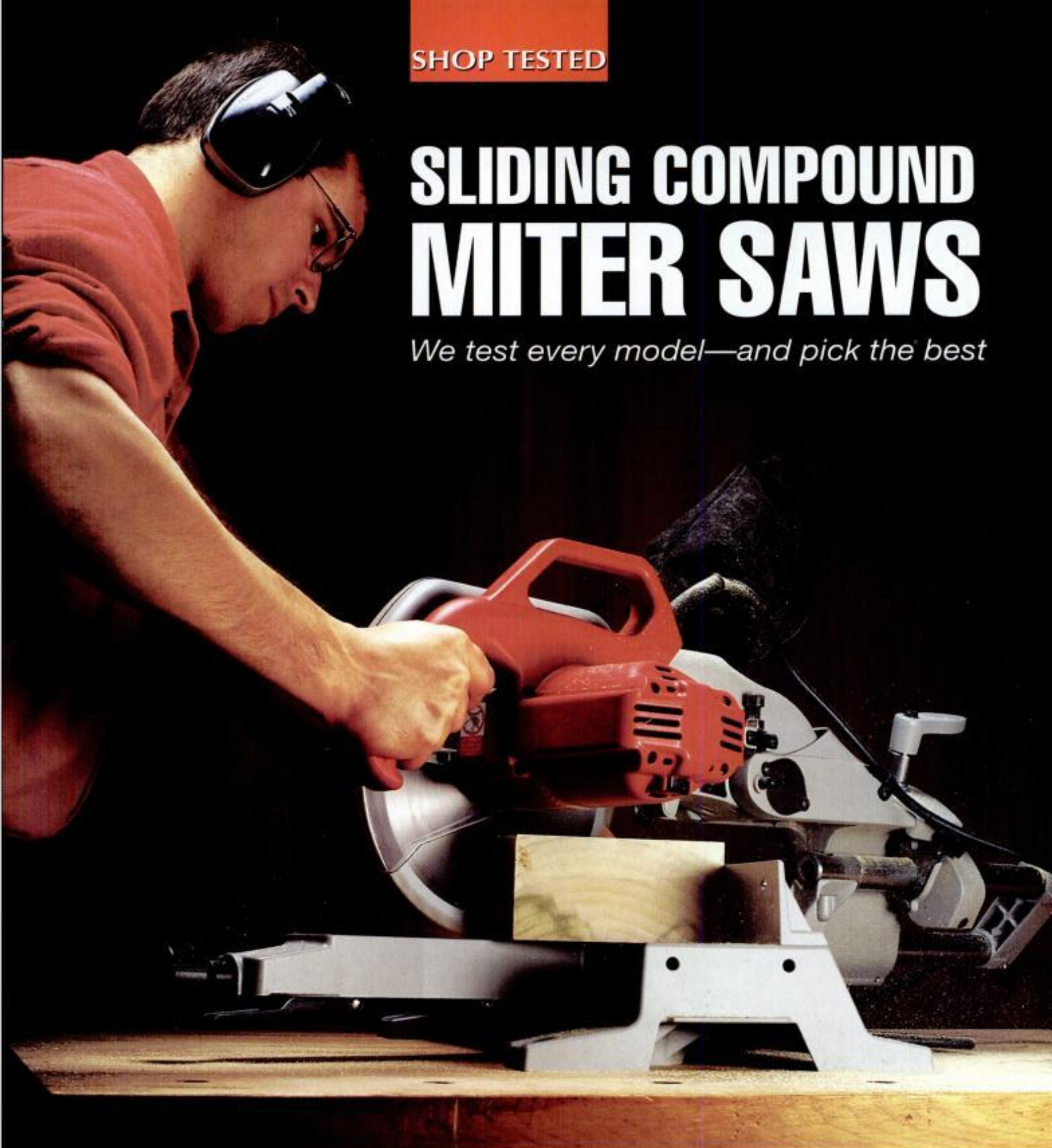
Distressing is next. The aim here is to create a variety of dents, worm holes and scratches with the tools you have on hand. The jagged edge of a broken brick works well; so does an awl. Sometimes I invent stories about "previous owners" to imagine how a piece might have been worn over the years. As a rule, do less distressing than you think you should.

Finally, wipe on a darker stain, such as Behlen's "dark walnut." Wipe most of it off, but allow some to settle into the dents, holes and crevices. Don't let it stay on edges or corners. Protect your antique finish with two coats of satin polyurethane, sanding lightly between coats with 320-grit sandpaper. For even more patina, rub the surface with 0000 steel wool and a dark-colored wax. ▲



WILLIAM DRAPER

and his staff produce original and reproduction furniture in Bucks County, PA.



SHOP TESTED

SLIDING COMPOUND MITER SAWS

We test every model—and pick the best

Making the cut.

A combination of accuracy and cutting capacity have earned sliding compound-miter saws a solid spot in the workshop and on the jobsite.

PHOTO BY JOHN HAMEL

Since Hitachi introduced the first sliding compound-miter saw back in 1986, these versatile saws have mitered and beveled their way to the top of many a woodworker's wish list. It's easy to understand why. A sliding compound-miter (SCM) saw can do just about everything a radial-arm saw can, but it beats the radial-arm in portability, precision, and ease of use.

Framing and finish carpenters were the first to be won over by the SCM saw's ability to travel to the jobsite and handle everything from trimming studs to cutting compound miters in cornice molding. Soon, carpenters and

cabinetmakers were building workstations for their SCM saws back in the workshop. (See "Ultimate Chop Saw Station," AW #31.)

Seven new models have entered the market since AW first tested SCM saws in 1993, and all four of the earlier models have been updated to compete with the newer machines. We ran all the saws through their paces to find out just which one had the best chops.

How They Work

An SCM saw has a pivoting turntable similar to the type you find on a motorized miter box, or "chop saw." Rotate the turntable on its base and you can make miter cuts with the blade vertical to the work. But SCM saws can also cut through wider stock than chop saws can—thanks to a rail system that allows

the motor and blade assembly to slide forward and back.

SCM saws are fairly easy to use. Rotate the turntable for miter cuts. Tilt the motor and blade assembly for bevel cuts. Rotate and tilt to make compound-angle cuts. Or set the table and rail assembly back to square for general cutoff work.

Unlike radial-arm saws, SCM saws are designed to cut on the push stroke. When you need to make a wide cut, you pull the blade and motor assembly forward on the rails, then plunge the blade into the workpiece and push toward the fence. Pushing (instead of pulling) through the cut keeps the blade from climbing up on the stock, as it can with a radial-arm saw.

You can't adjust an SCM saw to rip long boards like you can a radial-arm saw; nor can you fit a dado head on an

SCM saw. However, you can make closely spaced kerfs to rough out a dado or rabbet, by adjusting an SCM saw's cutting depth.

What's Important?

Price is an obvious priority if you're shopping for an SCM saw, and the price range for our test group was large: from \$350 for the Tradesman to \$799 for the 12-in. Makita. Beyond price, there are four major factors to consider: capacity, adjustability, quality of cut, and feel. Surprisingly, power didn't show up as a major consideration. We found that all the machines were able to cut through 8/4 oak without bogging down. Here are the details on the factors that matter.

Cutting capacity—While all the saws can cut through a 2x12 at 0° and a 2x8 at 45°, models with bigger blades can

SLIDING COMPOUND-MITER SAWS

Brand & Model	Street Price	Blade Dia. (in.)	RATINGS			CUTTING RANGE		CUTTING CAPACITY (IN.)			Amps	Weight (lbs.)
			Miter Scales & Locks	Bevel Scales & Locks	Feel	Miter L & R (°)	Bevel R & L (°)	Crosscut at 0° T x W	Miter at 45° T x W	Bevel at 45° T x W		
 Craftsman 23492	\$430	8 1/4	●●●●●	●●●●	●●●●●	47 50	0 45	2 1/2 x 12	2 1/2 x 8 5/8	1 3/4 x 12	10	42
Freud TR215	\$369	8 1/2	●●●●	●●●	●●●●	45 45	0 45	2 3/4 x 11 3/4	2 3/4 x 8 1/4	2 x 11 3/4	9.7	37
Hitachi CBF82	\$489	8 1/2	●●●●	●●●	●●●●●	45 57	0 47	2 9/16 x 12	2 9/16 x 8 21/32	1 25/32 x 12	9.5	38.6
Ryobi TSS200	\$429	8 1/2	●●●●	●●●●	●●●●	45 45	0 45	2 5/8 x 12	2 5/8 x 8 1/2	1 3/4 x 12	10	39
Tradesman 8335	\$350	8 1/2	●●●●	●●●●	●●●●	45 45	0 45	2 9/16 x 12	2 9/16 x 8 1/2	1 1/2 x 12	9	39
 Bosch B3915	\$599	10	●●●●●	●●●●	●●●●●	52 62	3 50	3 1/2 x 12	3 1/2 x 8 5/8	2 1/4 x 12	13	47
Delta Sidekick 36-250	\$499 stand incl.	10	●●●●●	●●●●	●●●●	47 57	0 45	3 5/8 x 11 1/2	3 5/8 x 8	2 x 11 1/2	13	59
Hitachi C10FS	\$749	10	●●●●	●●●	●●●●●	45 57	45* 45	3 11/32 x 12 9/32	3 11/32 x 8 15/32	2 11/64 x 12	10	44
Makita LS1011	\$479	10	●●●●	●●●●●	●●●●●	46 58	0 45	2 15/16 x 12	2 15/16 x 8 7/16	1 9/16 x 12	12	34.8
 Milwaukee Magnum 6496	\$620	10	●●●●●	●●●●●	●●●●	51 59	3 48	3 7/16 x 12 3/8	3 7/16 x 8 3/4	2 1/8 x 12 3/8	15	52
 Makita LS1211	\$799	12	●●●●	●●●●●	●●●●●	60 60	45* 45	4 3/16 x 11 7/16	4 3/16 x 5 11/16	2 1/4 x 11 7/16	15	51.2

KEY: ●●●●● = Excellent; ●●●● = Good; ●●● = Fair; ●● = Poor; ● = Unacceptable.

*These saws bevel left and right. Other saws bevel left only.

cut thicker stock. (See chart, opposite.) For example, the 12-in. Makita can cut through 4³/₁₆-in.-thick material, while the 8¹/₄-in. Craftsman maxes out at 2¹/₂ in. The 10-in. saws occupy the middle ground in terms of cutting depth. If you don't need to cut extra-thick stock, consider an SCM saw with an 8¹/₂-in. blade. You'll save money on the saw itself and every time you buy a blade.

Miter and bevel ranges are the other factors in the capacity equation. All the saws have turntables that rotate both right and left for a miter-cutting range of at least 90°. (See chart.) And all the saws tilt to the left at least 45° for beveling. But only the Makita LS1211 and the Hitachi C10FS can make bevel cuts to the left *and* the right. Left-and-right bevel capability is useful for difficult compound cuts—for instance, when

you're installing crown molding.

Adjustability—How easy is it to adjust a saw to a given miter or bevel angle, and then reset it back to square? To answer this question, we evaluated three features—the scales; the locking mechanisms; and the *detents*, or stops—that make it easy to locate common cutting angles.

In order to set an angle, you need to be able to see it. Clear, easy-to-read miter and bevel scales save time and reduce frustration. For visibility, Delta's miter scale was the hands-down winner. (See top left, page 41.) Located along the outside edge of Delta's oversized turntable, this scale reads clear as day—even to a fraction of a degree.

It was a different story with the bevel scales. Unfortunately, on most of the saws the bevel scale is hidden near the

back, where it's difficult to read. Milwaukee's bevel scale is the most visible of the lot. (See center photo, page 41.)

Once you've found your angle, you need a way to lock it in. Large, accessible locking mechanisms make a difference when you need to switch miter or bevel settings frequently. For miters, we liked the front-mounted handle locks on the Bosch, Craftsman, Milwaukee, the Makita 12-incher and both Hitachis. For bevels, Milwaukee's large-handled lock was the most accessible.

Detents are useful because they lock on common cutting angles. We preferred the wedge-and-slot type detents on the Bosch and Milwaukee saws. (See top right photo, page 41.) They click firmly into place, registering the angle

Text continues on page 41

CRAFTSMAN 23492

Street price: \$430

(800) 377-7414 Circle #601



PROS: Smooth chop and slide action. Easy-to-read miter scale. Scales for crown molding and common rafter miters are clearly marked.

CONS: Wide kerf opening in base can cause tearout. Dust bag doesn't come standard. Utility-grade blade.

FINAL CUT: Buy a premium blade and you've got a solid performer for a great price. A Best Buy.



FREUD TR215

Street price: \$369

(800) 472-7307 Circle #607

PROS: Premium-quality blade. Excellent dust-collection system (optional).

CONS: Awkward bevel lock and miter adjustment. Blade and motor lift too high on pull stroke. No safety on the switch. Only saw-blade guard that doesn't retract automatically with chopping action; instead, pressure from workpiece has to lift guard.

FINAL CUT: Optional dust-collection system makes for a clean-running saw, but slide action and adjustments are tricky.



HITACHI C8FB2

Street price: \$489

(800) 362-7297 Circle #602

PROS: Smooth chop and slide action. Adjustable kerf plates and fence reduce tearout. Bevel detents for crown molding.

CONS: One-color miter scale is hard to read. Bevel scale is one color only, and needs a fine indicator line for easier reading. Utility-grade blade.

FINAL CUT: The first SCM saw is still the best of the 8½-inchers, but it's also the most expensive. Proven durability makes this a great jobsite saw.



RYOBI TSS200

Street price: \$429

(800) 525-2579 Circle #603

PROS: Three-rail sliding mechanism rides sturdily and smoothly. Easy-to-read miter scale.

CONS: Rear-mounted miter lock is awkward to reach and use. Detents feel "soft." Bevel-scale indicator line is too thick to read accurately. Kerf-plate slot is too wide to prevent tearout.

FINAL CUT: A good low-priced saw.



TRADESMAN 8335

Street price: \$350

(800) 243-5114 Circle #604

PROS: Three-rail sliding mechanism rides sturdily and smoothly. Easy-to-read miter scale.

CONS: Rear-mounted miter lock is awkward to reach and use. Detents feel "soft." Bevel-scale indicator line is too thick to read accurately. Kerf-plate slot is too wide to prevent tearout.

FINAL CUT: Looks and acts like the Ryobi, but costs a little less.



BOSCH B3915

Street price: \$599

(312) 286-7330 Circle #605



PROS: Smoothest chop and slide action. Superior detents. Cam-action clamp and extension table come standard. Easy-to-read miter scale. Adjustable kerf plates reduce tearout.

CONS: Utility-grade blade.

FINAL CUT: Extra features, solid detents and comfortable feel make this saw stand above the competition—an Editors' Choice winner.



DELTA SIDEKICK 36-250

Street price: \$499

(800) 438-2486 Circle #606

PROS: Comes with folding legs, large table and built-in table extensions. Quick-action clamp is standard. Easy-to-read miter scale.

CONS: Detents feel "soft." Chopping action is slightly stiff. Awkward handle angle. No safety on the switch.

FINAL CUT: This is the only saw that comes with its own stand; an excellent jobsite SCM saw.



HITACHI C10FS

Street price: \$749

(800) 362-7297 Circle #602

PROS: Smooth chop and slide action. Bevels to left and right. Adjustable kerf plates and fence reduce tearout. Adjustable rear guard deflects small offcuts. Belt drive makes this the quietest model. Electronic speed control maintains constant speed under load. Bevel detents for crown molding.

CONS: One-color miter scale is hard to read. Bevel scale is one color only, and needs a fine indicator line for easier reading.

FINAL CUT: A quiet, high-quality, high-capacity saw.



MAKITA LS1011

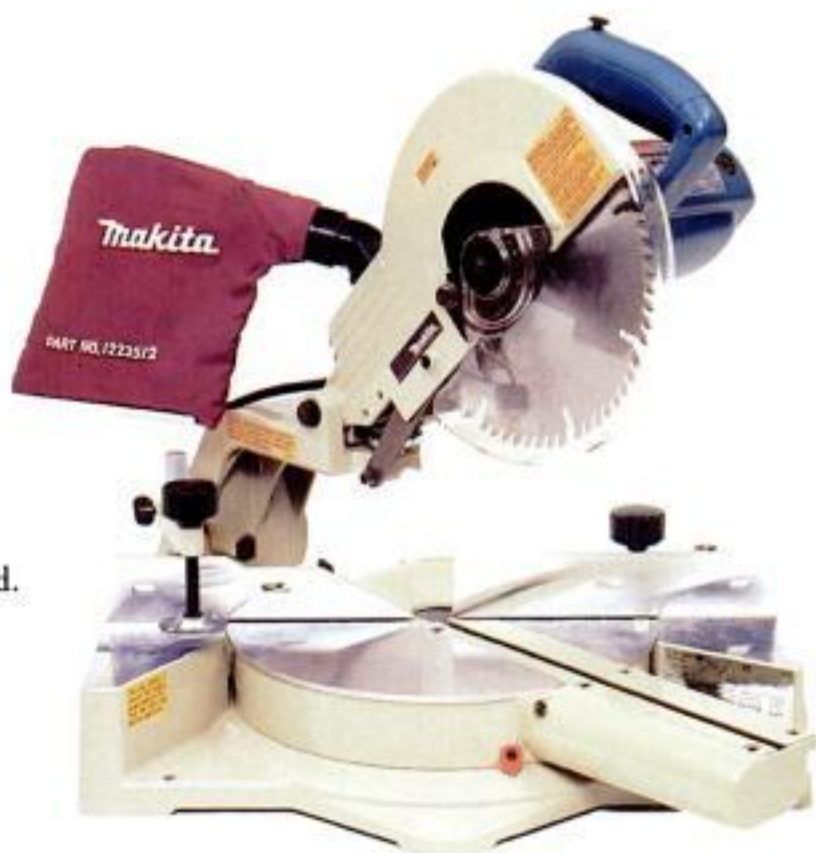
Street price: \$479

(800) 462-5482 Circle #608

PROS: Smooth chop and slide action. Good detents. Easy-to-read bevel scale and large locking handle for bevel cuts. Adjustable kerf plates reduce tearout. Top-quality blade.

CONS: One-color miter scale is hard to read. Rear-mounted miter lock is awkward to use.

FINAL CUT: A veteran among SCM saws with a proven track record. Compact size makes this saw a good choice for jobsite work or for the small shop.



MILWAUKEE MAGNUM 6496

Street price: \$620

(800) 414-6527 Circle #609

PROS: Superior detents. Easy-to-read bevel scale. Large miter-lock handle. Innovative two-way fence. Largest cutting capacity of 10-in. saws.

CONS: Utility-grade blade. No safety on the switch. Dust bag optional on model 6496.

FINAL CUT: Tops in the 10-in. category, and an Editors' Choice winner. This saw has the features and feel of a real workhorse.



Note: Model 6497 (\$689) comes with a dust bag, premium 80-tooth blade, stop gauge and clamp.

MAKITA LS1211

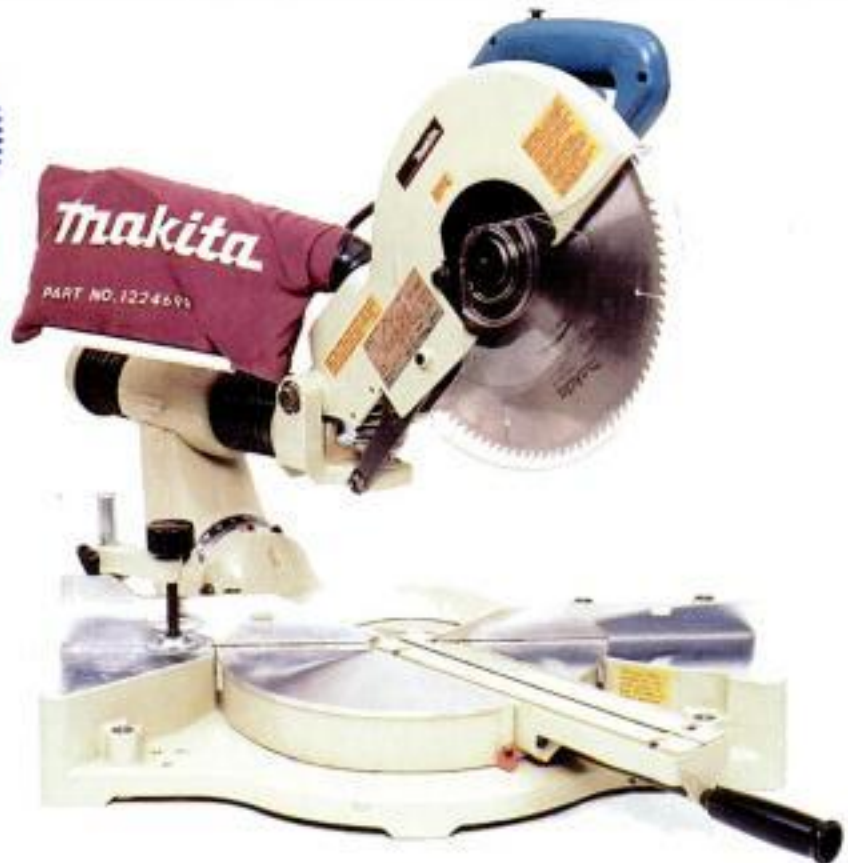
Street price: \$799

(800) 462-5482 Circle #608

PROS: Largest capacity of all saws. Bevels to left and right. Flip-up depth stop. Smooth chop and slide action. Easy-to-read bevel gauge. Premium blade.

CONS: One-color miter scale is hard to read.

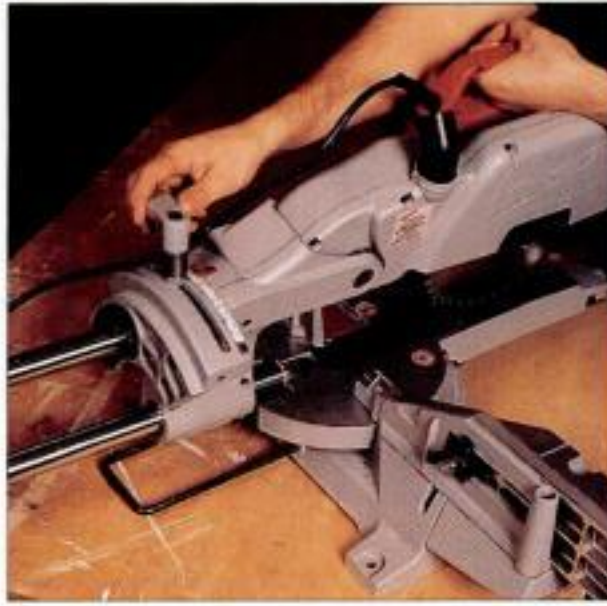
FINAL CUT: Capacity and quality of cut make this saw an Editors' Choice.



FEATURES THAT MAKE A DIFFERENCE



Smooth miter adjustments. Delta's easy-to-read scale and unique squeeze-operated turntable lock make miter adjustments quick and easy.



Big bevel scale. The Milwaukee's easy-to-read bevel scale and large locking lever make it the best saw for locating and locking bevel angles.



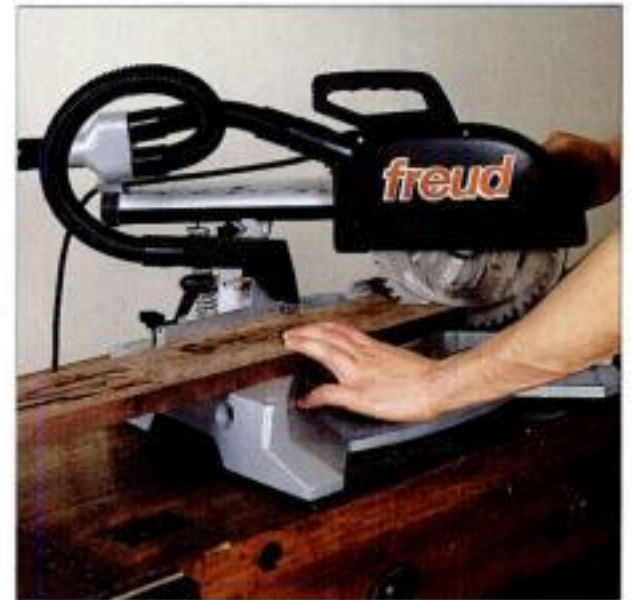
Rock-solid detents. The wedge-and-slot type detents on the Bosch saw give the most positive feel when locating commonly used miter angles.



Flip-around fence. Milwaukee's left-hand fence can be removed and flipped to support tall stock for miter or compound cuts.



Flip-up depth stop. On the Makita LS1211, the depth stop flips out of the way, so you can switch quickly from stopped cuts to through cuts.



Dust solution. The Freud saw's optional vacuum accessory includes dust pickup points at both the blade and the housing.

setting in rock-solid fashion. The ball-and-indent type detents on the other saws were less consistent. Those on the Hitachi and Makita saws registered with a good, solid feel. The Tradesman, Ryobi and Delta saws, on the other hand, were a bit too soft; we missed the positive "click."

Quality of cut—Which saws make the smoothest cuts? To find out, we ran them all through oak, pine and plywood—first using the factory-supplied blades, then using Forrest "Chopmaster" blades designed specifically for power miter saws (available from Forrest Mfg. Co., 461 River Rd., Clifton, NJ 07014, 800-733-7111). With the Forrest blades, all the saws made first-rate cuts. The Makita and Freud saws came with premium blades that cut like the Forrest. The factory-supplied blades on

the other saws didn't do them justice.

Comfort—"Feel" factors make a difference when you're working long hours. We looked for a comfortable handle, smooth sliding action, and just the right balance in the motor-and-blade assembly. With well-balanced spring action, the motor-and-blade assembly chops into the work with minimal effort but also returns solidly to its "up" position. The Bosch, Craftsman, Hitachis and Makitas all came out with impressive feel ratings. (See chart.)

Recommendations

The competition is tough in this tool category. All the saws we tested are good performers—they take adjustments quickly and accurately to make precise cuts at just about any angle.

Three saws earned our Editors' Choice

award for best tool: the Makita LS1211, the Bosch B3915, and the Milwaukee 6496. The Makita's unmatched cutting capacity, premium-quality blade and easily set adjustments made it a clear winner. The Bosch and Milwaukee both had rock-solid detents and substantial cutting capacity—and each had innovative features which placed them ahead of the competition. The Bosch's cam-action clamp helped make it a winner. And the Milwaukee had an easy-to-read bevel scale and unique two-way fence. (See left photo, above.)

The Craftsman saw earns our Best Buy stamp—the best value for the price. This SCM saw is easy to use, with great feel and clearly marked scales. Outfit it with a top-quality blade, and you'll have a first-rate cutting machine at a reasonable price. ▲



Opinel

**A wooden-handled pocketknife
with a rich heritage**

by Simon Watts



Little knife, big stone. Above: Perched on platforms over immense water-driven stones, workers sharpen blades in the original Opinel factory. Right: Located in the French Alps, the original building still stands today.





Big and little. Opinel's #13 has a 5-in.-long blade. On the #2 model, blade length is a mere $\frac{3}{4}$ in.

While strolling along a beach with a friend in Portugal, I came across a pocketknife that had washed ashore. Carefully shaped to fit the hand, the one-piece beech handle looked familiar. I took it home, dried the wood, brushed out the sand and finally managed to open it. Sure enough, stamped on the blade was the well-known Opinel trademark, *la main couronnée*, or the crowned hand. (See photo, right.)

The original Opinel knife was designed by Frenchman Joseph Opinel, who began making them more than a century ago. The knives rapidly became popular with farmers, fishermen and a variety of artisans. The business flourished—so much so that the Opinel enterprise outgrew its original workshop in the French Alps, where water power was harnessed to turn huge sharpening wheels on which thousands of blades gained their edges. (See photos, opposite page.)

The design has remained much the same for a hundred years, although the option of a stainless steel blade was introduced in 1964. As volume increased—it's presently about 3 million knives per year—production methods had to change. Today, computer-controlled lathes spit out handles at the rate of 200 per hour. Assembly is done by robots. But automation hasn't yet reached the blade. Final grinding, sharpening and polishing are still done by hand.

In a world populated by hefty jackknives with metal cases, plastic cladding and vast arrays of fold-out appliances, Opinel stands by its solitary blade and one-piece hardwood handle. Lacking the heft and hard edges of better-endowed pocketknives, Opinel knives never wear a hole in your pocket. The wooden handle gives these implements a distinctly organic feel, and the blade-locking mechanism is ingeniously simple—a small metal collar keeps the blade open or closed with just a slight twist.

When buying an Opinel, your choices range from the miniature #2, with its 2cm ($\frac{3}{4}$ -in.) blade, to the more formidable #13, which sports a 5-in.-long blade. (See top photo.) The longest blade I've found airport security will tolerate is the #6, with a blade length of $2\frac{1}{2}$ in.

Relying on the same folding mechanism and wooden handle design, Opinel also makes anglers' knives with filleting blades and a gardener's folding saw. But the basic knife continues to be the mainstay of business at Opinel. Every now and then the company makes a commemorative model to mark some historical event such as the French Revolution, Columbus' encounter with the New World or, most recently, the D-Day landing in Normandy. (See photo, right.) These

collector's items all have stainless steel blades and handles made of palisander wood.

In the U.S., a limited selection of Opinel knives is offered by Garrett Wade (800-221-2942), and by the Smoky Mountain Knife Works (800-251-9306). ▲

SIMON WATTS is AW's West Coast editor.



Simple and elegant. The steel collar on the knife twists to lock the blade open or closed. Each blade bears the crowned hand logo.



Special editions. Commemorative knives, such as this recently issued D-Day model, are produced in limited quantities. They feature stainless steel blades and handles made from palisander (Brazilian rosewood).





LEAD PHOTO BY JOHN HAMILL, OPPOSITE PHOTO BY SUSANNAH HOEGLDORN

Furniture on the Wild Side

Simple tools, a few sticks and a little imagination are all you need

by Susannah Hogendorn

Travel the winding roads of upstate New York and you'll pass through a number of picturesque towns with rambling houses and towering trees. In one of these villages, Daniel Mack is building an armchair. His tools stand quietly at the ready: a drill press; a vintage tenon-cutting machine; a battered old hammer and a handful of nails. Materials lie in a heap atop the workbench: peeled maple sticks the color of dry bones—some straight and sturdy, others forked and delicate. As the chair nears completion, Mack attaches a simple, upholstered seat of nubby white fabric. (See lead photo.)

This isn't any ordinary armchair. Mack's creation is surprising—it looks *wild*, like it's sprung straight from the woods. But perhaps the biggest surprise is that it doesn't take fancy tools or skills to build. When I went to visit Mack, he explained that common household tools, scavenged wood and a free afternoon are all you need to make a rustic chair. This article will get you started.

\$25 Worth of Tools

Mack has very strong opinions about the tools required for rustic work. "People view tools as a stumbling block: 'I don't have the right hollow auger,' or 'What are those special nails you use?' The fact is, you don't need fancy tools." (See photo, below.)

A Stanley Short Cut™ saw, some clippers and pruning loppers will do for gathering sticks. Mack made his first chair while vacationing at a cabin in the Catskills. His joinery tools appeared at the back of a closet: an electric drill with a brad-point bit for the round mortises, and a penknife to whittle the tenons. He drilled pilot holes for the bent supporting pieces, then attached them with 6d spiral-shank flooring nails for strength.

Simplicity and speed are major factors in Mack's continuing love affair with rustic work. His passion is the artistic side of woodworking, and the ease of rustic construction allows him to concentrate on that. "The moment when the chair 'emerges' from the woods is a pleasant, graceful encounter—



Simple tools. You probably already have all the tools required for rustic work: a Stanley Short Cut™ saw, clippers, pruning loppers, a drill with a brad-point bit, a hammer, some spiral-shank flooring nails, and a penknife.

Bringing the outside in. Self-taught craftsman Daniel Mack makes furniture from sticks at his rural New York workshop. In this article he shares his secrets.



Stick storage. Mack air-dries his "stock" in a loft above the workshop. Sticks are sorted by size and species for easy retrieval.



Natural habitat. Rustic end chairs, "reconstructed" with carved tops and turned legs from antique chairs, coexist with traditional Arts-and-Crafts side chairs in Mack's "organic" dining room. Mack's textured-top table ties it all together.

like catching a look at a buck or a doe. I want to get to that moment, and then I want to move on to the next chair. You can examine the joints if you want, but that's not what the chair's about."

Now that Mack is a professional, speed matters even more, so he's added a few more power tools. He cuts sticks to length on a 10-in. chop saw, and he makes mortises on his drill press. Also, he notes, "My electric tenon cutter is absolutely essential. I used a hollow auger for three or four years, but I was making tenons more than chairs. And prior to that, I was whittling."

Wood from the Backyard, Not the Lumberyard

Materials for rustic work often come straight from the forest. When Mack was starting out, he cut down small, unwanted trees on the property of friends and neighbors. These days he buys his wood from rural acquaintances across the country. But you don't need backwoods access; Mack used to scavenge wood from brushpiles in city parks. And for suburban rustics, local landscapers and tree surgeons can be a gold mine of free material.

When hunting for wood, Mack cautions, don't expect to find perfectly straight lines. Do think about the scale and the style of the piece you want to build. Consider the parts you'll need. Mack has developed a talent for "seeing furniture" in the trees; you, too, can develop your eye with practice. (See sidebar, opposite page.)

Just Do It

"The best way to learn is to make a lot of chairs, as fast as you can," says Mack, who taught himself this way. He recommends starting with nailed construction: It's quick, you can work the wood green, and you can build right in the backyard. "To get the proportions, start with your favorite kitchen chair and make twig mates to all those pieces. Make a nailed frame, then bend and tack twigs around it until it feels sturdy. It's easy to do, and it really feeds your need for immediate gratification."

Mortise-and-tenon furniture requires a little more patience and some storage space, because the sticks must dry before construction can begin. The traditional rule of thumb for air drying is to allow one year for every inch of diameter. "Find someplace dry," Mack advises, "not under a tarp in the backyard and

not the basement. You can use the rafters of the garage, or possibly the attic. In the early days I worked out of our apartment, and as more and more sticks came into the apartment, we moved into different rooms. At one point, my wife and I ended up sleeping in the foyer, because my workshop was in the living room and our daughter took our bedroom!" Now that Mack lives in the country, he's converted a small barn in his backyard into a studio, and he stores sticks in the loft upstairs. (See top photo, opposite page.)

Once you've built a couple of chairs, it's time to try some experiments. Consider the space between the sticks, just as you'd consider the placement of the sticks themselves. Vary the proportions and diameters. Experiment with new—and old—materials. (See bottom photo, opposite page.) Above all, says Mack, don't be afraid to try something unorthodox; that's what it's all about.

Finishing Touches

Bark-covered pieces can be left unfinished, but Mack shared a couple of trade secrets: If a piece has particularly smooth, attractive bark, he sometimes buffs it with steel wool and wax. And he sands peeled maple pieces, such as the center chair at right, using a random-orbit sander and 220-grit paper.

Of course, as with all aspects of rustic work, the sky's the limit when it comes to finishing. Some people enhance peeled work with bright-colored stain; others whitewash their rustic furniture for an airy look.

Proceed with Courage

"Rustic woodworking," Mack notes, "is a very brisk experience. You have to be an inventor. There really is no set of directions that can get you there." With rustic work there are no plans, and no two pieces are alike. All that's required is the courage to experiment. Whether you're a professional cabinetmaker or a weekend warrior, maybe it's time to take a walk in the woods—and take a look around. Maybe you're ready for rustic. ▲

SUSANNAH HOGENDORN
is an assistant editor
of *AW*.



BEYOND THE BASICS

Developing an eye for design



Rustic work looks casual, but it offers a design challenge. There's often a seduction in the woods—the most bizarre trees somehow catch your eye, and you want to make use of every unusual stick you see.

Yet good rustic work isn't outrageous. It should surprise you a little bit later on, with its subtlety. Aggressive understatement is what I strive for—not "wowing" people with the size or the scale of my work.

To create a beautiful piece of rustic furniture, you have to do two things. First you have to summon the sense of adventure to do it—to make that chair. At this level, things just sort of "run out;" your creative juices are flowing. But then your head has to kick in and "edit" the stuff: "Gee, although eight of these sticks are really interesting, I'm only going to put a twisted one in the back post there, so it gets discovered later on." With practice and concentration, your work becomes more artistically controlled.

DANIEL MACK
has written two books on rustic furniture: *Making Rustic Furniture* (1992) and *The Rustic Furniture Companion* (1996, Sterling/Lark Books, 50 College St., Asheville, NC 28801).



◀ **Child's chair, 1984.** Mack chose crooked sticks for the arms for a curved effect and placed them symmetrically.

JOHN HAMEL

▶ **Peeled maple chair, 1992.** Gothic cathedrals took their arches from trees outside. Mack returned the compliment.

BOBBY HANSSON



◀ **"Chairmaker's chair," 1993.** Mack's recent work features assemblage—artistic use of found objects. This chair is made from tools.

BOBBY HANSSON





A feast for the eyes. The top of this Arts and Crafts-inspired dining table appears to hover above the tapered legs and contrasting slats of the base.

Floating-Top Table

A unique base construction gives the top a visual lift

by Kevin Kopil

The dining table is certainly one of life's most useful pieces of furniture. Like any form of popular furniture, it comes in styles too numerous to mention. So it's not easy to come up with a new dining-table design—one that can evoke the timeless appeal of traditional furniture while at the same time expressing fresh ideas in form, proportion and color.

With the table shown here, we've found that successful synthesis of new and old. The design reflects influences from Shaker and Arts and Crafts furniture, Japanese architecture, plus my own ideas and those of the craftsmen that work in my shop. (For more on how the design evolved, see the sidebar opposite.)

I call my table the "floating-top table"

because of the way the top appears to rise or float above the base, giving the table an airy feel. The real secret to the floating top is in the base. The legs on this table don't connect to the top—or even to an apron—as they would on a conventional table. Instead, three recessed battens support the top, lifting it free of the base. (See Fig. 1.)

In contrast to the floating top, the base appears firmly anchored. The tapered legs broaden as they reach the floor, and they connect to thick, heavy rails. Multiple spindles, a decorative centerpiece and the contrasting colors of natural cherry and ebonized wood create an architectural-looking base that sets off the simple, two-piece top. To keep the top from floating away altogether,

we "tied" it visually to the base with black butterfly keys.

Although the base looks complex, the table is not that complicated to build. The drawings give all the dimensions and joinery details you need. First I'll explain the construction sequence, and then I'll discuss the highlights of the building process.

Construction Sequence

When we build a dining table like this one, we start by milling all the parts to size, except for the two lower rails, which we cut to the same length as the top rails. (See Fig. 2.) Later, we'll angle the ends of both top and bottom rails to fit the angles of the tapered legs. Once the stock is prepared, we drill for the dowels.

DESIGNING A TABLE FROM SCRATCH

Designing an original piece of furniture is always a challenge, but it's simpler once you realize that it starts with a single idea. That idea snowballs, generating more ideas along the way. Luckily, I'm surrounded by top-notch craftsmen in my shop, so I get everyone involved in the design process.

For my "floating-top table," I started with the idea of a piece in the Arts and Crafts style: sturdy, simple, with an honest use of solid wood. Looking at museum catalogs of the work of Frank Lloyd Wright, I was drawn to his use of cantilevers, angular geometry and repetitive, vertical lines. But his furniture was too heavy-looking for my taste.

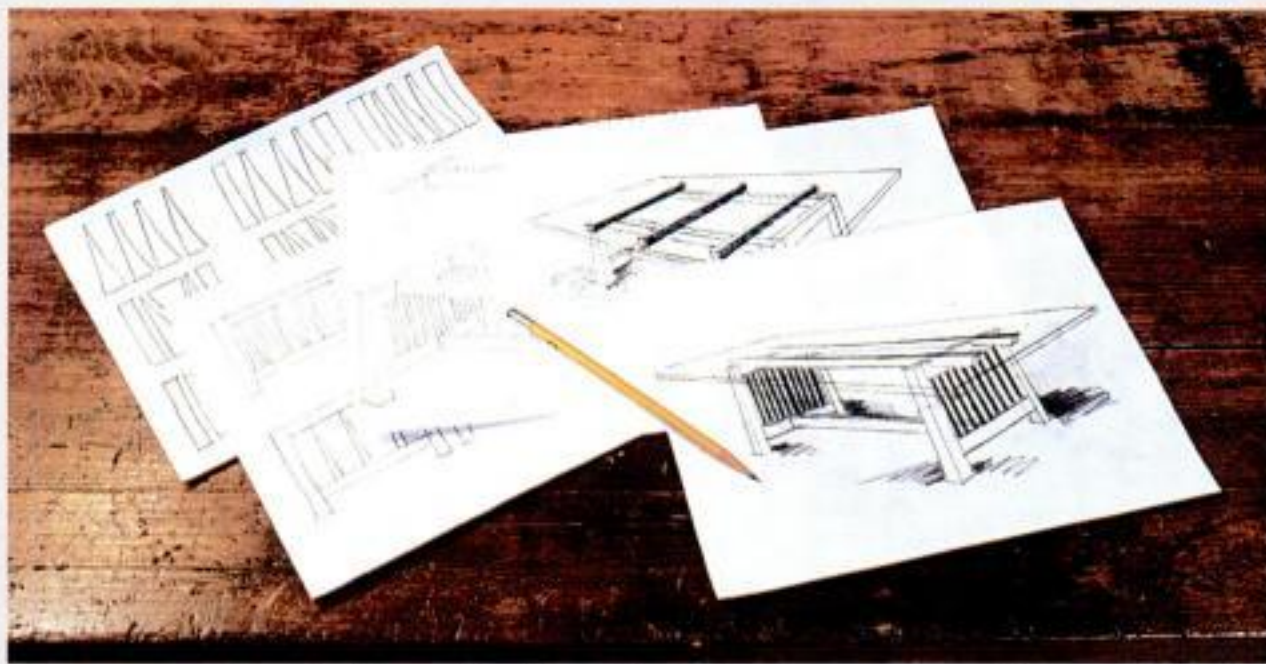
How to lighten up the look without losing that Arts and Crafts feel? We saw two opportunities: proportions and color.

Tapered legs and slats would give the table some visual lift. And using cherry, with its light tones and spectacular grain patterns, seemed quite the opposite of the dark oak typical of Arts and Crafts furniture. Since I like contrasts, I thought of accenting the cherry with ebonized wood.

With all these ideas in motion, it was time to sketch them on paper. Our sketches aren't fancy. The point is to get down on paper the ideas that are floating around in your head. Much to my surprise, the drawings showed a style reminiscent of the sweeping architecture of Japanese temples.

Rather than tone down this oriental flair, I decided to play it up. We added more slats in a decorative centerpiece. Thick, massive rails worked with the architectural theme. Then we beveled and angled ends and edges.

With such a complex base, the top needed to be simple. The clean lines of Shaker tables came to mind. And to keep the airy feel, we decided to set the top on tall battens, rather than fixing it to an apron in the conventional method. Adding



***From concept to final form.** Kopol's table design began as a collection of varied geometrical forms. Refining proportions and resolving joinery details yielded a design that was ready to be mocked up in the shop.*

the black butterfly keys tied the top to the base. At this point, the name "floating-top table" seemed to describe how the top appeared to rise above the base.

The next step was to build full-size mock-ups of the more complicated parts, such as the end assemblies and the centerpiece. Our mock-ups are pretty rough-shod affairs. We take care to size the stock accurately, then we slap parts together, stand back and look for opportunities to improve.

From mock-ups we went into the shop proper and began construction. As we build, we keep asking questions about the design—and posing answers. And we review our construction methods to make them more efficient. The result? An evolution in a series: The second table will have refinements that the first table lacked.

Interestingly, after we designed and built our first "floating-top" table, I learned that Frank Lloyd Wright was an impassioned collector of Japanese prints known as *ukiyo-e*—Japanese for "pictures of the floating world." —K.K.

Then we taper the legs and the slats, and ebonize the slats, the battens and the blocks for the centerpiece. Next, we assemble the centerpiece and glue up the end assemblies. To complete the base, we join the end assemblies together by installing the three stretchers, along with the centerpiece. Adding the stub rails is the last step.

The two-piece top is easy to make; it's just a matter of selecting or gluing up two beautiful boards and joining them with butterfly keys. (See sidebar, page 53.) We keep the base and top separate until both subassemblies have been coated with finish. To keep the butterfly joints from popping while the top is separate from the base, we screw scrap battens underneath the top.

Construction Details

Dowel joinery—We use grooved dowels to join all the parts. (See Figs. 2 and 3.) Dowels are strongest when used in pairs on wide parts to resist twist. Dowel joints simplify joining the angled parts of this table, such as where a tapered leg meets a rail. We drill all the dowel holes in the tapered stock—legs and slats—while these parts are still square. In our shop, we use a commercial horizontal boring machine for drilling. You can make accurate dowel holes with a plunge router and $\frac{3}{8}$ - and $\frac{3}{4}$ -in. spiral up-cutting bits.

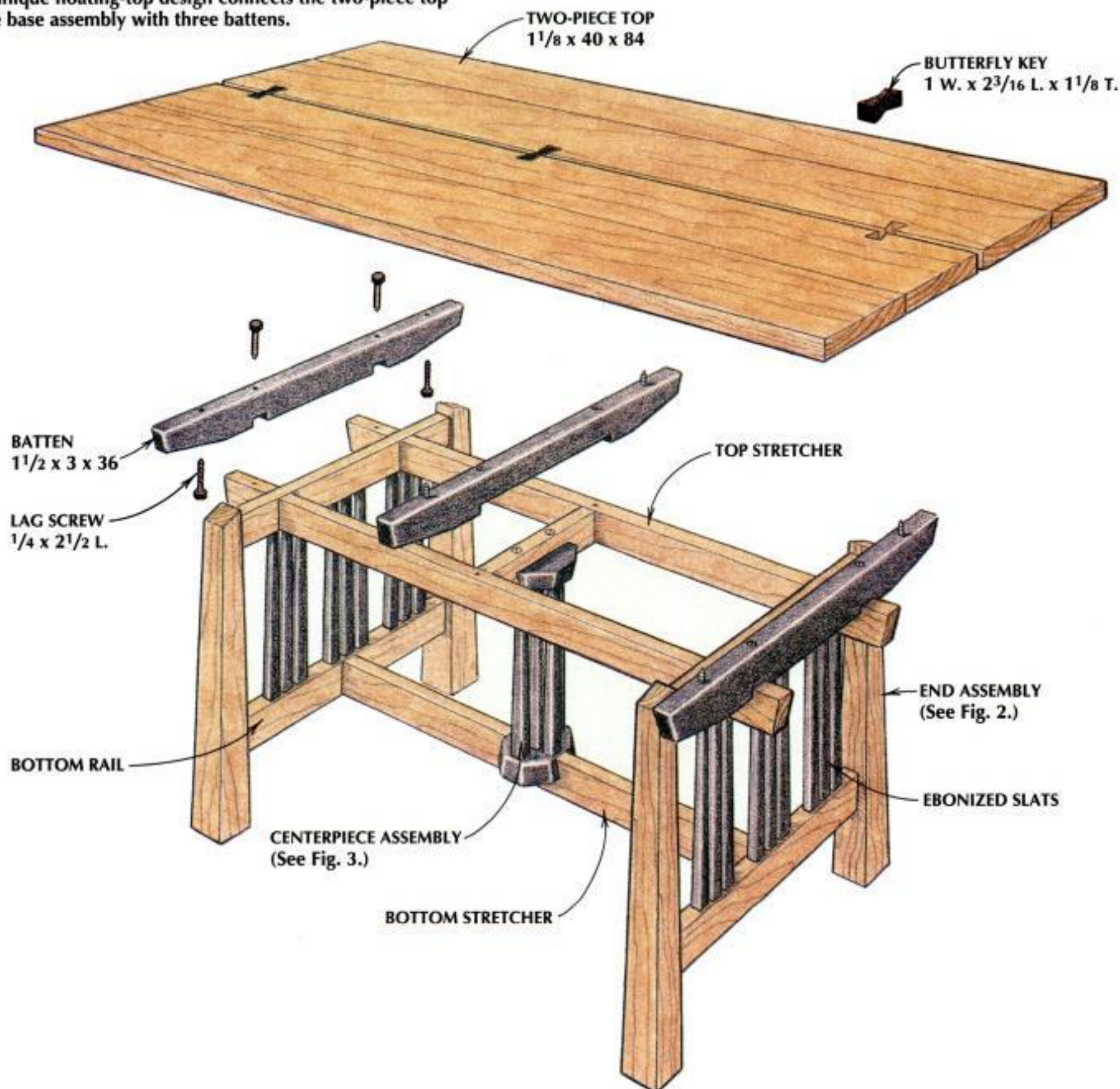
Four-sided tapers—We taper the legs and slats on the tablesaw with a tapering jig. The jig rides in one of the miter grooves on the saw and holds the stock at an angle to the blade. (See photo, right.)



***Cutting four-sided tapers.** The author tapers the slats by ripping two adjacent sides; then he inserts a spacer in the jig and rips the remaining sides.*

FIG. 1: FLOATING-TOP TABLE

This unique floating-top design connects the two-piece top to the base assembly with three battens.



First we rip two adjacent sides, then we insert a spacer between the stock and the jig's fence and rip the other two sides.

Sawing octagonal blocks—We use a sliding compound-miter saw to cut the angles and bevels on the two center-piece blocks. You can get the same results on the bandsaw if you tilt the table to 10°, saw the blocks to shape, then clean up with a sharp hand plane.

Notching stretchers and battens—

Angling the end assembly. Kopil cuts the angles on the rails by clamping the end assembly against the angled fence of a crosscut jig that rides against the tablesaw fence.



Center of attention. The centerpiece blocks fit into notches that are cut in the top and bottom stretchers. Screws hold the blocks in place.

The top and bottom stretchers are notched 10° to fit the beveled edges of the centerpiece blocks. The battens at both ends of the table are notched to fit over the stub rails, and the center batten fits over the two long stretchers and the center stretcher.

We cut the notches on the tablesaw, tilting the saw blade 10° to cut the angled shoulders on the stretchers. We use a dado blade for the 90° cuts. A sharp chisel comes in handy for cleaning up the corners on the stretchers where the blade can't reach.

Ebonizing—To get that jet-black color on cherry, we ebonize the slats, battens and blocks with an alcohol-based, black aniline dye that we buy from our local Sherwin Williams distributor. We brush on two coats of the dye, sanding lightly between coats with 320-grit paper. Be careful not to sand through the dye, or you'll expose the cherry and the work will look splotchy. Once the second coat of dye has dried, we seal the ebonized parts with two coats of lacquer.

Angling the end assemblies—When the parts have been ebonized, we glue up the black slats and the rails to fabricate the end assemblies. Then we make the angled cuts on the ends of the rails so they'll fit the tapered legs. We do this by clamping each assembly to a

FIG. 2: END ASSEMBLY

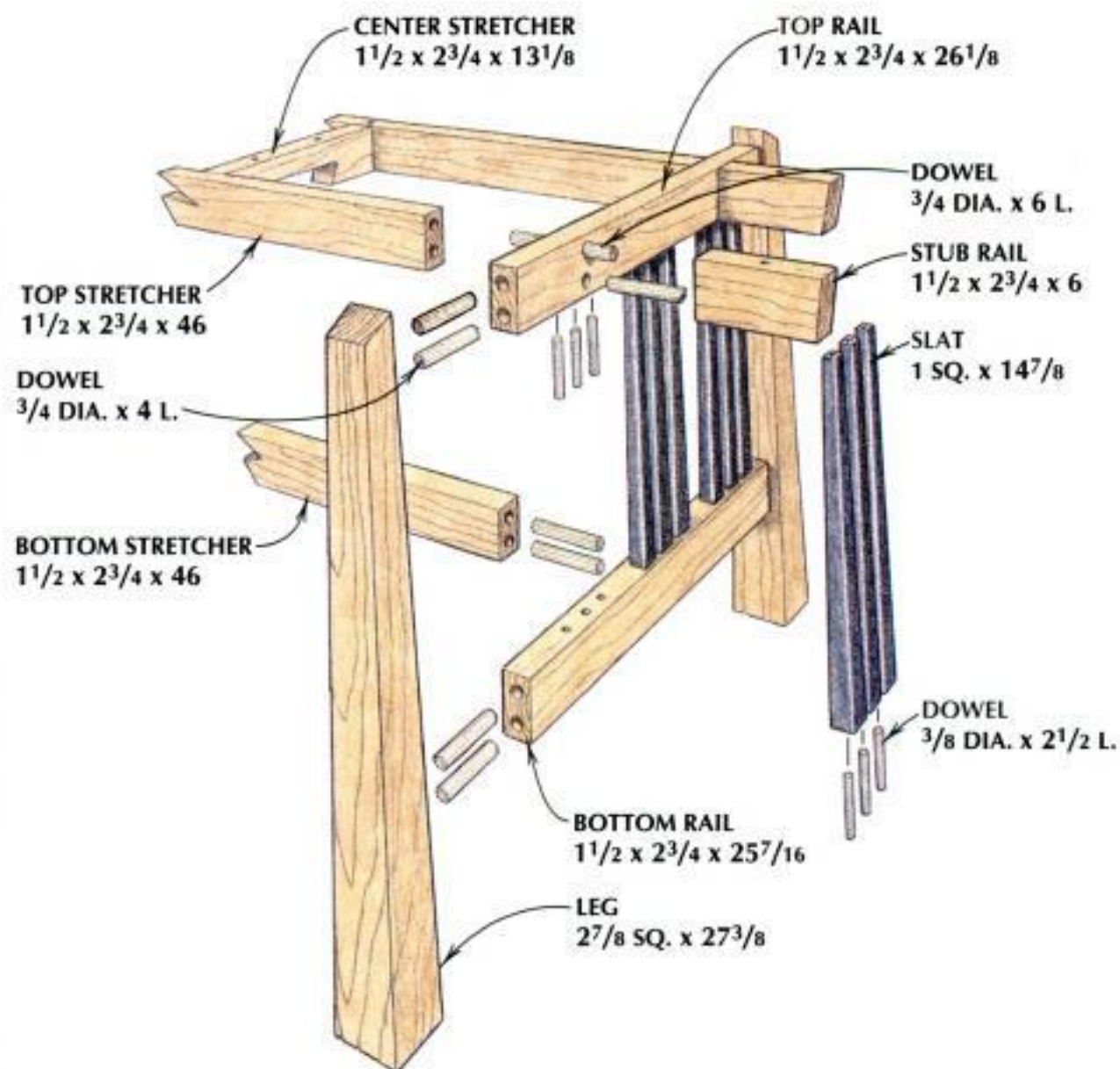


FIG. 3: CENTERPIECE ASSEMBLY

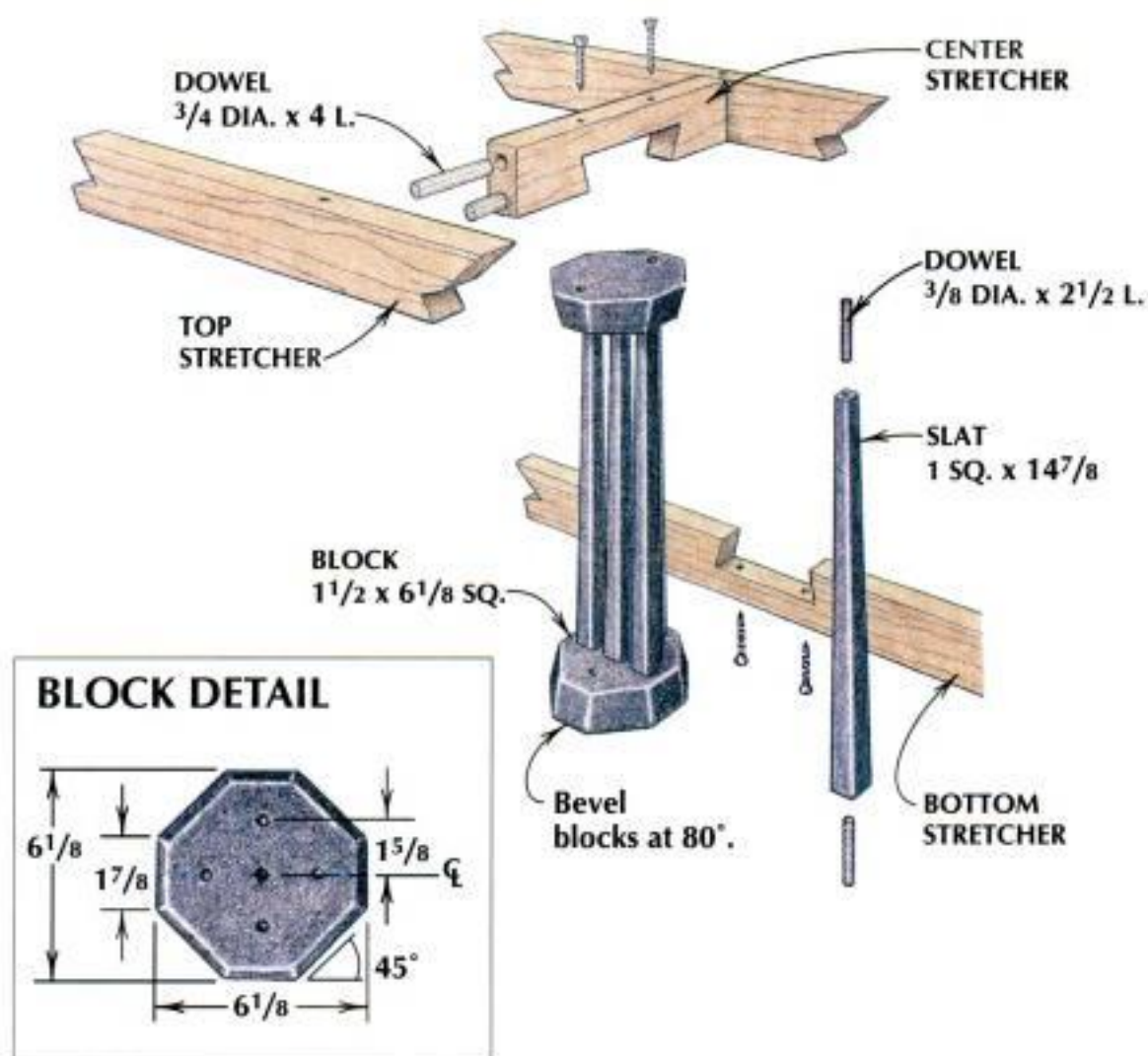
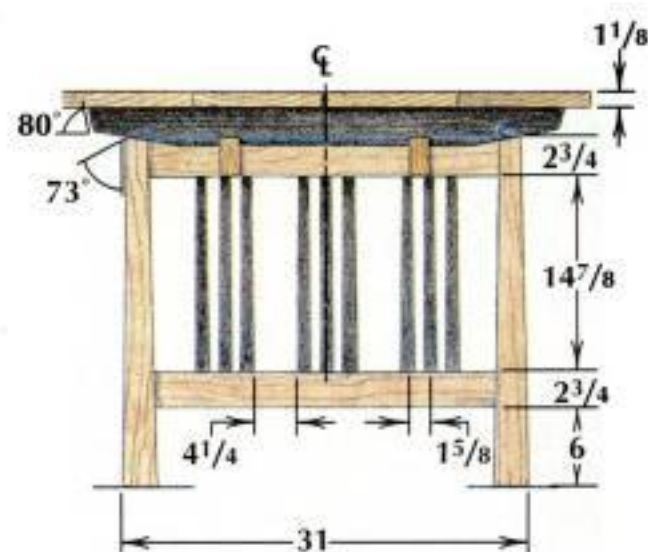
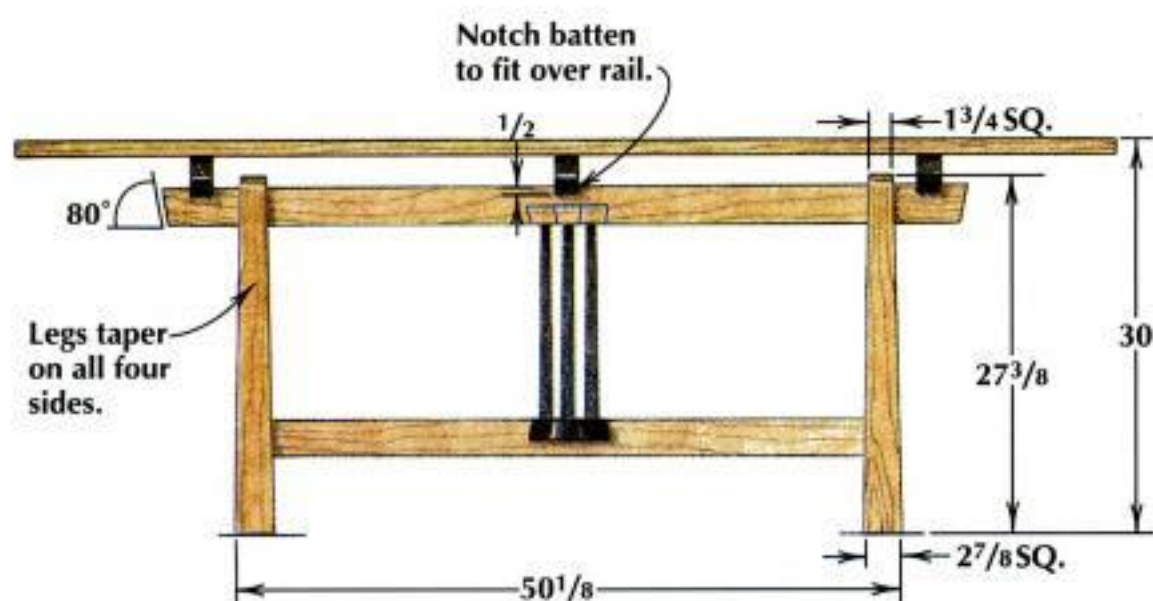
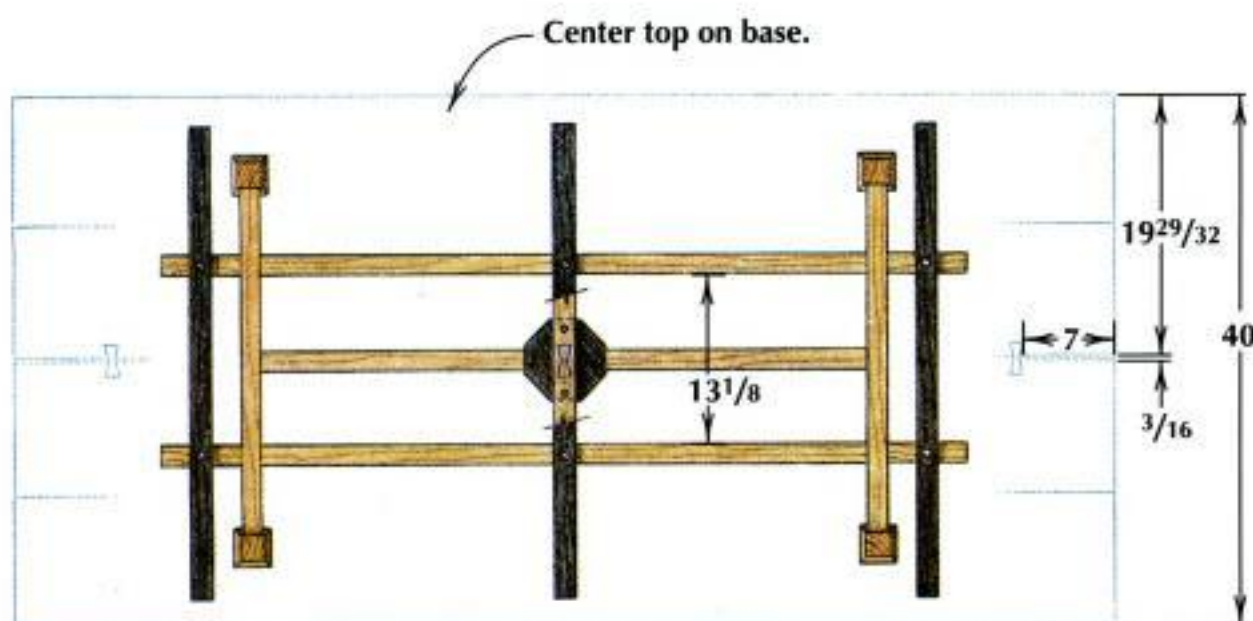


FIG. 4: TABLE DIMENSIONS



simple, sliding jig on the tablesaw. (See photo, page 50.) The jig's fence needs to be angled slightly so that it matches the amount of taper in the legs. To determine the exact angle of the fence on the jig, we made a full-scale drawing

of the end assembly with the legs in place. Once all of the rails are cut, we attach the legs.

Finishing with lacquer—We spray finish with Krystalac Plus—the same pre-catalyzed lacquer that we use on

most of the furniture in our shop (available from Sampson Coatings, 1900 Ellen Rd., Richmond, VA 23230, 800-368-2677). Spraying lacquer is a great way to get a beautiful, durable finish—quickly. We spray three to four coats on the base and on the top, sanding with 220-grit steatrated paper between coats. Since each coat of lacquer flows evenly over and into the previous one, the final coat goes on as smooth as silk without further fuss.

We wait a couple of hours for the lacquer to dry. Then we lift the top onto the base, center it and secure it by running lag screws through the battens and into the top's underside. The floating-top table is complete. Now, on to more new designs! ▲



Gluing up. James Hall, a craftsman at Kopil Design, assembles the base by joining the end assemblies to the rails and stretcher. Angled clamping blocks, taped to the ends of the stub rails, help direct the clamp pressure.



KEVIN KOPIL
and his craftsmen
design and build
furniture in Vermont.

PHOTO BY ANDY RAE

MAKING A BUTTERFLY JOINT

by Lew Johnson



A graceful bridge. A butterfly key is an attractive detail with the strength of a dovetail.

Commonly seen in the furniture of the late George Nakashima, the butterfly joint is a detail that turns heads. With its dovetail angles, the butterfly is strong, too. Nakashima used the butterfly to span splits and cracks in the wood that nature provided him; we use it to bridge an intentional gap between the two boards of our "floating-top table." (See main article.) All you need to make this joint is a tablesaw, a router and a simple jig, as shown here.

For this table, we make our butterfly keys from "Ebon-X" (available from SuperTech Woods, Box 242, Schoolcraft, MI 49087, 501-767-0608), an ebony substitute made from walnut impregnated with dye that colors the wood black. The dye is consistent throughout the wood, so we can scrape and sand without losing the rich black tones.

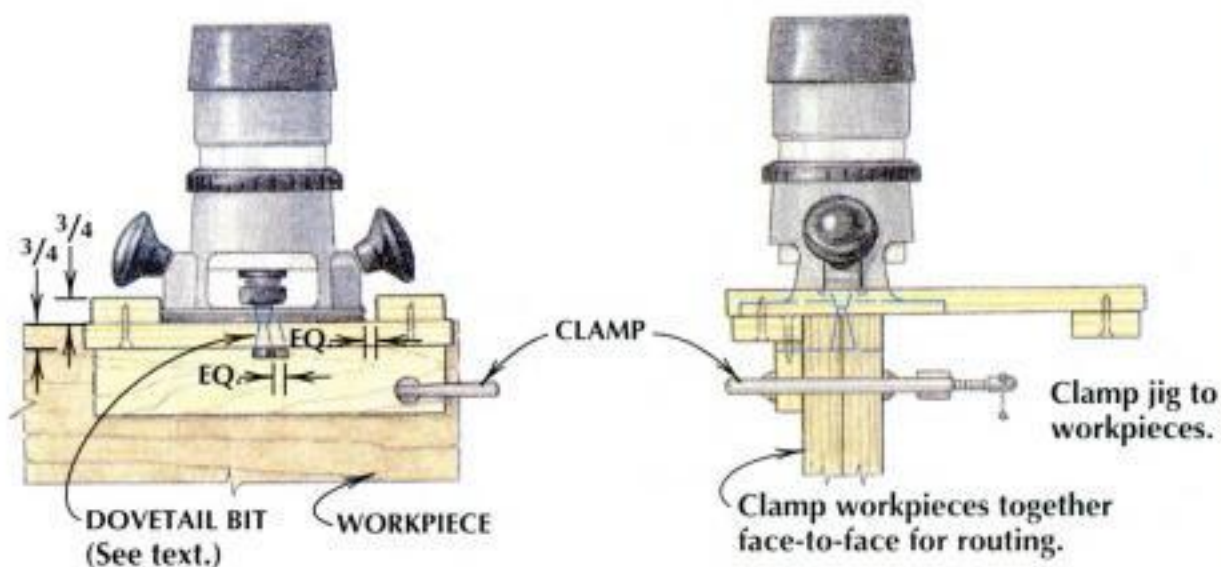
I rout the matching butterfly sockets at the same time by clamping the two boards face to face. The router is guided by a jig clamped to the boards. (See photo, above right.) The key to routing accurate sockets is to make sure the edges of your boards are straight, and to clamp the edges perfectly flush with each other. I use a 7° angle, 5/8-in.-dia. dovetail bit because I like the shallow shape it produces (part #DT35, available from Keller and Co., 800-995-2456).

Next, I cut the butterflies on the table-saw to fit the sockets I've just routed. Each blank is too small to cut safely on its own. My solution is to glue the blank to a piece of scrapwood and machine the blank and scrap as one piece, as shown in the photo at right. I tilt the blade to match the angle of my dovetail



Routing the sockets. With the tops of the tabletop boards clamped face to face, the author uses a simple plywood jig to rout the sockets for the butterfly key.

A JIG FOR ROUTING BUTTERFLY SOCKETS



bit and I adjust blade height to the center of the stock. Once I've cut a butterfly, I check its fit in one of the sockets. If it's too tight, I'll adjust the fence and trim a hair off until the parts go together with light blows from a mallet. Then I band-saw off the scrap and glue the butterfly in place, leaving it proud of the surface. After the glue has dried, I use a hand plane and a random-orbit sander to level the butterfly flush and smooth. ▲



LEW JOHNSON is a professional woodworker at Kevin Kopil Furniture Design.



Ripping a key. The author rips a butterfly key from a blank of Ebon-X glued to a piece of support stock.

Build a Cigar Humidor

Four simple secrets to keeping stogies fresh

by Dereyk Patterson

A while back, a good friend turned me on to smoking cigars. "Now you need a humidor to store them in," he remarked.

"A humidor? What's that?" I wondered. Could I make one? My woodworker's curiosity was stirred—I had to know more.

Here's what I discovered: A humidor is indeed a box used to store cigars or pipe tobacco. But it's not just any box. Inside, you must have the proper environment for the smoke you store. Cigars need just the right amount of moisture to stay in tip-top shape. Gordon Mott, managing editor of *Cigar Aficionado* magazine, says that if the temperature inside the humidor is 70° F, the relative humidity should be 70%, give or take a few percent. A well-made humidor can provide this optimum environment.

Humidor Design

So what's involved in building a box that holds the correct humidity level? There are four key aspects to humidor design, which I'll describe below. For some tips on how I built the box shown here, see the sidebar on page 56.

A cigar humidifier—Made specifically for humidors, a cigar humidifier holds and releases moisture, keeping those expensive stogies fresh. Expect to pay anywhere from \$50 to \$100 for a good humidifier. I like the Credo Precision 70. At \$60, it's priced right, and it will humidify up to 100 cigars. (See Sources.) Once you've installed the humidifier inside the box, you need to

"charge" it every so often with distilled water. I recommend that initially—and again every six months or so—you charge the humidifier with a 50/50 mixture of distilled water and propylene glycol, a humectant that helps the humidifier retain water. (See Sources.) Some humidor makers skip the glycol, but this means you'll have to monitor the humidifier more often in order to maintain its water content.

A hygrometer—To gauge the humidity level inside the box, you'll need a hygrometer. Available in analog- or digital-readout versions, this device tells you if the humidity level is in the correct range. I like the hygrometer sold by Woodcraft. It's accurate, and it cost me just \$6.50. Digital-readout hygrometers are generally more accurate, but they can get expensive. (See Sources.)

A cedar lining—Not just any type of cedar, but Spanish cedar. (See Sources, opposite, and "Wood Facts," page 64.) And don't put a finish on it. This particular type of wood acts much like a sponge, absorbing and releasing moisture. It also resists mildew. And Spanish cedar is revered for its spicy scent, which complements the aroma and taste of the cigars themselves.

An airtight seal—To keep precious moisture inside, the box needs to close with an airtight seal. To create this seal, you build a 1/4-in.-tall lip at the point where the box opens and closes, as shown in Fig. 2 on page 57.

The rest of humidor design and construction comes down to personal

choice. The size of your box will depend on how many cigars you want to store. The box shown here will hold about 100 cigars. Any more than 200 cigars and you're into cabinet-size humidors. The average length of a cigar is about 8 in., so I recommend an interior width or length of at least 8 1/2 in. (See Fig. 2.)

As you design your humidor, think of the outside of the box as an opportunity to show off the gorgeous wood you've been saving. You can join the sides of the box however you like—pegged butt joints, dovetails, or the splined miters that I use. (See sidebar.)

Finishing Thoughts

Coat the outside of your humidor with your favorite finish, but leave the Spanish cedar lining bare. After you've installed your humidifier and charged it, let the box stay empty at room temperature for about a week. This break-in period will allow the moisture level to stabilize. Then load up your precious cargo—I'm partial to Macanudo #1 Vintage. Monitor the box periodically by keeping an eye on the hygrometer, and by rolling a cigar in your hand: A good stogie should be firm, but soft. ▶



DEREYK PATTERSON

is a furniture maker and cigar aficionado; he lives in Garrison, New York.



Inside secrets. The interior of Patterson's humidor is fitted with the essential ingredients for proper cigar storage. Attached to the lid, a humidifier and a dial-type hygrometer promote humidity control. The cigars are surrounded by Spanish cedar, and a wooden lip keeps the box airtight.

SOURCES FOR HUMIDOR SUPPLIES

Humidifiers are available at local tobacconists or from:

Smokin' Joes
6332 Baum Dr.
Knoxville, TN 37919
(800) 752-4427 *Circle #611*

Woodcraft
Box 1686, Parkersburg, WV 26102
(800) 225-1153 *Circle #612*

Propylene glycol is available at local tobacconists or pharmacies, or from:

Chem Lab Supplies
1060-C Ortega Way, Placentia, CA 92670
(714) 630-7902 *Circle #613*

Hygrometers (analog or digital) are available at your local Radio Shack store or from:

Precision Movements
4283 Chestnut St., Emmaus, PA 18049
(800) 533-2024 *Circle #614*

Wind and Weather
The Albion Street Tower, Box 2320
Mendocino, CA 95460
(800) 922-9463 *Circle #615*

Spanish cedar is available from:

Central Distributors
2605 Rodney Lane, Dallas, TX 75229
(800) 460-2030 *Circle #616*

Maurice L. Condon Co.
250 Ferris Ave.
White Plains, NY 10603
(914) 946-4111 *Circle #617*

Groff & Hearne, 858 Scotland Rd.,
Quarryville, PA 17566
(800) 342-0001 *Circle #618*

Hinges (wire-stay hinge, item #73HV13; Brusso stay hinge, item #HBR17) are available from:

Whitechapel Ltd.
Box 136, 3650 West Highway 22
Wilson, WY 83014
(800) 468-5534 *Circle #619*

HOW I BUILT MY HUMIDOR



A good cigar deserves a handsome home. I'm partial to cherry because of its beautiful color and elegant grain, so I used it for the outside of my humidor. While the look of my box may be sleek and modern, its construction is conventional and it's not difficult to build. Here are some tips I discovered for the trickier aspects:

•**Start with a rectangle.** Miter the sides

while the stock is still square, and groove them to hold the top and bottom. Then glue up the box.

•**Kerf the corners.** Cut the slots for the splines on the tablesaw with a jig similar to the one I use. (See left photo, opposite page.) Then glue the splines into the slots and trim them flush.

•**Saw the lid.** Separating the top from the box is a simple tablesaw operation.

Tapered sides and splined corners.

The author's humidor holds about 100 cigars. The sides and top are cherry; the splines and handle are ebony.

Set the blade height about 1/16 in. shy of the thickness of the box's sides, and rip all four sides by holding the box against the fence. (See center photo, opposite page.) Finish cutting through the sides with a handsaw or razor knife.

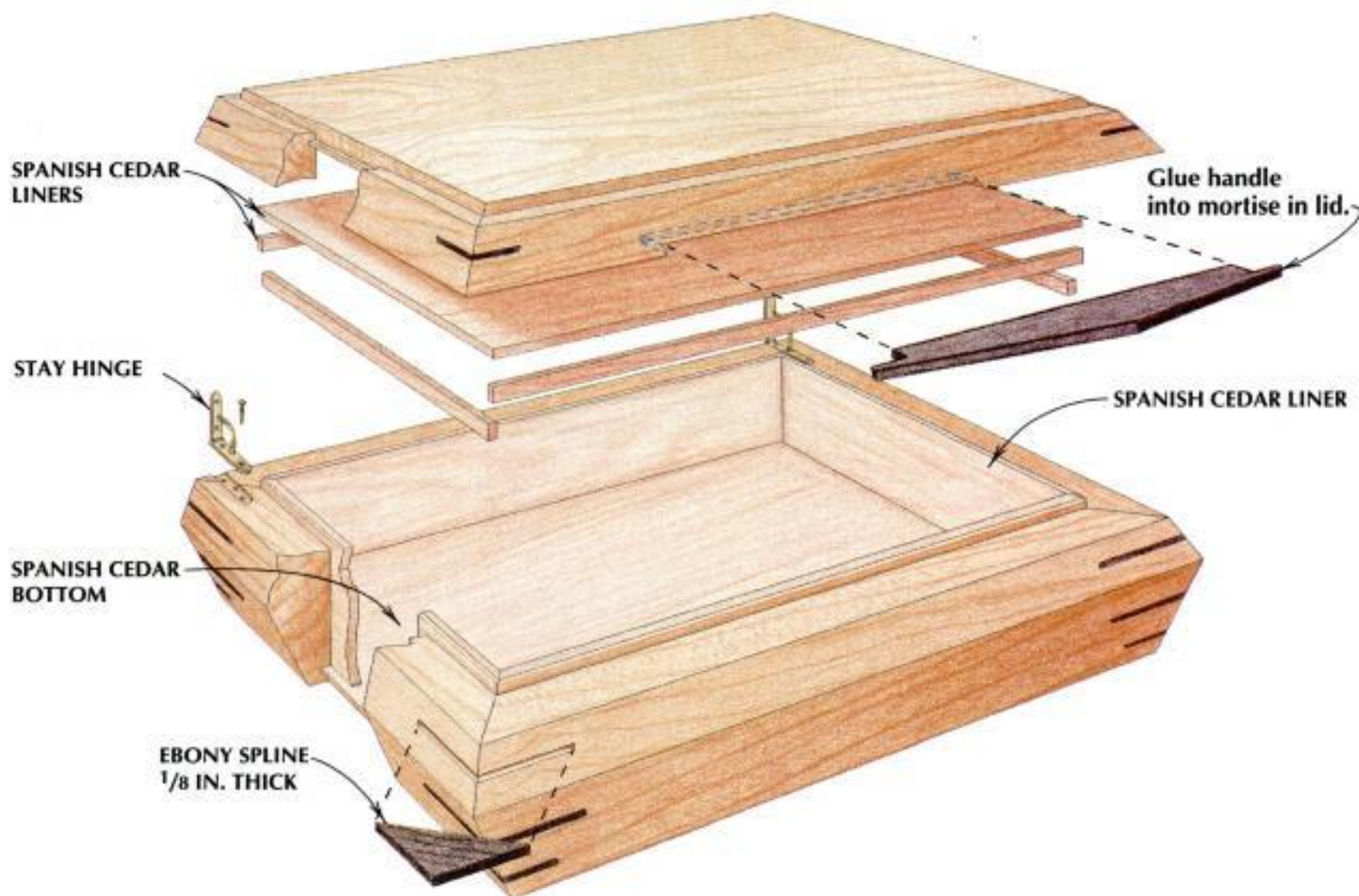
•**Install the liners.** These provide an airtight seal, and they keep the lid firmly on the box when you're beveling the sides.

•**Bevel the sides.** Make the bevel cuts on the tablesaw with the blade at a 20° angle. Guide the box in a homemade crosscut box, as shown in the right photo on the opposite page.

•**Handle it.** I shaped my handle on the bandsaw and the belt sander, and mortised it into the front edge of the lid.

•**Hinge it.** I used a pair of light-duty wire-stay hinges for my box. They hold the lid open at a 100° angle. A stronger stay hinge, made by Brusso, will hold up better over time. ([See Sources, page 55.](#))

FIG. 1: HUMIDOR





Cutting for splines. The author's slotting jig holds the box at 45° to the table and is guided by the rip fence. Ebony splines are sized to fit in the saw kerfs and are glued in place.



Sawing it open. Separate the lid from the body by sawing almost through all four sides, leaving about 1/16 in. of wall thickness. Finish the cut with a sharp knife or a handsaw.



Beveling the sides. Rip the bevel on the sides safely by holding the box against a fence on a homemade crosscut box. Wooden runners on the jig ride in the miter-gauge grooves.

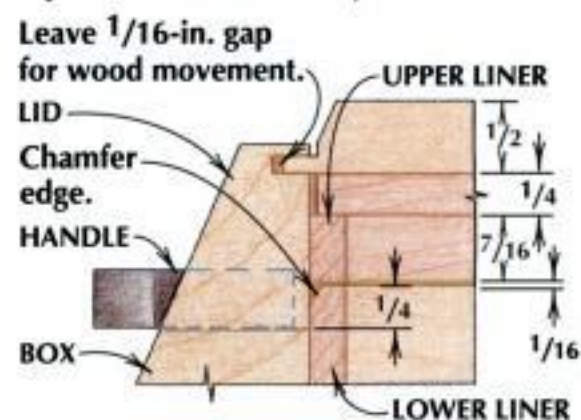
Make shallow mortises in the box and the lid for the hinges you're using. If you're using a wire-stay hinge, you'll need to drill clearance holes as shown in the Hinge Detail.

• **Install the hygrometer and humidifier.** To install the hygrometer, I turned a

wooden ring on the lathe and spot-glued it to the lid; then I epoxied the hygrometer to the ring. The humidifier is held by two L-shaped wooden brackets that are glued to the lid. The brackets let you slide the unit out of the box for routine maintenance. —D.P.

LID DETAIL

Lower liner extends into lid to form airtight seal. Chamfered edge on lower liner allows lid to open and close smoothly.



HINGE DETAIL (LID OPEN)

Stay hinges prevent lid from opening too far.

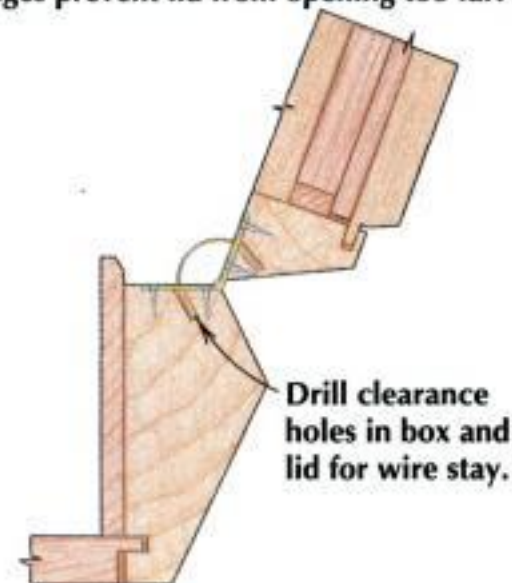
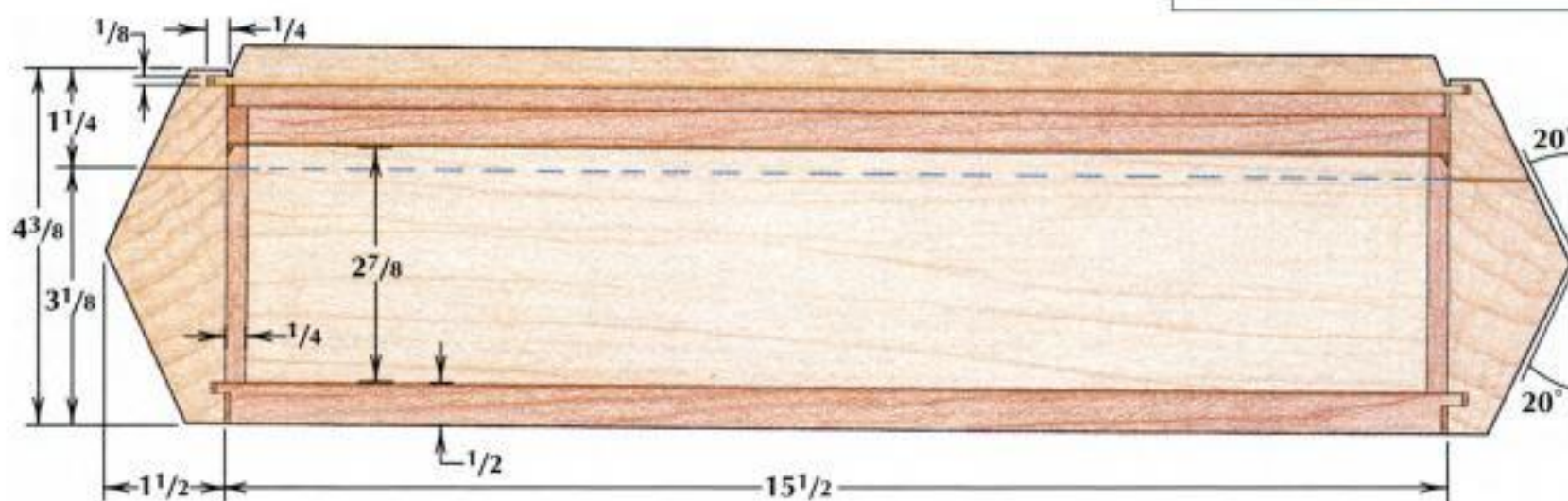
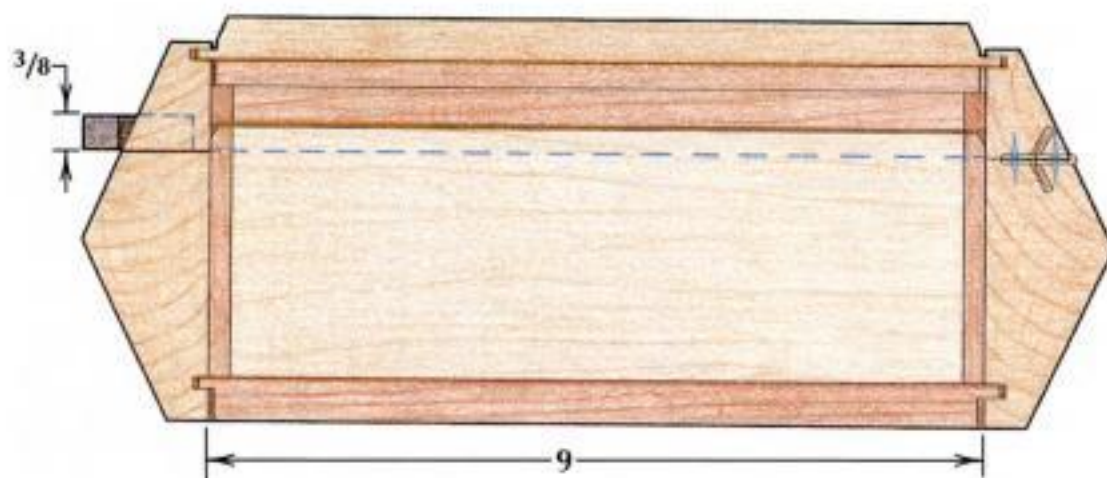


FIG. 2: SECTION VIEWS





Fire-safe spraying with a friendlier finish. Recent innovations in waterborne finishes have greatly improved their appearance, durability and ease of application. Learn how to select and spray a perfect waterborne finish, in a simple shop-made spray booth like this one.

Spray Like a Pro

Nine of the most commonly asked questions about spraying waterborne finishes

by Dave Schumacher

Waterborne finishes are here to stay. When they were first introduced, these products suffered a reputation for difficult application and poor appearance and durability. But today's waterborne finishes are greatly improved. They're easier to apply, and they rival solvent-based finishes in clarity, adhesion and toughness. (See "Buyer's Guide to Waterborne Finishes," AW #49.)

Waterborne finishes are also friendlier to the environment because they contain fewer volatile organic compounds

(VOCs) than their solvent-based counterparts. And unlike solvent-based finishes, most waterbornes are non-flammable. This is great news for any budget-minded woodworker: You don't need expensive explosion-proof equipment to spray a professional-quality finish. In fact, if you already own a suitable compressor, you can be up and spraying for around \$275.

In this overview, I'll discuss the tools and safety equipment you'll need, how to prepare your work, and how to select and apply a waterborne finish.



A compressor system. A compressor will power a conventional gun or an HVLP conversion gun. A coalescing filter (above the compressor) traps in-line oil, dirt and water.



A turbine system. A turbine is more portable and often less expensive than a compressor system. It uses a turbine gun, usually sold as part of the system.

Q: What kind of equipment do I need to spray waterborne finishes?

A: Basically, all you need is an air delivery system—either an air compressor or a turbine—and a spray gun.

A compressor will power either a conventional spray gun or a high-volume, low-pressure (HVLP) conversion gun.

Good conventional guns, costing \$150 and up, may be used with smaller compressors. These will spray a waterborne finish nicely but waste much of it in the form of overspray. If you plan on spraying finishes regularly, I recommend getting an HVLP conversion gun, which transfers much more of the finish to the work.

HVLP conversion guns, unlike turbine guns, run on compressed air. Although most conversion guns need 10 to 18 cubic ft. per minute (cfm) of air, some of the newer models—like my Binks Mach 1 or the DeVilbiss JGA-HVLP—require only 5 to 6 cfm.

Because waterborne finishes are corrosive to many metals, it's wise to get a gun with stainless-steel or plastic fluid path components. Prices for conversion guns range from \$200 to \$550. (For more on HVLP spray guns, see "Just Finishing," AW #46.)

Typically, a 3-HP compressor will be adequate for a 5- to 6-cfm spray gun. Make sure your compressor's cfm rating equals or exceeds your chosen gun's stated requirements. Prices for 3-HP compressors can range from about \$260 to \$800. (For more on air compressors, see AW's 1996 Tool Buyer's Guide.)

You'll also need a *coalescing filter*, which keeps dirt and oil from your compressor from contaminating the finish. It will also keep oil from getting on your work when you blow it with an air nozzle. You can buy a good filter for about \$75.

A turbine is a self-contained, fan-driven unit that supplies air to the gun. A turbine's portability is an advantage if you work on the jobsite. Instead of using compressed air, a turbine powers the spray gun with a fan or fans, each referred to as a *stage*. The more stages, the greater the turbine's ability to spray

viscous (thick and gooey) materials and to finely atomize a finish. For spraying most waterborne finishes, a two-stage unit will do the job. To spray thicker material such as latex paint, you'll need at least a three-stage unit.

A turbine is usually sold as part of a complete system including turbine, hose and gun. (See photo, above right.) Turbine prices range from about \$300 for a two-stage unit to about \$900 for a three-stage unit. (For more on HVLP turbine systems, see AW #28.)

Q: Can I spray waterborne finishes without a mask, spray booth or other safety equipment?

A:

Not safely. Waterborne finishes may contain harmful solvents, resins and additives. Always follow the precautions on the label. It's also wise to obtain the Material Safety Data Sheet (MSDS) available from the manufacturer or supplier of the finish. The MSDS gives important information on the finish's composition and hazardous ingredients, plus recommended safety equipment, health precautions and first-aid instructions.

To avoid irritation to the lungs, eyes and skin, use a MSHA- or NIOSH-approved organic vapor respirator. Goggles are also important to protect your eyes against splashes while mixing. And be sure to wash your hands thoroughly after you spray and before you eat or smoke.

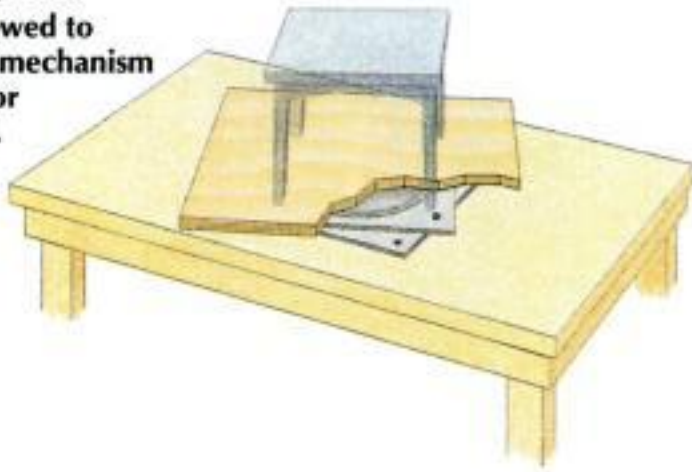
Good ventilation in your finish area is a must. One way to provide ventilation and protect your shop from messy overspray is to spray in a booth that has ventilation fans. (See sidebar, page 62.) Another solution, if weather allows, is to spray outside.

Because most waterborne finishes are non-flammable (check the label or MSDS) you don't have to worry about explosive fumes. If, however, you are also going to spray flammable finishes, be sure to install explosion-proof fans and lighting in your spray area and observe all other fire-safety precautions. Check with your local fire code administrator to determine your specific needs.

FIG. 1: SUPPORTING WORK FOR SPRAYING

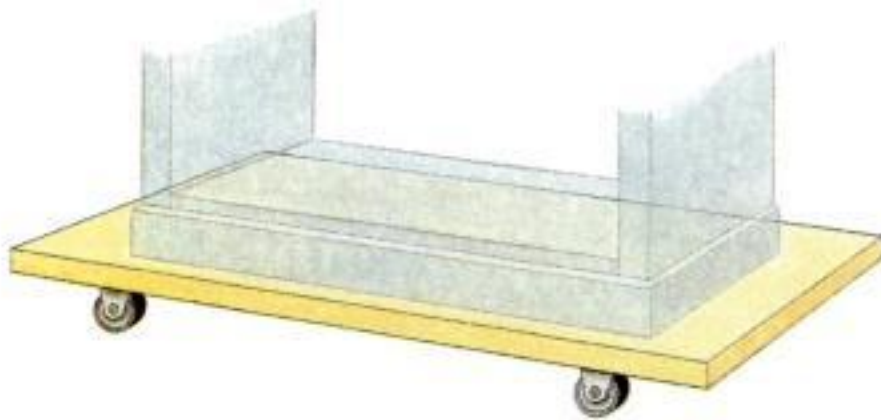
SMALL OBJECTS

Plywood screwed to "lazy Susan" mechanism turns easily for smaller work.



LARGE PIECES

4-wheel dolly lets you rotate large work.



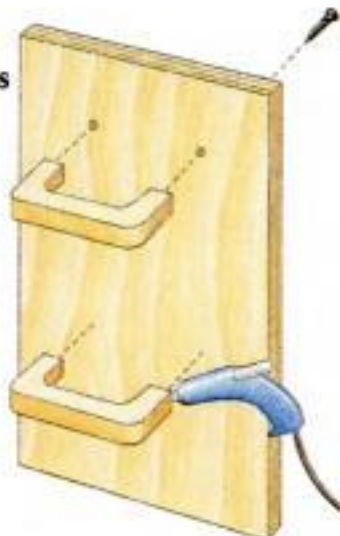
FLAT PANELS

Triangular sticks support flat work with minimal contact.



WOODEN PULLS

Attach wooden pulls to scrap plywood with screws or hot-melt glue.



Q: How do I prepare my stock for finishing?

A: A high-quality finish of any kind begins with a clean, well-sanded or scraped surface. I usually begin by sanding with 100-grit aluminum-oxide sandpaper. Then I move to 150 grit and finally 180 grit. Don't use steatited sandpaper, though; it can prevent finish adhesion.

After sanding, you might want to stain the wood or fill the pores. If you decide to do this, you can use water-soluble or oil-based stains or pore fillers.

Water-soluble dye stains will raise the grain, but you can minimize this problem. Before applying the stain, raise the grain with water, let it dry, and sand it lightly with 220-grit sandpaper. Alternatively, you can simply apply the stain over a sanded coat of finish sealer. I've found that one coat of sealer won't prevent stain from penetrating the wood. A coat of fresh, dewaxed shellac over the stain will keep it from bleeding into the top coat.

To prevent adhesion problems, make sure your stain or pore filler is absolutely dry before applying a finish over it. To be safe, I usually give it at least a 30% longer drying time than the manufacturer suggests.

Q: How do I select a waterborne finish?

A: Waterborne finishes (also called water-based finishes) come in three types: polyurethane, acrylic, and a polyurethane/acrylic mixture.

Polyurethane generally has superior durability and chemical resistance. Acrylic finishes are generally clearer and rub out more easily. A polyurethane/acrylic mixture is intended to provide a good middle ground. (For specific characteristics of 35 popular waterborne finishes, see AW #49.)

I use polyurethane/acrylic mixtures most often. Among the brands available, I've been happy with CrystaLac and Clearly Superior finishes. However, sometimes I use acrylics on pieces of furniture that don't generally get much abuse, such as dressers. I use polyurethane for high-wear surfaces such as bar tops and tabletops.

Retail stores generally carry semigloss and gloss waterborne finishes, but you may have to special-order flat-sheen finishes.

Most waterborne finishes are made for both brushing and spraying, but a few are made for brushing only. Read the label.

Q: How do I support the work for spraying?

A: Furniture can be quite awkward to handle while finishing. One of the best ways I've found to support smaller pieces is to put them on a piece of plywood screwed to a 12-in.-dia. TV swivel, which I set on a low table. (See Fig. 1.) This setup allows me to turn the work as I finish it, rather than walk around it. A good method for rotating a larger piece is to place it on a four-wheel furniture dolly.

To spray doors, panels and drawers, lay them on sticks and spray their backs or bottoms first. After the backs have dried, flip the pieces over and spray their faces. Don't let the sticks project beyond the edges of the piece, though, or you may end up with a small fillet of finish where they meet. Triangular sticks minimize contact with previously sprayed faces.

Wooden pulls and other small items can be attached to a piece of plywood with screws or hot-melt glue. Again, position the work so that you can reach it easily.

Q: How do I prepare the finish for spraying?

A: Waterborne finishes come ready to use, straight from the can. Unlike solvent-based finishes, there's no need to add solvents, retarders or accelerators.

To mix the finish, stir it gently. Shaking or vigorous stirring can cause bubbles. Strain the finish into the spray gun cup through a paper cone that has a cheesecloth filter (available at paint stores). Test the finish on a scrap of your material.

If this test finish develops "orange peel"—a bumpy condition that resembles an orange rind—thin it and try another test. (If the label doesn't give thinning recommendations, use distilled water—but never more than 10% by volume.)

Q: How do I spray the finish?

A: Spraying a waterborne finish is not much different from spraying solvent-based products. Basically, you apply a sealer coat followed by a series of top coats. But unlike solvent-based lacquers, waterborne finishes don't "burn in" by redissolving the previous coats, so you need to sand after each coat to level the finish and provide adhesion for the next coat.

First, apply the sealer recommended by the manufacturer. Set the gun pressure (and cup pressure on some guns) to the gun manufacturer's recommendations. Point the gun nozzle directly, not obliquely, at the work. (See lead photo.) Adjust the nozzle to spray a pattern about halfway between a circle and a wide fan.

Start each pass by spraying into the air at the edge of the piece. (See Fig. 3.) This ensures an even coat from the edge forward. Depress the trigger all the way to start the finish flowing. Move smoothly and evenly across the work at 8 to 12 in. per

FIG 3: SPRAYING TECHNIQUES

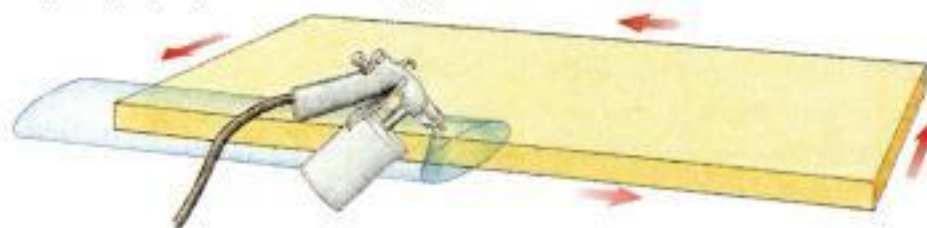
A vertical fan pattern works best for the spray patterns below.

SPRAYING A PANEL

STEP 1: SPRAY THE EDGES

Hold gun at 45° angle.

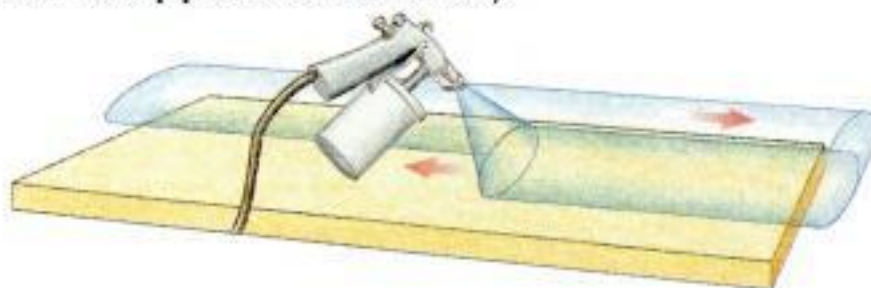
Begin spraying before moving gun onto work.



STEP 2: SPRAY THE FACE

Hold gun at a constant distance

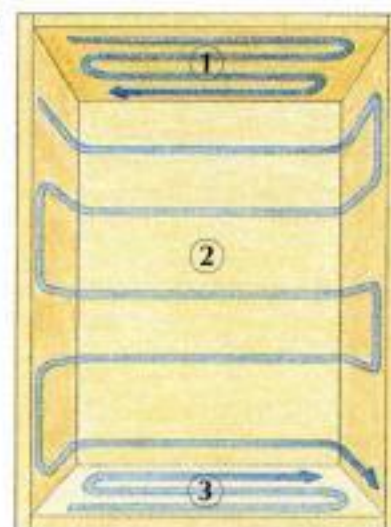
to surface. Overlap previous stroke halfway.



SPRAYING A CABINET

STEP 1: SPRAY THE INSIDE

Spray underside of top ①, then sides and back ②, then bottom ③.



STEP 2: SPRAY THE OUTSIDE

Begin with the edges or face frame ①, followed by top ② and finally sides ③.

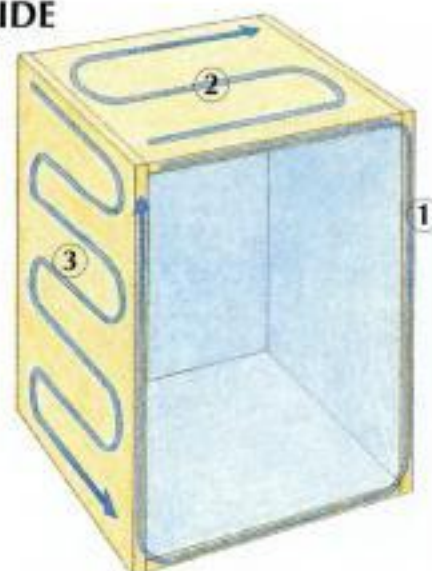


FIG. 2: SPRAY GUN ADJUSTMENTS

Turn knob to adjust spray pattern from circle to fan.

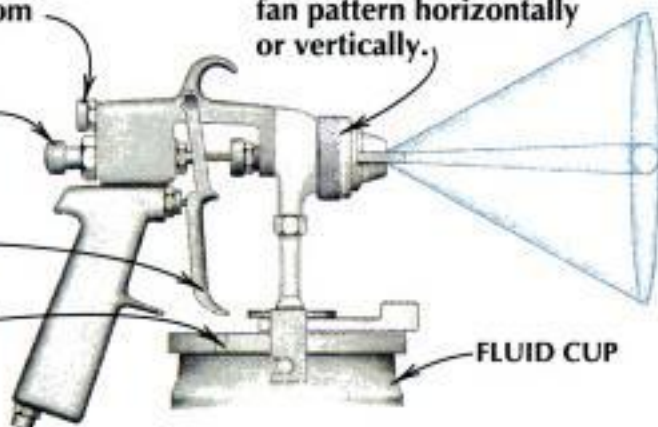
Turn knob to adjust amount of fluid.

TRIGGER

AIR-VENT HOLE

Turn air cap to orient fan pattern horizontally or vertically.

FLUID CUP



SPRAY FAN PATTERNS

VERTICAL FAN PATTERN



A vertical pattern works best for most spraying.

HORIZONTAL FAN PATTERN



A horizontal pattern is useful when spraying vertical work up and down.

second. An HVLP gun should be held 4 to 10 in. away from the surface and a conventional gun 6 to 12 in. away.

Always keep the gun moving parallel to the work surface and at an even distance from it. (See Fig. 3.) Sweeping the gun in an arc away from you deposits the finish unevenly. Don't release the trigger until the gun passes the other edge of the workpiece. Strive for a coat that looks uniformly wet, but not thick. Don't let the gun linger; just wet the surface. On wide surfaces, overlap each spray stroke halfway. (See Fig. 3.)

Spray in a sequence that minimizes overspray landing on previously sprayed surfaces. Spray the least exposed surfaces first, and move outward to the most visible parts. (See Fig. 3.)

After the sealer coat is dry—20 to 30 minutes, depending on the temperature and humidity—sand it with 400-grit sandpaper on a rubber sanding block. If a surface is particularly rough, use 220-grit wet-or-dry sandpaper. Be careful not to sand through the sealer coat. Then, wipe off the sanding dust with a clean, moistened, lint-free cloth. Many waterborne finishes must be sanded within four hours of application, or they harden and become difficult to sand. Check the product label for your finish's characteristics.

Unless the wood is unusually porous, I apply only one coat of sealer. After that, I apply the top coats. Again, each coat should look uniformly wet but not thick. A thick coat can create runs and sags, may appear hazy white, and will be slow to dry.

After each coat dries, block-sand it again, this time with 600-grit wet-or-dry paper. If the surface is rough, use 400 grit.

Two or three top coats of semigloss finish are usually enough. Glossier finishes generally require more coats. Never exceed six or seven coats, or the finish will be prone to cracking.

Q: What about temperature or humidity considerations?

A: Waterborne finishes are very sensitive to temperature and humidity. They don't dry well in temperatures below 60° or in relative humidity higher than 70%. To help dry the work when I have to spray under these conditions, I use a couple of 150-watt halogen lights placed about 18 in. from the finished surface. I also turn up my fans' speeds to increase air circulation in my spray booth.

Q: How do I clean my spraying equipment?

A: Always clean your gun thoroughly after spraying—especially if it doesn't have rust-proof parts. If I'm going to continue spraying the next day, I don't bother to take the gun apart to clean it. I simply wash the cup with warm soapy water, dump it out, then spray fresh soapy water through the gun. I then spray lacquer thinner through the gun and set it aside.

When I'm done with the project, I disassemble the gun's air cap, tip, needle and fluid stem. I clean all the parts with a toothbrush in soapy water. I remove the fluid stem and run a pipe cleaner through it. Any clumps of dried finish on the parts will dissolve in lacquer thinner. After rinsing the parts, I blow compressed air through them, then let them dry before reassembling the gun. ▲

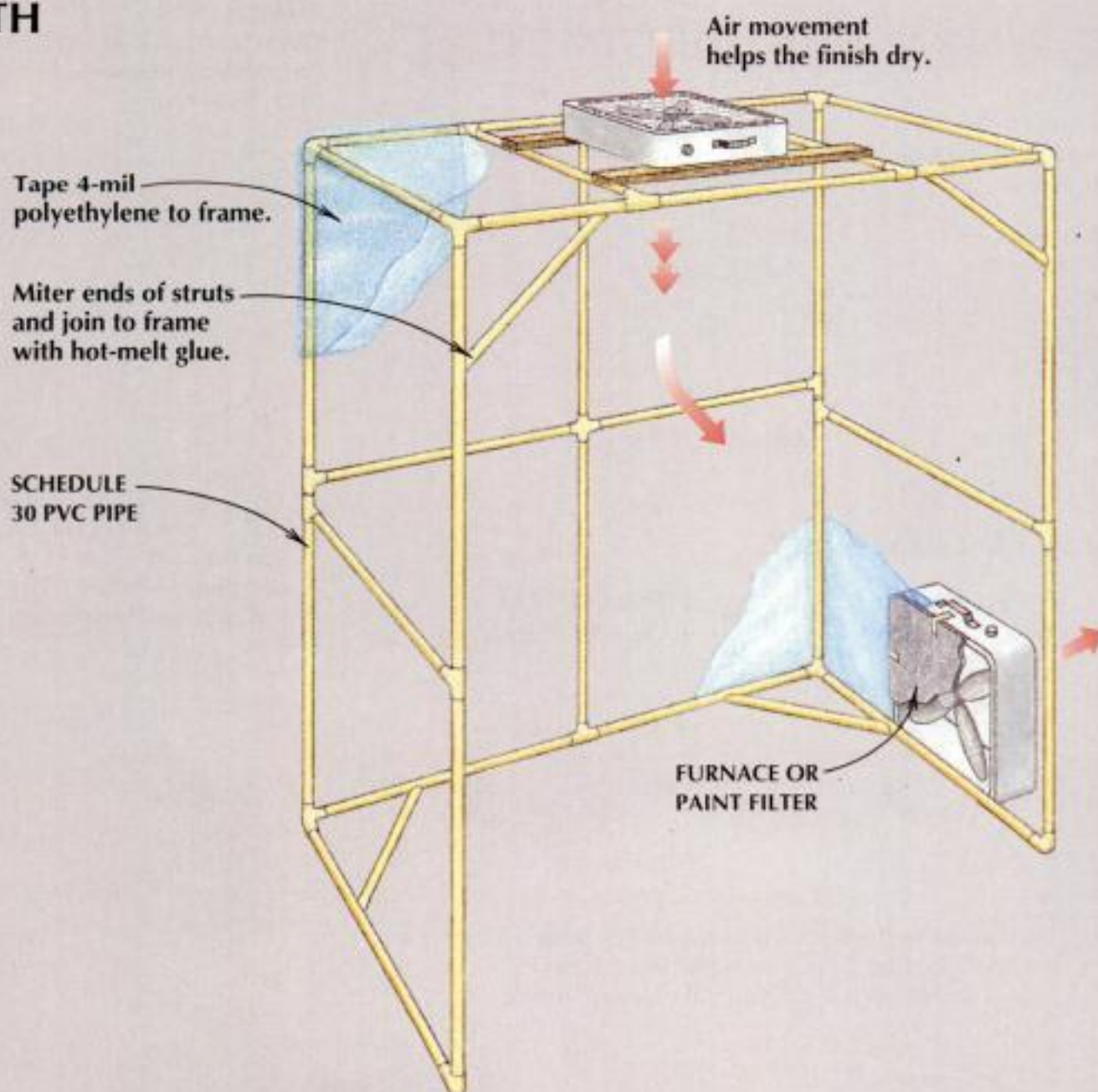


DAVE SCHUMACHER
owns Schumacher Woodworks
in southern California.

A SIMPLE SPRAY BOOTH

You can make a simple spray booth for waterborne finishing by wrapping 4-mil (0.004-in.-thick) polyethylene plastic around a PVC pipe frame. A fan at the top of the booth will bring in air and blow it on the project to help dry it. To filter out dusty shop air, install a furnace or paint spray filter on the intake side of the fan. An exhaust fan installed near the floor and vented to the outside (or simply aimed at a door opening) will provide air circulation and help remove overspray.

I light my booth with a couple of portable, 150-watt halogen lamps (available from good lighting dealers). These lights also provide heat to help dry the finish in cold or humid weather. I mount my lights on a commercial tripod, but you could cobble together a wooden stand with arms to hold clip-on lights. —D.S.



Spanish Cedar

by Paul L. McClure



Spanish cedar, or *cedrela*, is one of the most important timbers in Central and South America. Rot- and insect-resistant, it's ideal for exterior architectural applications of all kinds. Much of the Spanish cedar used in the construction of the Spanish missions has survived centuries of weather. For years, Amazonian natives have carved their canoes from this buoyant wood.

Although Spanish cedar is not a true cedar—in fact it's a deciduous tree—it has a fragrance similar to aromatic cedar, hence its name. The tree can attain heights of 100 ft. and diameters of 6 ft., with substantial buttresses. Clear of branches for 40 to 60 ft., these large trees yield wide, long boards that are free of knots.

Because the oils in Spanish cedar are thought to impart a better flavor to cigars, the unfinished wood is widely used for cigar humidors. (See page 54.)

Appearance

Fresh-cut Spanish cedar has pinkish to reddish-brown heartwood, sometimes with dark streaks. Exposure to air and light turns it red or dark reddish brown. The open-grained wood resembles genuine mahogany in texture and color, but is distinguished by its scent and lighter weight. The white or pinkish sapwood is sharply demarcated from the heartwood.

The grain is usually straight but can be interlocked, especially in wood from the tree's buttress. Buttress wood can also yield a very spectacular burl-like or *roey* (short, broken ribbon-patterned) figure.

Workability

Although it varies greatly in density, Spanish cedar is a relatively soft wood, and it works easily with hand and machine tools. It glues well and nails easily but you should predrill for screws in harder pieces. The wood sands or

scrapes to a medium to high luster. Use power sanders with care; they remove a lot of wood very quickly.

When selecting lumber, choose boards that are close-grained and dry to the touch. Some boards may exude oil over time. You can wipe away the oil with alcohol or acetone but it may return. To prevent this, you can finish with shellac.

Uses

In Central and South America, the lumber is used for furniture and cabinets, chest linings, boatbuilding, construction, millwork and musical instruments. It is also sliced for plywood face and core veneers. The wood's principal use in the U.S. is as a lining for humidors.

The oils in Spanish cedar can produce a vapor that condenses on metallic parts. Only stainless steel and lacquer-coated brass will resist this tarnish. ▲

SPANISH CEDAR



Species and Common Names

Cedrela odorata, *C. mexicana*—Spanish cedar, *cedrela*, Mexican cedar (or other nation of origin), cigar-box cedar

Growing Region

Mexico south to Argentina, except Chile; islands of the Caribbean

Specific Gravity

0.37 to 0.75

Density

23 to 47 lbs. per cubic ft.

Wood Movement¹

Tangential (flatsawn): small ($\frac{5}{32}$ in. per ft.)

Radial (quartersawn): very small ($\frac{7}{64}$ in. per ft.)

Durability

Heartwood highly resistant to insect and fungal attack

Sustainability

Sustainable at current harvest levels

Availability

Specialty wood dealers

Size

Thicknesses: $\frac{1}{8}$ and $\frac{1}{4}$ available for humidor linings; $\frac{4}{4}$; $\frac{8}{4}$ (rare)

Widths: 6 to 18 in. Lengths: 8 to 16 ft.

Cost

Lumber: \$4.50 to \$5 per bd. ft., depending on thickness

Veneer

Not commonly available

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



Maintaining Finishes

In most cases, cleaning is enough

by Michael Dresdner

The point of a wood finish is to make the wood look beautiful while protecting it from dirt, spills and abrasion. The common notion that finishes themselves need maintenance is cherished by manufacturers of furniture-care products; but, as it turns out, most finishes do not need any maintenance at all, short of keeping them clean.

Film-type finishes—shellac, lacquer, varnish, polyurethane and virtually any sprayed or brushed coating, whether waterborne or solvent based—protect by forming an unbroken film over the wood. Furniture-care products—polishes, lemon oil and wax—will simply sit atop such coatings, making them look temporarily shinier or duller and perhaps acting as a cleaner in the process. But there is little evidence to suggest that they add any real durability.

Nor do common furniture polishes or waxes substantially increase the water or stain resistance of a particular finish. But wax, which sheds water, may help prevent water spotting on vertical surfaces. And because waxes and oils make the surface more slippery, they allow a glancing blow to the surface to slide harmlessly rather than leave a scratch. A good waxing may also add a soft sheen to a surface and make it delightful to touch.

Acrylic-based floor polishes such as Future™ actually leave a clear protective film that acts like lacquer, holding out scuffs, stains and water. However, if you want a clear acrylic film on wood, I suggest you apply an acrylic lacquer to the wood and be done with it.

Cleaning Finishes

The best way to clean film-type finishes is to wipe up dust and spills with a damp rag. You can go after more aggressive dirt with a mild, potassium oleate soap, such as Murphy's Oil Soap (available at your local supermarket). In extreme cases—for instance, when you're removing tar or grease—you can resort to applying VM&P naphtha



Rule of twos. A good way to build and maintain oil finishes is to apply a fresh coat "twice a day for a week, twice a week for a month, twice a month for a year and twice a year for life."

(available at paint supply stores) or mineral spirits with some extra-fine Scotch-Brite™ or 0000 steel wool. This won't hurt a satin finish, but it will leave a dull spot on gloss coatings. Renew the shine with some automotive polishing compound coupled with a bit of elbow grease.

Stay away from strong ammonia compounds when you're cleaning finishes;

Aerosol problems. Fast evaporation of aerosol propellants can cause "cold checking"—a network of hairline cracks—in some brittle lacquer finishes.



they can break down shellac and some water-based coatings. It's also best to avoid any cleansers or powders that contain abrasives, since they can dull a finish quickly. If this happens, and you haven't rubbed through to raw wood, you can rejuvenate the shine with polishing compound.

Finally, be wary of aerosols—and not just because of their ozone-depleting properties. Some aerosols contain fast-evaporating propellants that quickly chill a surface once they are sprayed on it. This rapid cooling can cause fine cracks ("cold checking") in some older finishes, especially lacquers. (See bottom photo, page 68.) For safety's sake, hold the can at the recommended distance from the surface. Of course, this warning does not extend to pump-type atomizing sprays.

Two Exceptions

There are only two types of finishes that need regular rejuvenation: waxes and true oil finishes. Because even the hardest waxes are fairly soft, wax finishes

wear quickly and damage easily. Fortunately, a wax finish is easily repaired and fortified. Just add another coat of wax every few months, or whenever it becomes damaged or worn.

True oil finishes, which consist of drying oils such as tung oil or linseed oil, are tougher than wax, but they also need periodic rejuvenation. This is mostly because they are applied so sparingly, usually by wiping.

These are not to be confused with wipe-on Danish Oil finishes, which are mixtures of oil and varnish, or with wipe-on gels, which are either mixtures or varnishes. It's easy to add another coat when the finish starts to show wear or bare spots. However, if you build up enough coats of these wipe-ons, you will eventually have a fairly maintenance-free varnish, just as if you had brushed it on. True oil finishes can also be built up over time, but it takes much longer to get to that stage, and few ever get there.

My favorite approach to applying and maintaining an oil finish is the old finish-

er's "rule of twos," by which you rub in a coat of oil "twice a day for a week, twice a week for a month, twice a month for a year, and twice a year for life." A regimen like that is likely to give you both beautiful surfaces and good exercise.

And now for the question on everyone's mind: What do I do to maintain my own furniture here at home? I wipe down the surfaces with a damp sponge only when it is painfully obvious that they need cleaning. Other than that, I ignore them. After all, the worst that can happen is that someday the furniture may need to be refinished. That's a topic for another column. ▲



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. Keyword "wood" takes you to AMERICAN WOODWORKER Magazine Online. Click the "Shop Talk" icon to enter the chat room.

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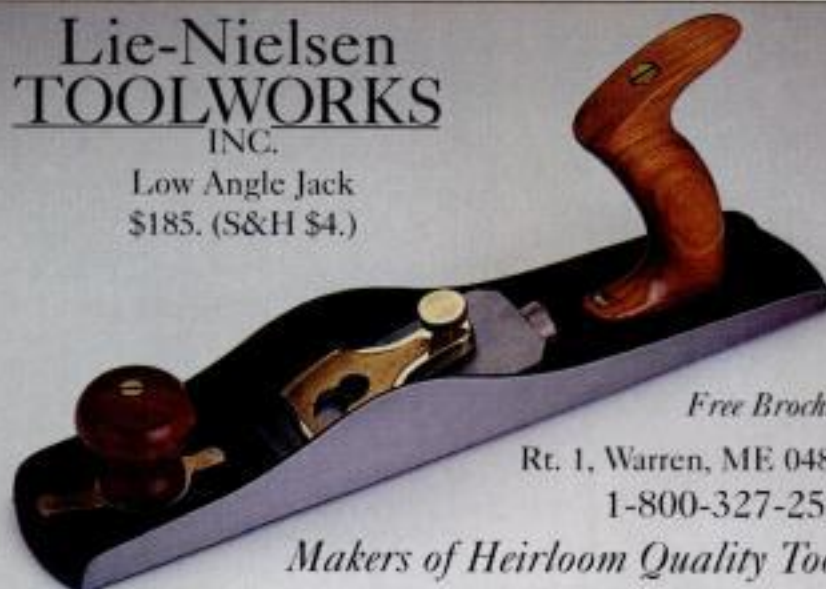


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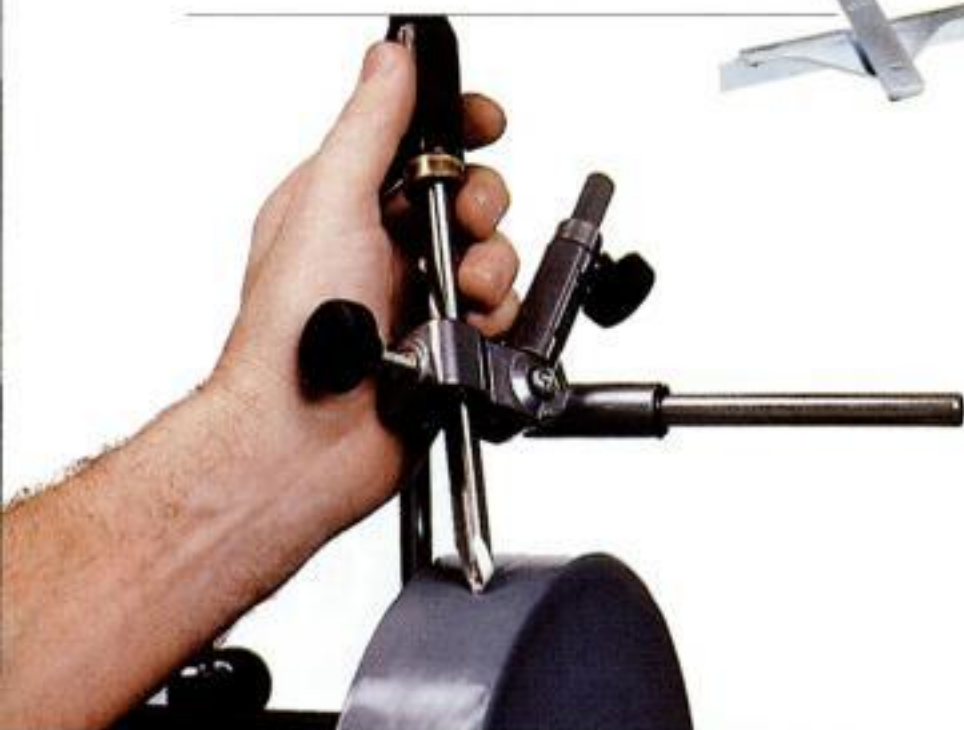
18-Volt Cordless!

Cordless power takes another leap forward with three new 18-volt tools from DeWalt: The DW995K, a 1/2-in. drill/driver; the DW936K, a 5 3/8-in. circular saw; and the DW997K, a 1/2-in. hammerdrill. Run time and power on these tools are about 40% greater than on 14.4-volt models. Each tool comes with one battery and a one-hour charger. (Retail price: Around \$235 for the drill driver, around \$250 for the saw.) *DeWalt Industrial Power Tools, Box 158, Hampstead, MD 21074, (800) 433-9258. Circle #609*



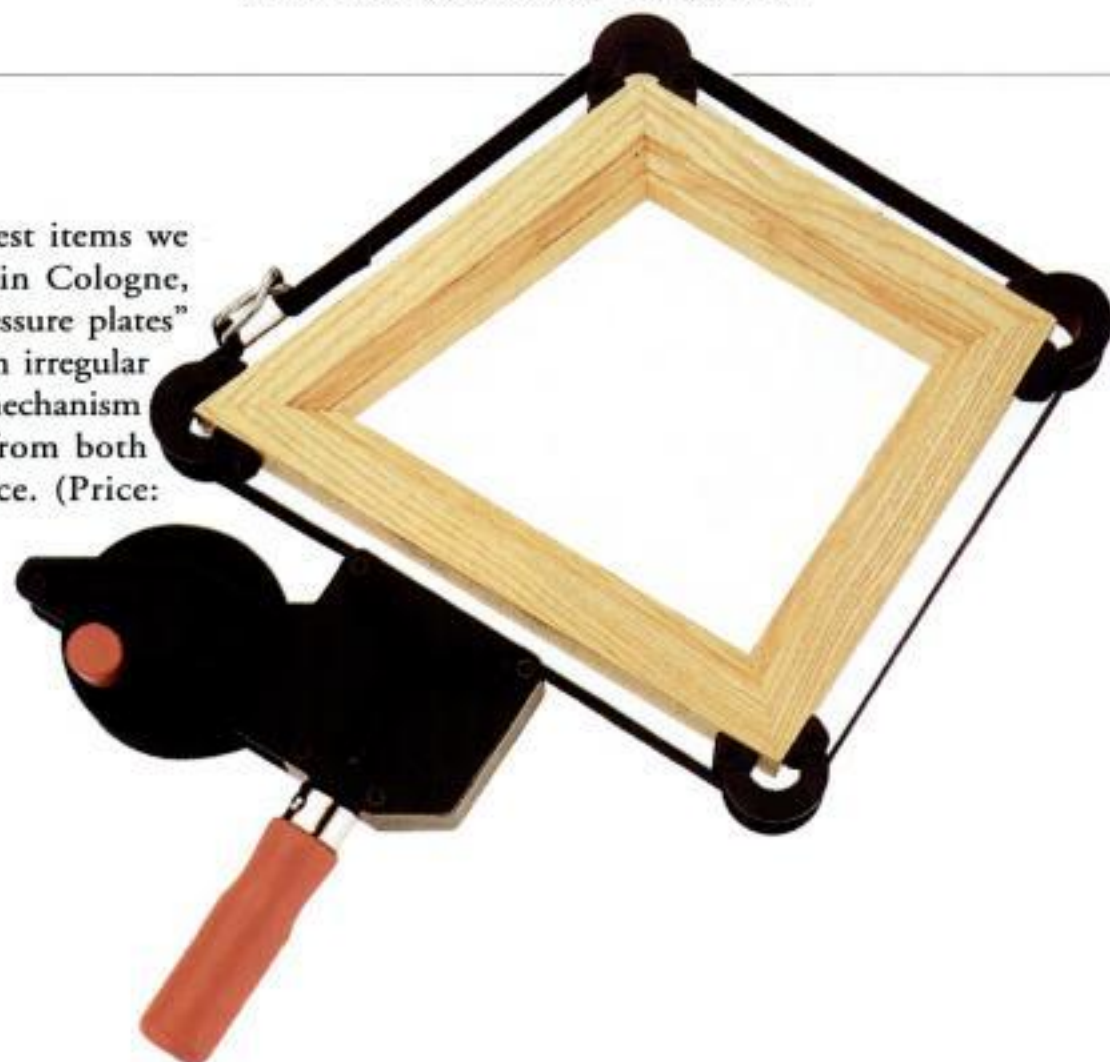
Gouge Sharpening Made Easy

■ Many woodturners prefer a long, "fingernail" grind (see photo) on their gouges, because it allows you to make both shearing and shear scraping cuts by simply rotating the gouge. Grinding this complicated edge freehand has always been a difficult, trial-and-error process. But the task just got much easier, thanks to the new Fingernail Gouge Jig from the makers of the Tormek wet wheel grinding system. Attach the jig to any Tormek grinder, and you'll be able to grind a perfect fingernail shape on either bowl- or spindle-turning gouges. (Price: \$54.95) *Tormek USA, Box 1522, Blue Springs, MO 64013, (800) 586-7635. Circle #610*



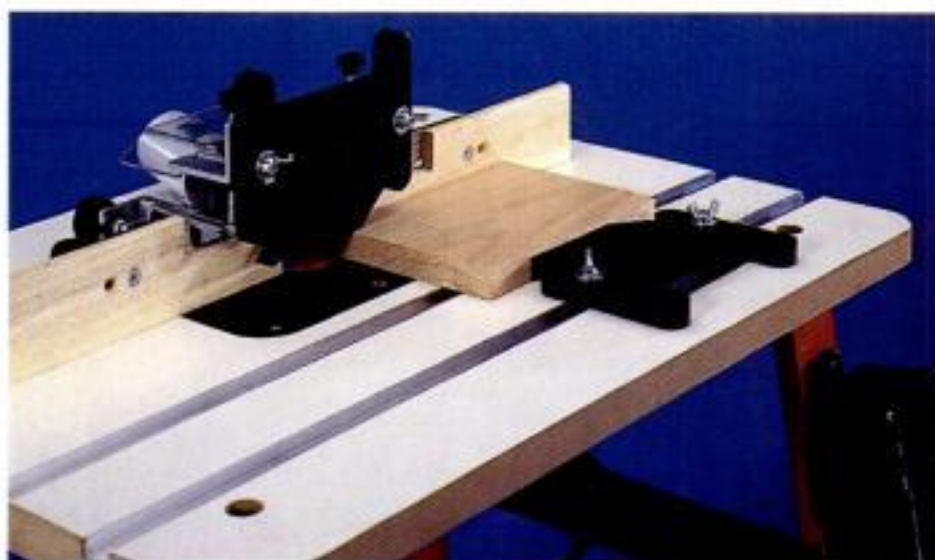
Versatile Band Clamp

■ Bessey's new band clamp is one of the hottest items we spotted at the International Hardware Show in Cologne, Germany, last March. The clamp's "floating pressure plates" conform to the corners of any workpiece, so even irregular shapes are easy to grip securely. The tightening mechanism pulls the 7-meter strap (about 23 ft.) evenly from both sides, so there's no distortion in the workpiece. (Price: \$49.95) *American Clamping Corp., Dept. AWT, Box 399, Batavia, NY 14020, (800) 828-1004. In Canada: (800) 265-8612. Circle #623*



Two-Track Router Table from Freud

■ Freud's new Router Table System offers a complete package of features we've come to expect in a router table, plus a few extras. The system includes a steel stand, a laminate-covered MDF top, and an insert plate with leveling screws. Among the extras are a micro-adjusting split fence, two miter-gauge slots, and a specially designed dust collection pickup. Options include hold-down clamps, feather boards, different sizes of inserts, and an oversized safety switch. (Price: \$495) *Freud, Dept. AWT, Box 7187, High Point, NC 27264. Call (800) 472-7307 for nearest dealer. Circle #624*



SHOP TESTED

Jet JPM-13 Planer-Molder

by Dave Sellers

I owe a lot to my 10-in. portable planer. But after 10 years, I was ready to move up to a stationary model that could offer greater capacity, more power and less noise. Jet's model JPM-13 caught my attention because of its \$799 price—attractive for a stationary planer with 13-in. by 6 1/8-in. capacity, cast-iron construction and two feed speeds. But then I found out that the JPM-13 is equipped with a special cutterhead that lets you insert and use molding knives without removing the planer knives.

It took me about an hour to assemble the stand, which comes with heavy-duty lockable casters that make this 202-lb. planer easy to move around. I appreciated the clearly written owner's manual, and found the fit and finish to be way above average for a Taiwan-built machine—indications of good quality control. I checked the alignment of the planer knives and rubber feed rollers and found everything on the money.

The Jet's 1 1/2-HP induction motor and twin-belt drive ran quietly and with very little vibration—quite unlike my old portable planer. I got smooth, ripple-free cuts with the slower 10 ft. per minute feed speed. It took only a minute to change over to the higher feed speed of 20 ft. per minute. The higher speed produced noticeable knife marks, but it's useful for removing a lot of material quickly. I found Jet's recommendations for maximum cutting depths (1/8 in. for boards up to 5 1/2 in.



Plane and mold. Jet's JPM-13 (right) makes it easy to switch from planing to molding, and back again. Molding cutters can be installed without removing the planer knives (above).

wide; 1/16 in. for wider stock) to be about right—but I'd take shallower cuts to produce a smooth surface on hardwoods. And I liked the dust collection efficiency, with the optional dust hood connected to a 750-cfm collector.

But what really sets the Jet apart is its molding capability. Other planer-molders require you to remove the planing knives or the whole cutterhead to set up for molding. With the JPM-13, you can install molding knives up to 2 in. wide without disturbing the planer knives. (See photo, above.) Jet offers more than 40 different molding profiles, up to 4 3/8 in. wide. Wider molding knives require removal of the planer knives.



Aligning the knives with the supplied gauge took some patience, but it wasn't a problem once I got the hang of it.

When molding, you install a particle-board auxiliary bed to protect the cast-iron bed, and hardwood rails to guide the stock through the cutters. At the slower feed speed, it took three or four passes to make a molding but the results were very smooth—no sanding was necessary.

The JPM-13 is a great entry-level or trade-up machine with the power and feed speeds for all your planing assignments. And its molding capability is reason enough for many shops to check out this machine. (Price: \$799) *Jet Equipment and Tools Inc., Dept. AWT, Box 1349, Auburn, WA 98071, (800) 274-6848. Circle #625*

Fabulous Feathers

The soaring work of Grainger McKoy

As a boy growing up in central South Carolina, Grainger McKoy began his carving career when his mother gave him permission to saw a chunk of wood from the family log cabin. The result was a simple carved bird. Forty years later, McKoy continues his passion for bird carving, but his designs aren't simple anymore.

McKoy's birds in flight are particularly eye-catching. The artist captures them in mid-flight, creating compositions with remarkable energy and realism. The illusion of soft plumage and effortless motion is the result of careful carving, masterful painting, and a system of cleverly concealed armatures—metal “skeletons” that are made from lengths of steel welded or screwed together.

McKoy's tools are surprisingly simple: a bandsaw, hand-held rotary grinders, burning knives and some favorite chisels. To reduce the weight of his birds, he saws the bodies in half along the grain, hollows the insides, then glues the halves back together. He follows up by texturing and burning the surfaces; then he paints on vivid, realistic colors to hide glue seams and bring his birds to life.

These days, McKoy is looking into casting his work in bronze. “It's a classical medium,” he notes. “And, after 40 years of making wood fly, making metal do the same is the next challenge.”

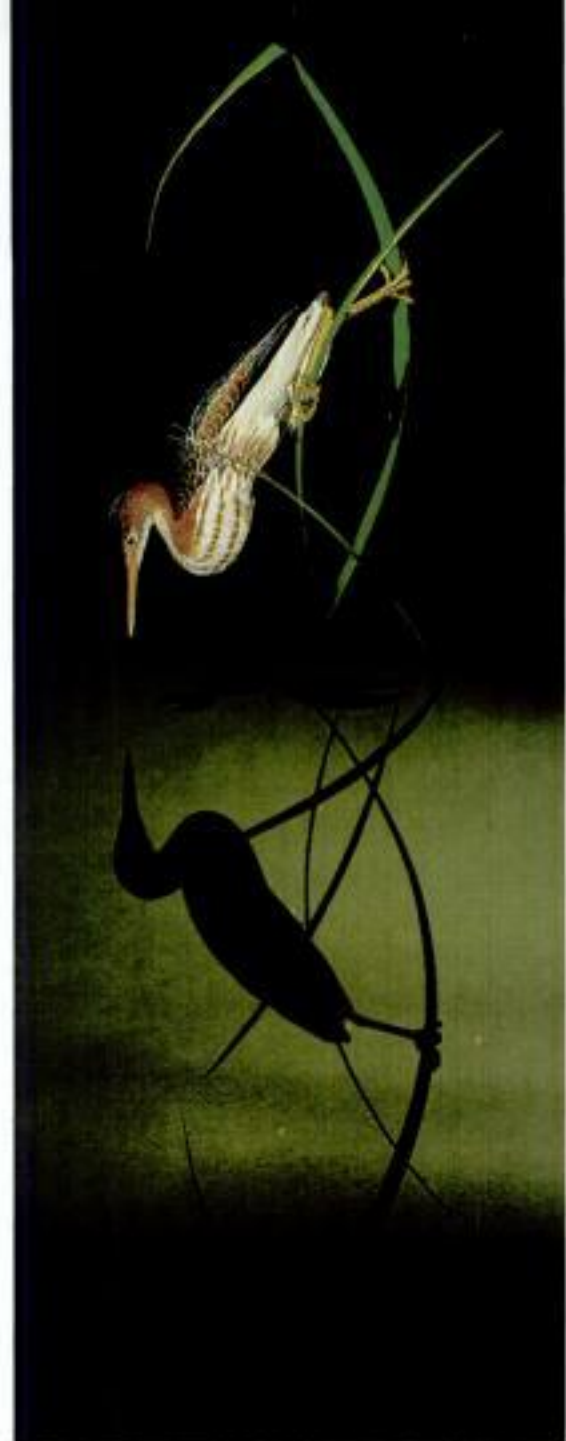
“Covey Rise.”
(Eastern Bobwhite Quail)
Basswood, steel, brass shim
stock and oil paint.
H: 36 in. Dia: 20 in.



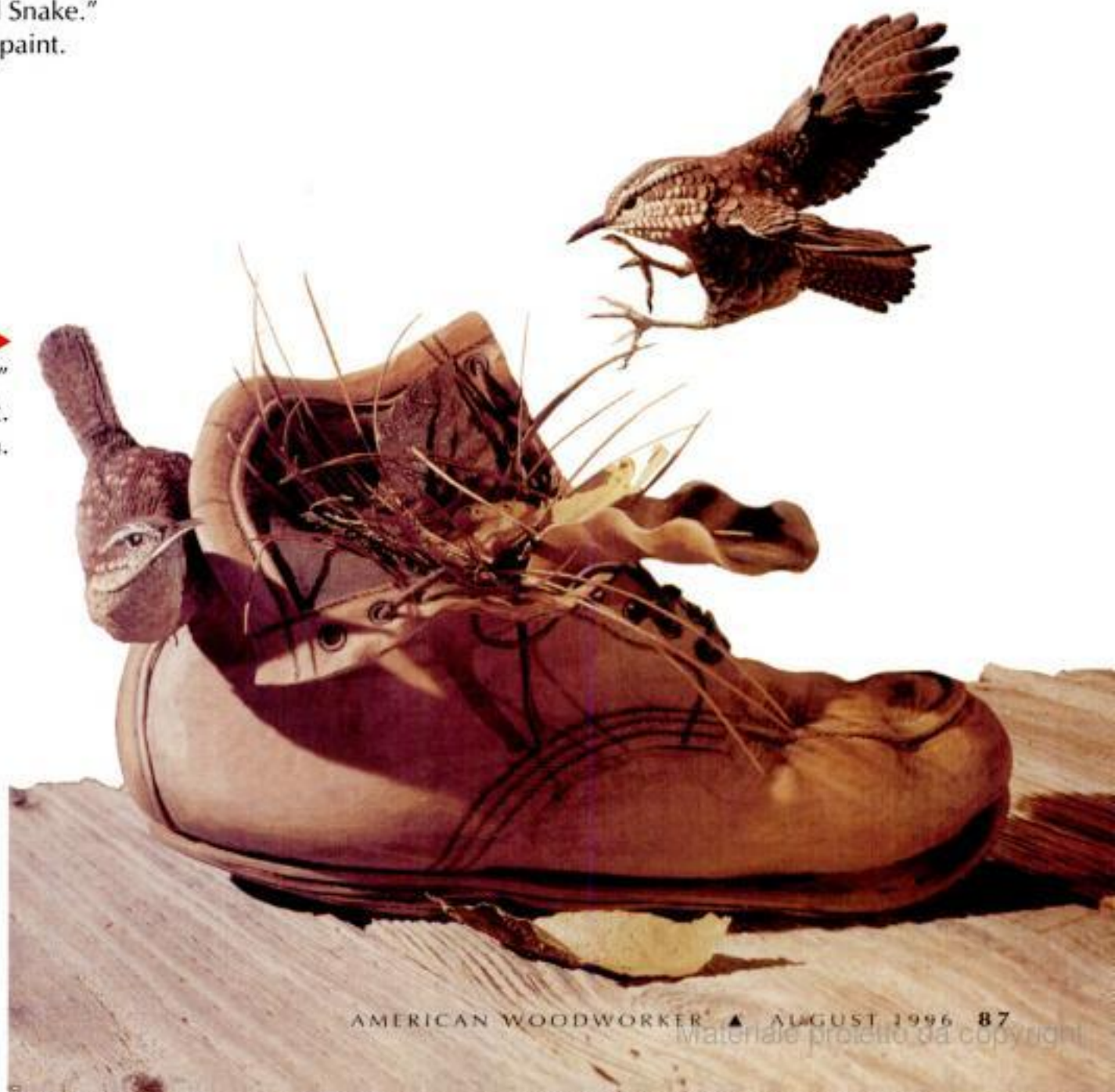


▲
 "Red-Shouldered Hawks and Copperhead Snake."
 Basswood, steel, brass shim stock and oil paint.
 W: 36 in. D: 30 in. H: 64 in.

▲
 "Least Bittern."
 Basswood, walnut,
 steel and oil paint.
 H: 30 in. Dia: 10 in.



▲
 "Carolina Wrens and Boot."
 Basswood, brass and oil paint.
 W: 11 in. D: 6 in. H: 10 1/2 in.



Want to see your work in "Gallery"?

Send color slides or larger transparencies to: "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include a title, a brief description of techniques used, 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.

Wharton Esherick

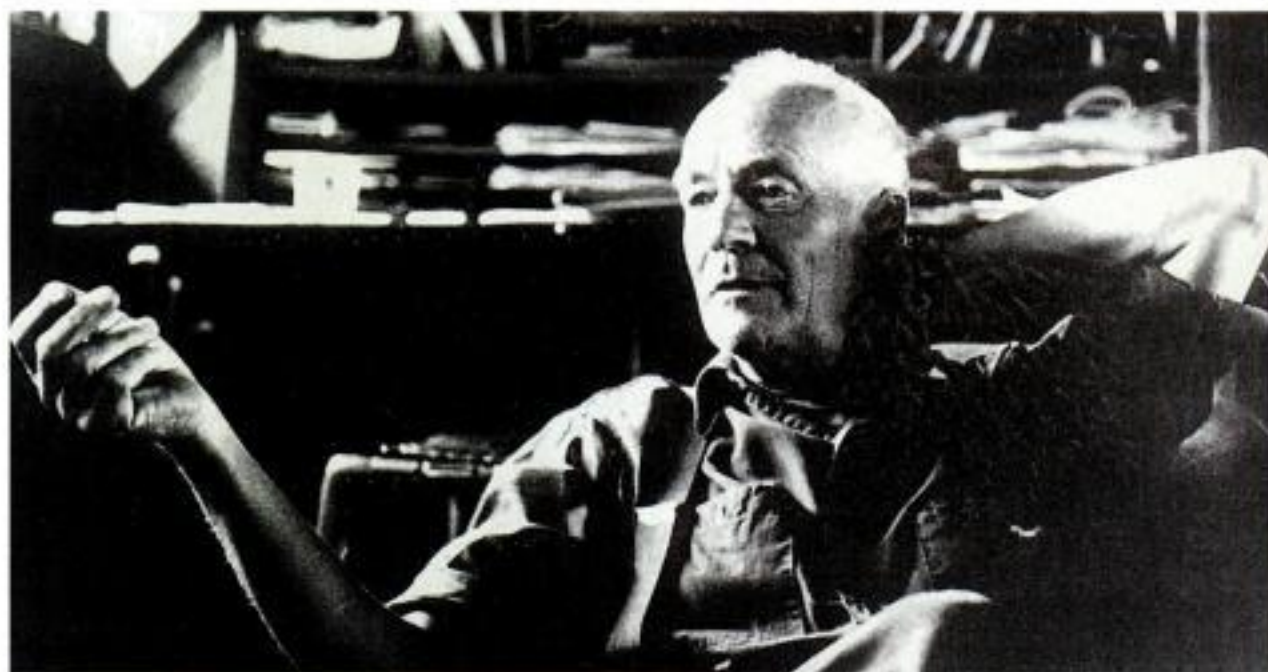
Pioneer of free-form furniture

by Susannah Hogendorn

Many craft experts consider Wharton Esherick the most important American woodworker of the 20th century—yet many woodworkers have never heard of him. Esherick spent most of his life (1887-1970) working with wood at the studio he designed himself, in Paoli, PA. His furniture designs influenced such well-known contemporary woodworkers as Wendell Castle and Sam Maloof. Now through July 20, some of his important works from private collections are open to the public at the first major Esherick sale, held at Moderne Gallery in Philadelphia.

Esherick studied painting at the Philadelphia School of Industrial Art (now the University of the Arts) and at the Pennsylvania Academy of the Fine Arts. In 1919 he began carving wooden frames for his paintings. In the early 1920s he branched out into woodcuts, wood sculpture and finally furniture.

Esherick considered himself a sculptor foremost. But like many artists, Esherick found that functional pieces—not sculpture—were in demand. Fortunately, he combined form and function to



Father of modern woodworking. Wharton Esherick (1887-1970) influenced a generation of craftsmen with the lyrical, organic shapes that he brought to his furniture and sculpture.

create a sculpted furniture style which still inspires woodworkers today.

Esherick's unique style did not evolve overnight. His early furniture had the sturdy, rectilinear look of Arts and Crafts, with carved surface decorations that only hinted at his sculptural ability. In the late

'20s and early '30s he borrowed the crystalline shapes of expressionism. But as Esherick's artistic vision expanded, the wood itself became his muse. The shapes of his furniture softened and became more organic, reflecting his medium.

One of Esherick's best-known works is a dining set made for the 1940 New York World's Fair. (See photo, left.) Its slender, sculpted lines and tapers are a premier example of Esherick's careful, nature-sensitive approach to woodwork.

Wharton Esherick reached artistic maturity during the 1950s. At a time when furniture was mostly straight lines, he used flowing forms to express the beauty and the spirit of the wood itself. In doing so, he left an indelible mark on today's finest furniture designers.

The Wharton Esherick exhibition and sale runs through July 20 at the Moderne Gallery, 111 N. Third St., Philadelphia, PA 19106; (215) 923-8536.

You can tour Esherick's home and studio from March to December. Write or call: Wharton Esherick Museum, Box 595, Paoli, PA 19301; (610) 644-5822. ▲



Dining set, 1940. Esherick made this set for the New York World's Fair. Hickory table with phenol top; hickory chairs with translucent goatskin seats.

SUSANNAH HOGENDORN
is an assistant editor of *AW*.