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August 2000
No. 143

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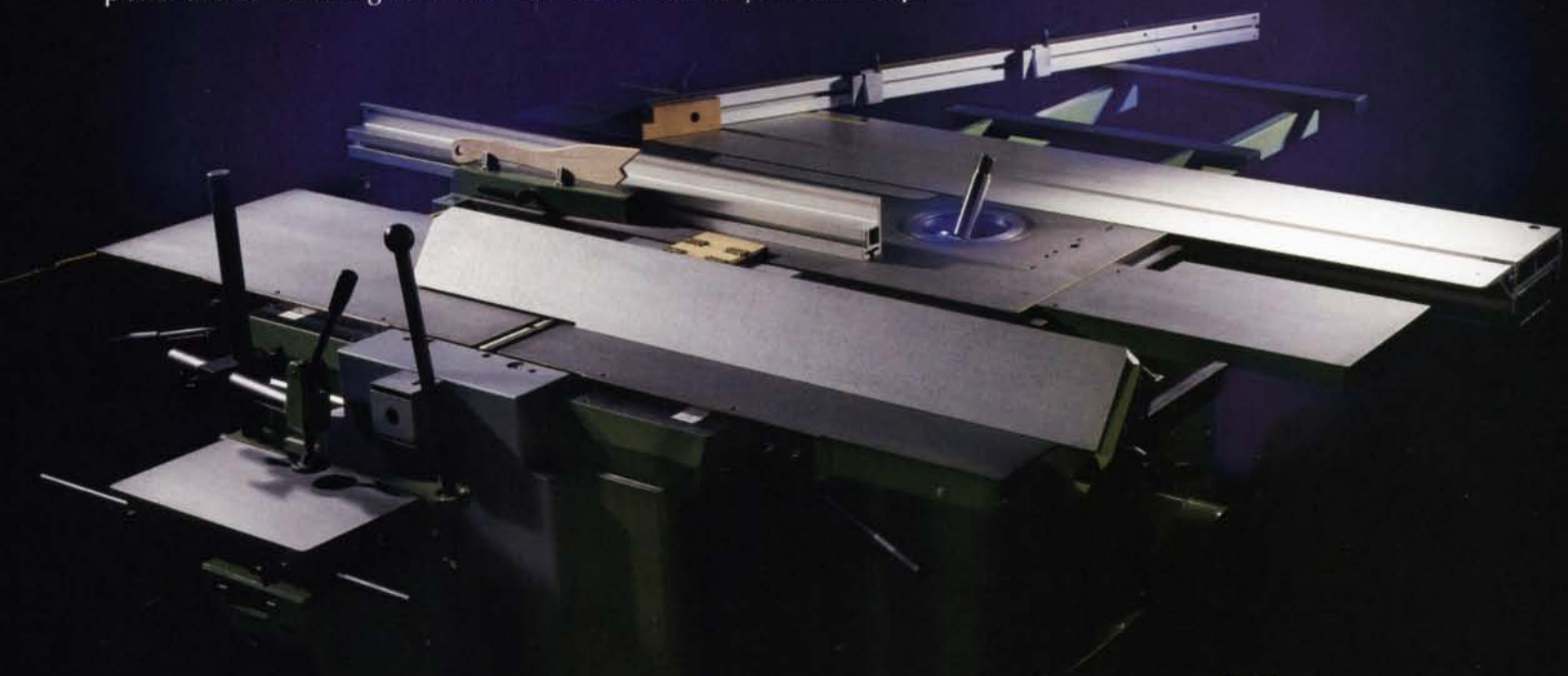

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Departments

On the Cover:
For Tony O'Malley, building a reproduction of the Lutyens garden bench was like putting together a large jigsaw puzzle. He simplified the job by breaking it into manageable steps. *See p. 78*
Photos: Scott Phillips; Matthew Teague (inset)

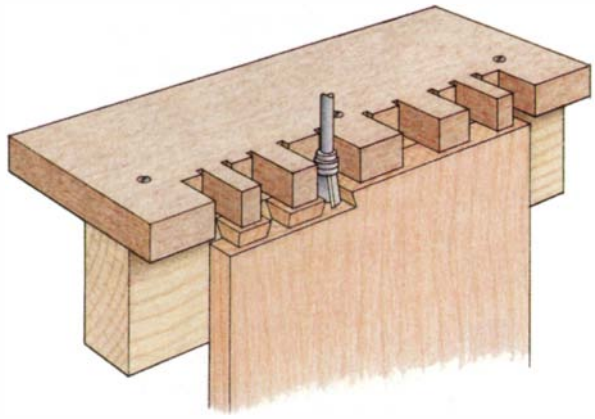
Bandsaw your own veneer, p. 44

A workbench that works, p. 50

No-brainer varnish technique, p. 57

JULY/AUGUST 2000 NO.143

Articles

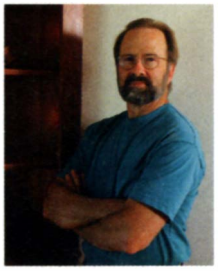


Shopmade dovetail templates, p. 86

Compound-angle joinery, p. 60

Contributors

Christian Becksvoort ("Full-Extension Wooden Slides") is the kind of guy a Shaker would entrust to repair an antique. His restoration work at the last Shaker community in the country, in Sabbathday Lake, Maine, is as renowned as the Shaker-style furniture he builds from scratch at his shop in New Gloucester. The Taunton Press published his book, *The Shaker Legacy*, in 1998. Becksvoort has been a contributing editor to *Fine Woodworking* since issue #72 (September/October 1988).



Jamie Buxton ("Shopmade Dovetail Templates") has been designing and building furniture for more than 30 years while supporting himself as a computer engineer. Two years ago he finally quit his high-tech day job and now does custom furniture full-time. He says, "I'm having so much fun I can't imagine why I didn't do this sooner."

Phil Lowe ("A Workbench That Works") has been making and repairing museum-quality furniture since 1972. He completed his formal training in the cabinet and furniture-making program at North Bennet Street School in Boston. After graduation, he was an instructor at the school for 10 years. His shop, situated on the waterfront in Beverly, Mass., is now the home of his own school, The Furniture Institute of Massachusetts. You can visit his web site at www.furnituremakingclasses.com. When he's not teaching or working wood, you can find him out in the harbor on his sailboat.

Lee Grindinger ("Three Simple Moldings") paid his dues in the construction trades, doing everything from floor installations to trimwork, before he settled into making and carving furniture for a living. After several years working and living on the East Coast, he and his wife moved to the wide-open spaces of Montana. They built a home and workshop in the Paradise Valley just north of Yellowstone National Park, where they take frequent day trips to dodge the geyser eruptions.

Tony O'Malley ("The Lutyens Garden Bench") has been woodworking since college in the early 1980s. He has worked for shops specializing in custom furniture and architectural millwork and as a book editor at Rodale Press. He currently combines freelance writing, editing and furniture making from his home in Emmaus, Pa.

Will Neptune ("Compound-Angle Joinery") graduated from North Bennet Street School in 1979 and has been an instructor there since 1985. He also teaches short courses at various woodworking schools and maintains an active schedule of commissioned custom furniture, the latest of which was a set of Chippendale chairs.

Steve Brown (Master Class) graduated from the cabinet and furniture-making program at North Bennet Street School in 1990, then spent eight years building custom furniture with Phil Lowe. He now teaches at North Bennet Street School and runs his own business, turning out a steady supply of custom furniture. He came up with the idea of a tablesaw jig to cut compound-angle joinery when his former instructor, Will Neptune, asked if he could lend a hand on a chair commission.

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Letters

Here's your chance to be in our anniversary issue and go on a virtual tour of IWF

Here at *Fine Woodworking*, we're gearing up for our 25th-anniversary, including the special, extra issue that we will publish later this year celebrating the event. Our readers obviously will share in that celebration, but we'd also like to give you a chance to be in the anniversary issue.

We have set up part of our web site (www.finewoodworking.com) to inform you about the anniversary and to let you submit some words about yourself, your woodworking and your relationship with the magazine. We'll pick a sampling for inclusion in the anniversary issue and also post some of the others on the web site later this year.

As most of you know, we have a very dynamic web site, with a huge cyber following. Our discussion boards—where people can ask woodworking questions, post opinions about power tools or just chat about the magazine—are particularly active parts of the site. We're trying some new things on the site, as well. In January we posted daily reports from the Colonial Williamsburg conference that we cosponsored on the topic of 18th-century case furniture. The reaction was so positive that we've decided to do something similar at the International Woodworking Fair (IWF) in Atlanta Aug. 24-27. This is the biggest woodworking show of the year, so we'll post daily reports about the new tools we spot there and about other events at IWF.

Visit *Fine Woodworking*'s web site now to see what we're up to and to submit your entry to be included in our 25th-anniversary issue. Please visit the site as often as you like, but be sure to visit again in August to see our reports from IWF.

–Timothy D. Schreiner, editor

An even safer tablesaw switch—I read Jamie Buxton's Methods of Work entry on a "Safer tablesaw switch" (*FWW* #139, p. 18) with great interest. When I bought my Delta Unisaw in 1993, I believed the on/off switch was poorly located because of its recessed position. This I remedied somewhat by extending the contractor box outward. Safety was improved because the switch was easier to locate.

To improve safety still further, I installed two kick-activated switches at the base of the saw, one in the front and the second on the left side. The normally closed switches were connected in series with the contactor-holding coil.

When I discussed this safety feature, as clearly described by Mr. Buxton, with Delta engineers, I was informed that the warranty on the unit was voided if I made these electrical modifications. Needless to say, in the interest of safety, the warranty has been voided.

–Paul R. Hennessy, Newark, Ohio

Most piano soundboards are spruce—In Jon Arno's well-written article "Basswood, Linden or Lime" (*FWW* #141, pp. 64-66), Mr. Arno states that basswood is "still one of the preferred woods for piano soundboards." As a piano technician, I must say that I have never seen a solid basswood soundboard, although basswood has been used in some laminated soundboards. To my knowledge, the preferred species for solid piano soundboards is spruce, whether Sitka, Adirondack or European.

–Jon Ralinovsky, Oxford, Ohio

Wants man-hours included for projects—I wanted to write this short note to thank you for your quality publication. Although I have been unable to adequately set up shop at this time, your magazine continues to inspire me to strive for quality no matter what I attempt. Most of my cabinetmaking knowledge is a result of my reading and my subsequent attempts at the procedures described. Therefore, I appreciate the clarity with which you present the various projects and techniques. One piece of information I would like to see included more often is the number of man-hours represented in each project. I think this might give a more realistic picture of the care that goes into each piece, even though it may be presented in a few pages.

–Jeff Warner, Middletown, N.J.

Canadian price differential—The reason that I did not renew my subscription is purely economics. Your annual rate outside the United States is $38 in U.S. funds. I live in Canada, so your rate is currently $56 in Canadian funds. Your newsstand rate is $7.95 for each issue, or $55. So buying the magazine on the newsstand in Canada is cheaper than subscribing. My pleas have fallen on deaf ears. I assume this plea will also fall on deaf ears. If you care you will publish this letter.

–Bob Houston, Owen Sound, Ont., Canada

PUBLISHER REPLIES: Good news. We are lowering our Canadian subscription price. Starting with this issue, we are going to charge our Canadian subscribers the same rate we charge our U.S. customers: $32 (in U.S. currency). I hope you'll agree this makes *Fine Woodworking* an excellent value for woodworkers, no matter which side of the border they live on.

Garage shop might be an insurance problem—Chris Gochnour's article "Turning a Parking Place into a Great Shop Space" (*FWW* #141, pp. 51-55) reminded me of a little known exclusion on homeowners' insurance policies. These policies all include coverage for "other structures," but coverage is often excluded if the structure is used for a business purpose. Use of a detached structure as a workshop for hobby use only is covered under the homeowners' policy, both for their tools and the structure itself. But the person who is

Writing an article

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selling their work needs to add a commercial insurance policy for the structure. *–William G. Hoffman Jr., Washington, D.C.*

Sandpaper sharpening can be very-scary sharp—The article on strategies for sharpening in the February 2000 issue (*FWW* #140, pp. 56-61) was of keen interest to me because it followed the same pattern I did over the last five years of woodworking while I learned to sharpen my edged tools.

I am finally satisfied that the fastest, sharpest and longest-lasting edge is obtained with the sandpaper method. I finish on a stropping wheel and then a buffing wheel with brown rouge polish for an absolute mirror edge. The hair on my hand jumps off to avoid this unbelievable edge when I test it.

One word of caution: If you test the edge by shaving end grain to a waxy smoothness, be aware that your edge can be too sharp. I was doing just that one recent Sunday morning, holding a board on the bench and pressing down on the end grain with a freshly sharpened chisel. The blade sliced completely through the cherry with unexpected speed and somehow cut my thumb. The moral is that even nonpower tools can sneak up on us if we are not careful.

–David Nastri, Wolcott, Conn.

Subscriber classified ads return—In the April 2000 issue (*FWW* #141) I thought the omission of the subscriber's classified advertising page was an error. The omission again in #142 made it obvious that the consideration to continue the reasonable means for nonprofessional woodworkers to communicate and exchange or sell their surplus had been withdrawn.

This was always the first page I read when I received each issue. It is unfeasible for a reader and amateur woodworker to consider placing an advertisement for $120 to pass on reasonably priced tools, machinery or back issues of your wonderful magazine at that rate.

–Edward C. Kozicki, Glen Mills, Pa.

PUBLISHER REPLIES: The Wood & Tool Exchange was eliminated in an attempt to get all classified advertising under similar pricing guidelines. Because no issue of the magazine had ever received more than a half dozen or so submissions for this section (out of 250,000 subscribers), we did not anticipate much inconvenience for our readers. However, it has become apparent that we were wrong. Thus, in response to yours and similar letters we have received, we will reinstitute the Wood & Tool Exchange beginning with our September/October issue (#144).

Duct tape vs. cellophane for clamping cauls—In his article "Gluing and Clamping Strategies" (*FWW* #141, pp. 44-50), Lon Schleining recommends applying cellophane tape to the cauls to prevent the cauls from adhering to the project and to allow the pieces to slide together when clamping is accomplished.

I suggest using duct tape instead. It is cheaper, stronger, more readily available, more durable and easy to apply. A piece of duct tape under the iron clamps also easily prevents the black stains on the workpiece caused by the interaction of glue and iron. It is easily removed, and no cleanup is required.

–Lee Holdren, Bellevue, Wash.

Use rasps with handles when turning—I appreciated Kim Carleton Graves' article "Duplicate Spindles by Hand" (*FWW* #142, pp. 68-71), but I would like to point out one safety issue, regarding the photo on p. 70, in which Graves appears to be using a rasp without a handle. Rasps or files held in this way can be useful in cleaning up a turning. But if an unhandled file grabbed the work and kicked back, the tail end of the file could plunge into your palm, and any time saved would be wasted in the emergency room. Believe me, files used this way should have handles or should be held carefully so the rear end doesn't rest in the palm.

–Dan Mehlman, Delmar, N.Y.

Dangers of potassium dichromate—I enjoy reading *Fine Woodworking* and learn a considerable amount of valuable

About your safety

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

–Timothy D. Schreiner, editor

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information from the articles. However, in a recent Finish Line column, the use of potassium dichromate as a means for artificially aging wood was discussed (*FWW* #140, p. 130).

I am a research chemist and am very concerned about woodworkers (and chemists) that use such compounds. To his credit, Chris Minick notes that this chemical should be used with the utmost care. But he may be unaware that chromium compounds, including potassium dichromate, are confirmed human carcinogens and serious environmental pollutants for aquatic organisms.

Their use should be avoided. There is a vast amount of material describing the problems associated with chromium compounds. Interested readers may check the Material Safety Data Sheet (MSDS) for this compound, or check the World Wide Web.

As environmentally responsible people, we should take all reasonable measures to refrain from adding well-known pollutants to our planet. Thus I strongly urge the suppliers of potassium dichromate to stop selling it to those who are not well informed about its potential hazards. Furthermore, all woodworkers should dispose of their stores of potassium dichromate in an environmentally responsible manner by contacting their local EPA office for disposal details.

—Colin P. Horwitz, Pittsburgh, Pa.

Guidice's Rules of Thumb was off the mark—Anthony Guidice's Rules of Thumb for four-squaring with hand tools (*FWW* #142, pp. 96, 98) are presumably intended for novice woodworkers. Unfortunately, his dogmatic insistence on some questionable assertions may persuade many that working with hand tools is a luxury they can't afford.

Mr. Guidice thinks in absolutist terms: Lie-Nielsen handplanes cut beautifully right off the shelf; no other metal planes do (not even a Holtey?). Only a scrub plane will flatten a board. You can't do serious work with grandpa's old tool, etc., etc.

I agree that Tom Lie-Nielsen makes beautiful tools. I own several (including a scrub plane), and they're wonderful to use. But Mr. Guidice's insistence that there is only one way (and only one brand of tool) to do "serious work" is absurd. The Lie-Nielsen tool trio he considers essential will cost the aspiring novice $850, an entry barrier high enough to drastically thin the ranks of future woodworkers. Tool author Aldren Watson points out that a jack or a smoother will do the work of a scrub plane if the lateral is set all the way to one side. Initially a novice could also do without a jointer. This brings the first cost of the tools needed to four-square a board by hand from close to $1,000 to about $100. Maybe then the aspiring woodworker could afford some sort of workbench, not to mention a board to square.

—Steve Harding, Seattle, Wash.

Plunge routers are better for use in tables—Contrary to the conclusions in Pat Warner's article "Routers for Router Tables" (*FWW* #142, pp. 86-89), there are many reasons why a plunge router is a better option than a fixed-base router in a router table. Mr. Warner points out some of the numerous disadvantages of a fixed-base router even though he still favors them. I have been using a DeWalt DW621 plunge router in my router table for two years with great success. I couldn't imagine putting up with the hassles Warner goes through to change bits and make adjustments.

My router table is a customized extension wing on my tablesaw. It is made of ¾-in. medium-density fiberboard (MDF) with formica laminate epoxied to the surface. The plunge router is mounted to a base plate made of ¼-in. aluminum, which is strong but still allows full travel adjustment of the router. The extension wing is strong and well supported but remains open on the end, making in-place bit changes and adjustments quick and easy. The DW621 has a spindle lock, which also speeds the process.

The plunging mechanism will not clog with dust while inverted. It also allows you to instantly drop the bit safely below the table surface, without fear of the router dropping right out of its base. The depth stops and microdial on plunge routers make for quick, accurate fine adjustments. The large tightening knob on the DW621 requires little torque and has never slipped.

Many good plunge routers share the same features as my DeWalt. I would urge anyone who is about to invest in a router and table to check out the very versatile plunge-style router.

—Justin Allan, Edgewater, Md.

Oil-laden rags are a shop hazard—In regards to the recent Finish Line column, "Three simple finishes," by Chris Minick (*FWW* #141, pp. 125-126), I could not agree more on his reasoning. I have used each one many times and found the results to be nothing short of superior.

I found it somewhat disappointing, however, that he did not mention the inherent dangers associated with the improper disposal of oil-laden rags after the application of oil or varnish finishes. As a professional woodworker for well over 30 years, I have been witness to the aftermath of two fires caused by craftspeople who simply did not know that a few wadded-up finishing rags carelessly thrown into a trash container could eventually self-ignite.

I personally prefer to simply unfold the saturated rags and place them individually around the rim of a metal trash can placed outside and away from the shop until I am certain that they are properly dried and pose no further threat of self-igniting.

—Glenn F. Weagle, Lorton, Va.

Dust-collection article was a big help—I wanted to install a central dust-collection system in my new shop, so I purchased a 1,900-cfm, 3-hp, single-stage collector with an 8-in. inlet. On the day I planned to lay out the ductwork, I was delighted to find in my mail your April issue, which contained Anatole Burkin's article "Dust Collection for the One-Man Shop" (*FWW* #141, pp. 82-87).

I chose to use metal ductwork designed for heating or cooling systems rather than to follow Mr. Burkin's advice not to use this ductwork. The first time I turned on the dust collector, the pipe collapsed. I removed and discarded that ductwork and replaced it with 22-gauge spiral pipe, as recommended by your article. My system now works perfectly.

—Leo Rowland, Hillsboro, Ore.

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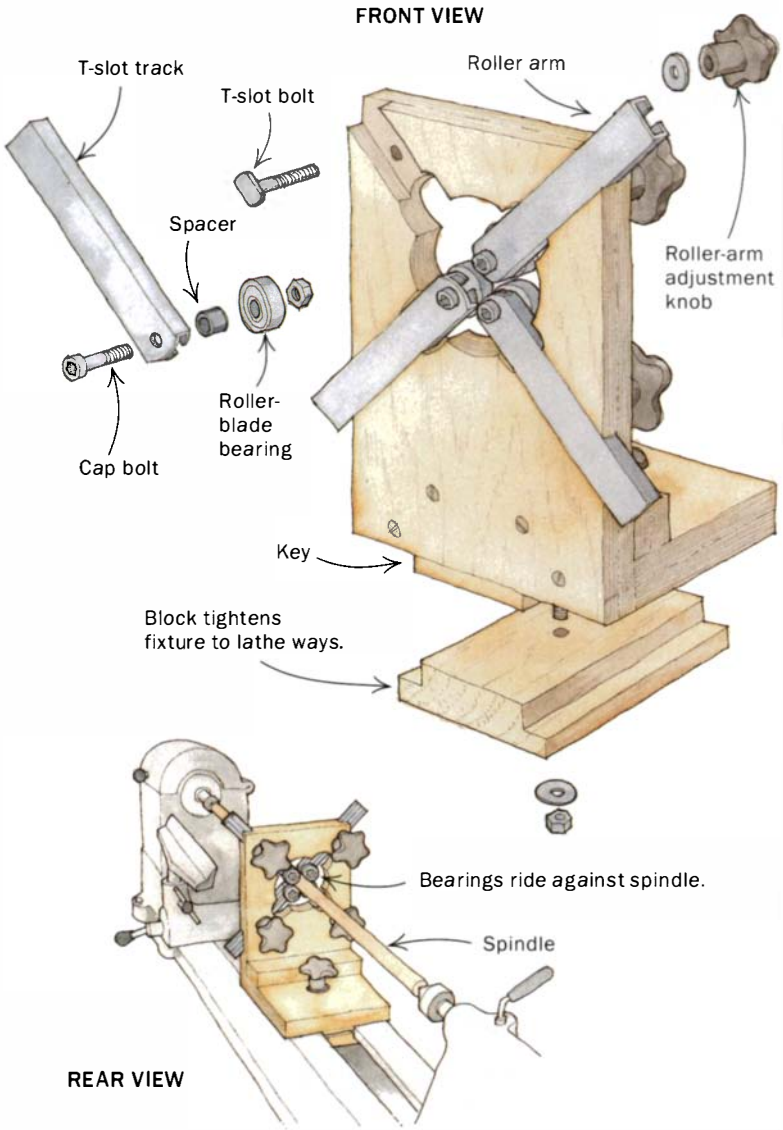
Shopmade steady rest

In the process of turning dozens of spindles for a bed I was making, I found I needed a steady rest to stabilize the thin spindles during the later stages of turning. I came up with a design that is easy to build, easy to adjust and works admirably. The steady rest consists of a main body and four roller arms. For the body, I laminated two pieces of ½-in.-thick Baltic-birch plywood. I made the roller arms by mounting roller-blade bearings (available from large sporting-goods stores) to the ends of 6-in. lengths of T-slot track. The roller arms adjust and lock into position with T-slot bolts and plastic knobs. T-slot hardware is available from Woodcraft (800-225-1153) and other mail-order suppliers.

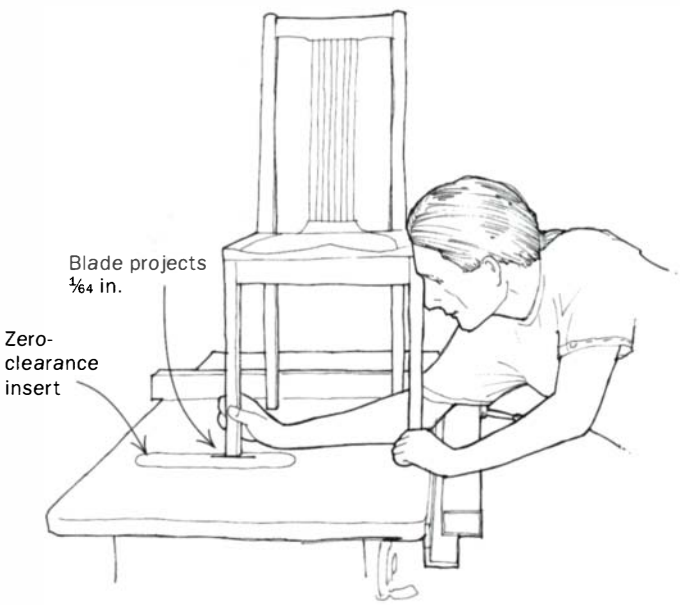


To make the steady rest, start by cutting out the vertical part of the body from the Baltic-birch plywood and locating the lathe's centerline on it. You can find and mark the centerline's height above the lathe bed by placing the vertical piece on the lathe bed and squeezing it between pointed centers. Cut two dadoes into the vertical part of the body (for the T-slot tracks) in an X pattern, with the X centered over the centerline point. Cut a circular opening through the body that is big enough for the largest spindle you will be turning, then drill holes for the hardware as necessary. Add a key to the bottom of the body to keep it centered and straight on the bed of the lathe. You will need to tailor the key and the fixture's bed-locking mechanism to your lathe.

To use the steady rest, slide it onto the spindle, lock the fixture to the bed, then adjust the roller arms so that the bearings ride gently against the spindle and support it during turning.

—Robert D. Eberhardt, Eau Claire, Wis.

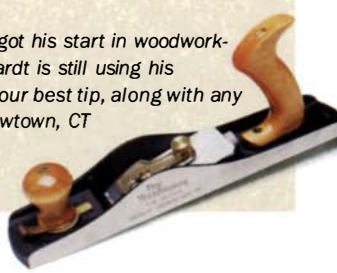
Stabilizing the legs of a wobbly chair



You've just built a chair, and you need to see if it wobbles. So you take it to the one guaranteed flat spot in your shop, which is probably the top of your tablesaw. You mark the high leg and then try to decide which torturous way you are going to trim that little bit off. Here's how I do it. Put a zero-clearance insert into the table-

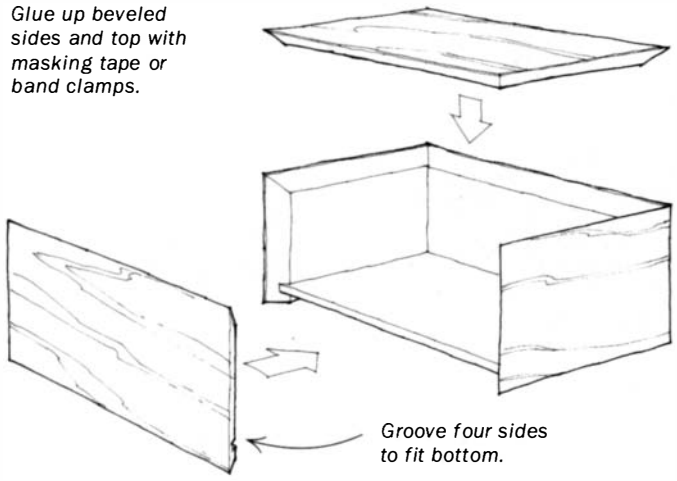
A reward for the best tip

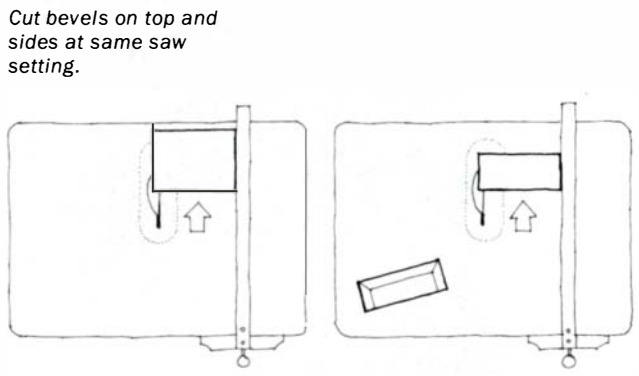
Robert D. Eberhardt won an engraved Lie-Nielsen handplane for the winning tip shown above. He got his start in woodworking by soaping screws for his grandfather, who built wooden fishing boats. Forty years later, Eberhardt is still using his grandfather's tools. He designed this steady rest to turn some spindles for his own bed. Send us your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*



saw. Drop the sawblade until it is below the bed and then raise it until it projects just a few thousandths of an inch, 1/64 in. max. With your chair still sitting on top of the saw, turn the saw on and pass the offending leg sideways across the blade back and forth until the wobble is gone. This technique works equally well with small tables. *—Tai Lake, Holualoa, Hawaii*

No-measure mitered boxes





Here's a technique for making mitered boxes that eliminates all of the measuring and fussing to get the mitered parts to fit perfectly. I use the technique on veneered boxes with medium-density-fiberboard (MDF) cores, but the basic approach will work with any box where the four sides and top join with miters.

Start by applying veneer to a core piece for the top and the sides, including a little extra material for the mitered bevels. Rip all four sides of the box to width (box height) and then square the sides to a little over their final lengths. With the tablesaw blade set at 45°, bevel one long edge and one end of each side piece. Then bevel one edge and one end of the top.

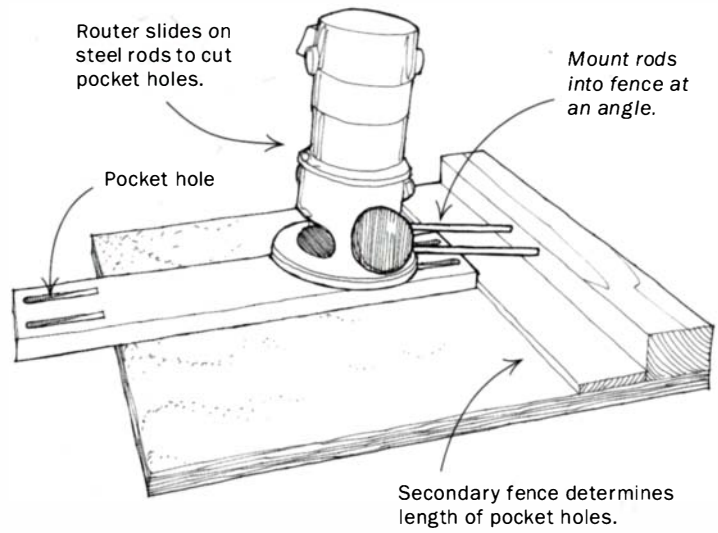
Now set the fence to the desired width of the top. Bevel the other long side of the top and—without changing the fence setting—bevel the two short sides to length. Reset the fence to the desired length of the top and bevel the short side of the top. Again, without changing the fence setting, bevel the two long sides to length.

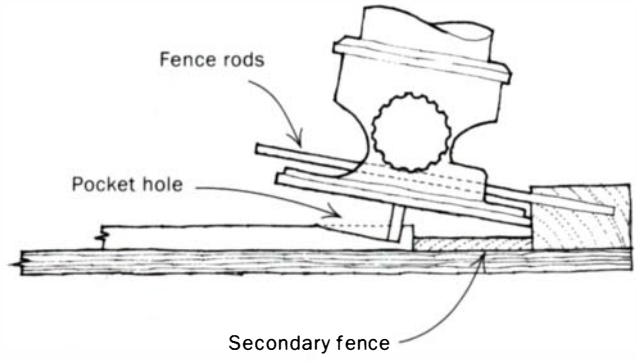
Run a ¼-in.-wide by ¼-in.-deep groove on the inside of each side piece, ¼ in. up from the bottom edge. This groove will hold the bottom of the box. Cut the bottom from ¼-in. plywood to fit the groove and glue up the box with web clamps or masking tape. Later, after the glue has set, saw the top off the box to produce the lid.

If your fence is square to the blade and your blade is accurately set at 45°, the joints are guaranteed to be perfect. The top will drop into the bevels in the sides with a satisfying precision.

—Pat Griffith, Ottawa, Ont., Canada

Router-cut pocket holes revisited





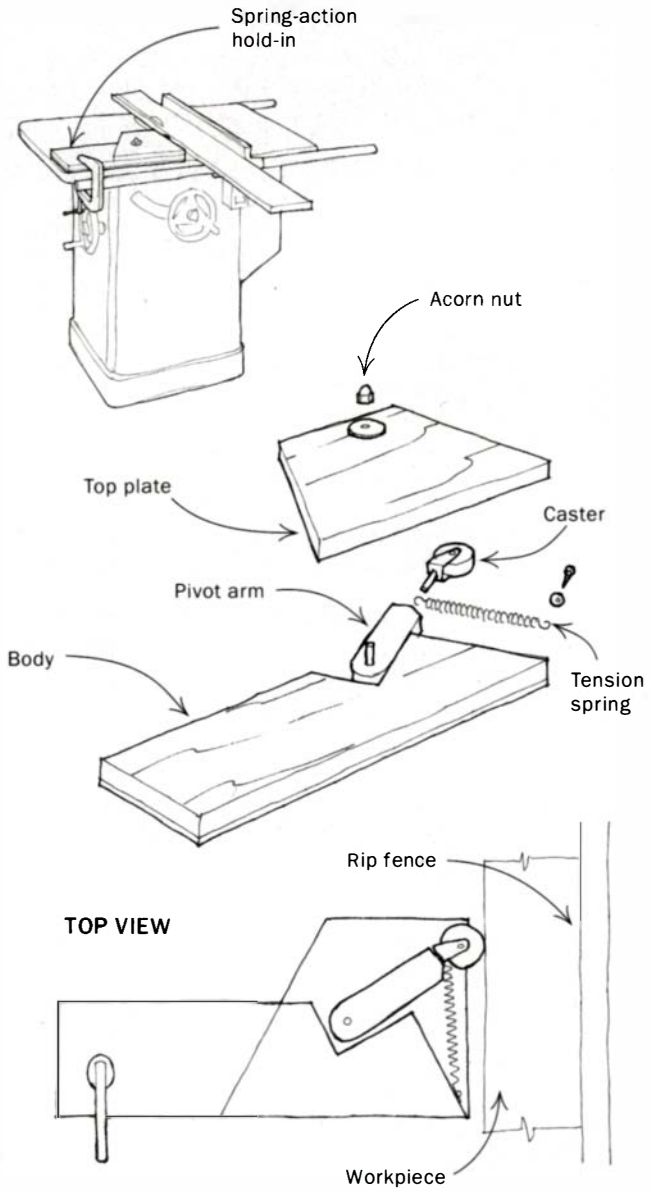
I liked Michael Csontos' idea for making pocket holes with a router and a sliding ramp (see *FWW* #134, p. 20). But the fixture seemed complicated to build, and it limited the width of workpiece that could be used. Here's another approach that doesn't limit the size of the workpiece. This approach uses the router's steel fence rods as sliding rails.

Start by making a full-sized, side-view drawing of the fence, the router base and the desired pocket holes. The drawing will give you the rod angles and locations in the fence. These two variables, along with the router-bit depth, control the length and depth of the pocket hole. Drill angled holes into the fence spaced at the right width to fit the router's fence rods. Attach the fence to a generously sized, ¾-in.-thick plywood base. To use the fixture, slide the

workpiece into position and clamp. With the router suspended above the workpiece on the fence rods, start the router and slowly slide it down toward the secondary fence to cut the pocket hole.
—Timothy Dalton, Middleton, Wis.

Quick tip: Paint tea onto raw wood for an inexpensive and natural-looking stain. The stronger the tea, the darker the stain. After it dries, seal with shellac or varnish. *—Sam Bruin, Brooksville, Fla.*

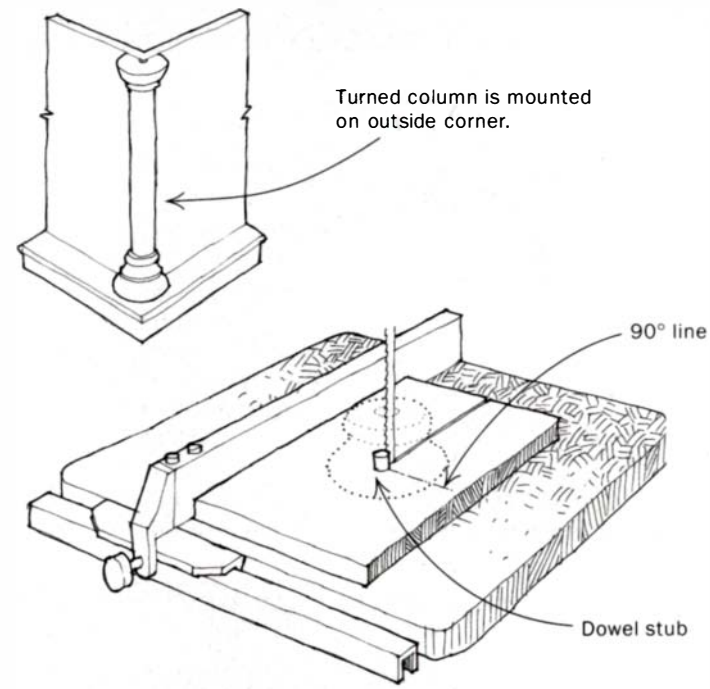
Spring-action hold-in



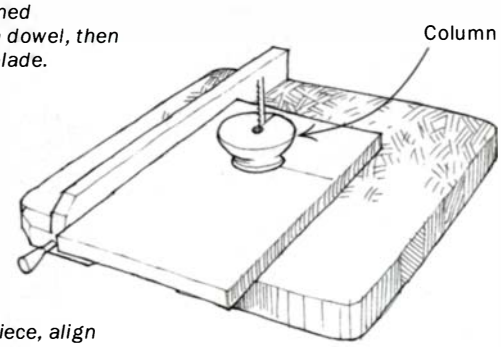
To make a safe, consistent cut on the tablesaw, it is important to hold the workpiece firmly against the rip fence. I have seen feather boards used for this purpose, but they are not very forgiving of variations in stock size, and they're awkward to clamp to the table. So I made this spring-action hold-in from wood scraps, a surplus caster and other hardware from my junk box.

The hold-in has several parts: a body laminated from ⅛-in. Masonite and ¾-in. plywood, a ⅜-in. plywood top plate, a pivot arm, a stem-type caster and a tension spring. The Z-shaped cutout in the body creates a positive stop for the pivot arm and allows a full 1½ in. of spring-tensioned displacement of the caster wheel to accommodate lumber of different widths.
—Steve Stern, Brooklyn, N.Y.

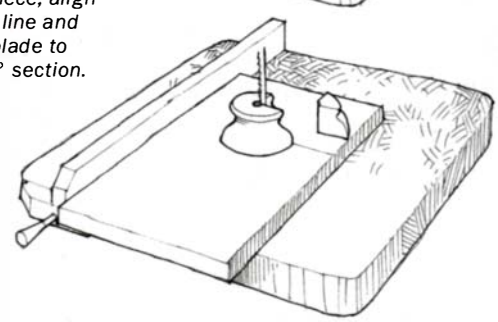
Making decorative turned columns for furniture



1. Mount turned workpiece on dowel, then push it into blade.



2. Flip workpiece, align first cut with line and push it into blade to remove a 90° section.



Turned columnlike decorations look great mounted on the outside corners of furniture or paneled walls. But to make the

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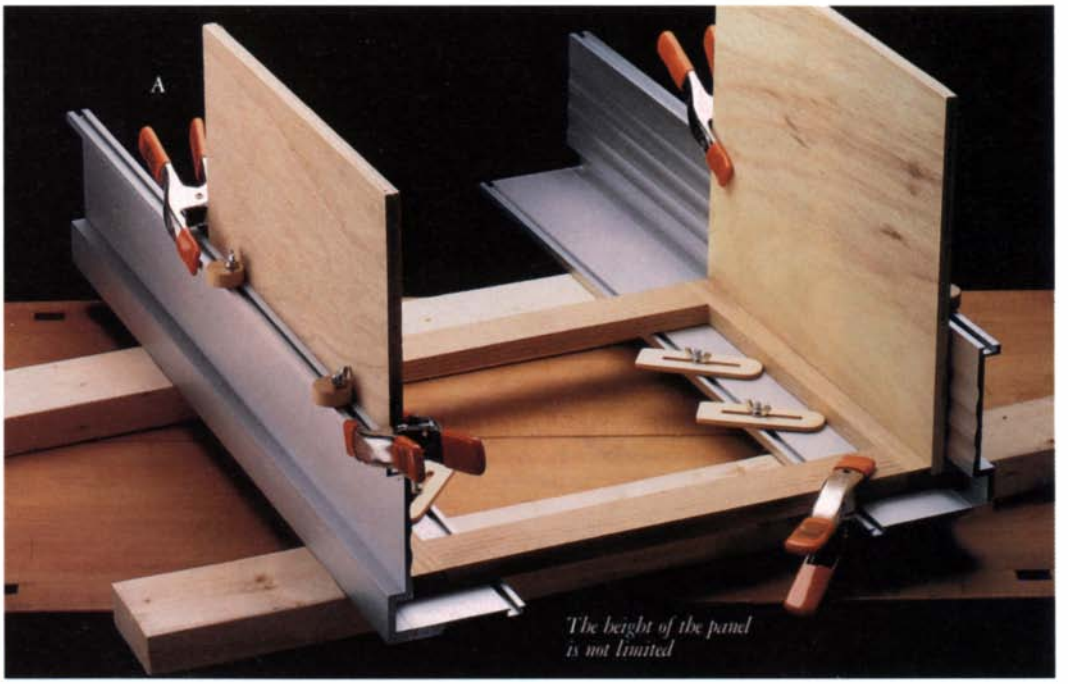
A / Our Universal Assembly Jig Is Ideal – It's A Cabinetmaker's Third Hand

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



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

This Jig can also be used to hold very long pieces vertically, like bookshelf sides (*of virtually any height*) while you fasten them in place. This practical lack of a height restriction gives the Jig exceptional additional utility.

Extra-heavy (8 lbs.) extruded, anodized (non-staining) aluminum, it is a massive ⅜″ thick and 30½″ long. Sides measure 4½″ and 6″. Two Adjustment Cams and two Position Clamps are included. Other clamps needed are common shop clamps (spring clamps, bar or pipe clamps etc.).

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

		Regular	*Sale*
14B01.01	Assembly Jig (each)	$ 89.95	
14B01.10	Set 2 Assembly Jigs	$179.90	$139.95

B / Scale Model – An Ingenious Cabinet Building System

Developed by two old-world German cabinetmakers living in New Jersey, the Donmar-Wiesing cabinet building method is an ingenious system, and was the inspiration for the Universal Assembly Jig. This ¼″ scale model, along with its instructions, illustrate this unique technique. Once you learn this method, you can *apply it to any type of casework* – furniture, desks, chests etc. Everyone from the most experienced casework builder to the novice woodworker will gain new skills quickly.

05N19.01 Casework Scale Model $24.95

C / Premium Float Glass – An Accurate Affordable Surface Plate

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

Traditionally, surface plates made of iron or stone, were quite expensive – and heavy. In contrast, "Float Glass" is an industrial product that is extremely flat, parallel sided, stable and reasonable in cost. Not to be confused with ordinary glass. Premium "Float Glass" is made by floating molten glass on a molten tin bath. Both Plates are ½″ thick and 4″ wide. Sizes shown are overall length. Edges are beveled. (Sandpaper not included.)

20K14.04	10″ Float Glass Plate	$26.85
20K14.05	24″ Float Glass Plate	$36.50

D / Traditional Wood Coloring Techniques For Quick Antiquing

Bichromate of Potash is one of the most important chemicals historically used in woodworking. Rather than dying the fibers or using pigment particles, it reacts with the natural tannin in the wood. The depth of color achieved is stunning. Oak (with its rich golden browns) and Mahogany (with its rich "Georgian" reds) are two woods which respond very well.

See the review in *Fine Woodworking Magazine*: Feb. 2000 issue, page 130.

It comes as a powder and can be mixed with warm water in varying strengths to produce varying color intensities. (Note: Bichromate of Potash is Toxic. Read instructions carefully and use a mask and gloves when handling.)

Natural Van Dyke Crystals have also been a favorite for centuries – not only to color but to shade or darken selected areas on wood surfaces. Just add warm water to the desired strength.

99P61.08 Bichromate (8.8 oz) $13.25
99P61.34 Van Dyke (8 oz) $11.95

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columns you have to remove much of the turned pieces to mount them properly. Here's how to remove the waste.

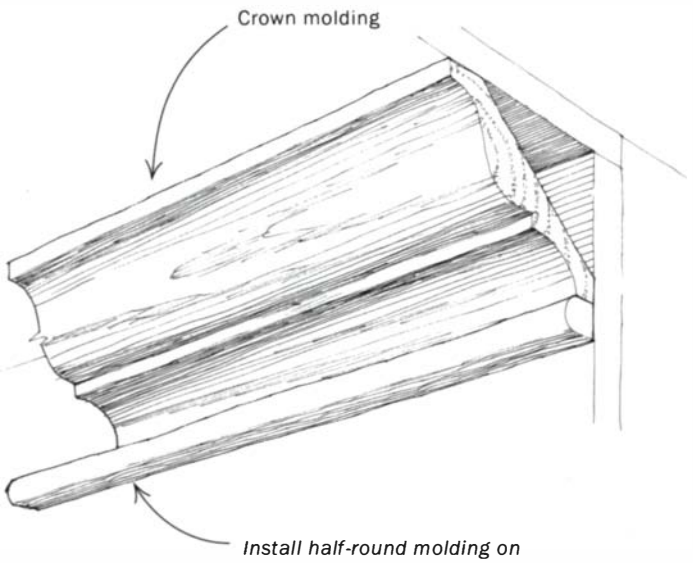
Start by turning the column midsection, head and foot from solid stock. Through the center of the head and foot, bore a hole to fit a commonly sized dowel. Remove a 90° slice from the midsection by screwing square blocks to each end of the column, run the column through your tablesaw and turn it 90° for the second cut.

To perform the same operation on the head and foot, construct a simple jig by mounting a dowel in a scrap of plywood or MDF. Mark a line on the top of the jig at 90° to the line of the cut. Mount the column head on the jig by pushing it onto the dowel and set the bandsaw fence with the cut line centered on the dowel. Push the jig into the blade and cut halfway through the head. Flip the workpiece, rotate the first saw kerf so that it is aligned with the 90° mark on the jig and cut again to remove the 90° wedge. Repeat the same operation with the foot.

—William Nyffeler, Newmill, Keith, Scotland

Installing crown molding

When I got the job of installing 200 linear ft. of large crown molding in a room with 10-ft. ceilings, I quickly discovered that this was no simple task. The main difficulty was holding long sections of crown in alignment along the wall as I tried to nail them in place. To achieve a consistent alignment, I first tried snapping a chalkline and placing the lower edge of the molding on the line. This procedure helped enormously but still allowed for too many variations. Finally, I came up with a method that is almost foolproof.



Install half-round molding on chalkline to support crown molding during installation.

I tacked a half-round molding of suitable dimension to the snapped chalk, flush to the wall. The half-round molding not only ensured consistent alignment but also provided a solid and stable ledge on which to place the crown and position it for nailing. If left

in place, the half-round strip provides an additional architectural detail to the molding. This approach improved the quality of the job and simplified the installation.

—George L. Ziff, Southern Pines, N.C.

Quick tip: To protect my hands around the shop, I use inexpensive latex examination gloves, available by the box from wholesale supply stores (such as Sam's Club). The tight-fitting gloves are sensitive enough to operate machinery but strong enough to protect from splinters when handling rough lumber. They are surprisingly durable. As a bonus, the gloves leave my hands in dramatically improved condition at the end of the day, reducing the need for moisturizers and rehabilitation.

—Lawrence A Salibra II, Gates Mills, Ohio

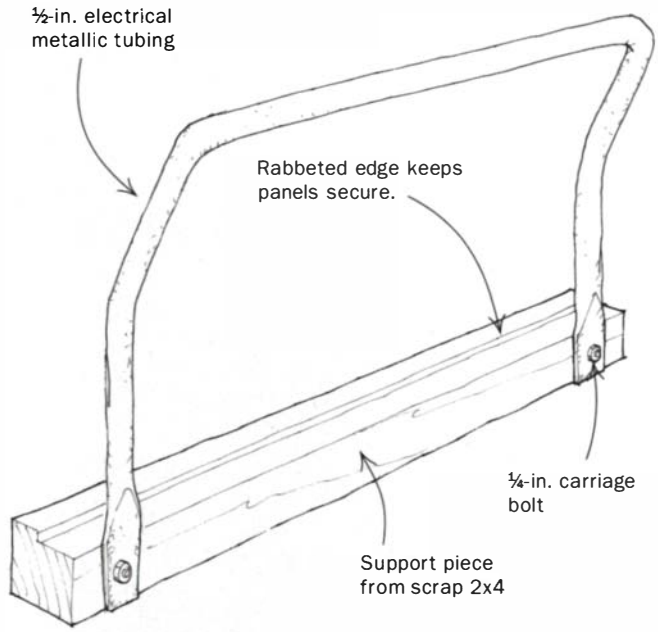
Shopmade plywood carrier

Here is a carrier that makes it much easier for one person to handle full sheets of plywood or drywall. I know you can buy similar tools at home-improvement centers, but this shopmade version can be customized to fit your height and arm length, and it costs next-to nothing to make.

Dimensions of the tool are not critical. A height of about 12 in. works for many people. You should size the tool so that you don't have to stoop too far to lift a panel.

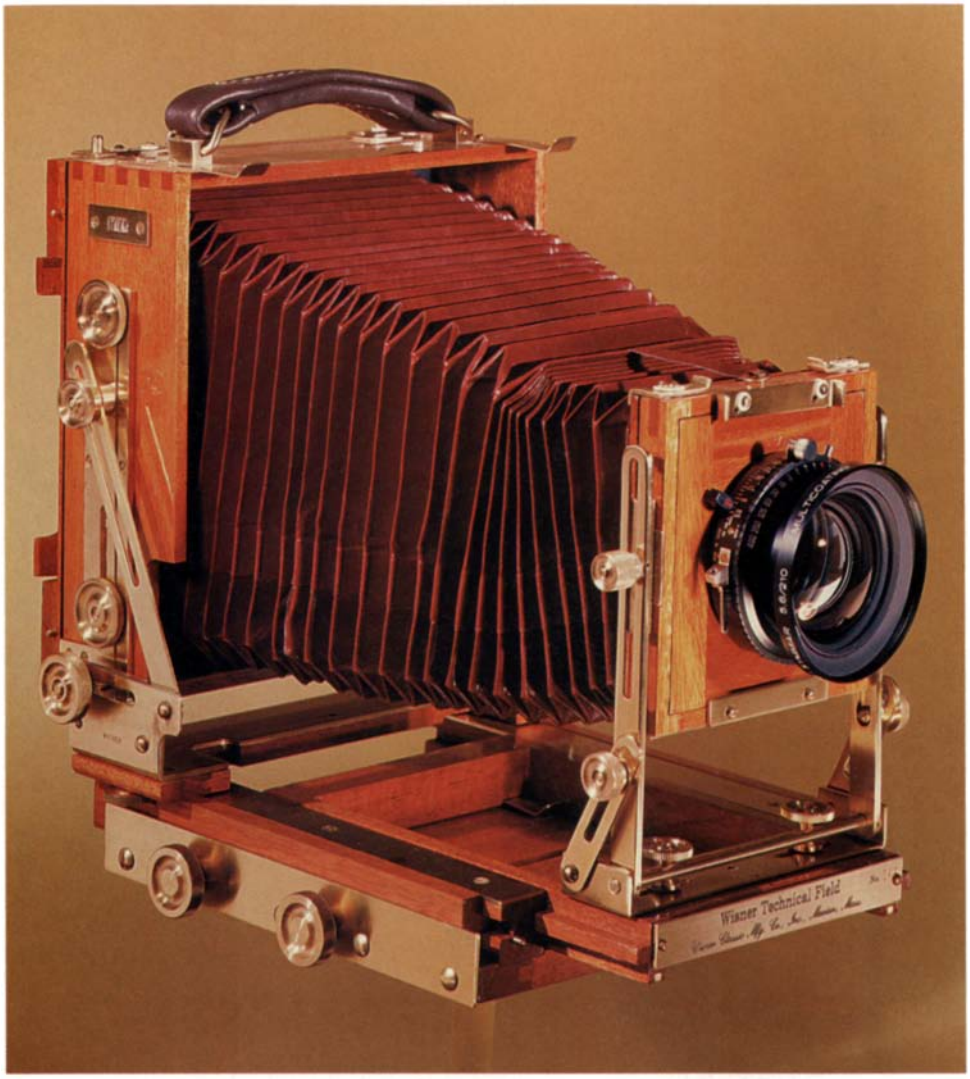
Make the handle from ½-in. EMT (electrical metallic tubing). The bend in the handle gives some clearance for your hand between the handle and the panel. Flatten and drill the ends of the EMT for ¼-in carriage bolts. Cut the wood-support piece from a scrap 2x4. Bending the EMT is pretty tricky: Bend the U-shape first, then bend the uprights.

—James A. Meier, Brighton, Mich.



Notes & Comment

Take a snapshot from the past



A camera that's built to last. *The Technical Field Camera, made of mahogany and brass, is one of four 19th-century, bellows-style wooden cameras that Ron Wisner and his company produce. The 4-in. by 5-in. model shown here sells for $1,850.*

Rapid advances in photographic technology have led to today's digital cameras. Ron Wisner, however, has decided to take a step back in time and recapture the early days of photographic history with his bellows-style wooden cameras.

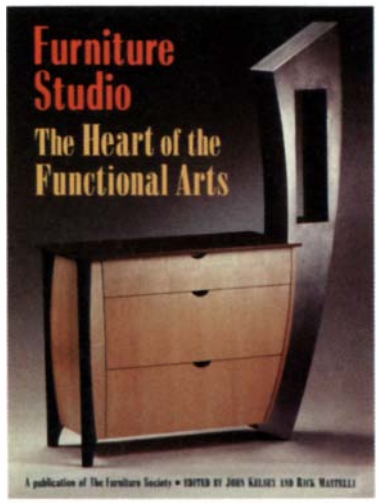
The Wisner Co. builds 19th-century-style, large-format view cameras. Wisner chose to build his cameras out of wood because of its beauty, strength, lightness and overall durability. All of his cameras are made of mahogany or cherry and finished with an oil varnish. The quartersawn, straight-grained, pattern-grade stock is handpicked and resawn in his shop from rough boards.

Wisner stresses "precision woodworking" when making his cameras. He coined this term to combine the notions of an expert woodworker and a knowledgeable machinist. Each wooden part is made with the highest precision, measured with micrometers and dial indicators to within a few thousandths of an inch.

Wisner's company has been around for 16 years and has established itself as the world's biggest producer of wooden cameras. For more information, visit the company's web site at www.wisner.com or call (800) 848-0448.

–Christopher Baumann is the editorial assistant.

A gallery of studio furniture



Furniture Studio *edited by John Kelsey and Rick Mastelli. Cambium Press, Bethel, Conn. (800-238-7724); 1999. $30 softcover; 144 pp.*

With 16 richly illustrated essays and a trio of eight-page gallery sections, this book is filled to bursting with photos of handcrafted contemporary furniture. This windfall of woodwork makes *Furniture Studio* the best place in print to see current furniture of original design.

What does *Furniture Studio* do with all of these photos? The book's editors, John Kelsey and Rick Mastelli, are both veterans of the black-and-white days at *Fine Woodworking*, but there isn't a scrap of how-to in the book—except how to think about furniture.

In a general sense, the book's ambition is to define the field of studio furniture in North America. The term "studio furniture," with its ring of the fine arts, is favored by the editors and most of the essayists, and that reflects the bias of the book: nearly all of the furniture shown is of original design; there are virtually no period reproductions; and the work ranges from the functional to the purely sculptural.

The 16 essayists approach their subjects from all angles. There are essays on recent furniture history, on meaning in furniture, on furniture collectors, on prominent furniture designers, on unorthodox young designers, on nonwood furniture and on much else. There happens to be some

Photo, this page (left): Ronald B.J. Wisner

"Compared to the other machines in the test, the Delta produced the cleanest surface and the least amount of snipe. The other planers in the test also gave us excellent surface finishing, but the Delta stood out as just a bit better."

Woodworker's Journal, January/February 1998

"...quick-change knives that we found easy and accurate to install. We found that with the quick-change systems we aligned the knives within .001." And, we could install both knives in about five minutes." "Editors' Choice Top Tool™ "

Better Homes & Gardens® Wood,® November 1996

"The Delta got great marks for quality of cut and portability, and for its innovative cutterhead assembly lock." "Editors' Choice"

American Woodworker,™ December 1996

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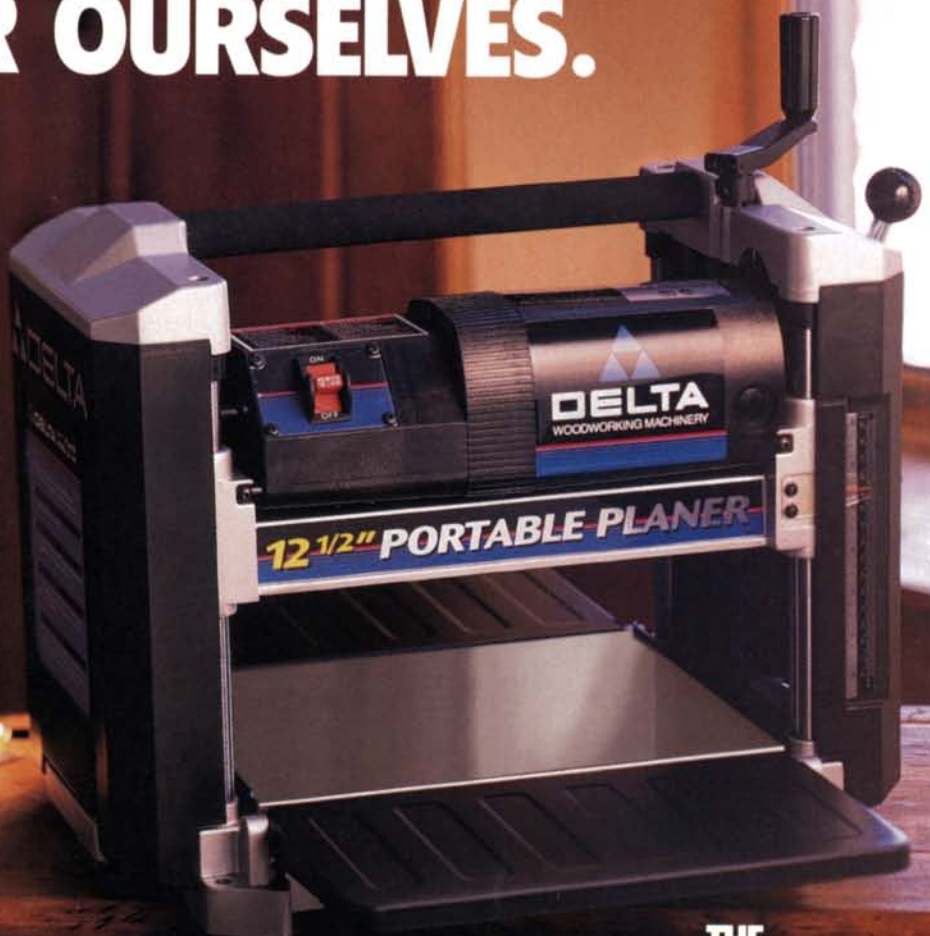
All of which leaves us with very little to say except this: If our planer fails to perform up to your expectations within 30 days of purchase, you can return it for a full refund. That's our Superior Performance Guarantee. And now, for a limited time, we'll even throw in an extra set of knives – a $30 value. Call toll free for the name of your nearest Delta dealer. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.



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overlap in the essays, and some humbug, but most of the essays are thought-provoking. There is a fascinating profile of Michael Fortune, the prodigiously talented Canadian furniture maker; a nicely observed and illustrated historical essay on furniture making in Northern California; and one man's thoughtful rumination on his chances of succeeding as a full-time woodworker decades after abandoning the field for a more dependable profession.

But taking the measure of one's own profession is not easy, and some of the essays tilt over into navel-gazing.

Furniture Studio is a production of The Furniture Society, an organization whose annual conferences have brought together a broad range of furniture makers and others interested in the field. Just about everyone involved with the book is a member of the Society, from the editors and essayists to all the furniture makers whose work is featured in the gallery sections.

The book actually grew from the Society's conferences, where the ideas for a number of the essays were generated. But the diversity, democracy and hub-bub that feels bracing in person at a conference can seem chaotic between covers. With 16 writers pursuing their own ends, the book is something of a crazy quilt. And the wide range in the quality of the writing, photos and furniture is jarring.

From functional to sculptural. *A new book from The Furniture Society offers a wide range of essays and photos of mostly contemporary work.*

But despite these shortcomings, *Furniture Studio* is an engaging book and a valuable record of recent furniture history.

—Jonathan Binzen is a senior editor.

Anyone for tossed salad?

Fit for the Smithsonian. *The Radish Salad Bowl has been purchased by the Renwick Gallery.*

The Radish Salad Bowl, made by Craig Nutt, was acquired recently by the Renwick Gallery of the Smithsonian National Museum of Art as part of its permanent collection. Nutt is best known in the woodworking community for his wooden vegetable sculptures.

At 5 ft. tall, the Radish Salad Bowl depicts a radish with plumed leaves, supported by three cayenne peppers. The red-lacquered 12-in.-dia. radish is made of maple and is turned and carved to separate, becoming two salad bowls. The interiors of the bowls are bleached, then finished with urethane. The leaves, made of birch with a nontoxic finish, can be removed and used as salad servers. The three cayenne pepper legs made of tupelo are proportioned to function as a table-high stand.

A sculpture with functionality. *With the leaves removed and the radish separated, one has all the necessary utensils to prepare and serve up a hearty salad.*

Nutt's inspiration for the Radish Salad Bowl came from a friend, who commissioned him to make the original. His friend, a fan of Caesar salad, follows an exact, almost ritualistic procedure for preparing his salad. Even though radishes aren't part of a Caesar salad, Nutt felt the sculpture could serve as a special container for his friend's "salad-making ritual."

You can see more of Nutt's work in *FWW* #86 and #124, or you can visit his web site at www.mindspring.com/~cnutt.

—C.B.

Photos, this page (bottom): John Lucas

The Studley tool chest is back

Henry O. Studley's famous tool chest, featured in *FWW* #71 and #100, has reemerged for public viewing at the Smithsonian National Museum of American History. Smithsonian tool specialist David Shayt has made arrangements with the owner to borrow the priceless chest for a newly opened exhibition of pianos titled Piano 300; Celebrating Three Centuries of People and Pianos.

Studley, an 18th-century piano maker, built his tool chest over a 30-year career at the Poole Piano Co. in Massachusetts. Using ebony, mother of pearl, ivory, rosewood and mahogany, materials used in the manufacture of pianos, he worked on the chest almost constantly, adding tools as he accumulated them.

The intricacy of the chest is astounding. Each tool has an individual holder. Tiny metal clasps rotate out of the way to allow a tool to be removed. Separate panels hinge outward, or come out altogether, to provide easy access to more tools below.

For housing some 300 tools, the tool chest is really quite small. When closed, it measures about 9 in. deep, just over 18 in. wide and 39 in. high. It is so densely packed that three strong men strain to lift it onto a benchtop.

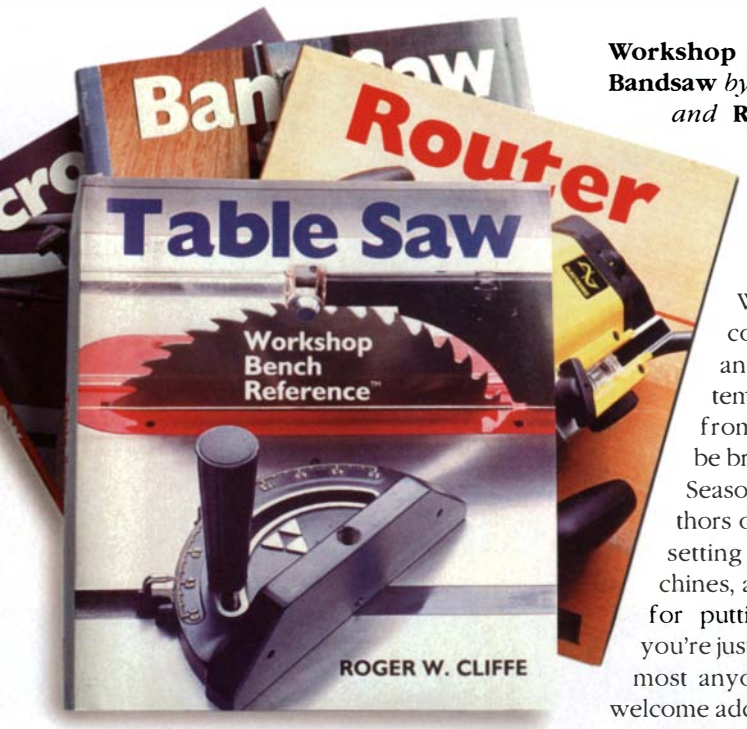
Although the Studley tool chest is occasionally housed and displayed at the Smithsonian, it has always been privately owned. It is currently part of a private collection in the Midwest. The exhibit at the Smithsonian International Gallery Ripley Center runs through March 4, 2001. For more information, call (202) 357-2700 or visit the museum's web site at americanhistory.si.edu.

Lon Schleining

Studley tool chest once again on public display. *Henry O. Studley's famous tool chest, built over 30 years and housing 300 tools, is on display at the Smithsonian International Gallery Ripley Center. The exhibit runs through March 4, 2001.*

—Lon Schleining is a woodworker and teacher in Long Beach, Calif.

A new line of handbooks for the shop



Workshop Bench Reference Series—Bandsaw *by Mark Duginske;* **Scroll Saw** *and* **Router** *by Zachary Taylor;* **Table Saw** *by Roger W. Cliffe. Sterling Publishing, New York; 1999. Each $17.95 softcover; 160 pp.*

With their durable, pliable covers, lay-flat spiral bindings and quick-tab referencing systems, this new series of books from Sterling Publishing begs to be brought into the shop and used. Seasoned woodworkers and authors offer more than the basics on setting up and maintaining the machines, as well as tips and techniques for putting them to use. Whether you're just starting out or an old pro, almost anyone will find these books a welcome addition to their shop.

—Matthew Teague is an associate editor.

Carve out a niche for yourself

NICHE magazine is accepting entries for the 2001 *NICHE* Awards. Categories for wood include the following: carved, inlaid, turned, painted/colored and traditionally joined. There is also a category for furniture. Judging is based on technical excellence and creativity, market viability and uniqueness and originality.

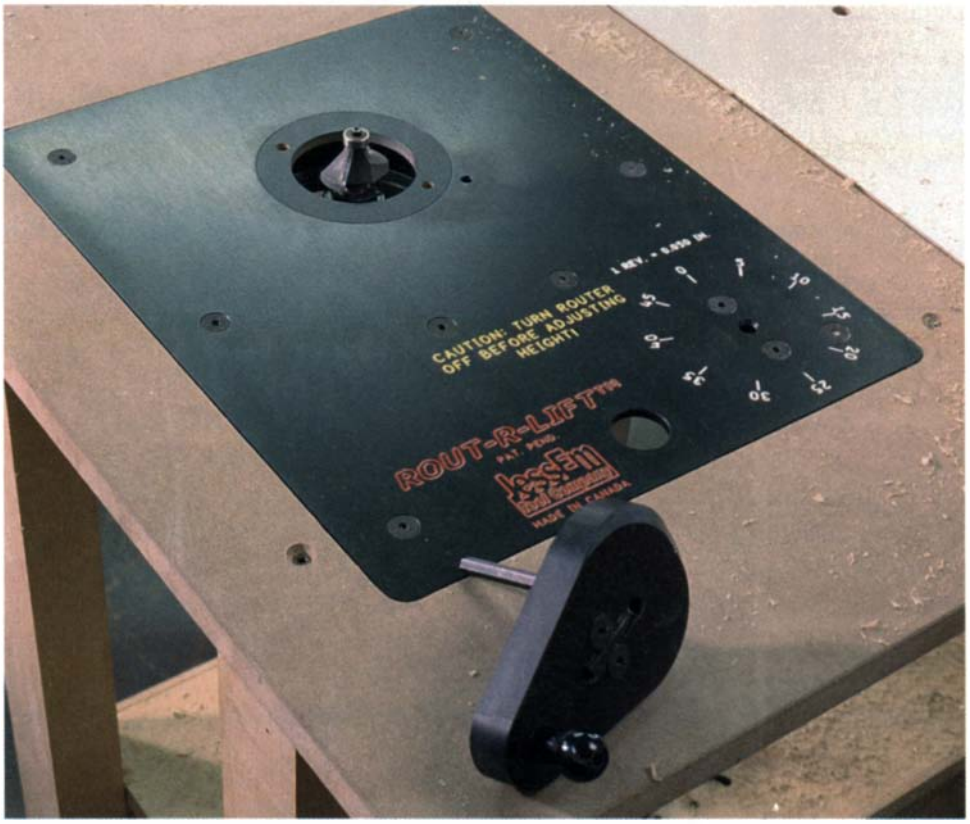
Deadline for entries is Sept. 1. For an application, call *NICHE* magazine at (410) 889-3093 or send e-mail to nicheaw@rosengrp.com.

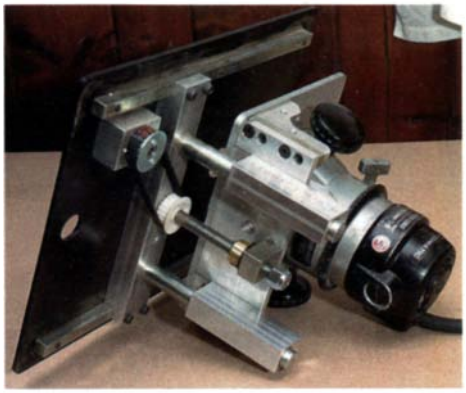
Notes & Comment

We welcome stories about woodworking, photographs of unusual work—anything you think other woodworkers would like to know about. Send submissions to Notes & Comment, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

Tools & Materials

Set router height without reaching under the table





The router-bit depth crank is removable. *Most parts of the Rout-R-Lift are steel or aluminum. With some routers, bit changes may be made without removing the tool.*

The best router accessories deliver a level of finesse that would impress even machinists. JessEm Tool Co. has come very close with the Rout-R-Lift, a table insert plate and router-height adjustment mechanism all in one. The device allows accurate height adjustments to be dialed in within a few thousandths of an inch.

The Rout-R-Lift eliminates the need to fumble underneath the router table for depth changes. You also don't suffer the frustration of having the depth setting change once the router lock screw or lever has been tightened, a problem with some routers. The Rout-R-Lift has a removable crank that slips into a hollow shaft recessed below the table. One complete revolution of the crank moves the router up or down 0.050 in. Graduated marks around the crank are calibrated every 0.005 in. Total travel is about 2½ in.

Underneath, the lift operates via a timing belt and pulley attached to a threaded rod. Most components are steel or aluminum. The router carriage rides along a pair of steel shafts fitted with sleeve bearings. In use, the lift is very precise when moving the router up. But when the lift is dialed down, it's not quite as smooth or precise. Like tuning a guitar, the best results are achieved when you create tension, not slack. If you go beyond the desired setting, first lower the router slightly, then dial it to the new setting by cranking the lift up. This procedure will also guarantee that the lift holds its setting.

If you do a lot of router joinery, this level of precision is welcome indeed and worth the $200 price. The Rout-R-Lift comes with a well-made locking insert plate and special wrench. A set of four additional inserts costs $20 more. Although the instruction manual is a bit thin, an improved version is on its way. For more information, go to www.jessem.com or call (800) 436-6799.

—Anatole Burkin

Veritas enters handplane market

Moderately priced plane from Veritas. *The low-angle block plane fits a niche somewhere between the hardware-store variety tool and the boutique model plane.*

The Veritas low-angle block plane is a well-conceived blend of tradition and innovation. It is sleek and uncluttered yet loaded with features. The blade is a hefty ⅛-in.-thick slab of A-2 tool steel, securely positioned with a setscrew on each side. It's seated on a mechanism adapted from vintage English planes that controls both the lateral and depth adjustments smoothly and positively. The body is made of ductile iron and has an adjustable throat plate. The plane I received needed some lapping before the sole was truly flat. After flattening and sharpening the iron, the tool went right to work. I found it comfortable to hold, with a good weight. There is no other block plane like this on the market. At $69.50, it's at a middle price-point for tools of this type. The Veritas (800-871-8158) plane has a lot more going for it than the hardware-store-variety block plane but is not quite as refined as a top-of-the-line Lie-Nielsen plane. All things considered, this tool is a great value for someone seeking a good-quality plane. *—William Tandy Young*

Photos, this page: Anatole Burkin

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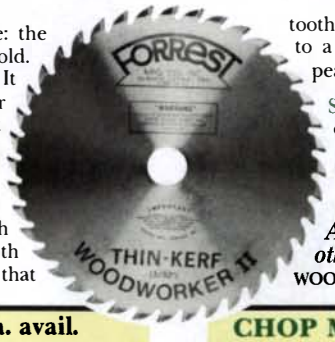

Sawing is believing. Prove it to yourself— completely without risk! Call (800) 733-7111 today for your chance to try a premium Woodworker II blade or any other Forrest blade in your own shop.

"The ONE BLADE THAT LEAVES A SMOOTH-AS-SANDEDSURFACE." Twice outperformed 36 other premium blades, both foreign and domestic, **WOOD magazine tests, Sept. 1998, pg. 45, and Feb. 2000, pg. 66 chart**

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All-purpose—**tablesaws and portable circular saws.**

Special 10% Discount! Take 15% off second blade of your choice.

EDITORS' CHOICE AND TOP RATING OVER 18 COMPETING SAW BLADES.

The 10"x40T earned the Editors' Choice Award for the best performance regardless of the price. See* American Woodworker *April 1998 pp 68-69.

	Sale Price	10% Off First Blade	15% Off Second Blade
14" x 40 T x 1"	~~$149~~	$134	$127
14" x 30 T x 1"	~~$139~~	$125	$118
12" x 40 T x 1"	~~$129~~	$116	$110
12" x 30 T x 1"	~~$119~~	$107	$101
➡ 10" x 40 T x 1/8" or 3/32"	~~$119~~	$107	$101
10" x 30 T x 1/8" or 3/32"	~~$99~~	$ 89	$ 84
9" x 40 T	~~$109~~	$ 98	$ 93
9" x 30 T	~~$99~~	$ 89	$ 84
*8 1/4" x 40 T x 3/32"	~~$99~~	$ 89	$ 84
8" x 40 T 3/32"	~~$99~~	$ 89	$ 84
8" x 30 T 3/32"	~~$89~~	$ 80	$ 76
7 1/4" x 30 T 3/32"	~~$89~~	$ 62	$ 59
**6" x 40 T 3/32"	~~$89~~	$ 80	$ 76
➡ ***5 3/8" x 40T x 5/64" x 10mm	~~$89~~	$ 80	$ 76

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8¼" x 60 T x 5/8" Sears, Delta, Ryobi	~~$109~~	$ 98	$ 93
8½" x 60 T x 5/8" Hitachi, DeWalt, Ryobi, Freud TR125	~~$119~~	$ 107	$ 101
9" x 80 T x 5/8" Delta & others	~~$129~~	$ 116	$ 110
10" x 80T x 5/8" Delta, Bosch, Hitachi, Makita, Ryobi, AEG & all	~~$139~~	$ 125	$ 118
12" x 80 T x 1" Delta,Hitachi, Makita,B&D, Sears & all	~~$149~~	$ 134	$ 127
14" x 100 T x 1" Makita, Ryobi	~~$189~~	$ 170	$ 161
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12" x 60 Tooth	~~$139~~	$125	$118

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Free $21 value
10" BLADE RUNNER CARRYING CASE!
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6" set	~~$269~~	$242	$229
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12" x 80 T (1" hole, 1/8" K)	~~$181~~	$163	$154
14" x 80 T (1" hole)	~~$197~~	$177	$168
14" x 100 T(1" hole)	~~$226~~	$203	$192
16" x 100 T (1" hole)	~~$243~~	$219	$206

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Use any of these blades for a month. If you are not completely satisfied, return the blade for a complete refund. No other blade company will make that kind of guarantee—because there's no other blade like a Forrest blade!

WE RECOMMEND OUR FACTORY SHARPENING as some local sharpening creates problems with MICRO-CHIPPED EDGES reducing blade life and cutting quality. 3-5 DAYS ON THESE AND ALL MAKES OF FLAT FACE AND CONCAVE CARBIDE TIP SAWS. Ship via UPS - typical 10 x 40T $17.00, 60T $19.00. Add return UPS $6.00, $1.00 each additional blade.

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Computer-driven blast-gate system

Ultimate in dust-control accessories. *The Ecogate system includes a computerized control unit and motorized blast gates.*

The Ecogate blast-gate system does what I frequently neglect to do: turn on the dust collector and open a blast gate. At first the system seemed like a luxury, but after working with it for just a couple of weeks, I'm a convert. The *Fine Woodworking* shop is noticeably cleaner. And because the dust collector shuts down when machines are turned off, noise, wear and tear, and power use are all reduced.

The system has three components. Vibration sensors are attached with hook-and-loop fasteners to the motor of each power tool. Motor-driven blast gates replace the standard blast gates at each machine. And a shoebox-sized control unit ties everything together. A basic control box will handle up to eight machines, but it can be expanded to handle more.

Hooking up the system was fairly simple and straightforward, helped in large part by an excellent instruction manual. Each machine requires a low-voltage cable for the sensor and blast gate. The wire is simply wrapped around the ducts.

The control unit allows you to troubleshoot the circuit to each machine and set the sensitivity of the sensors. The unit can be programmed to keep one or more gates open for proper airflow through the dust collector and to delay shutting off the system to clear the ducts. A manual override switch can also be installed.

A start-up system, with four 4-in. blast gates, costs a little over $500. It's not cheap, but it's a good value for commercial shops or home shops on a generous budget. For more information, visit Ecogate on-line (www.ecogate.com) or call (888) 326-4283. *—John White*

East meets West

I've always appreciated the infinite ability of Japanese chisels and plane blades to take and hold a top-notch edge. When a colleague, Toshio Odate, mentioned that a Japanese plane-blade manufacturer is now making retrofit blades for Western tools, I couldn't resist. Harima Enterprises Corp. markets laminated steel replacement blades (under the brand name Samurai) for Western-style plane bodies.

I replaced the tungsten vanadium blade in my Record compass plane with a Samurai blade. As I flattened the back and sharpened the edge, the blade revealed its differences. If you sharpen in a quiet environment and listen carefully with your ears and fingertips, you can sense the different sharpening characteristics of Western vs. Eastern steel. The Japanese blade sounds crisper, making the experience a bit more satisfying. Subtle differences to be sure, but nonetheless still there and, admittedly, somewhat subjective.

How well did they perform? Compass planes are tough beasts to master, unforgiving with the impatient but a joy once tamed. A good test. The Samurai blade cut convex and concave surfaces on poplar cleaner and faster, left a better finish and had no tendency to chatter. The tungsten blade, on the other hand, was prone to occasional chatter.

Converting to Japanese steel was worth the effort, and I plan to convert three more planes. Samurai plane blades are available for a handful of Western-style planes and cost from about $37 to $42 each. For more information, contact Japan Woodworker at (800) 537-7820. *—Dan November*

Quick Corner drawing templates

Like most everybody who works wood, I have freehanded a lot of corners with varying degrees of success. I've tediously measured countless diagonal corners with a combination square or corner pieces from my scrap pile. I've also drawn hundreds of rounded corners using soup cans, jar lids and compasses. A lot of my furniture corners bear a strong resemblance to my favorite coffee mug.

And then I discovered Quick Corner, a set of four templates for drawing a whole range of perfect corners, whether they're diagonal, convex or concave, 25 patterns in all. The four resin templates feature radii of ½ in. to 6 in. (convex), and ½-in. to 2-in. radii for the other patterns. The templates are transparent for easy alignment on stock. A set of templates sells for about $20. The company also sells corner templates that can be used with a router equipped with a flush-trimming bit. For more information, contact Streamline Manufacturing at (435) 723-8665. *—John Sillick*

An easy way to draw a corner radius. *Quick Corner templates come in a variety of sizes.*

Photos, this page: Anatole Burkin (top); Brendan Sillick (bottom)

Jet offers a shaper for the home shop

A shaper and router in one machine. *Jet's 1½-hp shaper also accepts a router collet, increasing its versatility.*

Can't decide between a router table and a shaper? With Jet's home-shop shaper (JWS-22CS) you can have both. The machine gives you the power and versatility of a shaper and the advantage of the low cost of router bits for small- and medium-sized profiles. A ¾-in.-dia. spindle and a 1½-hp motor can shape raised panels and other large profiles in one pass on all but the densest hardwoods. And the supplied ¼-in. or ½-in. router collets can handle less-demanding jobs. A spindle lock makes the changeover quick and easy.

Because of their low cost, router tables have become the popular choice for shaping in small shops. Routers have other advantages, too. The small diameter of a router bit allows you to shape tight contours where a shaper can't. And you can buy several router bits for what you'd spend on one shaper cutterhead.

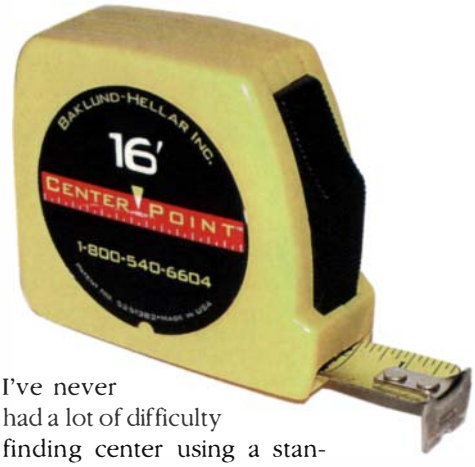
But the largest router is no match for the versatility of a shaper. The spindle of a shaper will reach higher than a router bit to shape profiles on wide or thick stock. And unlike router bits, shaper cutters can be inverted, which reverses the profile, giving you more options.

When using one of my insert cutters, I couldn't set the spindle low enough for a particular cut. But in most cases the 1⅞ in. of spindle travel is sufficient.

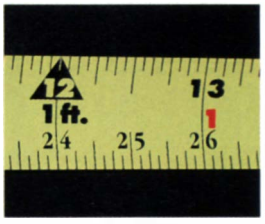
The cast-iron top is machined flat and won't sag like some router tables made of wood products. The shaper runs smoothly and quietly, too, thanks to dynamic balancing of the spindle and pulleys. A handwheel and lock allow you to make precise adjustments from outside the cabinet.

Jet's newest shaper also features a reversing switch and two spindle speeds, 7,000 rpm and 9,000 rpm. Although the top speed is slower than a router's, all but the smallest-diameter router bits will cut smoothly. Best of all is the cost. At about $750, this tool is competitively priced with an upscale router table equipped with a large router. For more information, contact Jet at (800) 274-6848 or visit on-line at www.jettools.com. *—Lonnie Bird*

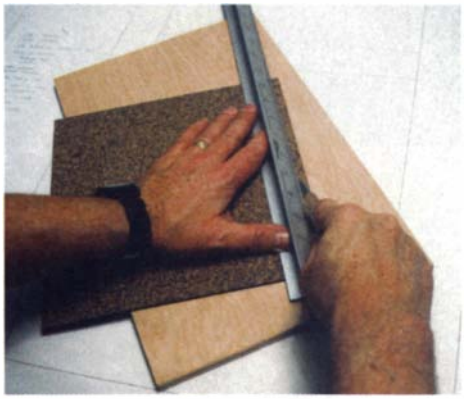
Find center with Center Point rules



I've never had a lot of difficulty finding center using a standard tape measure. Dividing by two is the kind of math I can handle. But on a recent kitchen remodel, Center Point's center-finding tape measure sure made my life easier. The tape has two scales, one standard and the other reduced by 50% (the same scales are used on the company's other rulers). Using the center-finding scale, for example, the middle of a 24-in.-wide box is indicated by the smaller numeral 24. It's a foolproof concept and may result in my becoming devoid of math skills altogether. For more information, call (631) 289-0500. *—A.B.*



Center Point's 16-ft. tape measure is a good size for general woodworking. *The lower numbers on the tape are scaled down 50%.*



Ruler protects your fingers from a knife. *You'd be hard-pressed to hurt yourself with the Straightway Safety Ruler.*

A safe ruler that won't wear out

The Straightway Safety Ruler is both a ruler and straightedge meant to be used with a utility knife. The straightedge has an imbedded hardened steel edge, so it should never wear out. And it has been constructed with safety in mind.

The ruler is V-shaped extruded aluminum. One leg of the V sits flat on the surface. The other, the ruler portion, sits at an angle. This way you can easily and safely hold the ruler in place when cutting or drawing, and your fingers holding the straightedge are protected. The ruler has a handy center-justified readout, which makes it easy to measure to or from the middle of something.

The Safety Rule comes in four different lengths, from 18 in. to 52 in. The 24-in. ruler I tried retails for $12.95 plus $4.50 for shipping. The company also offers a companion right-angle attachment for $16.95. Even though I have lots of rulers and straightedges around, this is the one I reach for first. For more information, visit www.straightwaytools.com or call (360) 735-8090. *— Lon Schleining*

Photos, this page (clockwise from top left): courtesy of Jet; Michael Pekovich; Lon Schleining

Dave makes shaves

Most woodworkers who make traditional reproductions find the spokeshave a very useful tool. For those who make Windsor and ladder-back chairs, a spokeshave is essential for shaping looping contours and swerving edges. No other tool cuts a smoother flowing line or leaves fainter tracks that speak of careful handwork.

For the past several years Dave Wachnicki, a former student of Michael Dunbar, has been producing elegant, 19th-century-style, wooden-bodied spokeshaves. Sold under the name Dave's Shaves, his tools can be set to hog off thick curls or adjusted for the most delicate of shavings. The tools are responsive and agile. And that seems to be the most significant difference between Dave's Shaves and others I've tried.

Modern spokeshaves have flat blades that are hung on two knurled nuts that travel on threaded posts. The blades are usually set at a cutting angle of 45° and secured to the body by the cap iron. If not properly tuned and fitted, these types of shaves are prone to chatter. On a wooden shave, such as Dave's, the U-shaped blade has a cutting angle of 25°. And the two threaded posts, attached to the blade itself, pass snugly through the body of the shave, which significantly reduces chattering.

Dave's Shaves sell for $95 (a "student" model costs $65). Wachnicki also offers kits, blades and supplies, as well as a one-day class on spokeshave making. For information, go to www.ncworkshops.com or call (603) 356-8712. —*Mario Rodriguez*

Mario Rodriguez

Classic wooden spokeshave. *Dave's Shaves have their blades angled at 25°, which helps prevent chattering.*

Anatole Burkin is managing editor; William Tandy Young is an author and woodworker from Stow, Mass.; John White maintains the Fine Woodworking *shop; Dan November is a professor of industrial design at Pratt Institute, Brooklyn, N.Y.; John Sillick works wood in Lyndonville, N.Y.; Lonnie Bird is the author of* The Shaper Book *(The Taunton Press, 1996); Lon Schleining is a woodworker and instructor in Long Beach, Calif.; Mario Rodriguez is a contributing editor.*

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READER SERVICE NO. 211

Bandsaw Your Own Veneer

Tips for smooth slicing in any kind of wood

BY TIMOTHY COLEMAN

It is a wonder to me that I can take a piece of solid wood, with its unforgiving properties of seasonal movement, resaw it into veneer and glue it to a stable substrate, and it will suddenly behave quite demurely. Much of my work consists of decorative cabinets and tables, and on the broad surfaces of these pieces veneer really shines. Most often, I cut my own veneer. Shop-sawn veneer gives me the stability of commercial veneer and a measure of flexibility that is missing from its commercial cousin. It lets me mix solid wood and veneer from the same stock, offers more integrity on an exposed edge and has enough thickness that I can work the surface as if it were solid wood. I can handplane the material or do shallow carving or sculpting on the surface. Building with solid wood may be faster than using bandsawn veneer, but I can seldom resist the

Photos, except where noted: Jonathan Binzen

magic of sawing a board into thin slices and spreading it out over the surfaces of a piece of furniture.

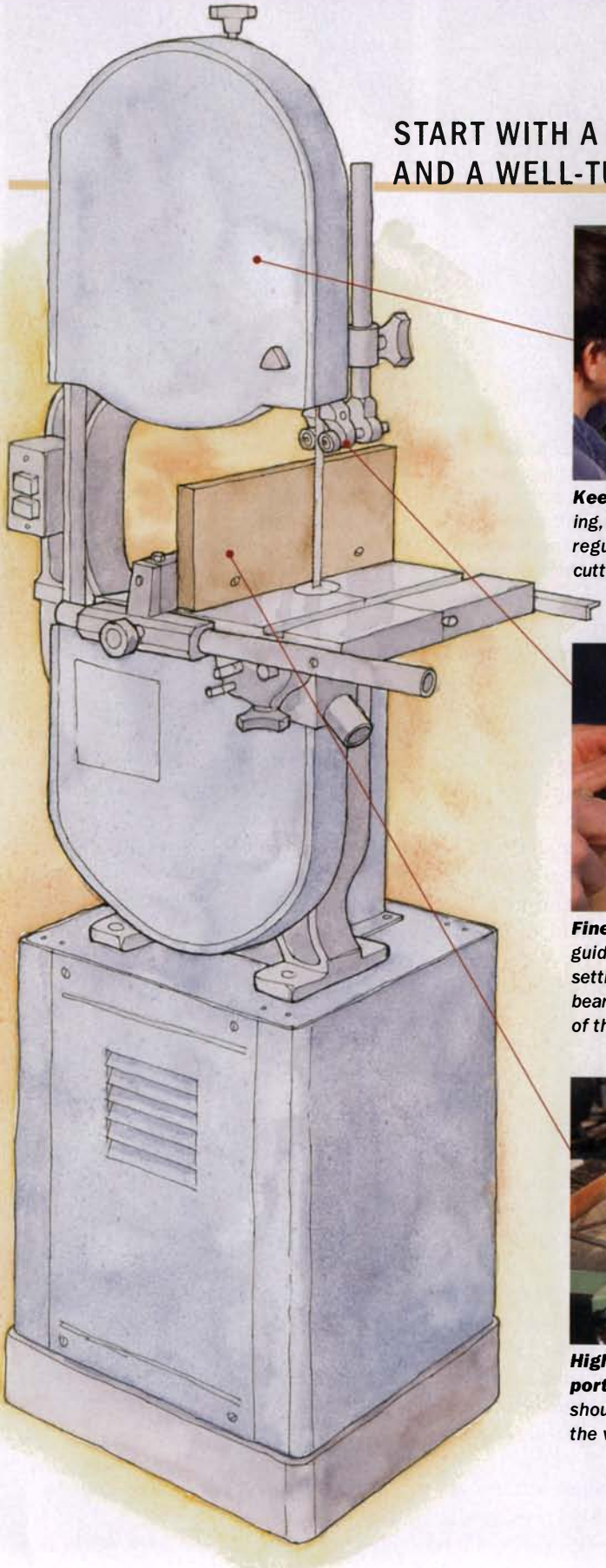
There are times when I use commercial veneer. The exotic figure and wide dimensions of the material can be an advantage. In recent years, however, the standard thickness of commercial veneer has gotten thinner and thinner. There is no margin for error when working with this material, and I am on pins and needles until the piece has a finish on it. When I saw solid stock into veneer myself, I have no such worries.

Bandsaw: the essential veneer tool

At the heart of sawing your own veneer is the bandsaw. If yours is running correctly, cutting veneer will be a pleasure. If not, prepare for pain. I have spent many hours fine-tuning my bandsaw. I have replaced the tires on the wheels, replaced the original guides with Carter roller-bearing guides and modified the factory-supplied fence so that it can pivot a few degrees, which allows me to adjust for the drift of the blade. Just about any bandsaw carefully tuned can be used for sawing veneer. I use a 24-in. European saw, and it works very well. A smaller saw will work, but its limitation will be in the width of the stock it will cut. If needed, you can always rip the plank into narrower pieces, resaw it and rejoin the veneers edge to edge.

I typically use silicon-carbide hook-tooth blades, ½ in. or ¾ in. wide. The teeth are set in a raker-5 pattern, which means they alternate left, right, left, right and then have an unset raker tooth. Bimetal blades reportedly work well on abrasive woods. However, because they are designed for cutting metal at slower speeds and are more than twice the price of standard blades, I do not use them.

Bandsaw tune-up and setup—Always go over the bandsaw from top to bottom before starting. Use a fresh blade and clean the tires with a stiff nylon brush. Screw an auxiliary fence of medium-density fiberboard (MDF) or melamine to the factory fence. The auxiliary fence provides the



START WITH A FRESH BLADE AND A WELL-TUNED BANDSAW

Keep it clean. *For best tracking, brush the bandsaw's tires regularly and start a veneer-cutting job with a fresh blade.*

Fine-tuning. *Raise the upper guides to cutting height before setting the bearings. The roller bearings should be set just aft of the blade's gullets.*

High fence provides full support. *The auxiliary fence should be at least as high as the veneer will be wide.*

Drawing: Jim Richey

ALIGN THE FENCE TO THE BLADE'S DRIFT

Get the drift? *To cut veneer accurately, the fence must be set to the natural cutting angle, or drift, of the blade. Find the drift angle by cutting freehand along a line drawn parallel to the edge of a scrap. Stop cutting after 8 in. or so.*

Bevel records the drift angle. *With one hand, keep the scrap from shifting. With the other, use a bevel gauge to measure the angle between the scrap and the front of the saw table.*

Angle the fence. *Use the bevel gauge to set the auxiliary fence to the scrap's cutting angle.*

height necessary to support veneer stock, which can be up to 10 in. wide. It is critical that this fence be smooth and flat.

I readjust the guides every time I cut veneer. Begin by loosening and backing off all of the guides. Then raise the post for the upper set of guides, locking it in at the correct height for cutting the veneer. Set the bearing guides to within a dollar bill's thickness from the blade and pull them forward until they are just behind the blade's gullets. Then set the thrust bearing so there is no more than a small space between it and the back of the blade.

Now set the fence to accommodate the drift of the blade (see the photos above). If this step is skipped or done improperly, you can be certain to have a bad day at the veneer-cutting shop. Begin with a piece of scrap about 2 ft. long. Mark a pencil line parallel to one long edge. Then feed the scrap into the blade freehand, cutting right on the line for about 6 in. or 8 in. Stop cutting and hold the scrap in place. Then place the body of a bevel gauge against the front edge of the bandsaw table and push the gauge's blade against the scrap. Lock the bevel gauge to record the angle at which this blade wants to cut—the drift of the blade.

Now bring the fence over to within a veneer's thickness of the blade, using the bevel gauge to establish the proper fence angle. At this point, I adjust the bar my fence rides on until the fence is at the drift angle. If you don't have a sliding fence or one that can be modified to pivot, you can cut veneer just as well with a shopmade, clamped-on fence.

To check the drift angle, run a scrap through the saw while holding it against the fence. If the scrap pulls away from the fence or requires excessive force to feed, check the drift setting again.

Kerf test. *To cut uniform sheets of veneer, the fence must be parallel with the blade. If the two are not parallel (as in the text), tilt the table until they are.*

Finally, check that the blade is parallel to the fence. Using your veneer plank or a wide piece of scrap, cut a kerf about ⅛ in. deep (see the photo below). If the cut is off from top to bottom, adjust the tilt of the table to correct it. Don't worry about whether or not the blade is square to the table. When the blade and fence are parallel, it won't matter if the table is slightly out of square with the blade.

Preparing the plank

To prepare a plank for being sawn into veneer, mill both faces and both edges. When you cut the plank to length, add at least several inches to the longest veneers that you'll need. You may need the extra length later, if you put the veneers through the planer. When you cut the plank to width, however, stay as close as possible to the finished width of the veneer. If you plan to make lipping or molding or other solid wood parts to match the veneer, cut them from the plank before you rip the plank to the veneer width. When you are ready to cut the veneers, mark a triangle on the end or edge of the plank so that the sliced veneers can easily be restacked in order.

At the same time you are machining your plank for the show veneer, prepare material to use as a backer on the veneered panels. To keep the panels balanced, it is

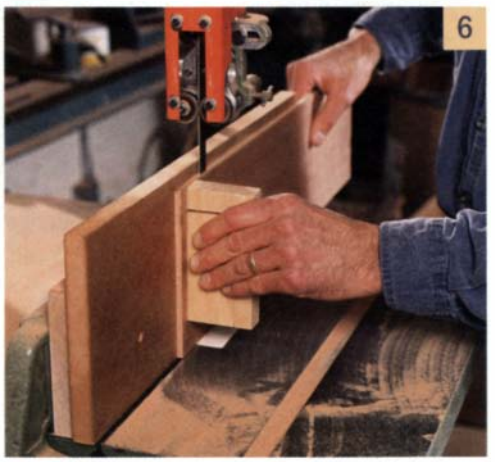
A little off the sides. *To make veneered panels with perfectly matched edge-banding, rip strips off each side of the plank before slicing it into veneer.*

Keep an eye on the saw marks. *If the marks from the bandsaw are even across the width of the piece, the cutting is going well. If the marks are heavier or lighter at the middle, the blade is bowing in the cut. Try a slower feed rate or a sharper blade.*

Support ahead of the cut. *Use a slow, steady feed rate when slicing veneer, keeping the plank tight to the fence with pressure applied just ahead of the cut.*

Smoothing between slices. *Joint or plane the sawn face of the plank after every slice. Use the jointer when the plank is still thick, switch to the planer for safety when the plank approaches ½ in. or so. A piece of melamine laid across the planer's bed rollers keeps the thin material from getting chewed.*

Go to the back of the bandsaw. *It is safest to move around to the outfeed side of the saw and pull the plank through the end of the cut.*



Slicing it fine. *It is dangerous to have your fingers near the blade when slicing the last sheets of veneer. Use a block to support the cut.*

important that this backer material be the same thickness as the face veneer and of a compatible species.

Slicing the veneer

Set the fence for the desired veneer thickness. I shoot for 1/16 in., and I can usually get six leaves of veneer from a 4/4 board. Feed the wood slowly and continuously, supporting the work just in front of the cut. Develop the habit of pushing the stock through the end of the cut with your hand on the face of the board rather than behind it. And try to develop a feel for the rate that the blade wants to take the stock. When the blade is cutting just what it can handle, it will barely touch the guide bearings. And when the blade is tracking properly in the cut, the back edge of the blade will be centered in the kerf. If you are cutting a lot of material, it is likely that the feed rate will slow as the blade begins to dull.

When the plank gets thin, be extra careful not to run your hand beside the blade. If the stock tapers in its thickness at all, there is potential for the blade to run out the side of the board. For safety, when I'm cutting the last few slices of veneer in a plank, I keep my hands well away from the blade by moving to the outfeed side of the table and pulling the material through the end of the cut. I use a block of scrap to keep the workpiece tight to the fence.

After cutting each slice of veneer, make a trip to the jointer and smooth the sawn face of the plank. I have my jointer set up just to

Smoothing after sawing. *Double-stick tape keeps a sheet of veneer still for a quick smoothing with handplanes. At 1/16 in. thick, the veneer can be planed and worked like solid wood.*

Shoot the edges. *A stroke or two with a jointer plane prepares the veneers to be joined edge to edge.*

Taping under way. *Short pieces of veneer tape are moistened and stretched across the joint; when they dry, they pull the joint tight. A lengthwise strip of tape reinforces the temporary joint.*

the right of the bandsaw to make this procedure easy. Don't worry about removing all traces of the bandsaw. Jointing enough to remove most of the bandsaw marks will be more than sufficient for a good glue joint. And the bandsaw marks that remain will tell you how you are cutting. Too fast a feed rate will often show up as bandsaw marks that are deeper or shallower in the middle of the board than at the edges, because the blade is distorting during the cut. As the plank becomes thinner, it will not be practical to joint the face. Instead I run it through the planer between slices.

Keep the veneer pieces in order as they come off the saw and cover them with a board to keep them from cupping. On the last cut I am sometimes splitting the board into two equal veneer slices. This is a very satisfying way to complete the cutting.

Surfacing the sheets of veneer

A well-bandsawn surface is quite acceptable to glue down, but if the thickness of the veneer varies much, it will have to be surfaced. There are several ways to do this.

If the pieces are manageable in size and number, they can be smoothed with a handplane. To hold the veneer still while you are planing, use a piece of MDF with a lip at the end to serve as a stop, or hold the veneer down with very thin, double-sided tape. Don't use too much tape—just a few small pieces—or it will be impossible to get up. A scraper or scraper plane can also be used for this type of surfacing.

Often I will surface the veneer by running it through the planer. But this procedure is not for the fainthearted. I have seen beautiful leaves of veneer go in one end of the planer and come out as crumbs. Check and make adjustments on the planer as carefully as you did on the bandsaw. Pay particular attention to the setting of the pressure bar. I use a piece of melamine to cover the bed rollers to keep the veneer from bending up into the cutterhead. Do not wax this surface because it will transfer to the surface of the veneer.

Use a slow feed rate and sneak up on the thickness very slowly. Feed the pieces one at a time, and be sure that one piece comes out before the next goes in to prevent one from riding up on another. If a piece begins

to chip, stop immediately. Sometimes the failure is a result of feed rate or feed direction and can be solved by reversing the pieces. Sometimes the ends of a slice are damaged in the planer, but the rest of the piece is fine. Hence the need for extra length. It is difficult to predict how a batch of veneer will fare in the planer, so it is always good to cut a couple of extra leaves of veneer so that one can be a test piece.

A third alternative for surfacing shop-sawn veneer is an abrasive planer or wide-belt sander. These work very well on veneer, and it is often possible to rent time on one of these machines as more shops are using them. Before committing your precious veneer to be sanded, however, make sure that the operator knows what you are after and that the machine can handle the job. I'd rather ruin the material myself than pay someone to ruin it for me.

Working with shop-sawn veneer

Now the anxious moments are behind, and the fun begins. If you are laying up broad surfaces from two or more leaves of veneer, play around with different combinations. You might try slip-matches, book-matches or reverse matches.

I edge-joint the veneer by lifting it off the surface of the bench on a piece of plywood and shooting the edges with a hand-plane. I make sure the joint is tight along its entire length.

Some people edge-glue adjacent pieces of shop-sawn veneer before gluing them to the substrate. This works fine, but I don't think it is necessary. I simply hold the unglued joint together with veneer tape the way I would with commercial veneer. I use a heavy-weight tape, running it across the joint in several places, then down the entire length of the joint. The veneer tape goes on wet and shrinks slightly as it dries, pulling the joint tight.

On a typical panel, I glue the face veneer and backing veneer at the same time. I roll yellow glue onto the substrate, put the veneers in place and slide the whole package into the vacuum press. Before I had a vacuum press, I used cauls and deep-reach clamps to accomplish the glue-up, and that worked perfectly well, too. The veneer tape comes off easily with a hand scraper after the panel comes out of the press. □

Timothy Coleman makes custom furniture in Greenfield, Mass.

THE VERSATILITY OF VENEER

Marquetry. *The drawer fronts and the upper cabinet face frame of this hutch are marquetry compositions in shop-cut maple and mahogany veneer. The rest of the hutch is solid mahogany.*

Parquetry. *The design on this cabinet is composed with pieces of cherry and morado sliced 1/16 in. thick and fitted together on a plywood substrate like tiles. On the upper doors, the edges of the tiles were chamfered, creating a handsome reveal.*

Low-relief carving. *Shop-sawn veneer is thick enough to accept light carved decoration, as on this cabinet in maple and bubinga. The design on the veneered door panels is a combination of lines carved with a V-tool and a background punched with steel stamps. The relieved areas were dyed with tinted shellac.*

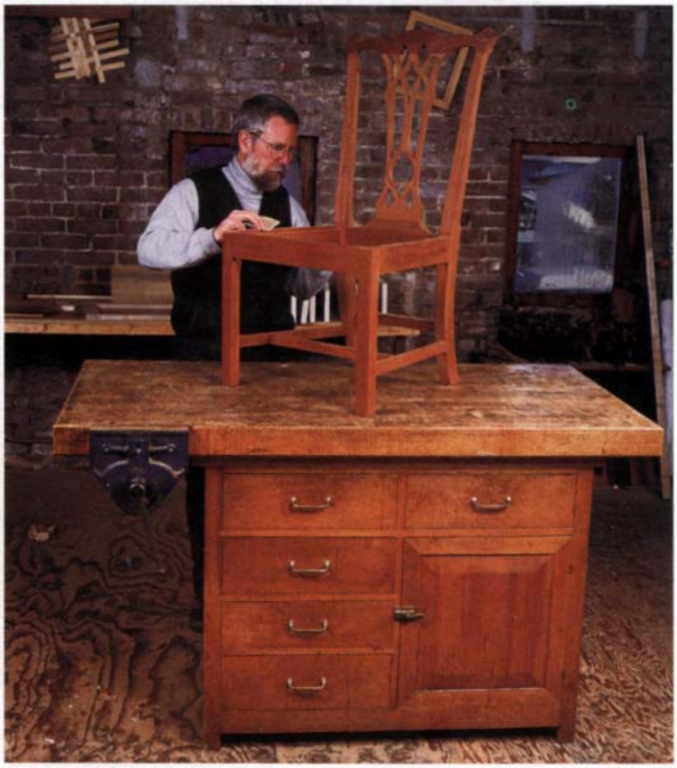
Photos, this page: Will Elwell

A Workbench That Works

A small top without a tail vise has served this master furniture maker for three decades

BY PHIL LOWE

In the early 1970s, having completed my training in furniture making, I found myself in need of a workbench. I figured I'd make one that would be large enough to hold all of my hand tools and small enough to move, guessing that it would be some time before I settled down. I wanted an all-purpose bench for planing, scraping, cutting joints, carving and finishing. Cost was a concern because there was a slew of tools and machinery I wanted to buy, so I decided not to use any fancy or expensive hardwoods in its construction. For the original bench, I chose birch (sturdy and cheap) for the top and the frame, and I used construction-grade fir plywood for the side panels. That first version was a little on the low side, so I later corrected the problem by cutting down the original top and adding a new maple slab over it.



Small but sturdy. *This workbench is almost 30 years old, and it's still used daily for all facets of furniture making.*

The relatively small size of the bench makes it comfortable to use. Unlike many larger benches, I can easily reach a workpiece resting on the top from all sides of the bench. It holds almost all of my hand tools—or at least the ones I use the most—keeping them well within reach. Also, this bench is small enough that it can be moved around the shop when needed. Loaded up with tools, it's heavy enough to stay in place while I'm using it. But I can break it down into manageable pieces, if need be, by removing the drawers and the top. I was particularly glad about this feature when I had to set it up in my first apartment in a third-floor attic space where I worked for a while.

In the construction of the case, I used mortise-and-tenon joints with pins for all of the frame pieces, through- and blind-dovetails for the drawers and housed dovetails for the drawer dividers. I built most of the frame with 8/4 birch, and I used 4/4 birch for the drawer dividers, the center partition and the drawer fronts. I fashioned the side panels with ¾-in.-thick fir plywood, set into rabbets that were cut into the back edges of the legs and rails. Drawer runners—joined with tenons into mortises in the drawer dividers—are held to an inside frame by a screw in the back. The top is 8/4 maple, ripped to 3-in. widths that I glued together on edge for strength and stability.

To make the benchdog holes in the top, I cut a series of ¾-in. by ½-in. dadoes before laminating the top. I also cut the same sized dadoes on every third board in a position that would line up with the dog on the vise, once it was fastened to the top. The overhang of the top is such that the dog holes are clear of the base so that they don't become clogged with sawdust. Also, I needed the overhang for clamping workpieces to the table. The overhang on the side above the drawers is smaller so that it doesn't restrict access to the tools in the top drawers. The new top is secured to the old original top (that I cut down to serve as a subtop) from underneath with lag screws, and that subtop is secured with lag screws through the top rails of the base cabinet.

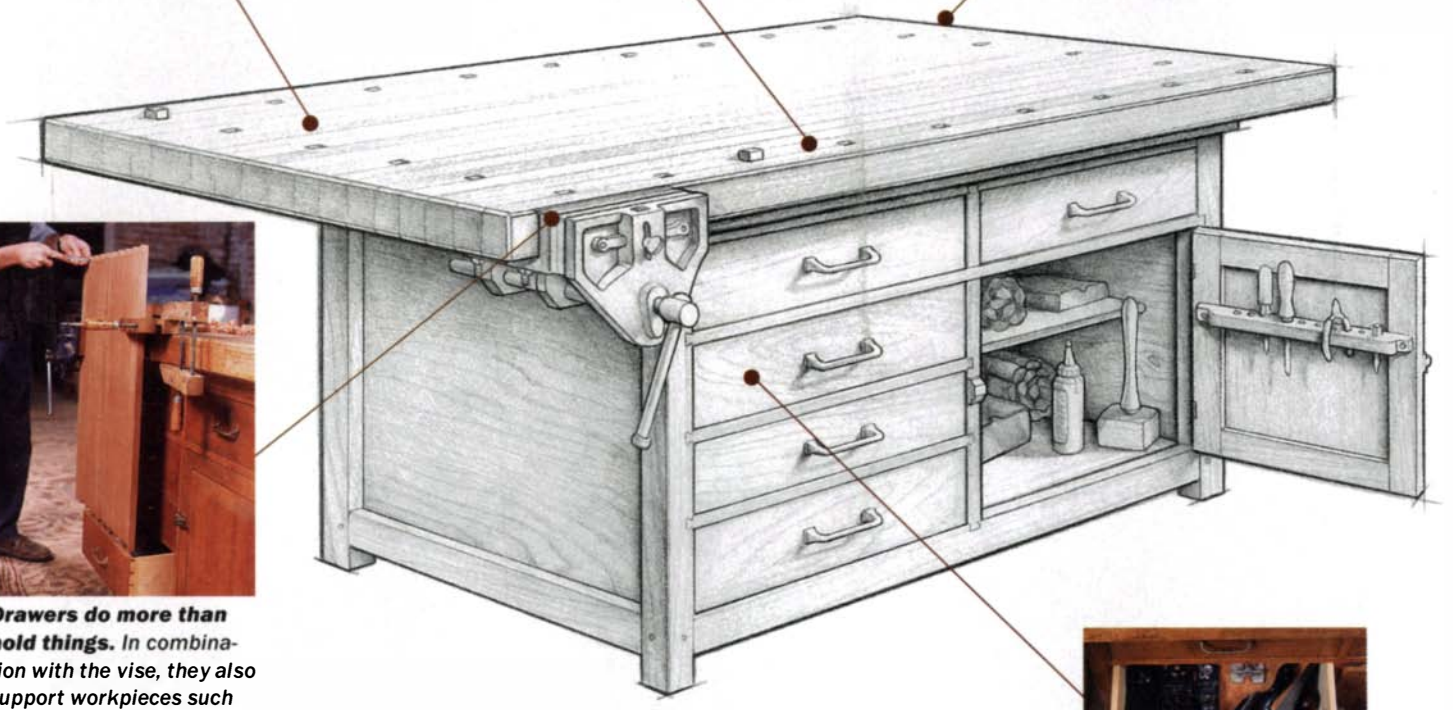
This bench functions quite nicely. The vise will not only hold workpieces between its jaws, but it can also hold them between the dog on top of the vise and one placed into the benchtop. I sometimes set up workpieces, such as panels to be planed, so that they rest against a thinner batten that spans two dogs. With this setup I need to lift my plane on the return stroke to prevent the panel from sliding backward. And sometimes, when planing the ends

Photos: William Duckworth

The vise is an adjustable clamp. *A series of benchdog holes in the top line up with the center of the vise for clamping workpieces of varying lengths.*

Securing the workpiece without clamps. *A hardwood batten thinner than the workpiece butts against two benchdogs in the top to serve as a stop.*

Out of harm's way. *When it's not needed, this 3-ft. Starrett straightedge lives in a slot under the benchtop.*



Drawers do more than hold things. *In combination with the vise, they also support workpieces such as this large mahogany carcase piece.*

Every tool has its place. *The contents of each drawer are custom-fit.*

How it's used and what it holds

This benchtop's small size (32¼ in. by 59¼ in.) belies its versatility. The author's most-often-used hand tools fit compactly but comfortably in storage under the top. Layout tools, chisels, planes and spokeshaves, saws, rasps, files, scrapers, sanding blocks, hammers and carving tools all have specific homes. There's even a spot for one very essential tool—a clipboard to record billable hours of time spent on jobs in the shop.

or edges of panels or long boards, I use the vise to hold the workpiece and one of the drawers underneath to support it.

Looking back at the number of pieces I've built on this bench and remembering the number of workspaces it has inhabited, I realize how well it has served me all these many years. I'm sometimes asked how I could get by with such a relatively small top and without a tail vise. I have the additional work surface of a fold-down table near the bench that I use to lay out and organize parts of furniture I'm working on. And I honestly haven't felt the need for a tail vise, because dogs and a few clamps do the same job. I can proudly say that I have never driven a nail into the top to hold anything in place. There is one thing I would change if I were to make this bench again. The kick space between the bottom rail and the floor is too small, resulting in an occasional pain in my big toe. Also, someday I'd like to replace the fir plywood side panels with something a bit more attractive, but I don't imagine that will happen until my daughters finish school. □

Phil Lowe builds and restores furniture in Beverly, Mass., where he teaches classes on building traditional furniture.

Drawing: Bob La Pointe

Three Simple Moldings

You can learn to carve without spending a fortune on tools

BEAD AND ROD

EGG AND DART

BEAD AND COWL

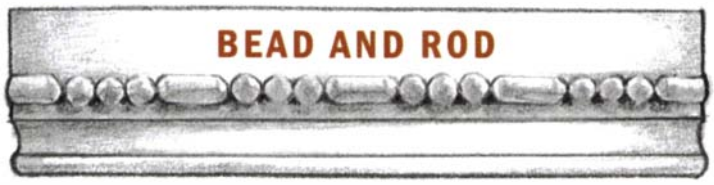
BY LEE GRINDINGER

If you've ever held a beveled cabinetmaker's chisel in your hands to cut a mortise for a hinge, then you have carved. It's a small step to go from cutting a mortise to carving a pattern on a molding that will embellish your next furniture project. The cutting edge is a different shape, but all of the same principles apply. Moldings are a terrific first step to learn ornamental carving because the steps are repetitive and fairly simple to execute, and the tools required are few. To make the three moldings shown above, you'll need three router bits, three gouges, a mallet and a set of slip stones to keep the cutting edges razor sharp.

Carving chisels come in a vast array of configurations that can be confusing: straight, bent, back-bent, fishtail and spoon gouges, flat chisels, parting tools and veining tools. But to get started, a few straight gouges similar in size to the ones I used here are all you need (for more on gouges, see the story on the facing page). Actually, you can carve any one of these three moldings using only two gouges.

If you're just learning to carve, look for clear lumber without varying and wild grain. Wood is easier to carve if the grain doesn't run out of the board at too steep an angle.

Photos, except where noted: William Duckworth



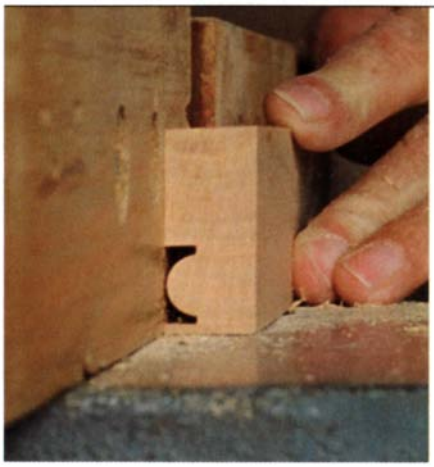
I've used a bead-and-rod molding on picture frames, cornices, table edges and pilasters. Also called bead and billet or berry and sausage, this molding looks good from any angle. You can carve variations of it by changing the number of beads from one to three (my favorite). I use two chisels to carve this molding: a ½-in. #7 gouge and a ⅜-in. #3 gouge.

Start with a ½-in. bead, cut with either a router or a shaper. Leave at least some shoulder on each side of the bead to set the depth of the carving. The layout should always begin at the corners or ends of a run of this molding. In a perfect world, the layout will be a repeating pattern of three beads, ½ in. each, and one rod, 1¼ in. long. If you need to fudge the layout to fit, you can change the length of the rods by as much as ¼ in. either way, as long as all of the rods are the same size. After you've determined the length of the rods, lay out the pattern with marks along the crest of the bead using a tape measure or a rule.

With a thin-kerf saw, cut straight down to just above the shoulders at each mark. Be careful not to cut too deeply—the scars left by a saw are hard to remove. Using the #7 gouge and a mallet, cut off the uppermost corners of the beads by holding the chisel at approximately 45° to the line of the molding. This step is called *setting in.* Move along and strike the chisel to remove all of the corners at the saw kerfs, opening the space between the carved shapes. I work as many as five sets at a time, doing all of the corners on one side of the molding first, then the other side on the return run. Work the shapes until—looking straight down from above the molding—you see round shapes in profile. Use the #3 gouge to clear chips away and to make a flat ground around the beads. This step is called *grounding.* You have the outlines done. Next comes *modeling.*

Modeling is the act of shaping the objects you have set in and grounded. Use the #7 gouge and a mallet to cut directly

SHAPING



The first step in making each of the three moldings illustrated in this article is to run the stock through a shaper or a router table. Use standard bead, roundover and Roman ogee bits for each of the three moldings.

Making sense of gouges

When I'm carving, I use straight gouges more than any other kind of carving tool. The profile of the curvature of a gouge is called the sweep, or section, and it's represented by a number (usually from #1 to #11—the higher the number, the more pronounced is the curve in the blade). The width

A few tools will get the job done. *The author completed all of the carving for the moldings on these pages using only these three straight gouges.*

of the cutting edge is expressed in either inches or millimeters, depending upon the manufacturer. You need both the sweep and the width to describe a gouge accurately, and different manufacturers use different sizing systems.

Brand names such as Ashley Iles, Henry Taylor, Marples and Sorby are all sized according to the English Sheffield system. German and Swiss manufacturers, such as Lamp and Pfeil, use the Swiss system. Because the systems are different, gouges labeled with the same numbers will not necessarily have exactly the same sweeps. As an example, the photo at right shows three similarly sized carving gouges from three European manufacturers: Henry Taylor #4, ⅜ in., Lamp #3, 10mm, and Pfeil #3, 8mm. The curvature in the sweep of the #4 Henry Taylor gouge is closer in profile to the other two than the curvature of a #3 Henry Taylor gouge would be. But the sweeps of all three gouges, though close, are not exactly the same. Most carving chisels are hand-forged and hand-ground, so you'll find some variation even in tools from the same manufacturer.

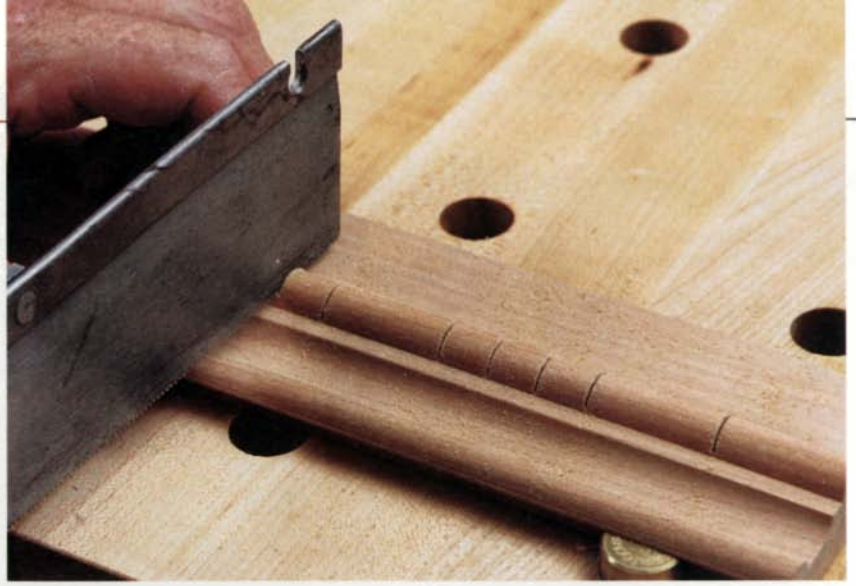
Different brands vary slightly. *The width of cutting edges and the sweep of the curves on these three European chisels vary slightly.*

Drawings: Erika Marks; photo, this page (bottom right): Michael Pekovich

BEAD AND ROD

continued

across the grain to define the crest of each bead. In a series of cuts, set the chisel just past the center of each bead and give it a sweet blow with the mallet, going straight across the grain. Do this down the row, taking the same measure on all of the beads and rods before you reverse direction and cut the other sides. It's important to repeat the same strokes all the way down the sets you're working because it helps you make consistent shapes and speeds the whole process greatly. After this cross-grain cut, switch back to cutting with the grain by using the chisel in a nearly horizontal position in line with the molding. As you push the chisel, raise the handle with a slight twisting motion to pare the wood. At this point you can work each bead and rod end until it's done, moving on to the next one when the bead looks like half of a sphere. The last step is to clean up the ground with the #3 gouge.



LAYOUT

After marking pencil lines on the shaped molding using a tape measure or ruler, score the divisions between beads and rods with a dovetail saw. Take care to stop the cut just shy of the flat part of the molding.

SETTING IN

Hold a ½-in. #7 gouge at about a 45° angle and cut off the corners of all the bead and rod shapes by striking the chisel with a mallet. Work five or six sets at a time.

GROUNDING

Define the round shapes in profile from above by striking the chisel as you hold it vertically. Work your way around all sides, and then switch to a ⅜-in. #3 gouge to clear away chips around the base.

MODELING

Refine the three-dimensional shapes using the #7 gouge. Work the beads and the ends of the rods from all sides, and carve them with the chisel held at many different angles to the surface of the molding.

EGG AND DART

You can find dozens of versions of egg-and-dart molding. It's a terrific first or second molding for a cornice, and it's great for picture and door frames and on the lip of a table. I use two chisels to carve the version shown above: a ½-in. #6 gouge and a ⅜-in. #3 gouge.

On ¾-in. stock, start by shaping an edge with a ½-in. radius roundover bit and leave a ⅛-in. step on the top. To lay out the pattern, set a compass at 1⅛ in. and mark centerlines on the top face of the molding along the length of the stock. These marks represent the center of the eggs. Set your compass at ½ in. and draw full arcs centered on those marks. These arcs represent the collars around the eggs. To define the eggs, set your compass at ⅜ in. and mark either side of the same center point.

The mallet work for this molding is next. Set the #6 gouge vertically on the upper part of the molding, with one corner on the ⅜-in. mark and the other corner hovering over the center at the bottom of the arc. Give the chisel a swift blow and move on to the next egg. I normally work six eggs at a time. When you reach the last egg, turn the chisel around and go the other way to cut the remaining ⅜-in. marks. Change the angle on the chisel handle and chop out a ⅛-in.-deep groove that defines the edge of each egg. After that, very lightly strike the chisel (held vertically to the molding) to score the outside of the collar. Be careful not to break the thin collar.

Put away the mallet; the rest is handwork. Angle the chisel first left, then right, to cut the finished depth around the eggs. The chisel will leave a clean face on the collars, and you can rough out the eggs by angling the chisel from different directions. Use the same right-left series of cuts to finish the fragile collars, inside and out. Then use the corner of the same chisel to shape the darts, taking care to make them symmetrical. Switch to the #3 gouge to remove material around the dart and the lower edge of the collar. Clean out any chips with the #6 gouge and a toothbrush.

LAYOUT

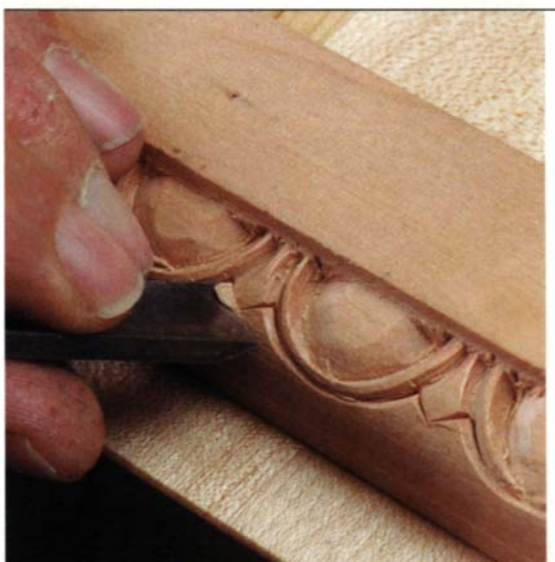
Use a compass at three different settings to complete the layout. Mark centerlines first, then use those points to scribe two arcs that define the eggs and the collars that surround them.

SETTING IN

Hold a ½-in. #6 gouge vertically and strike it with a mallet to outline the egg shapes first, working six at a time. Change the angle of the chisel to chop out a groove around each egg.

GROUNDING

Still using the mallet with the #6 gouge, score the outside collars; use a light touch to prevent breaking the wood. Then put the mallet away and begin to carve eggs and collars by hand.

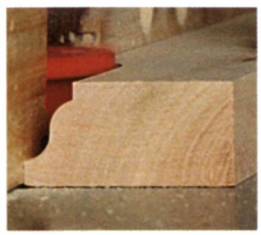


MODELING

Refine the egg shapes by hand-carving them. Use the corner of the #6 gouge to define the darts, then switch to a ⅜-in. #3 gouge to finish them and to remove the last bits of debris.

BEAD AND COWL

A bead-and-cowl molding is most suitable when seen above eye level, such as in a cornice molding in a pediment. The shadows created by the shapes of this molding make it a real eye-catcher. I carve it with two gouges: a ½-in. #7 and a ⅜-in. #3.



Begin with ⅞-in.-thick stock and shape a ¾-in. Roman ogee onto the edge. Lay out the pattern with a compass set at 1¼-in. intervals, and "walk" the compass the entire length of the molding. It will be easier to carve the beads if you scribe their perimeters with a compass set at ½ in. As you become more practiced, this mark won't be necessary. You'll be able to trace a sweet circle using only the gouge. Along the foot of the ogee, make a series of marks between the circles that define the outermost limits of the cowl. There is a little give and take in the layout of this molding, so begin from one end of a run and lay it out to the other end, fudging the space between beads, if necessary.

You can work as many as 10 beads at a time. Set in the beads with the #7 gouge, starting with the chisel centered over the scribed marks. Use light taps with a mallet and trace the full circle of each bead, then hit the mallet harder and chop deeper to about two-thirds the total depth of the bead. The finished depth is a line defined by the bottom curve of the ogee, straight down from the top step of the ogee.

Still using the mallet, turn and strike the chisel so that the concave face removes the corners of the still-flat beads and makes clearance for the chips as you remove the waste. Finish setting in the full depth of the beads and model them with the concave side of the #7 gouge, by hand, without using the mallet.

With the #3 gouge driven home by the mallet, cut straight down to the bottom of the ogee. The vertical lines of the cowl are perpendicular to the face of the molding, and the gouge defines the arcs in the sides of the cowls. After cutting the sides, cut in from the front of the ogee, carving out a flat area at the transition to the flat of the molding. Carve the small valley at the crest of the ogee with the #3 gouge. Hold it straight up, set in a cut dead center on the crest, then open the cut by angling in the concave side of the chisel, rolling the chisel from a vertical to a horizontal position. Scuff the moldings with a light touch of 220-grit sandpaper prior to finishing, but don't sand so much that you remove the facets left by the chisels—those marks are the charm and proof of hand-carving. □

Lee Grindinger builds carved furniture in his shop in Livingston, Mont. (Visit his web site at www.furniturecarver.com.)

LAYOUT

Use a compass to mark the distance between each bead, the centerline of the beads on the ogee shape and the circular profile of each bead. Mark the entire length of the molding before you begin carving.

SETTING IN

Use a ½-in. #7 gouge and light taps with a mallet to set in the circular shape of the beads. After tracing full circles, go back over them with heavier blows of the mallet to plunge deeper into the ogee.

GROUNDING

Define the cowls around the beads by chopping vertically with a ⅜-in. #3 gouge. Use the chisel to pare away the waste around the beads that have been shaped with the #7 gouge.

MODELING

Use the #3 gouge to carve the small valley at the crest of the ogee between each bead. Chisel into the valley from each direction using the concave side of the chisel to define the shape.

A No-brainer Varnish Technique

Applying thinned varnish with a paper towel

Unorthodox, but it works. *This simple method, which uses fast-drying varnish and smooth-textured paper towels, solved the author's need to apply a quick-drying, long-lasting finish.*

BY JEFF JEWITT

About a year ago, I moved my refinishing business. This time around, I was determined to install the most up-to-date spray booth right from the start. Though assured by the designer that it would be up and running within a month after moving into the new shop, inevitable delays stretched that timetable into several months. Somehow I had to keep a furniture-restoration business running that had a reputation of providing a quick turnaround on jobs.

Until the new booth was in order, spraying was out of the question, so I had to come up with a quick-dry finishing system. After some trial and error, I developed a method of wiping on a fast-dry varnish with a paper towel. The varnish provided protective qualities similar to those of a standard nitrocellulose lacquer. It was easy to apply, and it dried fast enough that all the dust kicked up by workmen wasn't a problem. I was so impressed with the results that this technique is now a staple in my teaching repertoire, and students love the results.

What to use

Fast-dry varnishes are similar to typical alkyd varnishes, but the drying time is sped up by adding vinyl toluene to the alkyd resin. These varnishes dry tack-free

Photos, except where noted: Susan Jewitt

The Piece

SIX COATS IN TWO DAYS
After sanding this small table through 180 grit, it took less than a day to apply the first three coats of diluted, fast-dry varnish.

Materials

FAST-DRY VARNISHES WORK BEST
These three brands dry so fast that you can apply a second or third coat within hours of the first one.

Step 1

FOLD IT UP AND SQUIRT
Glue bottles make great dispensers for the thinned finish. Replenish the supply of finish as necessary to keep it flowing smoothly onto the surface of the wood.

USE A SMOOTH-TEXTURED PAPER TOWEL
The author prefers Viva brand towels (left). Heavily textured paper towels (right) can leave streaks in the finish.

in as little as 15 minutes. This means that the conventional problem associated with varnish—dust drying in the finish—is eliminated. The three brands I've used—Zinsser's Quick-15, Sherwin Williams' Wood Classics Fast-Dry Oil Varnish and Benjamin Moore's One Hour Clear Finish (see *FWW* #133, p. 142)—are available in gloss and satin versions. I use gloss for this technique because satin versions tend to dry a bit streaky when applied in thin coats. Gloss can also be rubbed down to satin, as I'll explain later.

When brushing on varnish, bubbles sometimes form in the finish. But by thinning the varnish and wiping it on with a paper towel, bubbles are eliminated. Any nontextured paper towel will work, but my favorite brand is Viva. Avoid textured paper towels.

I use naphtha to thin varnish because it dries the fastest; I can easily apply three coats in a day. Mineral spirits will extend the drying time, so you'll probably be able to apply only two coats a day.

How to do it

Sand the wood through 180 grit. I use a random-orbit sander and then hand-sand with the grain, using the same grit. Remove all sawdust and other debris, and then apply any stain you want. Allow the stain to dry. Dismantle the project as much as you can so that you have flat surfaces to finish. Thin the varnish with equal parts naphtha or mineral spirits and put the thinned solution into a plastic squeeze bottle with a dispensing nozzle—the type you find on a glue bottle.

Fold a single piece of paper towel once perpendicular to the perforated seam. Fold it again perpendicular to the previous fold, then fold it again. You should end up with a rectangular piece of folded towel approximately 2¾ in. by 5 in.

Hold the paper towel so that the tip extends just beyond your fingers and apply a squirt of varnish (about ¼ oz.) to the tip of the towel. Bring the towel down onto the surface of the workpiece and wipe a thin, even coat from one edge to the other. Don't bear down too hard at the beginning or you'll get a pool of finish. Replenish the towel again and make another swipe, overlapping the first one by about ½ in. or so. Repeat this process until you've covered the whole surface. Do the edges last. The thin varnish sets up quickly, allowing you to fix a drip immediately. But your goal

Photos, this page (bottom): Michael Pekovich

Step 2

LAY IT ON IN LONG STROKES WITH A LITTLE OVERLAP

Wipe on the finish in long strokes in the direction of the grain. Each successive stroke overlaps the previous one by about ½ in. Work from one side of a piece to the other, always rubbing in the same direction. Take care to dispose of used paper towels properly.

Step 3

STRIVE FOR A LIGHT TOUCH

Scuff-sand the dried finish very lightly. A sufficiently dried finish will turn to powder (right); one that's too wet will form gumballs on the sandpaper.

Step 4

REDUCE THE SHEEN WITH STEEL WOOL

Using very fine (0000) steel wool, you can turn a gloss finish into a satin sheen by rubbing the final coat of varnish with the direction of the grain.

should be to get the varnish on as evenly and as quickly as you can and then leave it alone.

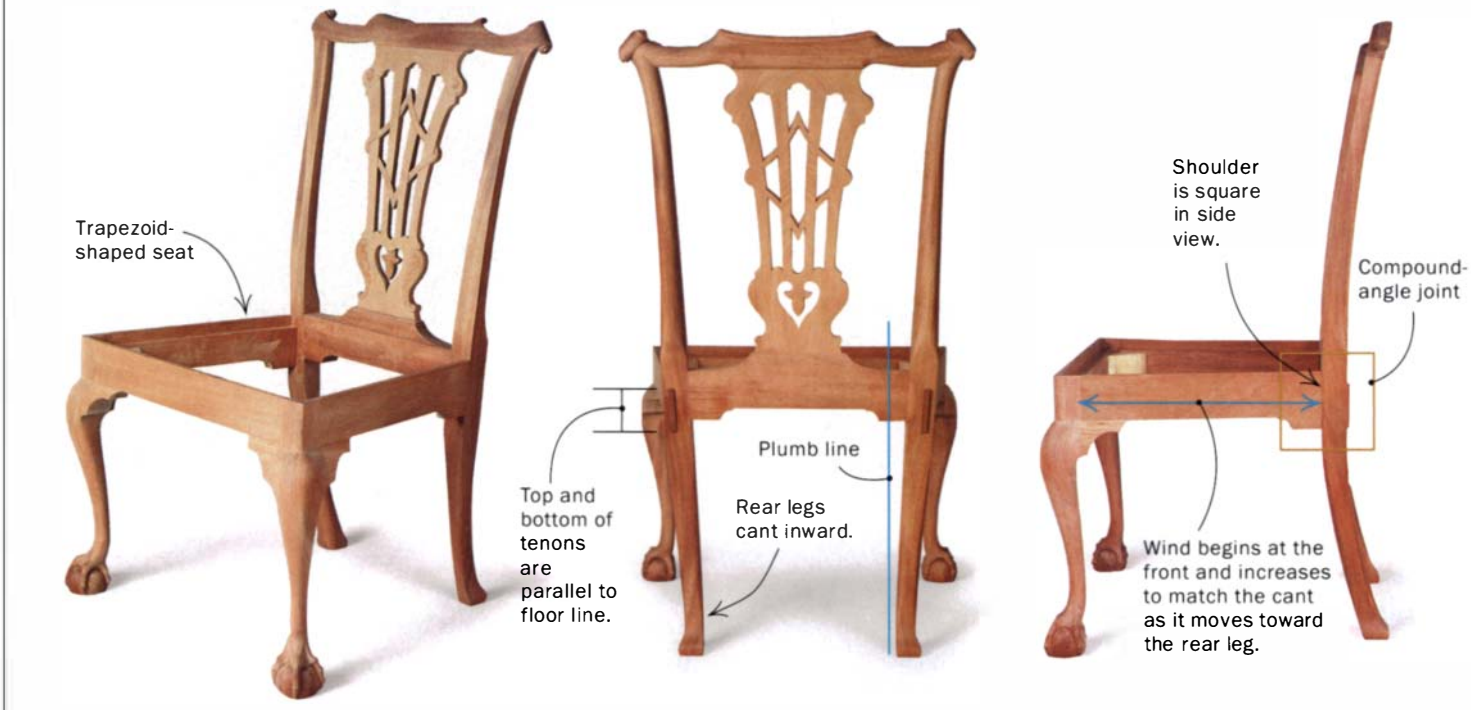
The first coat should be dry enough to sand in about an hour. Use 400-grit silicon-carbide sandpaper and scuff the surface just enough to remove any nibs. If the varnish film turns to powder easily when you sand it, then it is dry enough to re-coat. Remove the dust with a tack rag and apply the second coat just like the first. After a few hours, scuff-sand and apply a third coat.

After overnight drying, sand the finish again with 400-grit paper. Wipe all of the residue with a tack rag and build at least two more coats, and as many more as you like. When the finish depth is to your liking, stop. I typically apply six coats to maximize durability.

After a week's drying time you can rub out the finish if that's the look you want. Wet-sand the finish lightly with 600-grit wet-or-dry paper, by hand. Then, using 0000 steel wool and wax thinned with mineral spirits, rub the finish with the grain in long strokes. This results in a very pleasant satin sheen. □

Jeff Jewitt contributes frequently to Fine Woodworking *on finishing topics.*

Compound-Angle Joinery



The Chair

The side-rail to rear-leg joint on a Chippendale chair—and many other types of chairs—must account both for the trapezoid-shaped seat and for the cant angle of the leg, making it necessary to cut and use a compound-angle tenon.

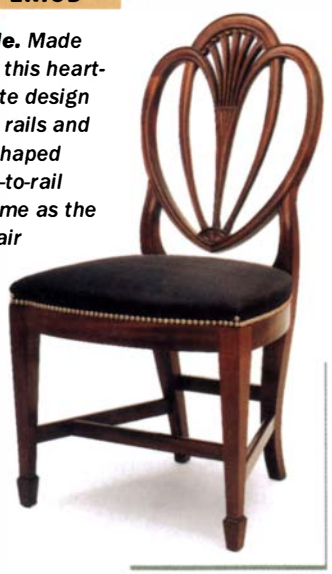
BY WILL NEPTUNE

For me, chairs are easily the most satisfying projects to build, but students often are puzzled by the compound-angle joinery between the legs and seat rails. I learned how to draft, lay out and cut these joints when I was a furniture-making student years ago, and now I teach it at North Bennet Street School. Once you answer two critical questions—"Where do the layout lines come from?" and "How do I get the layout lines on the wood?"—you'll see that cutting these joints isn't all that hard. What's more, once you understand how to cut compound-angle joinery, cutting joinery with a single angle becomes simple.

Recently, I built a set of Chippendale chairs. Most Chippendale chairs—and a lot of other styles of chairs—have rear legs that cant inward as they go toward the floor but front legs that are perpendicular to the floor line. Although this design lends a refined sense of upward motion to a chair, it also introduces a fussy situation when it comes to joining the rail to the back leg. To allow for the cant of the legs and the trapezoidal shape of the seat, most of the time you'll have to cut compound-angle tenons between the legs and seat rails.

It is tempting to angle the mortises, in either the plan or elevation, to simplify the tenon problem. In the first case, the mortise would angle in the plan view at the

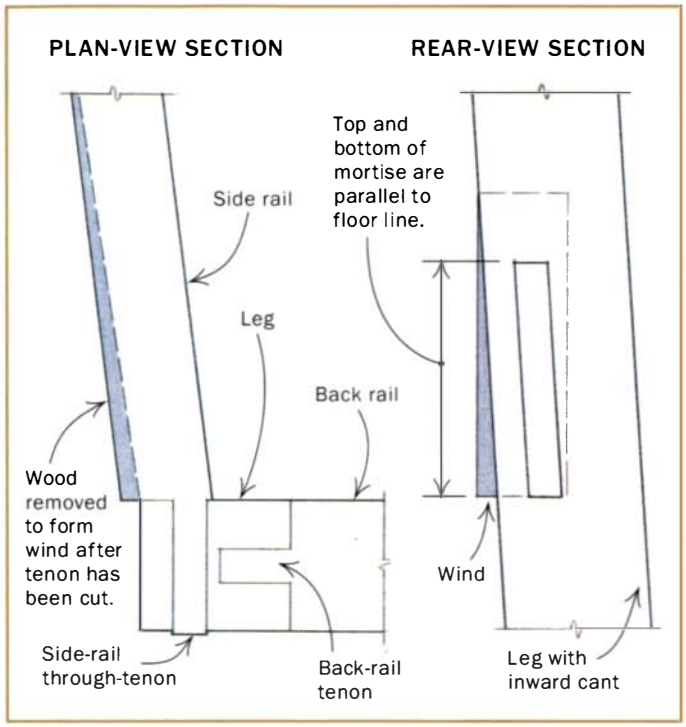
FEDERAL PERIOD

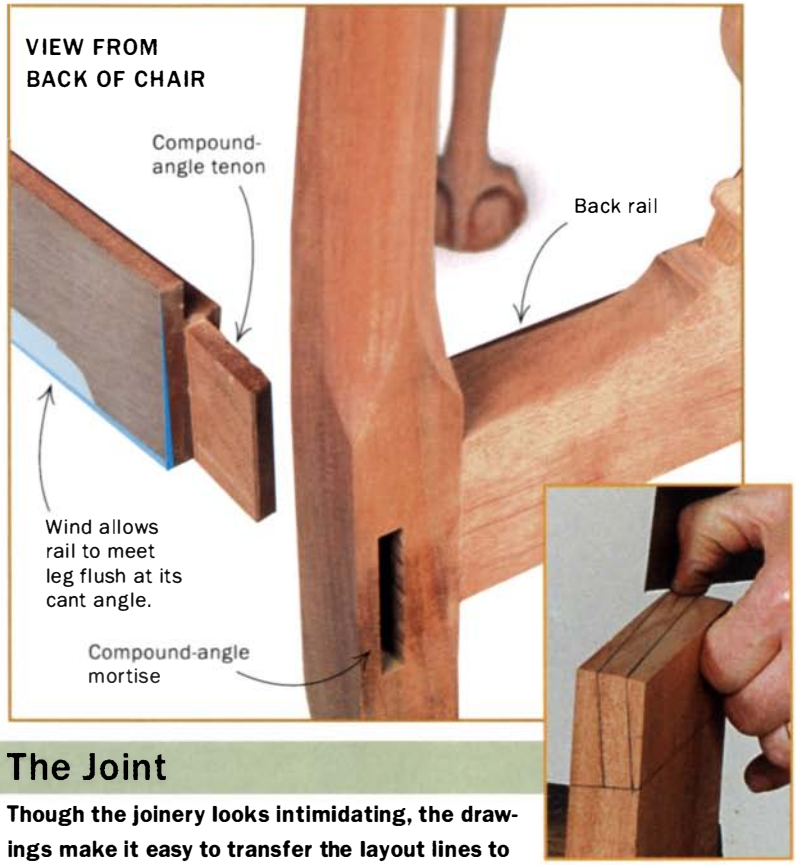


In the high style. *Made by Steve Brown, this heart-back Hepplewhite design has curved seat rails and more complex shaped legs, but the leg-to-rail joinery is the same as the Chippendale chair above.*

Photos, except where noted: Michael Pekovich; this page and facing page (bottom): Lance Patterson

Careful tenon layout is the key to cutting and mastering this intimidating joint





The Drawing

I teach students to lay out this joint with only two partial drawings—a plan (overhead) view at the bottom edge of the side rail and a front elevation view. This article will show you that simple drawings are all you need to know to cut this joint.

The Joint

Though the joinery looks intimidating, the drawings make it easy to transfer the layout lines to the rail. Once the layout lines are in place, it's simply a matter of cutting the joint—by handsaw, bandsaw or other means.

seat-frame trapezoidal angle. In the second case, the mortise could be cut square to the back rail in front elevation to correct for the cant angle. Both of these moves force you to shorten the back rail tenon, which would weaken this critical joint.

Both historically and for chair making today, I think compound-angle tenons represent the best possible technical solution to this problem. Once you have a system for laying out these joints, cutting them is not that difficult.

Draw simple elevation and plan views

No matter what style chair you're building, there are two angles to consider: the cant of the leg, seen in a front elevation, and the seat-frame trapezoidal angle, seen in a plan (overhead) view. Start by doing a partial drafting job, just enough to get the information you need for layout.

First draw the leg from a front view and show the mortise. The mortise in the rear leg should be as far to the outside of the leg as possible without sacrificing the thickness of the mortise walls. The mortises can be cut square and slightly short in length, then chiseled to the correct angle at the top and bottom, making the mortise a parallelogram. Cutting a mortise in the shape of a parallelogram not only helps you register the rail, because it makes the rail's top and bottom edges parallel to the floor line, but it also makes the through-tenon look better from the back of the chair.

Transferring information from the elevation, draw the sections of the leg at the bottom of the rail. Then you can draw the side

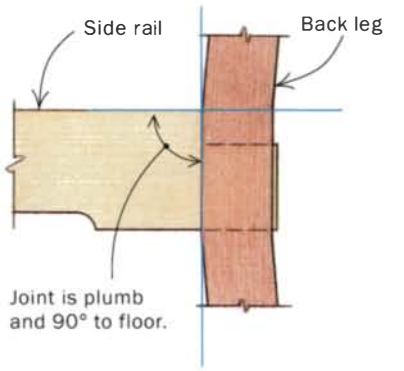
COUNTRY CHIPPENDALE

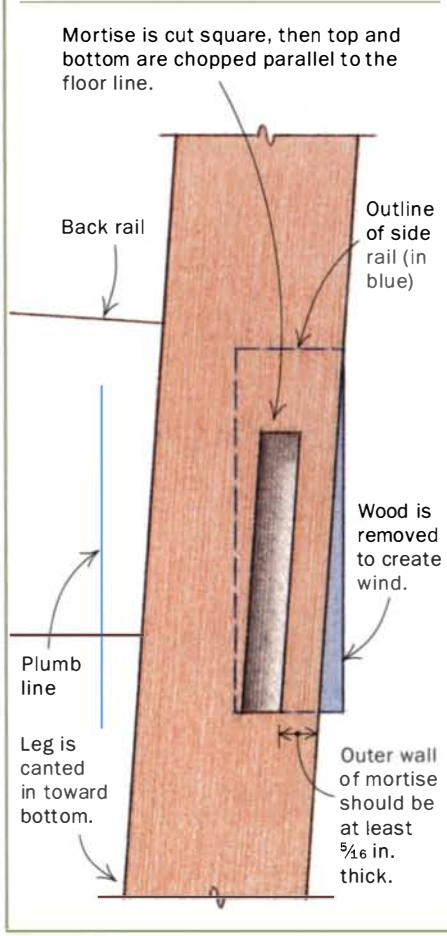
In any style. *Made of curly maple, Mary Conlan's Chippendale chair of simpler form is built using the same leg-to-rail joinery as a more flashy, high-style chair.*

Drawings: Vince Babak

LAY OUT AND CUT THE MORTISE

Set the mortise to the outside of the leg as far as possible, taking care to see that the outer mortise wall is at least 5/16 in. thick for strength. Lay out and cut the square mortise parallel to the side of the leg. Then chop the top and bottom of the mortise parallel to the floor line, making the mortise a parallelogram. The rail joins squarely to a flat section of the leg; cut a wind to keep it flush.





rail and its angle. Notice that the side rail must be thick enough to allow wood for the top outside corner as well as the bottom inside corner, as seen in the elevation drawing on p. 61. I also like to have extra rail thickness to allow for a shoulder at the bottom inside corner.

First draw the line representing the outside face of the rail blank and its angle. Here I'm assuming that the outside face of the rail lands flush to the top of the leg, but you could leave a shoulder if your design calls for it. Then draw a parallel line showing the bottom inside face of the rail, choosing a rail thickness that will allow for an inside shoulder of 1/16 in. to 1/8 in.

As a last check, draw a detail of the top section of the leg in plan view. I draw this as if the leg mortise runs all the way up to the top edge of the side rail. Extend the line that represents the outside face of the rail back through the leg to be sure that the tenon lies within the thickness of your rail.

This construction has the side rail forming a simple angle, which leaves wood sticking out from the canted leg on the outside. These surfaces will be reconciled by fairing a wind into the outside face of the rail once the joinery has been cut. The front end of the rail is left alone for the leg joints, so the rail starts plumb at the front and develops a wind that becomes the cant angle of the rear leg.

To show this, draw a dotted angled line from the bottom outside corner of the rail out toward the rail's front end. This transfers the information from the elevation onto the plan view (as in the drawing on p. 61). The plan view is simplified but contains all of the crucial points seen in the elevation. These two drawings provide the information necessary for laying out the joint.

Follow the drawings to lay out the joint

To make the layout easier, I pretend the mortise is extended up to the rail's top edge. Once the tongue of the tenon has been cut using the method of your choice, it will be easy to shoulder down the tenon to match the real mortise (see p. 64).

Extend the lines of the mortise opening up to where the edge of the rail will land. From the bottom inside corner of the mortise, square up a line to the top edge of the rail. Where these three lines cross the top rail edge will become the source of the layout information.

The important thing to realize is that the information seen here is true only at one location along the rail: the plane of the shoulders (see the plan view on p. 61).

On the inside face of the rail, square a line across that shows the correct shoulder location, measured in from the end. Here I've left extra length for later cleanup. Then, using a bevel gauge set to the seat angle, run the shoulder lines across the top and bottom edges of the rail. These should then connect with another square line, up from the outside face of the rail, describing the plane of the shoulders. Your drawing should now show the location of the tenon at this plane (see the drawing on p. 64).

CHIPPENDALE

One joint, many chairs. *No matter what kind of chair you're building, if your back legs are canted and your seat is trapezoidal, you'll need to use compound-angle tenons to join them, as was done with this Chippendale chair by Rich Heflin.*

Working from the elevation drawing, set a marking gauge to x and mark this distance across the top and bottom shoulder lines, measuring from the inside face of the rail. From the mark on the top edge, use a pair of dividers set to the distance y to make another mark along the shoulder. The new mark on the top edge and the first mark on the bottom edge locate the inside cheek of the tenon. From these marks, transfer the size of the mortise to locate the outside tenon cheek.

This may sound confusing, but all you're doing is converting the cant angle to a rise/run problem. The rail width is the run, and y is the rise. The reason for the initial marking gauge line is that it's more difficult

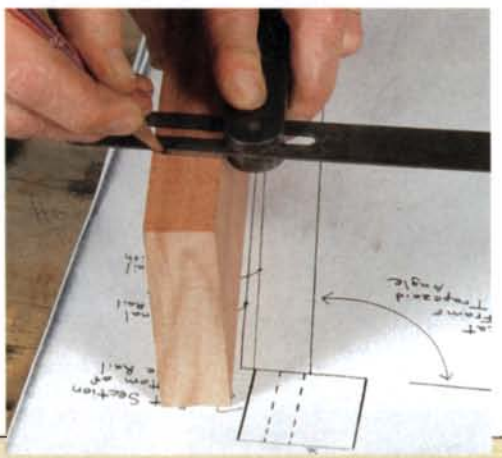
Photo, this page (right): Lance Patterson

CONSIDER LENGTH AND SEAT ANGLE WHEN LAYING OUT TENON SHOULDERS

While the joints at the front of the chair are simple angles, compound-angle joints are required where the side seat rail joins the back leg. Use simple full-sized drawings to determine the angle of the top and bottom tenon shoulders at the back of the seat rail. Then transfer measurements from the drawings to the rails.

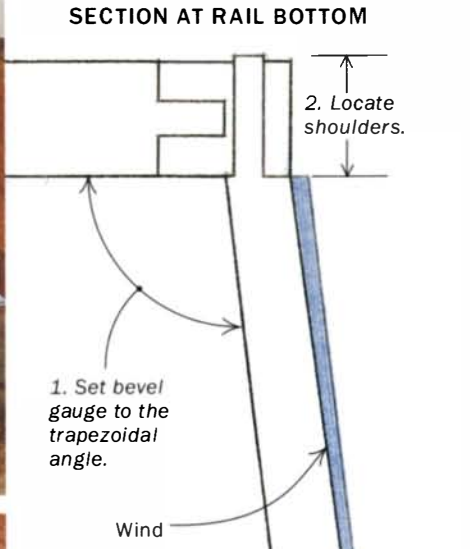
1. Full-sized drawings help you avoid errors. *Working from a full-sized plan (overhead) view, set the bevel gauge to the angle between the back rail and side rail on the seat frame.*

2. Marking the first face. *Set the side rail into place over the drawing (make sure there's enough stock for the full tenon). Make a tick mark on the bottom inside corner of the side rail, and pencil in the shoulder line on the inside face.*

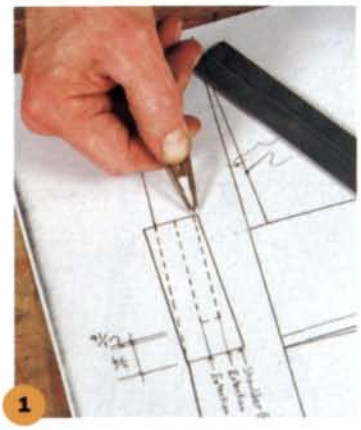


3. Locating the top and bottom shoulders. *Register the bevel gauge against the line for the inside shoulder, then mark the bevels at the top and bottom of the rail. Check that your angles match those in the drawing.*

4. Knife marks are more exact. *Once the tenon shoulder has been correctly marked, knife-mark the lines on all sides of the rail. The knife marks provide a specific line to pare or shoulder-plane to.*



CAREFULLY LAY OUT THE ANGLED TENON ON THE STOCK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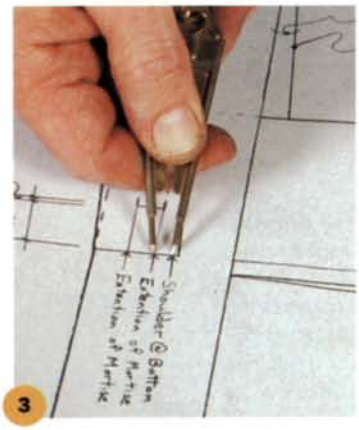
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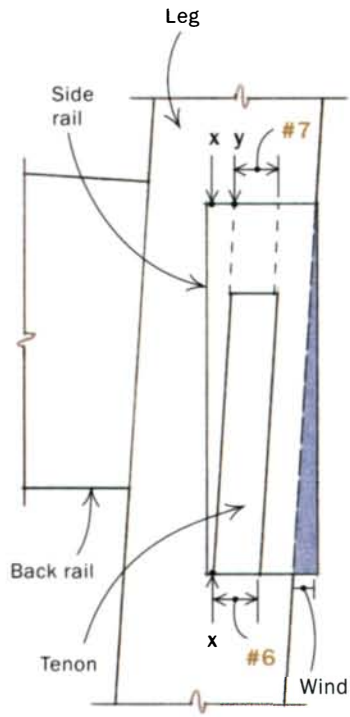
Laying out and cutting angled tenons is a methodical process, but it's not a difficult one. Work from simple but accurate drawings and mark out each measurement from a single reference line on both the top and bottom of the tenon.



1. Use a simple elevation drawing, as seen from the front of the chair, and set dividers to x—the distance from the bottom inside corner of the rail to the inside corner of the tenon.

2. Set a marking gauge to the distance x between the inside face of the rail and point x and scribe a line across the top and bottom shoulders from the inside face of the rail.

3. Set the dividers to the distance between x and y.

4. Use the divider setting from step 3 to locate point y on the top edge of the rail, measuring from point x.

5. Set the dividers to match the mortise width on the rear leg of the chair itself.

6. From point x on the bottom of the rail, transfer the width of the mortise.

7. With the dividers still set to the mortise width, measure from point y to mark the tenon width at the top of the rail.

8. Tenon cheeks are marked perpendicular to the shoulder line by registering a square against the bevel gauge—which is still set to the trapezoidal seat angle.

9. After the top and bottom of the tenon have been marked, use a straightedge to connect the points and complete the layout.

10. After knife-marking the shoulder lines, cut the tenon and shoulders with a backsaw, then trim to fit.


7


8


9


10

to measure from a corner using dividers. The goal here is not just to get a tenon that fits—the rail should also land on the post at the correct location and project at the trapezoidal angle.

Once the base of the tenon has been located, the plan view (see p. 61) shows the next move. The tenon is simply square to the shoulder. Clamp the bevel gauge to the rail and square all four tenon marks out to the end of the rail. Once you've connected these lines across the end grain and knife-marked the shoulders, layout is complete, for now. Once the tenon cheeks and the side shoulder have been planed, the top shoulder can be marked out and cut. After fitting the tenon, mark the wood to be faired directly from the leg (see the photos at right).

Take it slow. *The author uses a shoulder plane to trim the cheeks, checking the tenon frequently against the mortise until he has a tight fit. He then trims to the layout lines with a shoulder plane.*

MARKING OUT THE WIND

Once the tenon has been cut and fitted, dry-fit the joint tightly and mark out the section of the rail that needs to be planed away. Notice that there is no material removed at the front of the rail.

Establish layout lines. *Connect the bottom line of the wind with the bottom front corner of the rail. Planing to this line gives you an even wind and lets the rail meet flush at both the front and back legs.*

Make practice cuts in scrap before cutting the real joint

One very direct way of cutting a compound-angle joint is with a handsaw. First the cheeks would be sawn in the ordinary way. The only tricky part is remembering that the shoulder cuts are at different depths on each edge. Begin sawing with the shallow edge facing you, and avoid cutting into the tenon.

A bandsaw is good for cutting the cheeks, too. Setting the table for the cant angle (remember to keep track of lefts and rights), you can follow the cheek lines on the top edge and the blade will follow the cant angle on the rail's end.

The tablesaw can probably get you closer and thus avoid a lot of cleanup with hand tools, but the explanation is a story all by itself (for more on this technique, see Master Class on p. 108).

Whatever method you use, lay out with pencil first and confirm that you have things correct. Often, the cant and seat angles are close enough that it's easy to grab the wrong bevel gauge during layout. The shoulder won't look bad, but the front legs will be way off. It's also possible to get the lefts and rights mixed up and lay out the correct angle in the wrong direction. These mistakes make for a long day, so when in doubt, mill a practice rail and check both your layout and cutting method. Once the joinery for the back end of the chair has been cut, the simple angles on the front ends of the rails will seem easy. □

Will Neptune teaches furniture making at North Bennet Street School in Boston.

Dust Detector

Switch automatically turns on dust collector when machines are running

BY ROBERT S. WRIGHT

After we moved into our new house, my wife decided that we needed a change in bedroom furniture. As I contemplated the months—years?—it would take me to complete this challenge, my pride was dealt a sudden blow. My wife said she wanted to *buy* a bedroom set made in the Queen Anne style. Well, I had to admit that carving shells was not part of my repertoire (yet), so I gave in. Meanwhile, as a sop to my ego, I got the go-ahead to enhance my shop with a bandsaw, new saw fence and, most importantly, a dust collector to keep the new home clean. I love that new bedroom set!

The new tools worked out fine, except for one thing: Even though I placed the switch for the dust collector in a central location, I often neglected to turn it on. I needed a better solution. The World Wide Web can be a good place to find answers to technical problems, and this dilemma proved to be no exception. After some searching, I discovered I could buy an off-the-shelf current sensor that would serve as the heart of a shopmade automatic switch for my dust collector. The rest of the parts include a relay, a basic on/off switch, single electrical box and some wire. The total cost: a little more than $50.

The concept is simple and works like similar products on the market, which cost four times as much. A current sensor is placed inside the service panel (or in a separate panel next to it) that serves the shop. One hot wire from each tool that is connected to a dust collector runs through the sensor. When a tool is fired up, the sensor detects the current running through the hot wire. A signal is sent to the relay, which turns on the dust collector. It's that easy. Blast gates are your responsibility.

It's important to choose the correct relay based on the horsepower and voltage of your dust collector. And because the sensor works by reading current, you'll need to isolate each tool on its own circuit. For home shops that share electrical circuits with home appliances, my system may be more work or expense than you're willing to absorb. An aftermarket radio-controlled on/off switch might be a better choice.

A few words of caution: If you don't know anything about electrical equipment, get some help. There is a danger of electrical shock and all the mishaps associated with it, including death. Some locales do

Photos, except where noted: Anatole Burkin; this page: Michael Pekovich

SHOPMADE AUTOMATIC SWITCH

Turn off all power before working inside the service panel. If this is unfamiliar territory, call an electrician. This diagram shows the wiring for a 240-volt woodworking machine and a 240-volt dust collector. For a 120-volt tool, substitute the second power wire with a neutral wire (see the bottom drawing on p. 69).

The heart of the unit is a toroid sensor, which detects when current flows to a woodworking tool. The sensitivity of the sensor can be adjusted between 2 and 20 amps.

Service panel

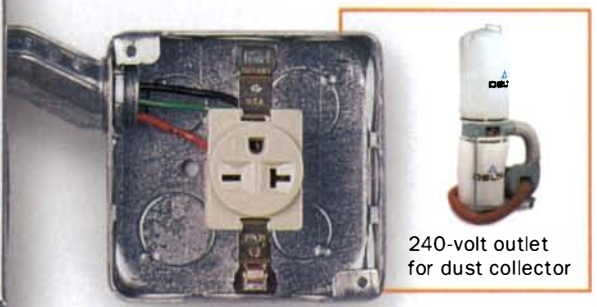
Override switch for dust collector

Double-pole circuit breaker (240 volts) for tool

Double-pole circuit breaker (240 volts) for dust collector

Hot wires

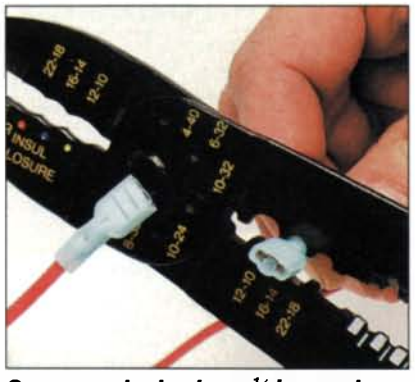
Neutral wire



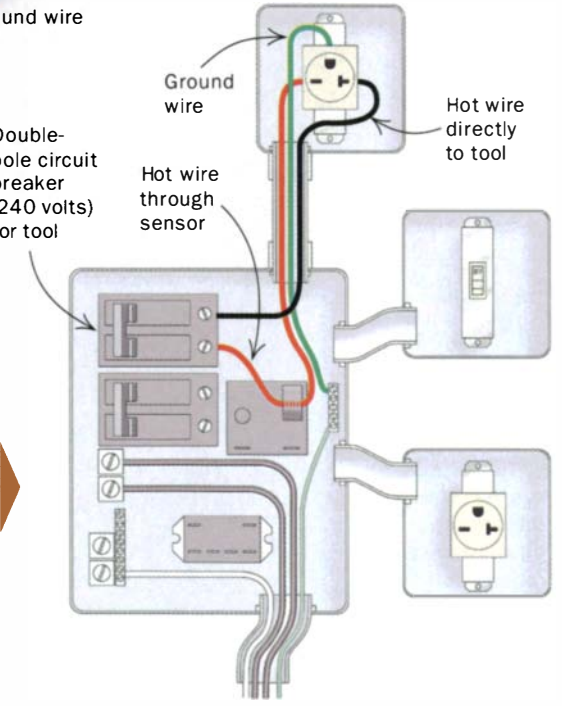
Choose a relay rated for the dust collector's horsepower *and* voltage.

Ground wire

Incoming power



Sensor and relay have ¼-in. spade lugs. *Female connectors are attached to the wire with a crimping tool.*



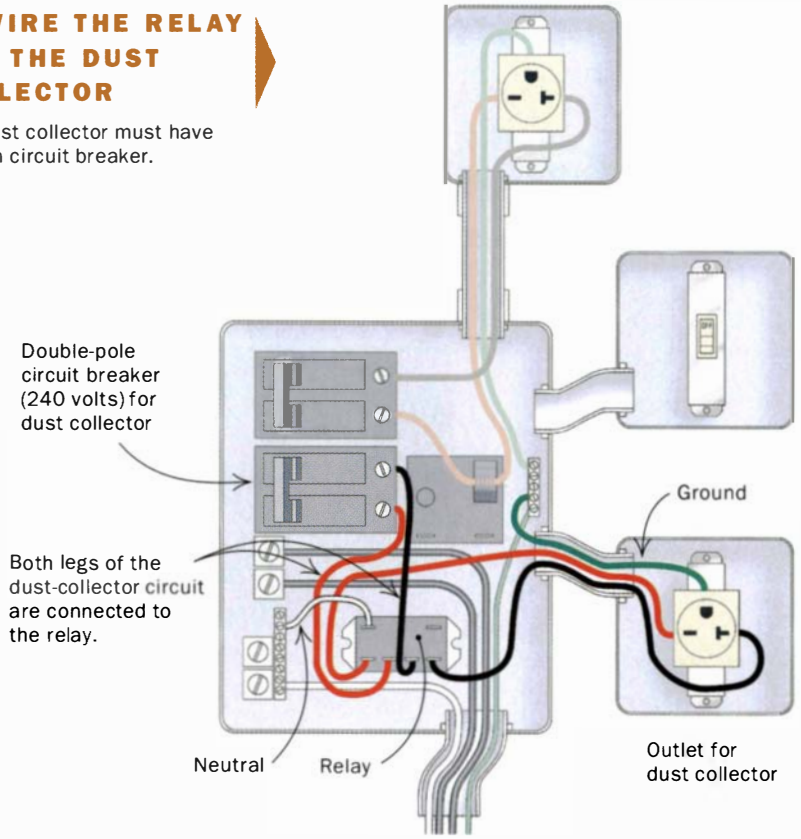
1. CONNECT TOOLS TO THE CURRENT SENSOR

One hot wire from each tool circuit is routed through the sensor's loop. The loop can handle about six 12-gauge wires.

Drawings: Michael Pekovich

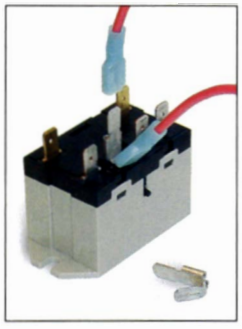
2. WIRE THE RELAY FOR THE DUST COLLECTOR

The dust collector must have its own circuit breaker.

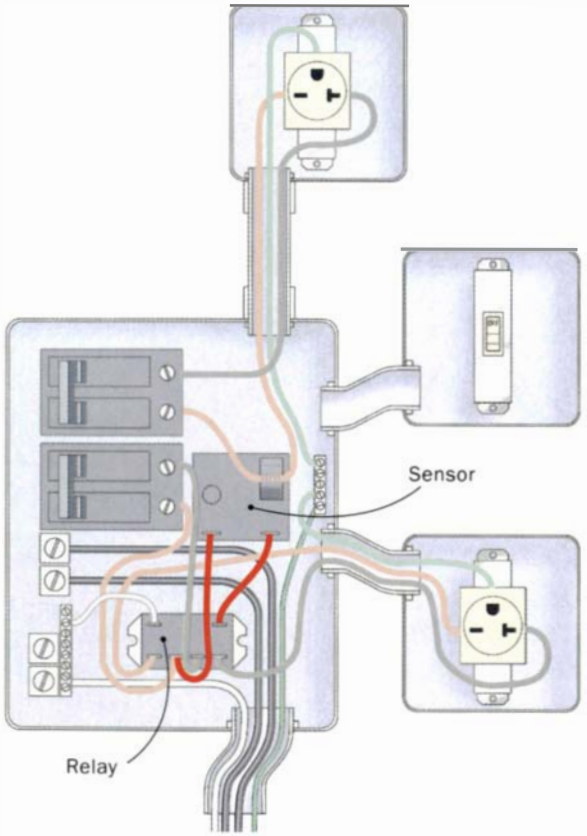


3. CONNECT THE RELAY TO THE SENSOR

Choose a relay that's rated for 240 volts.



Use a splitter where two connections need to be made to one terminal. *You could also use pigtails and wire nuts.*



not allow you to do your own electrical work; you're required to hire a licensed contractor to do it. When in doubt, contact your local authorities. Be sure to turn off the power before working around any live connections. Once I gathered up all the parts, the job took me about an hour.

Install the sensor in a service panel

After turning off the power, remove the cover of the service panel. Be sure to place the screws in a safe place. It is amazing how far they can travel without legs.

Locate and mark the wires that power woodworking machines with dust collection. If there are tools on a trigger circuit that should not set off the dust collector, put them on new or different circuits. (Because the current sensor can be adjusted for sensitivity from 2 amps to 20 amps, it is possible to run other tools without setting off the sensor as long as the unwanted tools are of a lower amperage rating.)

Find an area near the wires to install the current sensor module. Attach it with a pan-head sheet-metal screw. Position the relay to allow easy routing of wires.

Detach one hot wire for each circuit (use only one hot wire from 240-volt tools) from its circuit breaker. Route the wire through the sensor's loop, then reconnect it to its circuit breaker. The current sensor has a loop big enough for about six 12-gauge THHN wires.

Next, install the relay. If there's no room in the service panel, place the relay in a smaller electrical box and connect it to the main box with a piece of conduit.

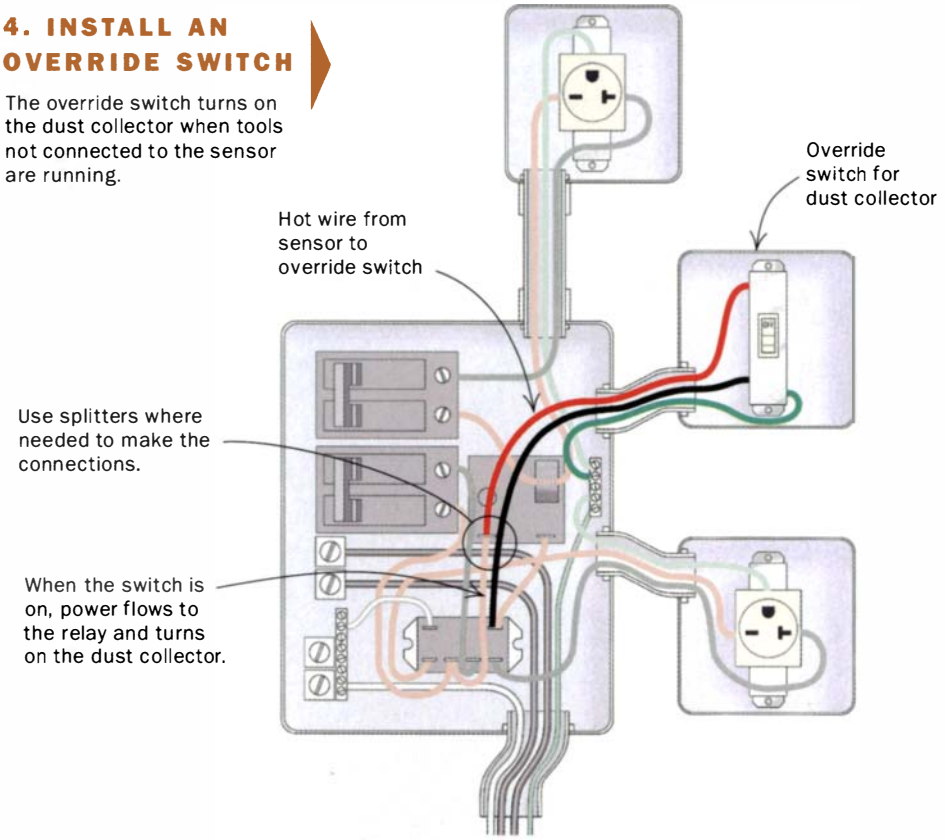
Install the override switch in a logical place in the shop. Run conduit and two 12-gauge wires from the switch to the service panel. The switch allows the collector to be turned on for other uses, such as with a floor sweep, or to be used with tools not connected to the sensor.

If the dust collector's circuit breaker is far from the shop area, and the dust collector does not have its own on/off switch or a plug, install a disconnect switch in the power line close to the dust collector as a safety measure.

The wiring for the relay is slightly different for a 120-volt collector than it is for a 240-volt collector (see the bottom drawing on the facing page). Use crimp-on spade lug connectors to connect to the sensor module and relay. Be sure to orient the override switch in a way that won't con-

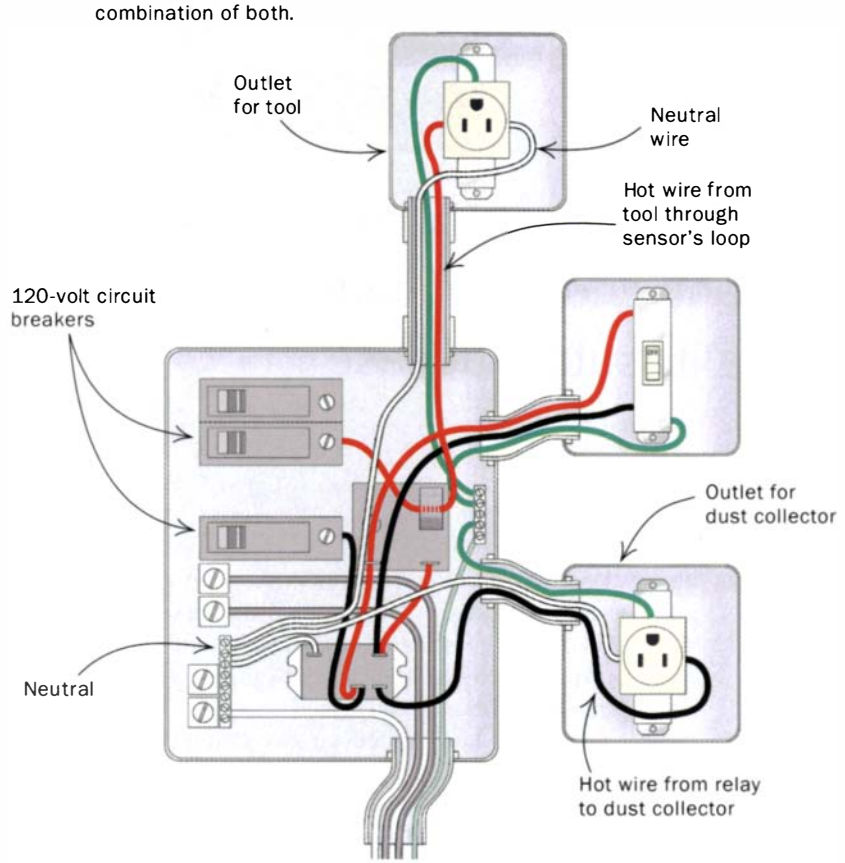
4. INSTALL AN OVERRIDE SWITCH

The override switch turns on the dust collector when tools not connected to the sensor are running.



WIRING FOR 120-VOLT SYSTEM

Substitute a lower-cost single-pole relay. Note: Woodworking machines may be 120 or 240 volts or a combination of both.



fuse. Normally, the up position means "on." The wires used to connect all of the parts have to be large enough for the circuit breaker that powers everything. Twelve-gauge wire is the minimum size required for a 20-amp circuit.

Time for the acid test. Set the sensor's sensitivity knob to 2 amps. Re-install the cover on the service panel. Verify that the override switch is in its off position. Restore power to the panel, then turn on all of the circuit breakers. The dust collector should not start. If it does, be sure that the override switch is installed correctly. Test the current-sensor circuit by starting the tools connected to the dust collector. The collector should turn on and off with each tool. Test the override switch. If everything works as planned, power up some smaller tools that share circuits with dust-collected tools. If they set off the collector, fiddle with the sensitivity knob of the sensor and see if you can dial them out selectively. It's a trial-and-error process and will be more successful with smaller, portable tools. □

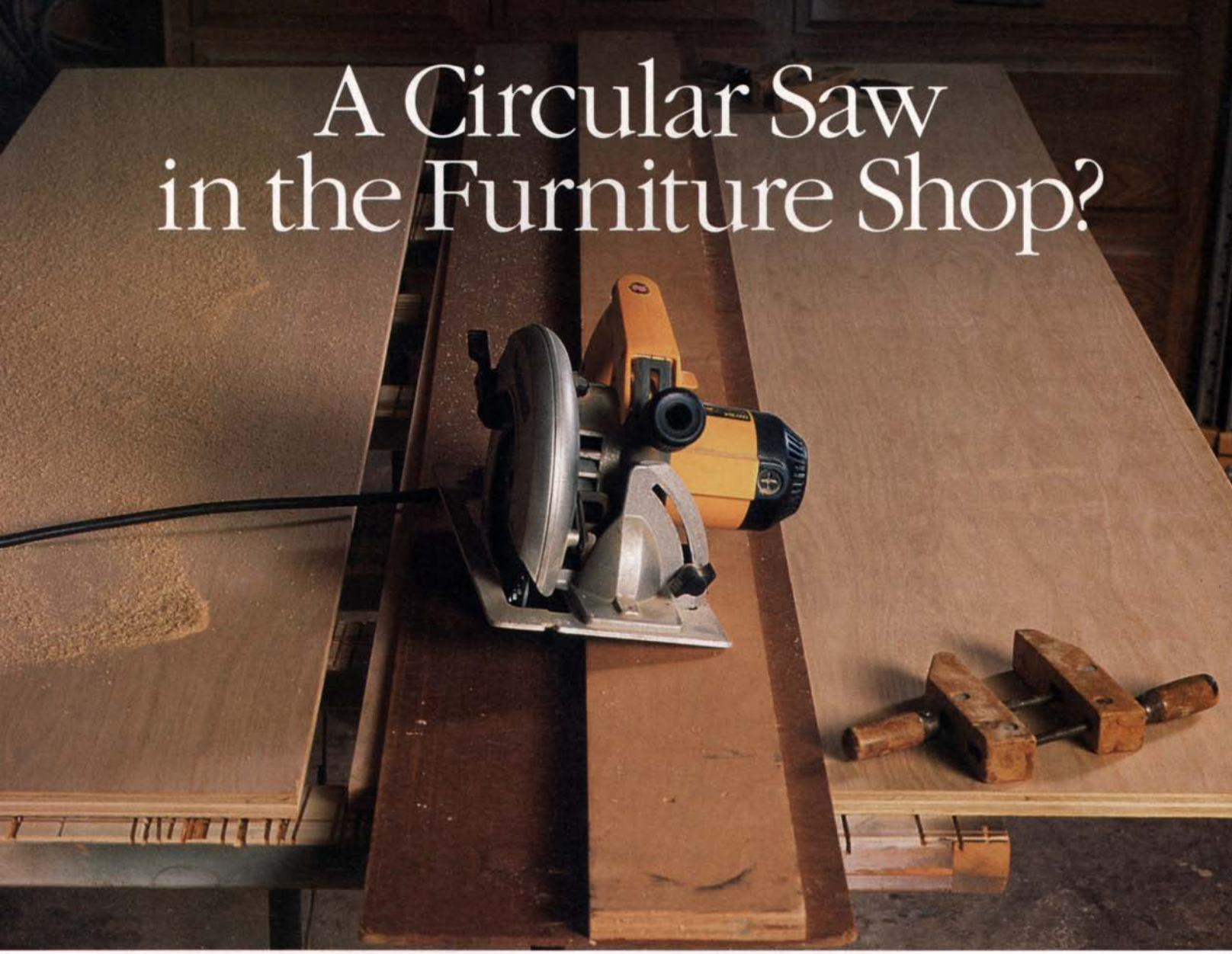
PARTS LIST FOR AUTOMATIC SWITCH

Part	Cost
SSAC current sensor TCSHAA	$38
Power relay; Grainger part No. 3A355	$11
Common household switch	$1
Single-gang electrical box	$1.50
Female ¼-in. spade lugs	$2
Wire nuts or splitters	$1
If needed: 12-gauge THHN wire, conduit	

- The current sensor and power relays are available from many electronics distributors. Grainger (800-225-5994) is listed for convenience. Contact SSAC via its web site (www.ssac.com) or call (315) 638-1300.
- Choose a relay rated for the dust collector's horsepower *and* voltage. The Grainger 3A355 is suitable for a 1-hp collector running on 115 volts or a 2-hp unit running on 230 volts. For a 3-hp dust collector, choose a heavier relay (Grainger part No. 6C913).

Robert S. Wright enjoys recreational woodworking at his home in San Marcos, Calif.

A Circular Saw in the Furniture Shop?



For cutting sheet goods in tight quarters, this carpenter's tool, used with a sacrificial table and dedicated cutting guides, produces joint-quality cuts with ease

BY GARY WILLIAMS

Contractors couldn't live without the portable circular saw, but we of the warm, dry furniture shop tend to leave it on the same shelf as the chainsaw. Great for building a deck but far too crude for quartersawn oak. Necessity has a way of teaching us humility, however.

I've been a sometimes-professional woodworker for nearly 30 years, but somehow I have never managed to attain the supremely well-equipped shop. I work alone in a no-frills, two-car garage that I share with a washer, a dryer, a water heater and a black Labrador. My machines are on the small side, and I lack the space for large permanent outfeed and side extension tables for my tablesaw. Perhaps you can relate. Under these conditions, cutting a full sheet of plywood can be a very challenging operation. Even if you have your shop set up to handle sheet goods with ease, perhaps you've run into similar difficulties cutting plywood and lumber accurately on job sites and installations. The solution?

May I suggest the humble circular saw. Cutting lumber and plywood with a handheld circular saw is nothing new. You've probably done it before, with varying degrees of success. You get that 4x8 sheet up on the sawhorses, mark your cut line, rig up some

kind of straightedge and cut. Trouble is, in the instant before the cut is complete, gravity happens, and you are presented with an entirely new challenge. Now you have two pieces that either want to collapse in the middle or fall off the end. Meanwhile, the scrap you used as a straightedge bowed a little during the cut; and it wasn't quite long enough to begin with, so the last few inches of the cut were done freehand. And as to the cut produced by that blade you last used to cut creosote-soaked fence posts ...

I've developed methods of tuning the saw, supporting the workpiece and guiding the cut that combine to make slicing up sheet goods and unwieldy planks of solid wood with a circular saw so simple and the results so clean that I don't even daydream about the big shop and the behemoth tablesaw anymore.

You must tune the saw

If you're going to make joint-quality cuts with a circular saw, there are rules:

Rule No. 1: Start with a good saw, one that can be properly adjusted and that has good bearings to prevent the blade from wobbling.

Rule No. 2: Install the best 40-tooth carbide blade that you can find.

Rule No. 3: Always check the blade tilt with a machinist's square before starting a job.

Rule No. 4: Make sure the blade is exactly parallel to the edge of the saw's base. Use a dial indicator if you can. If you can't adjust the base, see Rule No. 1.

Use a cutting table to support the work

The backbone of my system is a sacrificial cutting table with folding legs. Picture that unwieldy sheet of plywood lying serenely on a dedicated cutting table, waiting to be operated on like a patient in surgery. When each cut has been completed, both halves of the sheet will still be lying there, awaiting further disposition. Nothing caves in or falls off the end. Each cut makes a shallow kerf in the table, and when you've chewed up one table, you simply make another (for me, a matter of a couple of years). The table is cheap, easy to build and lightweight, and you can store it in a narrow space when you're not using it. The table's open-grid format serves three purposes: It keeps the table light; it keeps it clean (sawdust falls through, and you can't pile junk on it); and it allows a clamp to be used anywhere on the table surface.

It doesn't take a 4-ft. by 8-ft. table to handle a full sheet of plywood. I build mine a little under 3 ft. by 7 ft. This size is comfortable to work on and easy to store. If you have to cut a foot or less off one end of the sheet, you can slide it over so that the far end hangs over a foot or two. Same thing with width. As long as there is enough table to support more than half of the piece, it's not going to fall off.

There are various ways to assemble the grid. If you have a regular workbench large enough to lay out all of the pieces on, you can use a couple of bar clamps to snug the assembly together while you insert screws. Alternately, you can lay the pieces out on the floor and use a wall to give you something to push against while driving the screws. I use fir 2x2s for the long rails and 2x4s for the crosspieces. I drive 3-in. drywall screws to connect them, and I drill clearance holes only for the screws at the ends of the long rails, where there is some danger of splitting the wood. If you work on the floor, you can assume the grid won't be perfectly flat, but that's okay. As long as it's not far out of flat, it should perform well.

You can place your tabletop on sawhorses for use, or just put it on a bench or table, but I'd recommend fitting it with folding legs. Folding banquet table legs, available in many woodworking catalogs, are fairly inexpensive and add a tremendous amount of convenience.

To get a heavy sheet of plywood or medium-density fiberboard (MDF) up on the table, there's a simple way to save your back (see the photos on p. 72). Place a couple of wood scraps on the floor and tilt the table down so that the edge of the tabletop rests on them. This gives you room to get your fingers underneath. Then set the plywood on edge on the blocks as well. Lean the plywood against the tabletop, reach underneath and tilt up the table and sheet together.

Make dedicated cutting guides

The difficulty in using a straightedge with a circular saw is that you have to offset the straightedge from the cut line to account for the

Tuning the saw

To make joint-quality cuts with a circular saw, start with a good saw and a good blade and keep them well tuned.

Parallel base and blade. *Use a dial indicator to check that the blade is parallel to the edge of the saw base. Adjust the base to correct any error.*

Square is essential. *Use a machinist's square to get the blade at 90°. A flat base like this one makes it easier to check for square and more likely that the cut will be square, too.*

Don't worry about what's below. *Set the depth of cut so that a full tooth of the blade extends below the workpiece. You'll be cutting right into the surface of the sacrificial table.*

Photos: Jonathan Binzen

Setting up the table

A boon to the small shop, a folding cutting table can be stored in a space several inches wide and can be set up in about a minute. To load a sheet of plywood, tip the table onto a pair of scrap wood spacers. Lift the ply onto the spacers, and lift the ply and the table together.

width of the saw's base. My first approach to simplifying this process was to rip a strip of Masonite the exact width of this offset. I would lay this spacer down next to the cut line and then snug my straightedge up to the spacer. It didn't take long to figure out that it would be more convenient to attach a Masonite spacer to the bottom of the straightedge.

Now I simply lay the Masonite base of a cutting guide right on the line, clamp the guide to the workpiece and cut. One bonus is that the saw glides smoothly across the Masonite instead of on my workpiece. And another is that the Masonite backs up the cut, minimizing splintering of the veneer in cross-grain cuts.

I keep several of these guides in the shop, in different sizes and configurations. Together with the circular saw and the cutting table, they make dissecting large panels a breeze. I recommend at least three different guides: an 8-ft. guide for cutting sheet goods in the long dimension, an easier-to-wield 4-ft. version for shorter cuts and a 90° guide for perfectly square cuts (see the photos on the facing page).

To make a guide, begin by cutting an 8-in.-wide strip of ¾-in.-thick plywood for the fence portion. Next, measure the saw's footprint—the distance from the blade to the edge of the base on the side under the motor. Then make the Masonite base. Its width is 8 in. plus the saw's footprint plus ½ in. or so extra, which will be trimmed off. The plywood for the fence should be of good quality—something with good inner plies, such as hardwood or marine plywood. The edge that the circular saw will be running against should be free of voids, if possible. For the Masonite base, tempered is best, ⅛ in. or ¼ in. thick.

To assemble a straight guide, lay the plywood fence, best-side down, on the table, and lay down the Masonite strip with the best side down on top of the plywood. Drill and countersink clearance holes in the Masonite, about every 6 in. along the length of the assembly. Clamp the two boards and screw them together, being careful to get the screws fully countersunk.

Your next move will be to trim the Masonite base. If you haven't bought a good sawblade yet, drop everything and do it now—your guide will be trimmed to match your exact saw and blade combination; you don't want to make a guide with one blade and use it with another. When you get back from the store and put your good carbide blade in the saw, check the blade for square and parallel according to those iron-clad rules on p. 71. Then clamp the guide to your cutting table and trim off the excess Masonite by running the saw down the length of the assembly. Now the guide is ready to go.

The key to making the right-angle cutting guide is getting an accurate 90°. I use a scrap piece of plywood as a form when I join the two legs of the guide. I use a factory corner (checking with a square to see that it is 90°) or cut one corner square.

Using a guide is a snap. The only thing to remember is that the guide is always placed on the good side of the cut marks—that is, on top of the piece you're going to be using—so that the saw kerf is in the waste.

Nonstandard cutting with the guides

Once you've used this cutting system for a while, you will no doubt see other applications for it. Here are several that have come up in my work since I first made these guides.

Straight-lining crooked boards—The 8-ft. guide offers an easy way to straighten the edge of a long, waney-edged plank. Use scraps the thickness of the workpiece to space the cutting guide off the table. Clamp the guide to the table. Then tuck the crooked edge of the board under the guide's Masonite base just far enough

Using the guides

Simple two-part cutting guides—with a Masonite base attached to a plywood fence—make it possible to get accurate cuts with minimal layout.

Long division. *The long, straight guide makes quick work of ripping a full sheet of plywood. When the cut has been made, the halves of the sheet stay put, supported by the cutting table.*

Four-foot guide for crosscuts. *The short, straight guide (near right) is used for intermediate rips and long crosscuts.*

Swift, square cuts. *The 90° guide (middle) makes perfectly square cuts 2 ft. long.*

The miter option. *To make mitered edges, assemble a guide with its base cut to 45° (far right). Align the angled layout line with the mitered edge of the base.*

that the waney edge disappears. Then clamp the plank to the table and rip.

Mitering—What if you need to rip a wide mitered edge to make a large box? All you need is another cutting guide. Make one with an oversized base, just as you did with the others, and then trim it with the sawblade set to 45°.

When you are ready to cut the miters on the workpiece, mark the cut on the edge of the piece with a 45° marking square and line up the beveled Masonite with the marks.

Waney edge, go away. *You can use the long guide to put a straight edge on a waney board. Block up the guide so that the workpiece just fits under it. Then nudge the waney edge of the workpiece under the guide's base. Clamp both guide and workpiece, and rip off the edge.*

Ripping skinny pieces—Narrow pieces are typically best cut on a tablesaw. But on site or on an installation, there may be times when you want to cut a piece narrower than the cutting guide. In these cases it's difficult to clamp the two together without the clamps interfering with the saw. The solution is to clamp the workpiece to the table, with the clamps in the waste, and hold the guide down with different clamps. As with the straight-lining, elevate the guide using scraps the same thickness as the workpiece, positioning them under the clamps. Slide the workpiece under the guide, line up the cut marks with the Masonite edge, and clamp the workpiece to the table. Then rip as usual. If you need to rip a number of skinny pieces to the same width, position the spacer blocks to serve also as stops, determining the width of the cut.

A cutting table and guides should make your life a little easier around the shop, especially if it's a small one. You may even find them helpful next time you go out in the cold to build a deck. □

Gary Williams is a technical writer and woodworker in San Diego.

Full-Extension Wooden Slides

Shopmade hardware designed to fit any drawer, large or small

BY CHRISTIAN BECKSVOORT

I admire the resourcefulness of shopmade hardware. If it's entirely made of wood, all the better. I discovered full-extension wooden slides on an antique chest of drawers I restored. They are beautiful in their simplicity and can be made almost any size.

Full-extension slides are necessary whenever access is required all the way to the back of a drawer (file drawers and card catalogs, for example). The drawer must be held in a fully open position and should be easy to remove. This system of wooden slides meets both criteria.

There are a few rules to follow when making these slides. First of all, the drawers must be 15/16 in. narrower than the opening. The drawer must have an applied front, obviously, to cover the gap. The carcase must be built with solid vertical dividers or sides, which provide an attachment point for the slides, and horizontal dividers, which may be solid or open web frames.

The slides may be as tall as the drawer sides. For light-duty cases, you may wish to make the slides narrower, about two-thirds the drawer height. For very deep drawers, such as files, there's no need to make the slides any wider than 6 in. At that dimension, they will provide plenty of strength. For inset drawers, the slides must be 1/4 in. shorter than the total length of the drawer sides (do not include the applied front when measuring the drawer length).

To make a pair of slides the same height as the drawer, mill two pieces of 7/16-in.-thick hardwood 3/8 in. wider than the actual drawer sides and the correct length. Measure about a third of the way across one piece, set the rip fence for that dimension and rip all of the stock in two. The exact width doesn't matter as long as everything is cut at the same setting. Put the narrow pieces aside and work on the wider halves, which will become the lower slides.

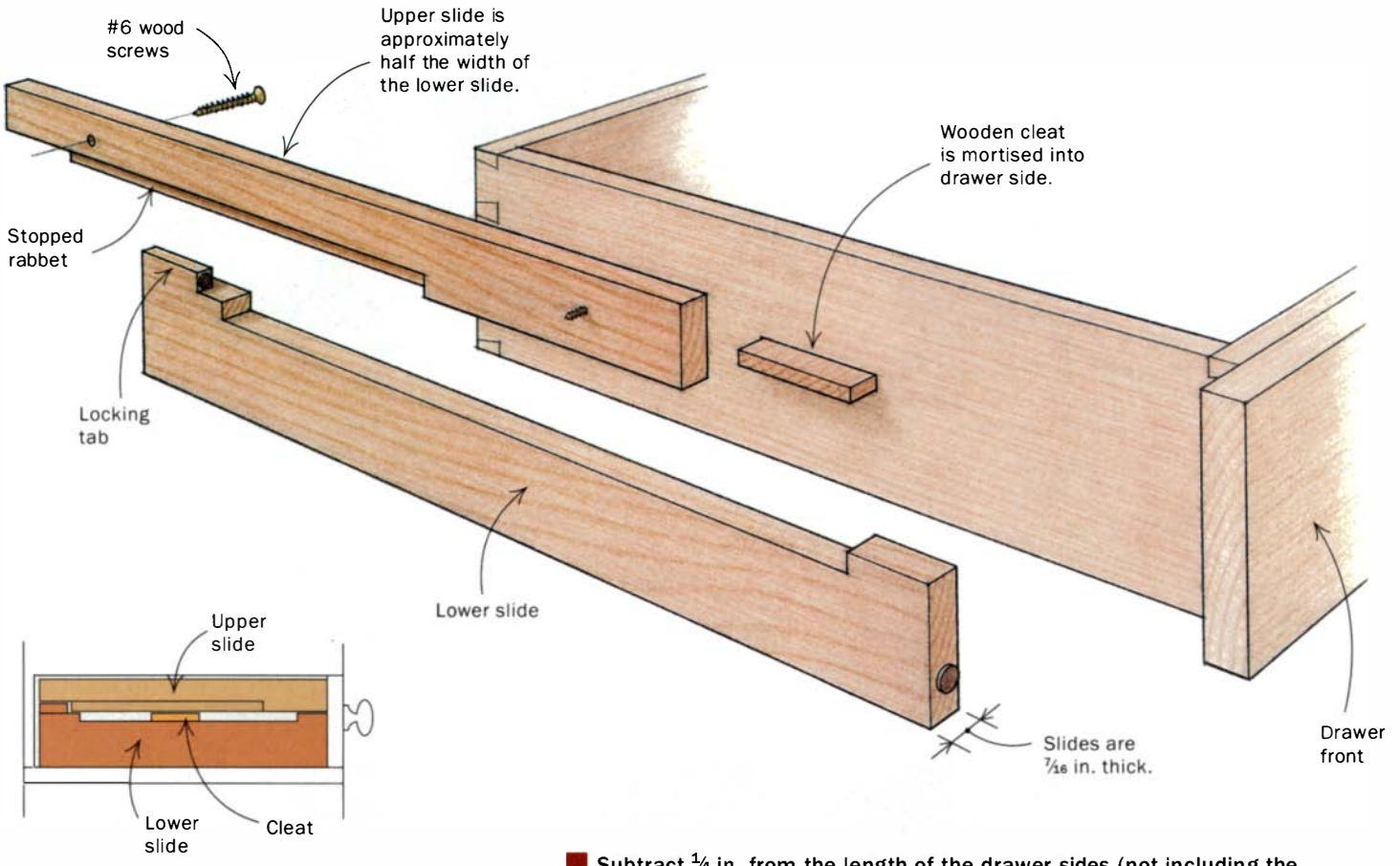
(If you're wondering how the slide parts end up becoming the same height as the drawer, here's what happens: The saw kerf will reduce the width of the stock by 1/8 in.; and once the parts are machined for the mechanical connection, the slides interlock, reducing the width by another 1/4 in., for a total reduction of 3/8 in.)

Begin with the lower slides

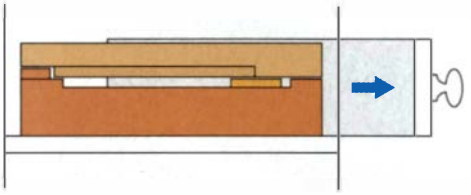
Start by cutting a rabbet 3/16 in. wide by 5/16 in. deep along the entire length of each lower piece (for more on making the lower slides, see the photos on p. 76). Next, set your tablesaw blade for a 9/16-in.-deep cut. Set a slide or slides (same-side slides may be ganged to-

Photos, except where noted: Vincent Laurence; this page: Michael Pekovich

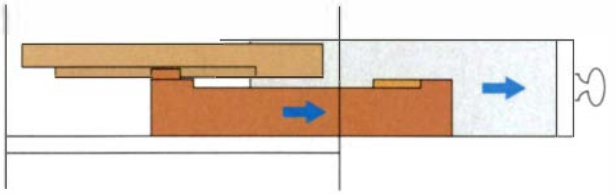
HOW THE SLIDES WORK



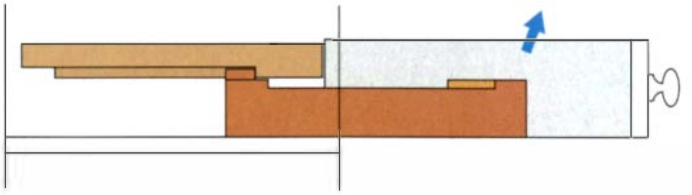
Subtract ¼ in. from the length of the drawer sides (not including the applied front) to arrive at the correct slide length. The heights of the slides may be equal to or less than the drawer height. The drawer cleat position is determined once the slides have been installed in the carcase.



1. As the drawer slides out, its cleats engage the lower slides.



2. The drawer and lower slides continue moving until the tabs on the lower slides reach the ends of the stopped rabbets in the fixed upper slides.



3. The drawer can be lifted off the slides when fully extended.

gether) against a miter gauge or sled and make two crosscuts, one 15/16 in. from one end and another 1¼ in. from the opposite end. Remember that the left and right slides are mirror images of one another. In other words, while making the crosscuts, the rabbet will be facing the blade for one slide and facing the miter gauge for the opposing slide.

Set up a couple of stops along your saw's rip fence and carefully cut away the rabbet between the notch. Clean up the corner of the rabbet using a handsaw and chisel. Go back to the tablesaw and make another crosscut on the stepped portion of each slide, ⅞ in. from the back and as deep as the rabbet, then remove the waste on the bandsaw to create a locking tab at the rear of the slide. This step engages with the rabbet on the upper slide and keeps the drawer from tipping out. Finally, go back to the tablesaw and rip off the portion of the step on the front of each slide that protrudes above the rabbet.

Machine the upper fixed slides

As with the lower slides, the uppers should be mirror images of one another (for more on making the upper slides, see the top

Drawings: Michael Pekovich (left); Vince Babak (top)

MAKING THE LOWER SLIDES

1 CUT RABBET

Begin work on the lower half of the slides. *Machine a full-length rabbet 3⁄16 in. wide by 5⁄16 in. deep.*

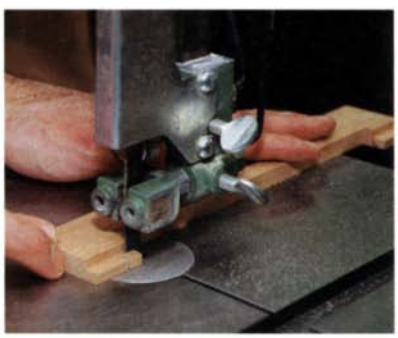
2 CUT NOTCHES FOR DRAWER CLEAT

Set the tablesaw blade for a 5⁄16-in.-deep cut. *Make crosscuts 15⁄16 in. from the front and 1¼ in. from the rear of the lower slides. Left and right slides are mirror images of one another.*

Using stop blocks, make a rip cut along the rabbet to remove the center portion. *Be sure to stop short of the notches. Finish the rip using a handsaw.*

3 DEFINE THE LOCKING TAB

Make another notch. *Set the notch ⅞ in. from the rear of the slide and as deep as the rabbet.*



Remove the waste behind the notch. *The locking tab engages with the upper slide and keeps the drawer from tipping.*

4 TRIM THE UPPER STEP

Remove the upper step at the front of the slide. *The step is removed right down to the base of the rabbet.*

photos on the facing page). First joint the edges to remove the saw marks. Then lay out and cut a stopped rabbet—¼ in. wide and 5⁄16 in. deep—in each slide equal to two-thirds its length, measured from the back. The rabbet must be located on the carcase side of each slide. One way to ensure this happens is to mill opposite slides on opposite sides of the tablesaw's rip fence using a stop block. Square up the rabbets using a handsaw and chisel.

At the back end of each slide, make a notch by cutting off 1 in. from the thin wall of the rabbet. The notch allows the other half of the slide to be inserted or removed. Drill and countersink two or three screw holes on each slide, going in from the sides that will face the drawer.

Fit together the two left pieces and the two right pieces, flat on the benchtop. Use a 1⁄16-in. spacer to separate each pair, and compare them to the height of the drawer sides. If necessary, trim the bottoms of the movable slides so that the total height (with spacers) is equal to or less than the height of the drawer sides.

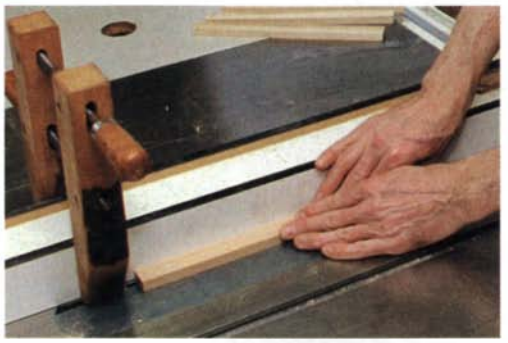
Install the slides and check the action

Make sure the slides are lightly sanded and that all sharp edges are broken. I like to add leather bumpers to the slides. Cork or rubber discs would work just as well. The bumpers are applied to all of the parts that bump into one another.

Place an upper and lower slide inside the drawer housing. The movable slide rests on the bottom of a divider. Place the fixed slide atop it, being sure to use a 1⁄16-in.-thick temporary spacer between them. Now maneuver the lower slide (the one with the bumpers) so that the distance from the front bumper to the edge of the carcase equals the thickness of the drawer front. Clamp both slides in place, keeping the upper slide in line with the lower (wood to

MAKING THE UPPER SLIDES

1 *CUT THE STOPPED RABBET*



Stopped rabbet engages locking tab of lower slide. *The rabbet, ¼ in. wide by 5/16 in. deep, runs two-thirds the length of each upper slide.*

Square the corners of the stopped rabbet. *Remove the waste using a chisel.*

2 *CUT THE CLEARANCE NOTCH*

Cut a notch at the rear of the upper slide. *The notch is 1 in. from the back and as deep as the rabbet.*

wood, not wood to bumper). Screw the upper slide to the case and remove the spacers. Do the same for all of the slides.

The action of the slides should be smooth, with only 1/16 in. of vertical play. When pushed all the way in, the lower slides may be tilted out via the small notch at the rear of the upper slide.

Drawer cleats are added last

Once the slides have been completed, locate and install the cleats (see the photos below right). Pull out a pair of slides as far as they will go. Fit the drawer between them so that the inside of the drawer back is flush with the outside of the case. This is the fully extended position. Clamp the drawer so that the bottoms of the slides and the bottom of the drawer are flush. With a sharp pencil, mark the top of the slide (horizontal) and the step (vertical) on both sides of the drawer.

The antique cabinet that I used for a model had brass cleats set into the drawer sides. Aesthetically, I don't like the look of the metal in the middle of the drawer sides nor the green metallic streak it leaves on the slides. Instead, I use hardwood cleats, the same species as the drawer sides and slides.

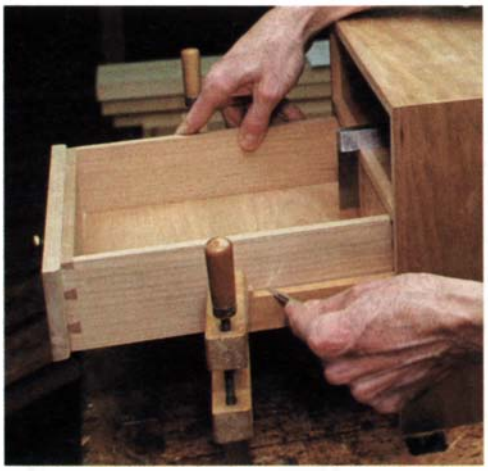
Make each cleat ¼ in. thick by 1½ in. wide. For drawers ½ in. thick or less, I make the cleats about 9/16 in. long and cut mortises 3/16 in. deep into the drawer sides, which leaves 3/8 in. of cleat exposed. For thicker drawers, the cleats may be longer; be sure to cut deeper drawer mortises, too. Glue the cleats in place.

When the glue has set, position the drawer back in its opening, lower it onto the slides and shut it. Now pull it out. It should ride smoothly and stop in the fully extended position. (Use a little paste wax if parts stick.) The drawer back will remain in the opening, while the cleats resting on the slides support the weight. If fine-tuning is needed, a little bit of material may be removed (or added) to the front steps of the lower guides.

I think these wooden slides are a pleasing alternative to using metal hardware on fine pieces, whether they're antique or contemporary, small or large. □

Christian Becksvoort is a contributing editor.

LOCATING THE DRAWER CLEATS



After installing the slides in the case, mark the cleat locations on the drawer. *Clamp the drawer at full extension and trace along the step and lower slide.*

Cut mortises into the drawer sides. *Once the cleats have been glued in place, the drawer is ready to be used.*

The Lutyens Garden Bench

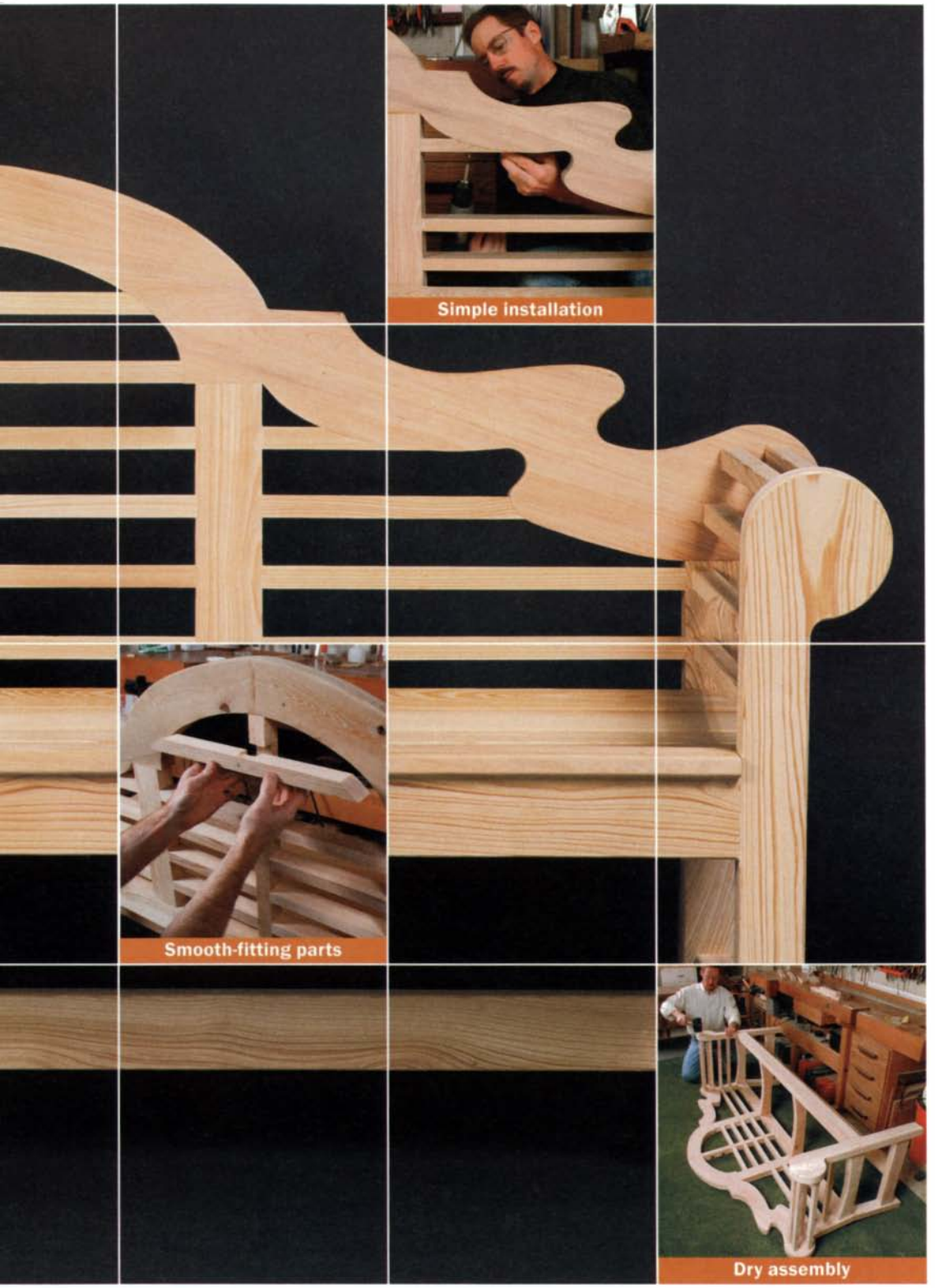
Turning our little yard into a landscaped garden retreat has been one of those back-burner projects my wife and I have managed to avoid since buying our house six years ago. It's been easy to do because neither of us is a gardener. As a woodworker, I'm always able to find constructive projects somewhere inside the house that are better suited to my skills than moving earth and planting flowers. Plus, I've decided that a proper garden should evolve slowly over the years—four years ago we planted a Japanese maple under the fringe of the huge Sycamore that dominates the yard, and last summer I laid down a brick patio outside the back porch. Good things shouldn't be rushed, I tell myself.

Now that I work primarily from home, the prospect of taking daily work breaks in a more pleasant backyard nook has me thinking more about the gardening part of our imaginary garden. But over the winter months all I could do was plan, dream and defer. Then I saw a picture of the Lutyens garden bench in a catalog. The bench had the kind of distinctive elegance that I wanted my garden to have, but with a price tag nearing $2,000 in the catalog, I decided to make one myself.

The original bench was designed 100 years ago by Edwin Lutyens (1869-1944), a British architect and designer. The bench's curvaceous crest rail and lollipop-like front legs form a whimsical frame around the classically regimented slats of the back and rolled armrests. An

Full-sized drawings and accurate templates help break a classic design into manageable parts

BY TONY O'MALLEY



eye-catching and comfortable three-seater, it's no wonder the Lutyens bench is still copied by dozens of outdoor furniture manufacturers.

Some reproductions I've seen have no bottom stretcher at the front or back, and others have both. As I sketched and worked through drawings, I began to notice that a bottom stretcher even with the front legs would restrict a sitter's feet from going where they naturally want to go—under the seat a few inches. As a compromise, I positioned a stretcher under the middle of the seat, tenoned into the bottom side stretchers.

I worked out the details of the entire bench using full-sized drawings. I drew the bench, at various views, directly onto ¼-in. plywood. Because of the myriad joints, angles and curves in this design, full-sized drawings were crucial to making the project run smoothly. The drawings helped me not only to refine the design of the bench before committing any cuts to lumber but also to figure out the construction and necessary order of assembly.

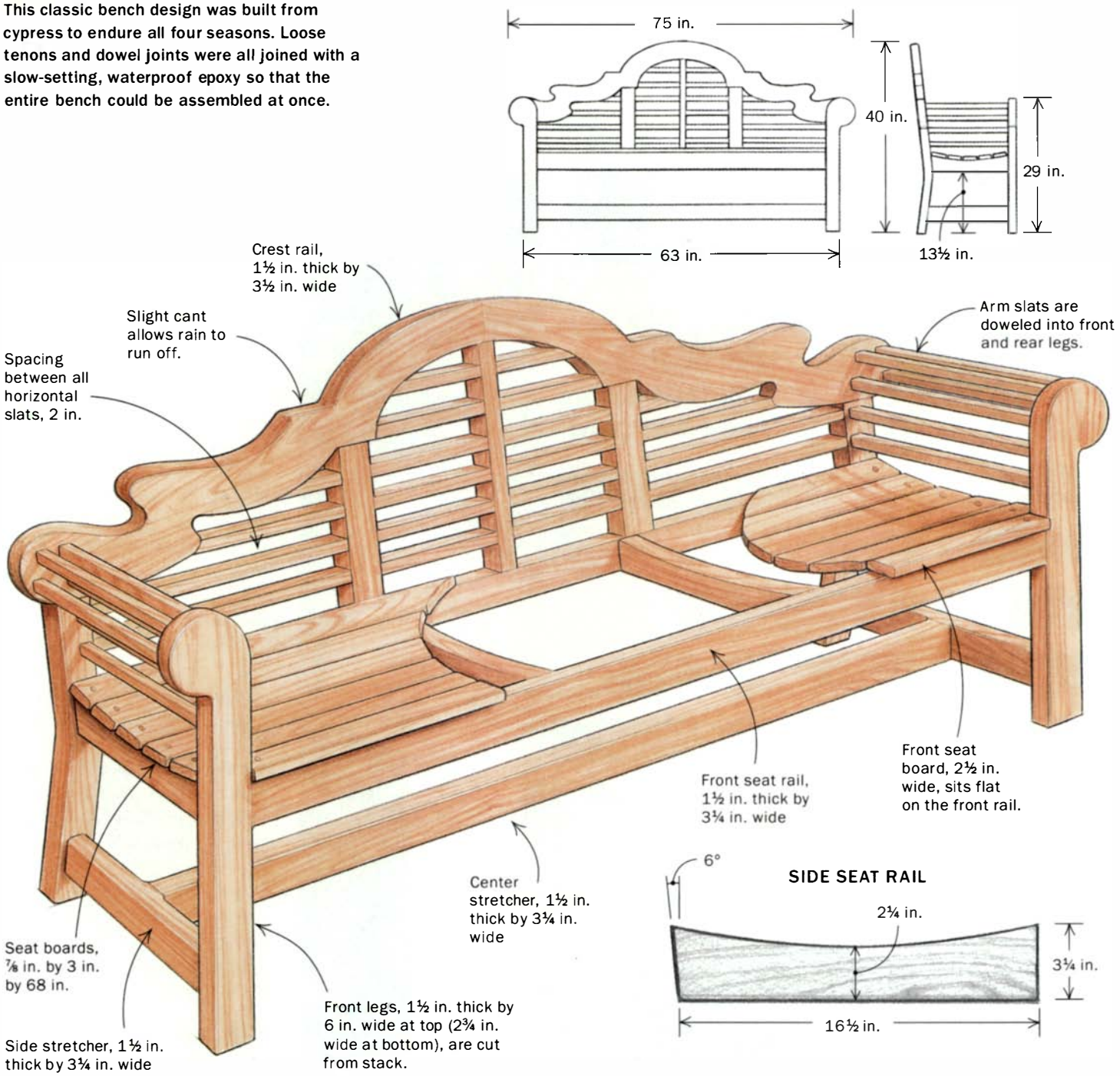
Choose an appropriate wood for outdoor use

Reproductions of the Lutyens garden bench are typically made of teak, but I ruled that out immediately due to the cost. My bench would sit outside permanently because I didn't have a place to store it indoors over the winter, so weather resistance was a main requirement. Spanish cedar is a good mahogany-colored wood that weathers better than real ma-

Photos, except where noted: Matthew Teague; main photo, this spread: Scott Phillips

AN OUTDOOR FAVORITE

This classic bench design was built from cypress to endure all four seasons. Loose tenons and dowel joints were all joined with a slow-setting, waterproof epoxy so that the entire bench could be assembled at once.



hogany, but I couldn't find any locally. I looked at several imported hardwoods being marketed for deck building—ipe from South America and jarrah from Australia among them—but these woods are very heavy, quite abrasive to tools and generally hard to work. High weight also helped me rule out locally grown woods like white oak and locust.

I settled on cypress for its light weight, good moisture resistance and moderate hardness. It was also available from a local supplier at a good price and in thicknesses that would work—I used 8/4 material for the bench frame and 4/4 material for the seat boards, arm slats and back slats. If you want to avoid planing rough lumber, cypress is available as dimensional lumber from many suppliers of deck-building materials.

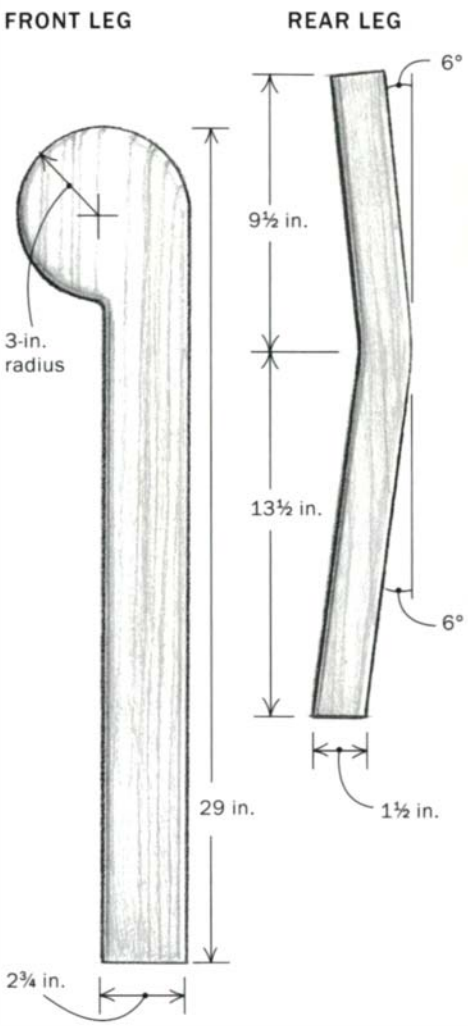
Start with the seat frame

There's no better motivator when making furniture than actual progress, so I like to start with the easier parts of a project and work my way up to the more difficult ones. In this case the back of the bench was by far the hardest part to make, so I decided to build the rest of the bench first.

For each back leg, I face-glued two pieces of 8/4 stock. I

Drawings: Bob La Pointe

FULL-SIZED DRAWINGS AID LAYOUT



Full-sized drawings lead to accurate templates. *The drawings make it easy to check measurements and make a template for the legs. Simply mark out the profile on the blank (left), then bandsaw the leg to shape (right).*

Mark legs at intersection points. *With the front leg cut to shape, use a side-view drawing to mark out the position of the rail and stretcher (left). All frame mortises are centered on the stock and are ½ in. thick (right).*

planed down the stock to 1¾ in. thick (the actual thickness is not crucial; just keep it as thick as possible). I ripped the stock slightly oversized to 3 in., then glued the slabs together. The seam is visible only from the side, not from the front or back. Structurally, either approach would be sound, but my approach made the front view a little cleaner. I planed the rest of the 8/4 stock down to its final 1½-in. thickness.

I transferred the profile of the back legs from my full-sized side-view drawing and cut them out on the bandsaw (see the photos above). I sanded the bandsawn surfaces on my 6-in. edge sander, but a block plane and some hand-scraping would work just as well.

Both front legs can be cut from a single piece of stock, 6 in. or wider, with the straight part of the legs overlapping. I rough-cut the legs first, then ripped the inside edge of each one on the tablesaw, stopping short of the top circle. Then I bandsawed the final shape of the circle and the transition into the straight inside edge.

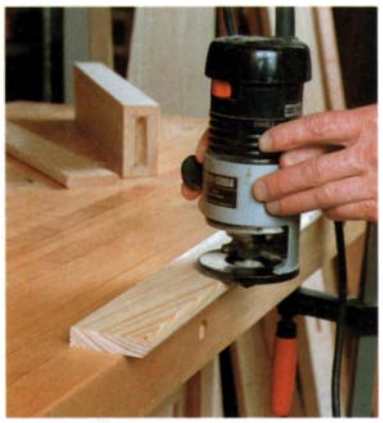
With all of the seat-frame parts cut to size, it was time to cut the mortises. Years ago, when I first learned woodworking, there was a horizontal mortiser in the shop where I worked. With one setup, this machine cuts mortises in both parts that form a joint; a separate piece of wood is used for the tenon (called a loose tenon). In most cases it's a lot easier than cutting a tenon and routing a mortise, and the resulting joint is just as strong. Since then, the idea of cutting mortises with a plunge router has never caught on for me, and I now use the mortiser on my Robland combination machine (see the photo below) for al-

DO COMBINATION MACHINES MAKE SENSE?

The deal I got on my used Robland X31 combination machine seven years ago was too good to pass up. The Robland combines five tools: tablesaw with sliding table, jointer, planer, spindle shaper and horizontal mortiser. Moving from one task to another can be time-consuming, but the tool is heavy duty and high quality. For my small shop and tight budget, the machine definitely has been worth the money.

most all joinery work, including doweling.

I centered the mortises in the 1½-in.-thick rails and stretchers and in the faces of the legs. After shaping the tenon stock and cutting the separate tenons to length, I glued them into the ends of all the rails and stretchers with epoxy. One caution, however: Before gluing the tenons into the seat rails, dry-assemble the legs and side rails. If the complementary angles formed by the back-leg cant and the rails are off, the joints won't close perfectly. To solve the problem, simply scribe a new cut line and recut the back ends of the side rails and side stretchers for a perfect fit. (Be sure to recut the two intermediate seat rails at the same time.)



One tenon fits all. *The author mills tenon stock to thickness, rips it to width, then rounds over the corners. By trimming them to short lengths, he can make many tenons from one piece of stock.*

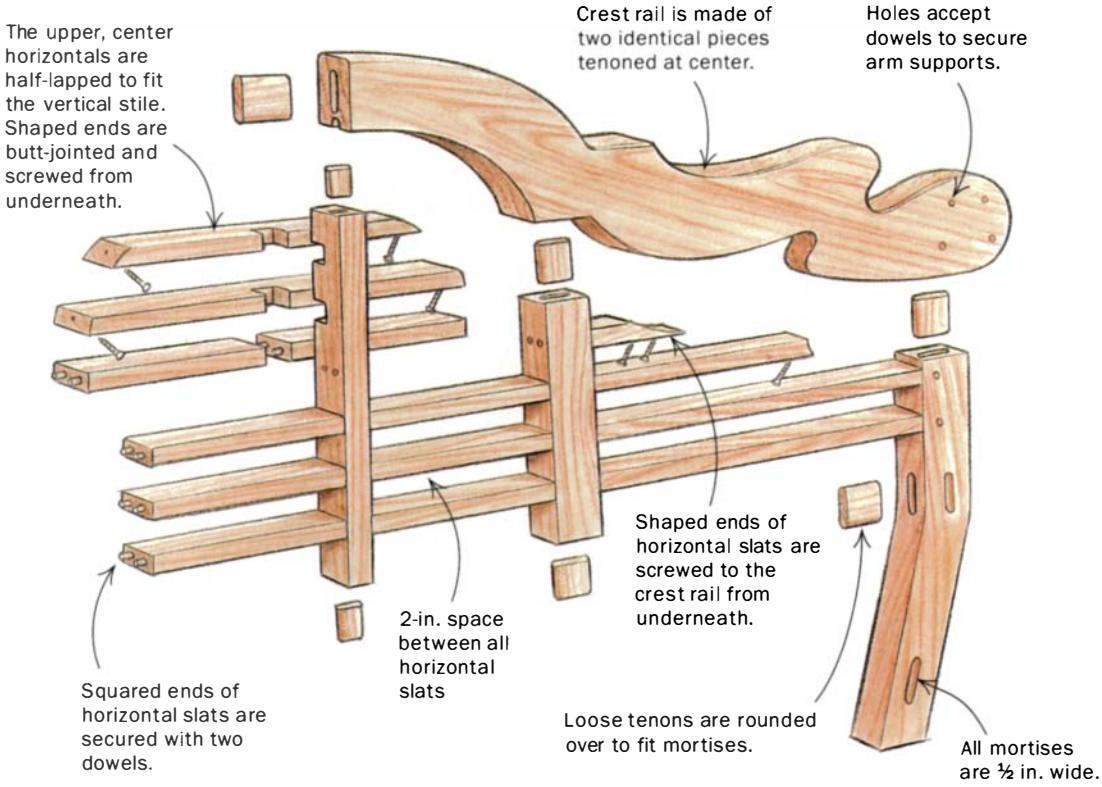
Also, because the tenons on the front, rear and side seat rails intersect, I mitered them so that each is as long as possible. I cut the curve in the seat rails on the bandsaw and—at long last, it seemed—dry-assembled the bench frame, less its back.

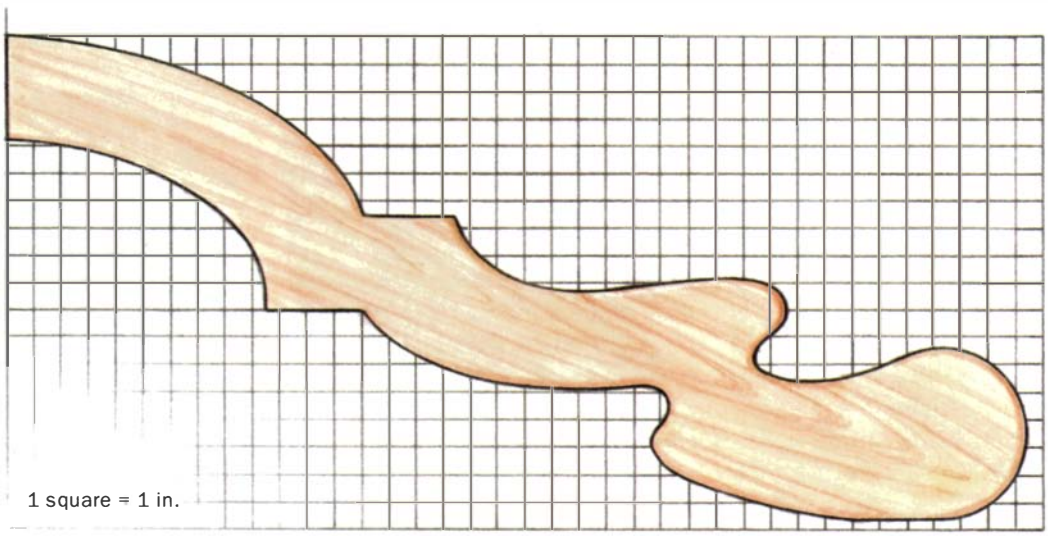
The back is the most difficult section to make

Good design often leads to construction and assembly conundrums, and it's certainly true with the back of this bench. The visual centerpiece around which the bench is designed, the back is deceptively well integrated into the rest of the bench's structure (see the drawings above). But the required assembly sequence was not immediately obvious to me. Looking at the sturdy bench frame dry-assembled, I wanted to glue something up. But each assembly sequence I considered led to a dead end involving the back of the bench.

After scratching my head for a long while, it became clear that the entire bench, starting with the back, would have to be glued up in one continuous assembly. It also would have been possible to glue up the back first and then the rest of the bench frame, but I opted for a single glue-up. I chose an epoxy from West Systems and used a hardener with a slightly longer open time than the company's standard hardener (see the box on the facing page).

First I made a full-sized drawing of the entire back. Then I made a template for shaping the crest rail, which is made of two pieces connected at the center-





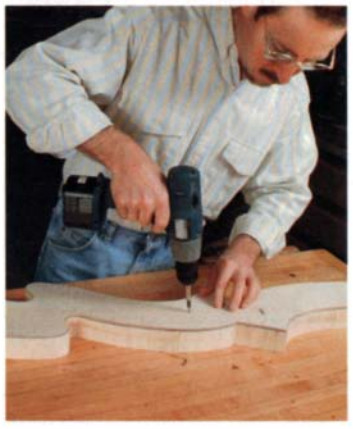
line with a mortise-and-tenon joint. I drew a half pattern of the crest rail on paper and refined the wavy curves with a lot of trial and error, using catalog photographs as a visual guide. After transferring the pattern to a piece of ¼-in. plywood, I bandsawed the shape, then blended the curves using a belt sander, spindle sander and rasps. I traced the shape onto the rail halves, then cut them out on the bandsaw, staying slightly outside the line. Then I screwed the template to the back faces of the rail halves and trimmed them flush. The first pass with a pattern-routing bit trimmed about two-thirds the thickness of the edge; a flush-trimming bit, with the bearing riding on the edge already shaped, cleaned up the rest (see the photos at right).

Incidentally, each half of the crest rail requires 8-in.-wide stock or wider. I didn't have any 8/4 material this wide, and I didn't want seams in the face of the rail, so I face-glued two wide pieces of 4/4 stock.

I was less than thrilled with my decision for two reasons. First, the front and back boards were not well matched, so the grain is noticeably different when looking at the top edge of the crest rail. And because one of the boards was a lot heavier than the other, the laminated stock bowed slightly after I had planed it to final thickness. The lesson: select boards of similar grain and weight if you have to face-glue.

Next, I cut the mortises in the crest rail and bottom rail of the back, in the two vertical stiles in the back and in the top of the back legs. Because their odd shape precluded clamping to the mortising table in the normal fashion, I could not completely cut the mortises for the two intermediate stiles into the crest rail using my horizontal mortising machine. Nevertheless, I clamped the rail halves at an angle and mortised in as far as possible, then deepened and finished these two mortises with a drill and chisels. I cut the center vertical stile to fit between the crest rail and bottom rail, rounding its top end to match the curve of the arch. Then I cut small mortises to join this center stile to both rails. I could finally dry-assemble the main structural frame of the back, then cut all the slats to fit.

My plan was to fit all of the slats with a pair of dowels in each end and drill the corresponding holes in all of the verticals. At this time I wondered about the assembly sequence of the back, with all of those slats. The main structural parts (bottom rail, crest rail, three stiles and back legs) come together in one direction, while all of the slats are joined in the perpendicular direction. The problem is with the slats that join to the crest rail—if they were doweled, there would be no way to



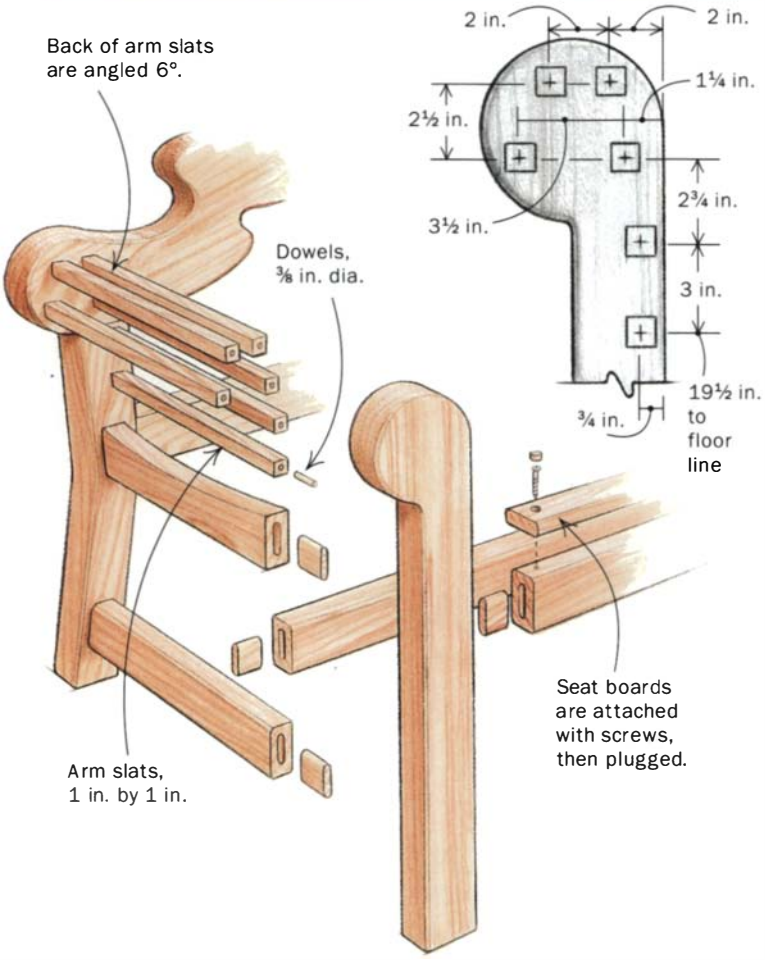
SHAPING THE CREST RAIL

Many chances for refining the crest rail. *Begin with a pattern shaped on paper, then adjust it as you mark it out on plywood template stock. Cut out the shape on the bandsaw and refine the template further with rasps and various sanding machines. With the template screwed to the face of the crest rail, use a pattern-routing bit in a router to clean up the shape. A flush-trimming bit finishes the job.*

CHOOSE GLUE SET TIME TO MATCH YOUR WORK

This is an outdoor bench, so I turned to epoxy (West Systems Epoxy; 517-684-7286) because it is waterproof. But I learned that adding a slow-set hardener would give me 50 minutes open time—more than the usual 9 to 12 minutes. For simple applications, such as gluing loose tenons into place, I used the regular formula. But the hardener gave me enough time to do the final assembly all at once.

ROLLED ARMS



bring the crest rail down onto the stiles and also engage the dowels in the back slats at the same time.

I'm sure there are other solutions, but I decided that all of the slats attaching to the crest rail would be butt-joined and reinforced with countersunk screws from underneath. Additionally, the slats under the center arch would have to be added after the main assembly by half-lapping them over the center stile. Between epoxy's good gap-filling ability and carefully predrilled holes for the screws, these butt joints should hold up just fine.

I cut all of the slats to fit within the assembled back frame. To get the curved ends of the upper slats, I held them in position and marked right off the crest rail where they intersect. I bandsawed and sanded the ends to fit snugly. After cutting the half laps in the center stile and the two top slats, I used the same process to fit these last two slats. I drilled the dowel holes for all of the slats on my horizontal mortiser.

Build the rolled arms and attach the seat

Once the components of the back had been cut and the joinery fitted, I reassembled the entire bench dry (see the right photo below), then cut the arm slats to fit. First I laid out the position of each slat on the front and back legs, then cut the slats square at the front and with a 6° angle at the back to correspond to the angle of the back (see the drawings at left). I drilled and doweled the ends of the arm slats on my mortiser, then drilled the corresponding holes in the back legs and crest rail with a hand drill using a bevel gauge as a guide (see the left photo below).

After all that, the most essential part of the bench—the seat—still remained undone. The back edge of the rear-most seat board is angled at 18° so that it can snug up against the back legs and stiles. The front

HAND-DRILLED MORTISES

Rolled arms are attached with dowels. *With the back dry-fitted tightly into place, you still have to drill dowel holes for the slats that make up the rolled arms. To make sure the angle is correct, use a bevel gauge canted to 6° to guide a handheld drill.*

ATTACHING THE SHAPED SLATS

Finishing the back. *After the main components of the bench have been glued up, the smaller slats can be set into place.*

A smooth fit. *Using a dado set on the tablesaw, the two top slats are notched to fit over the center stile.*

Scribing the back slats. *The upper slats on the back are scribed for a tight fit. A bandsaw is used to cut them to shape, but final shaping is done with rasps and sanding machines. The shaped ends of the slats are screwed into place from underneath.*

The last touch. *Working from the back toward the front, the author uses spacers and screws down the seat. Once in place, bungs are epoxied into place over the countersunk screws.*

seat board is narrower and sits flat on the square edge of the front seat rail. The four middle seat boards are identical. To promote rain runoff from the seat and reduce the likelihood of splinters, I rounded over the top edges of the seat boards with a ⅜-in. roundover bit.

Using exposed screws in the top of the seat boards would detract from the refined look of this bench and give water a place to pool. And screwing up through the curved rails would require different-sized screws or counterboring a different depth for each board. So I attached the seat boards to the frame from above with galvanized deck screws. The holes were counterbored, and I glued plugs in them for a clean look.

Before the final glue-up, I sanded all of the bench parts, keeping the joined areas good and flat. I went over all four edges of the arms slats with an ⅛-in. roundover bit. I used a ¼-in. roundover bit to soften the exposed parts of the curved crest rail and the front legs, being careful to stop at the joint seams. After sanding, I assembled the bench with epoxy and a lot of clamps.

Well, my garden retreat is still composed of a brick patio, a Japanese maple and a few potted plants. Only now it's also graced by a quite comfortable and distinctive bench. But I'm afraid it will take some inspired landscaping and probably more than a few years to develop a garden that's worthy of the bench. □

Tony O'Malley is an editor, writer and woodworker in Emmaus, Pa.

Shopmade Dovetail Templates

Half-blind joints may be variably spaced or fixed and any size you like

BY JAMIE BUXTON

The variable-spaced, half-blind dovetail joint is complete. *Templates can be custom-made for any project of any width.*

Hand-cut dovetails are versatile and suitable for projects of any size. The problem, however, is that they're time-consuming to make and require a fair amount of skill. Router jigs solve some of the problems, but the most adaptable jigs cost a lot of money. It turns out that there's another solution: custom-sized shopmade router templates.

I worked on the problem in my spare time, and after a few weeks of number crunching, I was ready to put my theory to the test. In a few hours I succeeded in making my first dovetailed drawer using a pair of shopmade templates.

My method is limited to making variably spaced, half-blind dovetails. Both halves of the joint are cut using a bearing-guided dovetail bit. Then I ease the corners of the square-cornered tails with a chisel so that they fit the round-cornered sockets. With this method I can cut joints faster than I

Photos: Anatole Burkin

could by hand, yet it allows me to custom-make templates for individual projects.

Half-blind dovetails are most commonly used to join drawer sides and fronts, but you can also use them to join solid casework. My templates take only an hour or so to build, and I make a new set for each project so that the dovetail pattern is perfectly suited to the width and scale of the piece.

Accurate by construction

My system uses two templates—one for cutting tails and another for cutting pins. Because the initial and critical machining for the templates is done with them sandwiched together, they are mirror images of each other, which makes the joint accurate.

As with all machine-cut dovetail joints, tails cannot be any narrower than the dovetail bit itself. But the maximum width of the tails and the maximum spacing between them are infinitely variable, features that make this technique so versatile.

These jigs have their idiosyncrasies. For example, the height of the tails depends on the thickness of the sawblade used to make the first cuts in the template (see the chart on p. 89).

To join ¾-in.-thick stock and end up with ½-in.-high tails, which look about right, I use a 1⅛-in.-dia., 8° dovetail bit fitted with a ¾-in.-dia. bearing. Next, lay out the tails on the stock, keeping in mind the diameter of the dovetail bit at its widest point. Then transfer those marks to the tails template. Clamp both templates together so that they are flush on all sides.

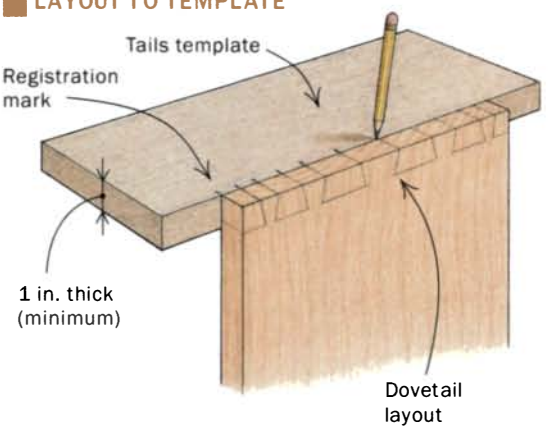
Before making a first template, make some test cuts in scrap using whatever sawblades are available. Measure the kerf with a dial caliper, then refer to the chart. You may find that the measurements (kerf widths) don't exactly match my chart. Don't worry. Find the closest match and make a template that suits your needs. It can be fine-tuned later. I use a blade that's a hair thicker than ⅛ in., but it produces a kerf of 0.135 in. due to runout.

Template stock should be about 6 in. wide so that it can support a router and slightly longer than the workpiece to allow for clamps. I use plywood or medium-density fiberboard (MDF) for the templates and laminate the material to get stock that is at least 1 in. thick. Both templates must be the same thickness.

Clamp the tails and pins templates together and lay out the dovetails. The space

MAKING THE TEMPLATES

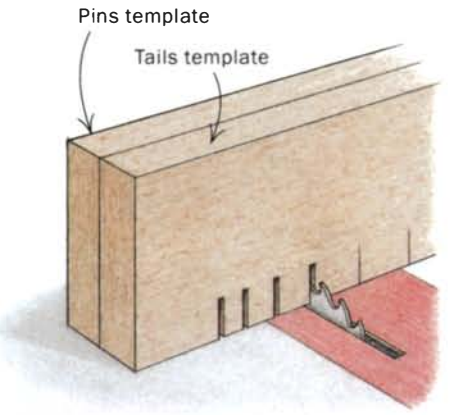
1 TRANSFER DOVETAIL LAYOUT TO TEMPLATE



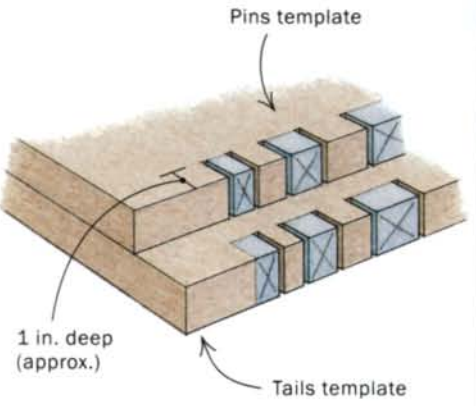
Choose an appropriately sized bearing-guided dovetail bit. *The diameter of the bit determines how close the tails may be spaced.*

Make the first cuts in the dovetail templates using a tablesaw blade. *Clamp the pins and tails templates together and cut notches that define the templates' fingers.*

2 SANDWICH TEMPLATES TOGETHER AND CUT NOTCHES ALONG LAYOUT MARKS



3 DADO TEMPLATES SEPARATELY



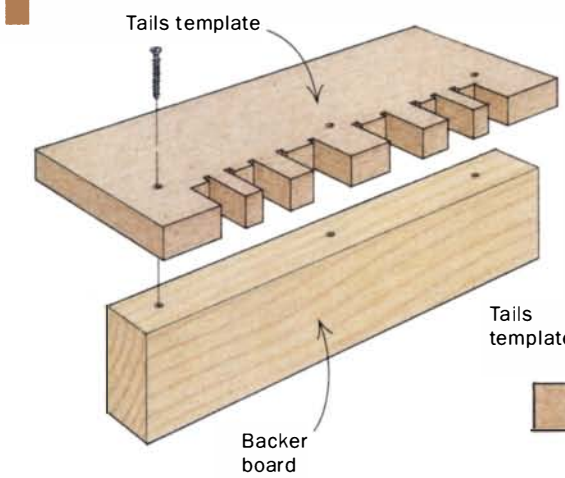
Note: The template fingers are made deeper than necessary. The extra depth allows you to adjust the offsets, if necessary, to get snug-fitting dovetail joints.

Remove the remaining waste with a dado blade. *Be sure the space between fingers is wide enough to allow the dovetail bit and bearing to fit inside.*

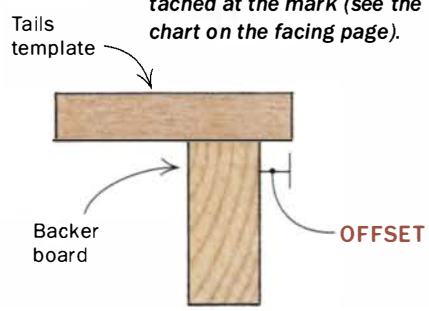
Drawings: Vince Babak

ROUTING THE TAILS

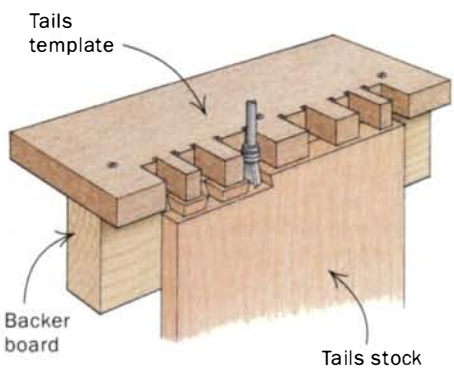
1 ATTACH BACKER BOARD



Mark the offset on the tails template. *A backer board is attached at the mark (see the chart on the facing page).*

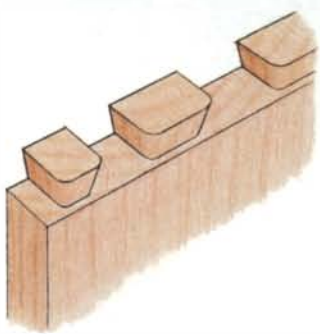


2 CLAMP WORKPIECE TO THE JIG AND ROUT TAILS



The tails are routed with the stock clamped vertically. *The backer board positions the stock and prevents tearout.*

ROUND THE TAILS WITH A CHISEL



Chop off the corners of the tails using a chisel. *The corners must be removed for the tails to fit inside the rounded sockets produced by the pins template.*

between the fingers on the tails template must, obviously, be larger than the diameter of the bit's pilot bearing. Next, using the tablesaw, cut out notches along the layout lines. Make these notches deeper than the depth of the tails by about ½ in. (The exact amount isn't important; you'll see why soon.) Separate the halves and mark out the waste sections, which will be opposite for each half. Finally, remove the waste with a dado blade set for a slightly shallower cut than the notches. The exact depth of cut isn't important as long as it's greater than the height of the tails (refer to the chart). For the 11⁄16-in.-dia. dovetail bit, I cut a dado that's about 1 in. deep.

Mark out the offsets on both the pins and tails templates. The offsets are used to register stock. Because the dadoes on the templates are cut deep, the offsets can be repositioned, if necessary, to tweak the fit of the joint. One could make the templates without offsets for an exact fit, but it's not worth the extra effort.

I mark the offsets using a finely sharpened mechanical pencil. For the pins template, measure the offset from the bottom of the dado out toward the edge of the template. For the tails template, do the opposite: Measure the offset from the outside edge of the template in toward the base of the dado. Offsets will vary, depending on the thickness of the stock and the kerf width (see the chart).

Finally, screw a backer board onto the tails template. I use a piece of 2x4 that has been jointed square. The block does two things: It registers the stock to the offset and prevents tearout as the bit exits the tails stock. The pins template requires no additional preparation.

Using the templates

Chuck the bit in the router and set the depth. Refer to the chart and be sure to add the thickness of the template to the depth setting. Some routers with limited travel may not work with my templates. I use a 3¼-hp plunge router that has lots of travel. Use the same depth setting for cutting both pins and tails.

Now for the fine-tuning. If your saw's kerf is a few thousandths of an inch wider than indicated in the chart, set the router bit slightly deeper. Conversely, if your saw leaves a kerf thinner than indicated in the chart, set the bit shallower by a few thousandths of an inch. Make trial cuts in scrap

and check the fit. If the joint is loose, adjust the router for a deeper cut.

To make the cuts, secure the tails stock—with the inside face out—to the tails template using a pair of clamps. Place the stock in a vise to hold it upright. Take a light pass along the edge of the board to establish the shoulder cut. Then rout out the remaining waste, taking care that the router-bit bearing rides firmly along the fingers of the template. It doesn't hurt to take a second pass to ensure a clean cut. If you are using a ¼-in.-dia. shank bit, remove most of the waste using a straight bit first to avoid stressing the dovetail bit. I prefer to use ½-in.-dia. shank bits whenever possible.

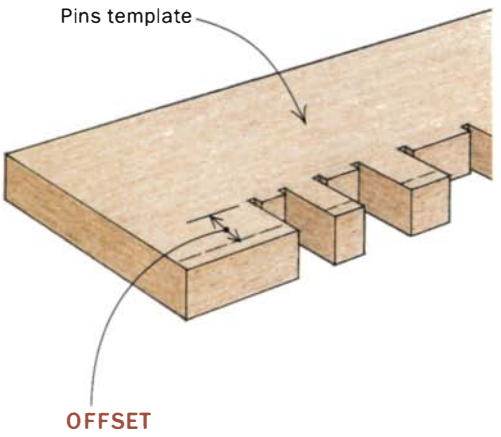
The pins template is clamped to the inside face of the stock, which is aligned to the offset. I clamp the template and stock directly to my workbench with a second pair of clamps. Make the cuts, moving the router from left to right. If your router seems to be straining, especially when cutting thick stock, take several light passes.

After removing all of the waste, only one step remains. Because the tails have square corners and the pins have rounded corners, they won't seat properly. I solve that by chopping off the corners of the tails using a chisel. The corners need not be rounded to match the pins perfectly because most of the joint's strength will be in the long-grained areas. But if you prefer, the pins can be chiseled out and made square to mate cleanly with the tails. This will take longer and, to my mind, defeats the timesaving nature of the jig. □

Jamie Buxton is a computer engineer and woodworker who lives in Redwood City, Calif.

ROUTING THE PINS

1 MARK OFFSET ON PINS TEMPLATE



Use a ruler to mark the offset. *The pins offset will depend on the thickness of the stock used (see the chart below).*

2 CLAMP WORKPIECE AT OFFSET LINE AND ROUT PINS

The pins stock is clamped facedown to the template. *Rout the pins from above using a router bit with a bearing and stop collar.*

DOVETAIL TEMPLATE SETTINGS

Cutter diameter	Cutter angle	Bearing diameter	Kerf width	Depth setting*	Offsets ½-in. stock		Offsets ⅝-in. stock		Offsets ¾-in. stock	
					Tails	Pins	Tails	Pins	Tails	Pins
11/16 in.	8°	¾ in.	0.125	0.445	0.344	0.469	0.469	0.594	0.656	0.781
11/16 in.	8°	¾ in.	0.135	0.516	0.334	0.469	0.459	0.594	0.646	0.781
11/16 in.	8°	¾ in.	0.160	0.694	0.309	0.469	0.434	0.594	0.621	0.781
11/16 in.	8°	¾ in.	0.200	0.978	0.269	0.469	0.394	0.594	0.581	0.781

*Add this number to the thickness of the template for the actual router-bit depth setting.
For an expanded chart, see our web site at www.finewoodworking.com.

SOURCE OF SUPPLY

Eagle America (800-872-2511; www.eagle-america.com) offers a good selection of dovetail bits, including 8° bits, which I use frequently. Eagle also sells bearings and stop collars, which are needed with my templates. The collar and bearing fit directly over the bit's shank.

Current Work

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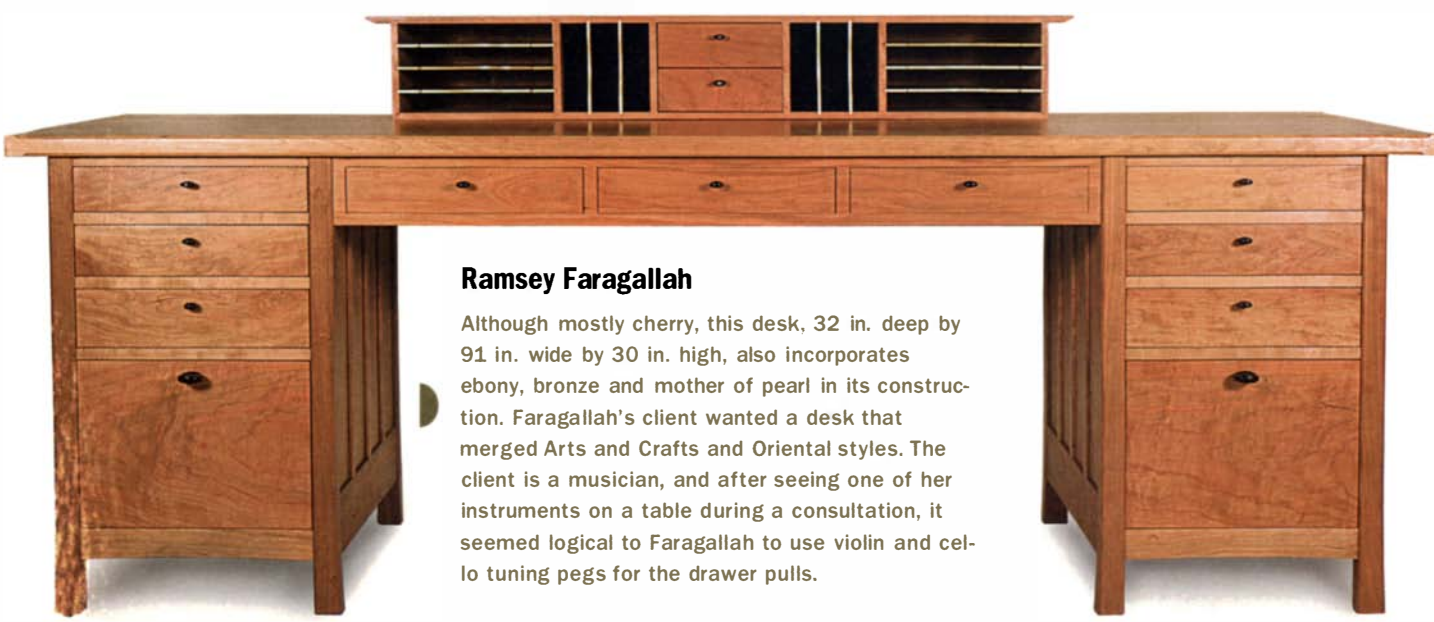
Maurie Conner

As an art teacher, Conner always seemed to lose or misplace pencils. Each medium-density fiberboard (MDF) drawer tray holds 30 pencils, and when pulled open the drawer pivots downward, making the pencils visible and accessible. This walnut pencil box is 9½ in. deep by 18 in. wide by 7¼ in. high. Conner has made several of the boxes and says they are a great project for "using up those hardwood scraps that are hard to throw away."

John Cangelosi

This end table, 17 in. dia. by 24 in. tall, was built as a Christmas gift for Cangelosi's wife. It is made of cherry and finished with a mixture of tung oil and turpentine.

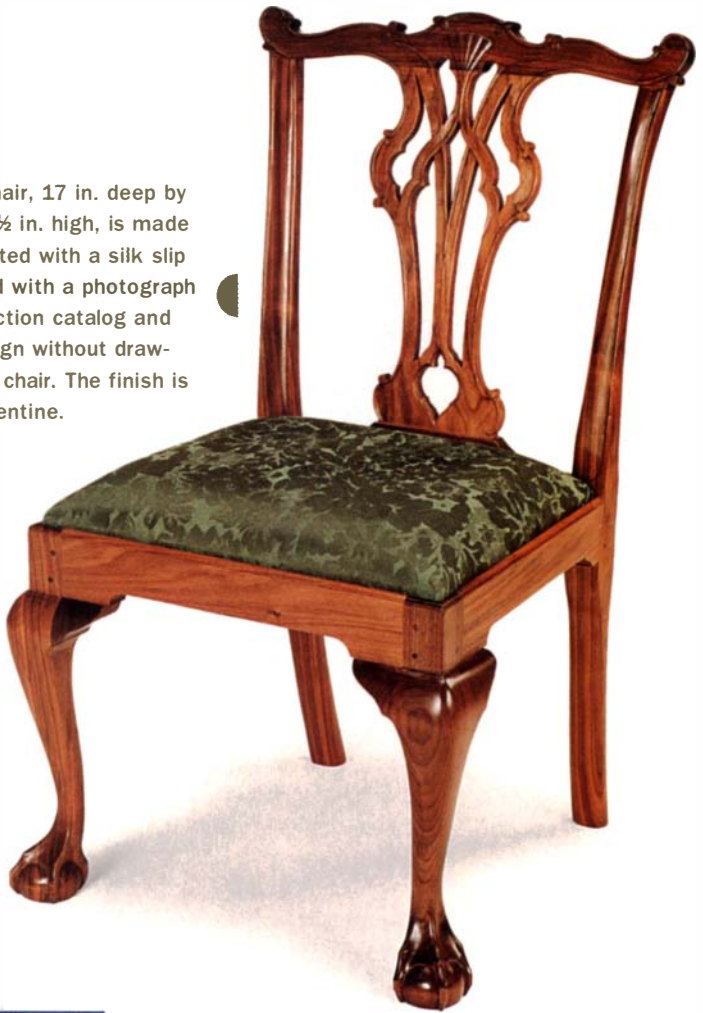


Ramsey Faragallah

Although mostly cherry, this desk, 32 in. deep by 91 in. wide by 30 in. high, also incorporates ebony, bronze and mother of pearl in its construction. Faragallah's client wanted a desk that merged Arts and Crafts and Oriental styles. The client is a musician, and after seeing one of her instruments on a table during a consultation, it seemed logical to Faragallah to use violin and cello tuning pegs for the drawer pulls.

Larry L. Books

Built for Books' youngest granddaughter, Erica, this cradle—24 in. deep by 41¼ in. long by 35½ in. high—is made of black walnut and bloodwood and is accented with brass pins. Books, who has been a high school woodworking teacher for 28 years in Washington state, finished the cradle with an oil-urethane mix.



Joe Willard

This Chippendale chair, 17 in. deep by 18½ in. wide by 36½ in. high, is made of walnut and outfitted with a silk slip seat. Willard started with a photograph from an antique auction catalog and worked out the design without drawings as he built the chair. The finish is linseed oil and turpentine.

Carl A. Morrell

Twenty years after high school woodshop class, Morrell took up woodworking for the second time and made this chest (20 in. deep by 39 in. wide by 48 in. tall) using a vacuum bag and cherry veneers. The six drawers are different heights and are rimmed with bocote. As for the clock in the chest's gallery, Morrell said, "I figured every dresser has a clock sitting on it, so why not integrate?"

John H. Margeson

This eastern red cedar chest, 13 in. deep by 46 in. long by 18 in. high, sits on a base and is supported by ledger strips. The chest is held together with 72 hand-cut dovetails and finished with Danish oil and wax. The chest was a Christmas present for Margeson's oldest daughter. "It knocked her socks off," he said.

Matthew Putnam

For his third assignment at the William Sayre Woodworking School in Massachusetts, Putnam designed and built this cabinet, which features horse-hoof feet, a Chinese-style "roof" and a rising cloud shape throughout the piece. The cabinet is 11¼ in. deep by 17½ in. wide by 62 in. high and is made of bubinga, quartersawn sycamore (drawer sides), camphor wood (drawer bottoms), ebony, nickel-plated brass and hand-blown glass. The finish is a padded blond shellac. Photo by Lisa Clayton

Brian E. Harroun

The carcase of this chest of drawers was made from recycled oak pallets, and the rest of the chest was made from #2 common oak and #2 pine for the drawer boxes. The chest, 16 in. deep by 29⅝ in. wide by 56½ in. high, was fumed with ammonia, then finished with oil-based polyurethane.

Alan Carter

A painter and photographer for the last 22 years, Carter took up woodworking full time just a year ago. The design for this table, 14 in. deep by 14 in. wide by 30 in. tall, was influenced not only by Asian and Art Deco styles but also, Carter said, "by the impressions left from years of photographing and painting urban settings." The table is made of African mahogany and maple with ebony accents.

Wayne Weatherhead

A self-taught woodworker, Weatherhead has been reading *Fine Woodworking* for 20 years. He has been particularly inspired by the articles of contributing editor Christian Becksvoort. Weatherhead built this cherry chest, 20 in. deep by 42 in. wide by 38 in. high, for his youngest grandson, Benjamin.

Robert J. Lentz

This blossom-like vessel, 20 in. dia. by 10 in. high, was turned and sculpted from a cedar stump. Lentz used slow lathe speeds and a grinder to shape the piece. The heartwood, sapwood, bark, knots and gaps made the process difficult. The vessel was made for clients who wanted a keepsake from their property. Photo by William H. Turner.

Ted Blachy

Blachy built this sideboard for the annual auction of the New Hampshire Furniture Masters. The sideboard, 20 in. deep by 61½ in. wide by 34 in. high, is made of cherry and features rosewood pulls. The patron who won the bid on this piece has become one of Blachy's regular clients. Photo by Frank Cordelle.

Tips for photographing your furniture

1. *Use 35mm color print (negative) film of moderate speed (ISO 200-400).*
2. *Clean and dust the furniture.*
3. *No matter how you light the furniture, it will appear more three-dimensional if each plane has a different brightness. Take care, however, to avoid excessively bright highlights or dark shadows.*
4. *To be sure the photos will be free of distortion, avoid the use of wide-angle lenses, and photograph with the camera positioned even with the center of the furniture both vertically and horizontally.*
5. *Photograph the furniture from several angles. Include some head-on shots, as well as some shots that show both the front and side of a piece.*
6. *Keep the background simple. A cluttered or otherwise distracting background may draw the viewer's attention away from the subject.*

Rules of Thumb

BY MIKE DUNBAR

Alternative sources for wood

Most wood used in woodworking is cut into boards, dried and surfaced by a series of processors and handlers, starting with the logger and ending with the lumberyard. We don't see or participate in this process, so most of us lose the log-to-lumber connection. Buying a board can be like buying a steak: You don't think of the cow.

Think of trees as materials, and you will see alternative ways to obtain wood. Bowl turners provide a good example. At turning symposiums, you'll typically find a pile of logs outside. Each demonstrator slices off a block of green wood and mounts it in a lathe. A short while later, that chunk of tree is a completed vessel.

Because trees grow everywhere, your raw materials are potentially everywhere, maybe as close as your neighbor's lawn. Better yet, wood obtained from alternative sources will probably save you a bundle.

Riving with a froe

Sawmills became common during the 17th century. Before that, furniture makers got most of their wood straight from the log in a controlled splitting process called riving. Riving was used for making small boards for furniture, turning blanks, clapboards and shingles. Wood is rived with a variety of splitting tools. The one used most often is the froe, a metal blade with an eye forged at one end for a perpendicular wooden handle. The blade is either driven directly into the log with a wooden club or placed in a split made with wedges or a hatchet. Then the tool is used as a lever to continue the split progressively.

Starting with wedges and a maul, and moving to hatchet and froe, a log can be reduced to accurately sized splits in a matter of minutes (see the photos below).

Boards obtained by riving are radial cuts and therefore very stable. There is little change in grain direction, so the wood is a joy to work. Chair makers still rive much of their wood because splitting follows the grain. This yields wood that is much stronger than sawn boards and is the reason why rived wood bends better.

Rived wood is dimensionally more irregular than sawn boards, so a bit more work is required to surface and thickness it. A scrub

FREE LUMBER FROM A LOG

If you think of logs as lumber, you might find good wood lying around your neighborhood, waiting to be hauled away for free. To reduce the log to smaller splits, start with wedges and a maul (1). A fresh, straight log should open up with just a few blows. Then move on to quarters and eighths (2). Split a larger log eight ways before moving to hatchet or froe, which make smaller splits for chair parts (3,4). Use a wooden club to get them started.

Photos, except where noted: Asa Christiana

plane used diagonally across the board eliminates most irregularities quickly and prepares surfaces for the jointer and thickness planer. Choose straight-growth trees for riving. Splitting wood is much more difficult when knots and twists are present. Also, freshly cut logs are easier to split.

Boards from your bandsaw

Another way to get wood directly from a tree is to use your bandsaw. At The Windsor Institute, we do this all the time. Sometimes we split open a log that turns out to have a nice figure. Rather than use the wood in chairs, we set it aside to be sawn into small boards and veneers.

To cut your own wood on the bandsaw, split a log into quarters with a maul and wedges. In the past, when many woodworkers took wood directly from a tree, these quarter-logs were called spokes. According to Tom Lamond, who has written a history of the spokeshave, the tool was so named because it was used to work spokes, or splits, obtained for shoe lasts (shoemaker's forms), not because of an association with wheels.

Choose wood that won't overload your bandsaw. If it's too thick, split it again. Around here, we use a large Hitachi resaw to cut oak for chair backs (you may not have a machine this beefy). One person feeds the spoke into the blade and directs the cut (see the photo above). Another pulls it and supports the far end as more and more of the spoke hangs off the table. Use a blade designed for resawing.

A bandsaw is used to cut spokes into boards. *It helps to have a second person to guide the cut.*

Bring the sawmill to you

Sometimes you run into a tree that is too big to handle by yourself. Rather than let the tree service haul it away and turn it into firewood or chips, hire someone with a portable bandsaw mill to cut it into boards for you (see the right photo above). You not only get lots of inexpensive wood, but you also can have the tree cut the way you want. You can ask the sawyer to cut thin wood, wide boards or extra-thick planks. The blade on a bandsaw mill has a thin kerf, so there isn't much waste. People all over the country own these portable mills. The guys I know get a real kick out of using their machines and are more than happy for a chance to put them to use. I have located the guys I use by inquiring at woodworking stores and clubs and by asking other woodworkers.

Portable sawmill owners usually offer a per-hour rate and a board-foot rate. These often work out to the same thing overall. Rates are generally about 30 cents a board foot. Quartersawing requires that the log be rolled more frequently, so it will probably cost a little bit more. Sawyers are very cautious around trees that grew in yards—the wood is likely to have nails and other metal in it—and will frequently check such logs with a metal detector. If they hit a foreign object, expect to be charged for sharpening the blade. (For more on hiring a sawyer with a portable bandsaw mill, see *FWW* #128, pp. 52-55.)

Hire a sawyer with a portable bandsaw mill. *Rates are reasonable, and the log will be sawn the way you want.*

Recycling wood

Trees aren't the only alternative source of wood in your neighborhood. Another is recycled wood, or wood that has led one useful life already. This wood can be obtained from used furniture and even demolished buildings. My wife will be horrified at me for admitting in public that I occasionally stop at the end of a driveway and toss into the back of my pickup a piece of furniture left for the rubbish truck. My most recent find was a pair of 20-in. quilted mahogany table leaves.

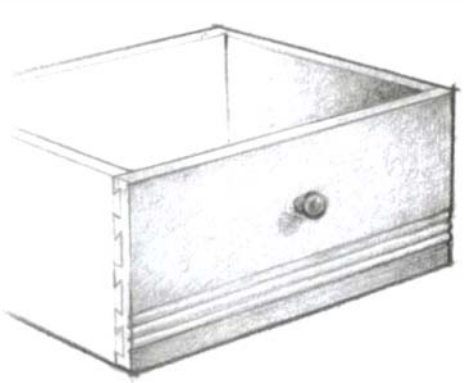
Recycled wood is usually good quality because it was selected once before. However, you will be limited somewhat by the wood's original use. For starters, you are typically forced to make a smaller piece of furniture out of what used to be a larger one. Also, nails and broken screws can damage your tools, old finishes need to be removed, and laying out your project can be more complicated because fasteners and hardware often leave holes right in the middle of a nice board.

From local trees to your local dump, usable materials are lurking everywhere. If you keep your eyes open and stay creative, you should find some boards hiding out in your neck of the woods.

Photo, this page (right): Vincent Laurence

Q&A

Matching the beading on an antique



I am restoring a 19th-century Victorian rolltop desk in cherry with a missing drawer. The existing drawer fronts are decorated with a three-bead molding, ⅞ in. from the edge, cut into the surface from one end to the other. To reproduce the three-bead pattern on a new drawer front, I tried using a No. 66 beading tool. But on practice drawer fronts the tool had a tendency to wander, producing an irregular cut. The problem was even more noticeable at each end of the drawer front because there is little stock to help support the tool's fence. Is there a better way to tackle this job?

—Les Katz, Brooklyn, N.Y.

Mario Rodriguez replies: Your impulse to reach for a hand tool to perform a one-off operation is admirable. But the original was probably cut on a molder, run off by the mile, then cut to length, producing identical drawer fronts with clean and straight three-bead cuts. Trying to achieve machine-like results by hand is difficult.

One problem with your chosen method is the ⅞ in. between the beads and the edge of the drawer; with its small fence and widely spaced handles, the No. 66 beader works best along the edge of a board. Another complication is that the handles of the tool are so far apart that you have to deal with torque as you guide the tool, making a straight cut nearly impossible.

First, set the cutter for a very light cut. This will reduce the wood' s resistance to the cut and make the tool easier to guide. Also, try pulling the tool, dragging the profile toward you.

If this fails, cut several lengths of three-bead molding on the edges of a clean board, separate the strips by ripping the board, and select the cleanest and straightest material for the replacement drawer front. Next, cut a shallow groove into the drawer face to accommodate the molding strips, cut the molding strips to length and glue them into the groove.

[Mario Rodriguez is a contributing editor.]

Finish on teak won't dry

Last year I built a small teak desk consisting of veneered panels set into a solid 1½-in.-thick frame and legs. I used a nonurethane varnish that dried normally on the veneer, but the thick sections stayed tacky for days. Is there a way to get around this problem?

—Clyde Seitz, East Aurora, N.Y.

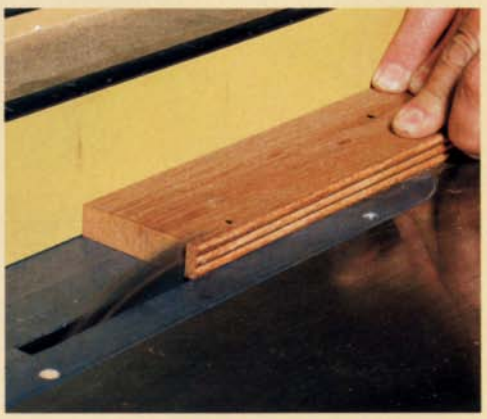
Chris Minick replies: Rosewood, cocobolo, teak and many other tropical hardwoods contain naturally occurring antioxidants, which are responsible in part for the decay resistance, oily feel and distinctive aroma of these species. These natural antioxidants are also responsible for the marginal gluing properties of some tropical hardwoods and, as you have found, can prevent oil finishes from drying.

Oil-based finishes, including alkyd varnish, urethane varnish, Danish oil or plain linseed oil, all dry by a chemical process known as oxidative polymerization. During the drying process, oxygen is abstracted from the air by the liquid finish where it acts as a chemical bridge to tie the finish molecules together (cross-link) and form the dry finish film. Antioxidants chemically alter the process, preventing the molecules from cross-linking; thus the finish remains liquid.

The obvious solution for this problem is to eliminate the offending antioxidants from the wood before finishing—a task easier said than done. Common woodworking wisdom says to wipe

INSETTING A BEAD ON A DRAWER FRONT

Cut the beading. *For a smooth cut with a beading tool, take light passes across the edge of the board.*



Separate the molded edge. *Once the profile has been completed, rip off the edge of the board on a tablesaw.*

Set the beading in place. *The beaded stock is glued into a groove ripped on the drawer front.*

Photos: Michael Pekovich; drawing, this page: Erika Marks

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C10FS	10" Slide Compound Saw	1627	579
C15FB	15" Mitre Saw	1346	659
C10FCD	10" dual bevel Compound Mitre Saw	550	265
NV45AB	Coil Roofing Nailer	935	369
EC12	2 HP, 4 gallon Compressor	561	289

MAKITA TOOLS

Model	Description	List	Sale
5090DW	3-3/8" Saw Kit 9.6 volt	213	139
DA391D	3/8 angle Drill 9.6V	142	95
DA391DW	3/8" angle Drill Kit 9.6V	216	139
6095DWE	9.6 volt Drill Kit w/ 2 batt	240	125
6095DWLE2	6095DWE w/flashlight	263	139
632007-4	9.6 volt Battery	55	30
632002-4	7.2 volt Battery	45	28

18 VOLT MAKITA TOOLS

6343DWAE	1/2" Drill Kit	458	255
5620DWA	6-1/2" Circular Saw Kit	458	255
DK1016	1/2" Drill & 6-1/2" Saw combo kit	698	389
DK1021BL	18 volt Combo Kit. Includes drill, 6-1/2" Circ. Saw, Recipro Saw, and flashlight	Sale	579

CORDLESS DRILLS WITH 2.0 AMP HIGH CAPACITY BATTERIES

6213DWAE	12V 3/8" Drill Kit	293	169
6233DWAE	14.4V 3/8" Drill Kit	358	205
9900B	3"x21" Belt Sander w/bag	322	165
9924DB	3"x24" Belt Sander w/bag	333	169
N1900B	3-1/4" Planer with case	268	142
1912B	4-3/8" Planer	360	209
N9514B	4" Disc Grinder 4.6 amp	106	65
DA3000R	3/8" Angle Drill	328	185
6013BR	1/2" Drill Rev. 6 amp	268	149
9401	4" x 24" Belt Sander w/bag	416	219
5007NBK	7-1/4" Circ Saw w/ case	238	125
LS1011	10" Slide Compound Saw	807	429
LS1211	12" Slide Compound Saw	1370	695
3901	Plate Joiner Kit	318	159
3612C	3 HP Plunge Router	503	265
LS1040	10" Compound Miter Saw	474	249
LS1013	10" Dual Compound Slide Miter Saw	1087	599
BO5010	5" Random Orbit Sander	121	69
LS1220	12" Compound Miter Saw	678	379
9227C	7/9" Polisher	338	195
2702	8-1/4" Table Saw	538	299
2703	10" Table Saw	568	309

SENCO AIR NAILERS

SFN30	Finishing Nailer w/case	459	249
SNS45	Stapler 7/16" crown, 1" - 2"	540	369
SLP20	Pinner w/cs 5/8 -1-5/8"	422	189
SKS	Stapler 5/8 - 1-1/2"	390	259
SN70	Framing -Clip Hd 2 - 3-1/2"	725	449
SN65	Framing -Full Hd 2 - 3-1/2"	709	359
SN600	NEW Framing 2 - 3-1/2"	699	339
SFN40	Finish Nailer 1-1/4 - 2-1/2"	569	329

BOSTITCH AIR NAILERS

Model	Description	List	Sale
N80S-1	Stick Nailer	Sale	255
RN45	Coil Roof Nailer 3/4 - 1-3/4	845	339
N60FN-2K	Finishing Nailer w/ case	557	239
BT35-2K	Brad Tacker 5/8" - 1-3/8" with case, oil, & brads	279	119
MIIIFS	Flooring Stapler 15 gauge	902	539
S32SX-1K	Finish Stapler-1/2" - 1-3/8" with case & oil	269	135

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Jaw Length	Opening Capacity	List	Sale	Box of 6
#0	8"	4-1/2"	20.35	12.95	69.95
#1	10"	6"	23.30	14.50	79.95
#2	12"	8-1/2"	26.75	16.25	92.50
#3	14"	10"	33.85	20.25	114.95

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe	15.45	8.50	94.00
52	1/2" Black Pipe	12.65	6.95	79.00

PANASONIC CORDLESS

EY6431NQKW	1/2" 15.6V drill kit with two 3 amp-hr Ni-Mh batteries, 45 minute charger, & case	372	205
EY6431FQKW	1/2" 15.6V drill kit with two 2 amp-hr Ni-Cad batteries, 30 minute charger, & case	342	189
EY6407NQKW	1/2" 12V drill kit with two 3 amp-hr Ni-Mh batteries, 45 minute charger, & case	339	189
EY6406FQKW	3/8" 12V drill kit with two 2 amp-hr Ni-Cad batteries, 30 minute charger, & case	305	169
EYC133	5-3/8" 15.6V Wood Cutting Saw and Drill Kit	650	379

BIESEMEYER FENCES

B-50	50" Commer. Saw	443	325
T-SQUARE 52	52" Homeshop	360	275
T-SQUARE 40	40" Homeshop	335	255
T-SQUARE 28	28" Homeshop	325	245

AIRY AIR NAILERS

Model	Description	List	Sale
0241SK	Brad Nailer 3/8" - 1-9/16"	180	79
0626SK	1/4" Crown Stapler 3/8" - 1"	194	89

Above nailers come w/case, fasteners, oil & wrenches

STABILA LEVELS

25010	10" die cast Torpedo Level	Sale	21.95
24640	24" Level w/ hand holes	Sale	47.95
24670	48" Level w/ hand holes	Sale	59
03050	Compact Laser Level	Sale	299
03100	Compact Laser Level with prism	Sale	359

DEWALT TOOLS

Model	Description	List	Sale
DW124K	1/2" right angle Dr'll	590	329
DW321K	Top Handle Jigsaw Kit	300	164
DW364	7-1/4" Circ. Saw w/brake	294	155
DW378G	7-1/4" Framer's Saw	210	149
DW610	1-1/2 HP 2 handle Router	266	149
DW411K	1/4 sheet Palm Sander w/ cs	88	58
DW682K	Biscuit Joiner with case	448	169
DW705	12" Compound Mitre Saw	734	339
DW621	2 HP Plunge Router	400	199
DW677K	3-1/4" Planer with case	268	155
DW421	5" Palm Ran. Orb Sander	144	75
DW272	Drywall Gun, 0-4000, 6.3 amp	160	95
DW276	Drywall Gun, 0-2500, 6.5 amp	160	99

DEWALT CORDLESS DRILLS

DW972K-2	3/8" variable speed w/ two 12V XR batteries	362	175
DW991K-2	3/8" variable speed w/ two 14.4V XR batteries	415	199

Above drill kits come w/ charger & steel case !

DW991KS-2	DW991K drill, DW935 trim saw, 2 XR batteries & case	Sale	345
DW911	Jobsite Radio & Charger	Sale	139

DEWALT 18 VOLT CORDLESS TOOLS

DW933K	Jigsaw Kit	468	275
DW938K	Recipro Saw Kit	520	269
DW995K-2	1/2" Drill Kit w/ 2 batt.	Sale	259
DW997K-2	1/2" Drill/Hammer Drill Kit	454	249
DW995KS-2	DW995K Drill, DW936 Saw and case	Sale	399

NEW 24 VOLT DEWALT TOOLS

DW006K	1/2" Drill/Hammer Drill Kit	560	299
DW007K	6-1/2" Circular Saw	560	299
DW008K	Reciprocating Saw	560	299

DEWALT BENCH TOP TOOLS

DW708	12" Slide Mitre Saw	Sale	649
DW788	20" Scroll Saw	Sale	469
DW733	12" Planer w/ extra blades	Sale	399
DW744	10" Portable Table Saw	Sale	499

POWERMATIC MACHINES

Model	Description	List	Sale
1660760	3 HP Model 66 Table Saw	2555	2099
1660791	5 HP Model 66 Table Saw	2690	2199
1270100	3 HP Model 27 Shaper	2899	2299
1791237	Hollow Chisel Mortiser	887	649
1610050	8" Model 60 Jointer	2392	1899
1791051	6" Model 54 Jointer	684	549
1791070	1-1/2 HP Dust Collector	494	399

DAVID WHITE INSTRUMENTS

Model	Description	List	Sale
LP6-20A	Sight Level package-20x	329	245
LP6-20XLA	Level Package	409	275
LT8-300	Level Transit - 26x	739	579
LT8-300P	above Level with optical plum	869	649
ALT6-900	Automatic Level - Transit - 18x	666	519
ALTP6-900	above Level with tripod & rod	799	559
ALP8-22	Automatic level - 22x with tripod and rod	Sale	355
AL8-26	Automatic Level - 26x	854	315
ALP8-26	AL8-26 with tripod & rod	Sale	379

BOSCH

Model	Description	List	Sale
1587AVSC	Top Handle "CLIC" Jig Saw Kit with case and Progressor blades **Super Sale**	155	
1584VS	Barrel "CLIC" Jig Saw	288	164
	Bosch Metal Case for above Jig Saws		24
	Bosch 30 blade assortment for Jig Saws		29.99

1584VS or 1587VS
with steel case and 30 Bosch blades
Sale 189

1295DH	5" Random Orb Palm Sndr	155	89
1274DVS	3"x21" v/spd Belt Sander	326	175
1278VSK	1-1/2"x12" Belt Sander	242	129
1275DVS	3"x24" v/s Belt Sndr	410	219
1276DVS	4"x24" v/s Belt Sndr	443	229
1194VSRK	1/2" v/spd Drill w/ case	256	159
1613EVS	2HP v/s Plunge Router	374	199
3315K	12V T-handle Drill Kit	298	159
3615K	14.4V Drill Kit	340	174
3107DVS	5" Random Orbit Sander	181	98
3725DVS	5" Random Orbit Sander	272	145
3727DVS	6" Random Orbit Sander	283	149
3915	10" Slide Compound Saw	960	499
3912	12" Compound Mitre Saw	595	329
11224VSR	7/8" SDS Rotary Drill	434	229
1703AEVS	5" Grinder - 8.5 amp	264	145
1347AK	4-1/2" Grinder with case	159	92
1638K	Drywall Cut-out Unit	181	105
1617	1-3/4 HP Router - 2 handle	307	159
1617EVS	2 HP Router with variable speed, 2 handle	349	189
1618	1-3/4 HP Router "D" handle	332	179
1618EVS	1618 router w/ var/speed	360	215
1640VS	Power Tenon Saw	200	115
4000	NEW 10" Table Saw	900	495
3960K-CC	NEW 24V Drill Kit	540	299

JDS AIRTECH AIR CLEANERS

Model	Description	List	Sale
750	12"x24"x28" 1/4 hp 200 CFM - 750 CFM	Sale	249
8-12	20"x24"x44" 1/3 hp 800 & 1200 CFM	Sale	479

JET TOOLS

JJ6CSXW	6" Jointer - closed stand and extra knives	Sale	499
JJ8CS	8" Jointer - closed stand	Sale	1189
JWBS14OS	14" Band Saw 3/4 HP - open stand	Sale	495
JWBS14CSK	14" Band Saw 1 HP - closed stand with rip fence and mitre gauge	Sale	579
JWTS10CW2PF	10" Contractor Table Saw with 30" Exacta fence 1-1/2 HP & cast iron wings	Sale	789
JTAS10X501	10" Tilting Arbor 3 HP Table Saw with 50" Exacta fence, table, and legs	Sale	1399
JDP17MF	16-1/2" Drill Press 3/4 HP - 16 speed with bits and mortise attachment	Sale	429
DC-650	Dust Collector, 1 HP, 650 CFM	319	199
DC1100	1-1/2 HP, 1100 CFM Dust Collector w/ access. kit.	425	299

PORTER CABLE

9444VS	Var/spd Profile Sander Kit	218	119
690	1-1/2 HP Router 8 amp	284	149
6931	Plunge Router Base	142	89
693PK	690 and 6931 plus case	381	199
691	1-1/2 HP Router D-handle	312	168
693	1-1/2 HP Plunge Router Base	342	188
697	1-1/2 HP Router/Shaper	430	245
698	Heavy Duty Shaper Table	242	138
352VS	3x21 v/s Belt Sander w/bag	340	179
360	3"x24" Belt Sander w/ bag	410	225
360VS	360 Sander w/ variable speed	439	235
362	4"x24" Belt Sander w/ bag	424	229
362VS	362 Sander w/ variable speed	448	245
9125	3-1/4" Planer Kit w/ case	258	148
505	1/2 sheet Pad Sander	268	149
330	Speed Block Sander 1/4 sheet	129	72
556	Biscuit joiner w/ 5556 fence	250	135
557	Plate Jointer with tilt fence. Includes 2" & 4" blades for use with standard & face frame plates	400	205
5563	Face frame plates for 557		7.99
5554	1000 assorted biscuits	Sale	29
7529	2 HP variable speed Plunge Router	415	209
97529	Above router with guide, dust collection, and case	480	249
7519	3-1/4 HP Router 2 Handle	502	275
7518	3-1/4 HP 5 speed Router	550	295
7539	3-1/4 HP v/sp Plunge Router	570	309
7310	5.6 amp Laminate Trimmer	182	104
97310	Laminate Trimmer Kit comp	318	194
97311	Laminate Trimmer Kit with underscribe base	390	209
7335	5" Random Orbit Sander	260	109
97355	7335 w/ case & dust pick-up	280	135
7336	6" Random Orbit Sander	265	114
97366	7336 w/ case & dust pick-up	290	139
332	Palm Grip Rndm Orb Sander	110	62
333	above sander with dust bag	120	68
333VS	Random Orbit Sander - variable speed	145	88
334	333 Sander with PSA pad	120	68
335	Palmgrip Random Orbit Sander with dual flip pad	150	88
310	Production Lam. Trimmer	260	154
347K	7-1/4" "Framers" Circ Saw with plastic case	232	129
743K	7-1/4" "Framers" Circ Saw with case - left hand version	232	129
9737	Tiger Recipro Saw	319	159
9543	Top Handle Jig Saw	300	165
CDA250	"Bammer" Cordless Angle Finish Nailer 1-1/4" to 2-1/2"	500	249

NEW Porter Cable Mitre Saws

3802	12" Compound Mitre Saw	580	349
3807	10" Slide Cmpnd Mitre Saw	975	519

Porter Cable Pneumatic Nailers

BN125	Brad Nailer - 18 ga. 5/8" - 1-1/4"	160	89
BN200	Brad Nailer - 18 ga. 3/4" - 2"	230	115
FN250A	Finish Nailer - 16 ga. 3/4" - 2-1/2"	328	169
DA250A	Nailer - 15 ga. 1-1/4" - 2-1/2"	396	204
FC350	Framing Nailer - clipped head	502	265
FR350	Framing Nailer - round head	502	265
RN175	Roofing Coil Nailer	505	259

Porter Cable Compressors

CF1400	1 HP, 4 gal. Pancake	356	199
CF2400	2 HP, 4 gal. Side Stack	586	329

New Porter Cable Cordless Products

9866	12 volt Drill Kit	Sale	145
9876	14.4 volt Drill Kit	Sale	179
9877	14.4 volt Hammer Drill Kit	Sale	199
9884	19.2 volt Drill Kit	Sale	269
9845	19.2 volt Circular saw Kit	Sale	275
9884CS	19.2V Drill / Saw combo Kit	Sale	385

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down the wood with a rag soaked in acetone or lacquer thinner to remove the oil from the surface. I've found this procedure sometimes causes more problems than it cures. In fact, the evaporating solvent often pulls fresh antioxidants to the surface, negating the reason for wiping in the first place.

A second approach is to abandon oil-based varnish in favor of lacquer finishes. However, many lacquers, especially nitrocellulose, are not immune from the effects of tropical-wood antioxidants. In this case, the antioxidant in the wood tends to migrate into the dry lacquer film and soften the finish over time. This over-plasticized lacquer film will dent or scratch easily and may become sticky.

The best approach is to seal the wood before applying the topcoat finish. Sealers trap the antioxidants in the wood, preventing them from mingling with the finish and eliminating the problem. Special vinyl sealers are sold for use under lacquer finishes, but dewaxed shellac is my sealer of choice. Two or three thin coats of 2-lb.-cut dewaxed shellac form an effective barrier against antioxidant contamination. Best of all, dewaxed shellac is compatible with all common wood finishes. So after the shellac sealer is dry, you can topcoat with an oil varnish, lacquer or even a water-based finish.

Incidentally, the reason your varnish dried on the teak veneer surfaces but not on the solid wood is that the antioxidants are removed from the teak log during the veneer-making process. Even so, putting a coat of dewaxed shellac on the veneered surfaces is good insurance. [Chris Minick is a finish chemist and contributing editor.]

Resawing logs

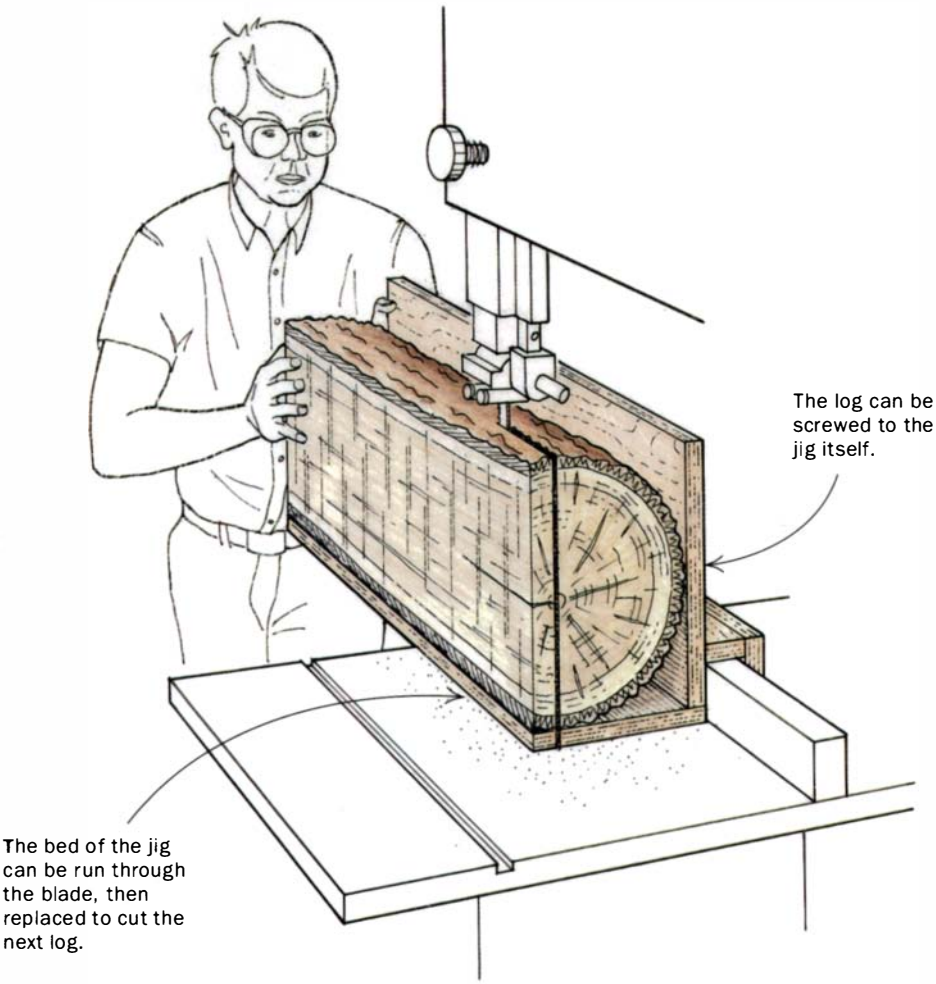
I've heard that it's possible to saw logs into lumber with my bandsaw. What's the best way to go about this?

—Jack Spencer, Hot Springs, Ark.

Lonnie Bird replies: You can saw small logs into lumber with your bandsaw, but this is a labor-intensive process. Green logs are heavy with sap, so don't expect to saw big logs for large woodworking projects. However, depending on the size of your bandsaw, you can saw planks that are suitable for many smaller projects.

FROM LOG TO LUMBER

Made of MDF or plywood, this quick-to-make L-shaped jig helps cut logs that won't sit firmly on the bandsaw table.



Once you've acquired the logs, set up your bandsaw with the proper blade and a simple jig to guide the log safely past the blade. Also, if you own one of the many 14-in. bandsaws on the market, adding a riser block to the column will double your saw's cutting capacity.

The best blade for this job is one with large gullets and few teeth. The gullets will haul the sawdust out of the kerf and prevent the motor from bogging down. A 3-pitch, ½-in.-wide, 0.025-in.-thick hook-tooth blade is a good choice; most 14-in. bandsaws can't adequately tension anything wider.

The jig is simply an L-shaped platform made of inexpensive plywood or medium-density fiberboard (MDF). Fasten the log to the jig with two or three lag screws. It's important that the screws penetrate the soft bark and bite into the fibrous sapwood. The jig runs against the bandsaw fence to guide the log in a straight path (see the drawing above). You can also attach a U-shaped channel to slip over the fence for additional support.

After you saw the planks, be sure to dry them before you use them. [Lonnie Bird is a woodworker, teacher and the author of *The Bandsaw Book* (The Taunton Press, 1999).]

Trouble drying holly

I have tried to air-dry holly and have gotten mixed results. Much of it has turned a dirty gray color, and even the few nice, white boards have cupped and twisted so badly that I've had to waste a lot just to get them planed flat. The wood

Drawing, this page: Vince Babak

has great working characteristics, and I really like it, but what am I doing wrong?
—Gaylord Stewart, Duncan, B.C., Canada

Jon Arno replies: The trouble you've experienced in trying to air-dry holly isn't the least bit unusual, so don't be so hard on yourself. This is a very difficult species to air-dry. Its average volumetric shrinkage of 16.9%, green to oven-dry, is extremely high, and holly is exceptionally prone to distortion as it dries. And the dirty gray stains are caused by fungi that invade the wood if the surface moisture of the boards is not quickly brought down to below 20% moisture content. Air-drying holly can be particularly troublesome in this regard, because not only does it have very low decay resistance, but the wood's stark white color also makes the slightest hint of staining vividly obvious.

When air-drying holly, it is critically important to ensure that there is adequate airflow through the pile early in the drying process and to keep the top of the pile covered to ward off precipitation. To help prevent the boards from distorting, keep the pile well weighted down. Also, to minimize checking, the ends of the boards should be thoroughly coated with a sealer. However, even when these precautions are carefully followed, it is virtually impossible to avoid at least some degradation, typically in the form of "sticker stain," where moisture is trapped on the surface of boards under the stickers. In the case of holly, having the wood professionally kiln-dried is a choice worth considering. Sometimes kiln-drying gives the wood a slight ivory cast, but this is often the lesser of two evils.

There is no totally acceptable substitute for holly when a pure white wood is required. Its uniform, very fine texture gives it outstanding machining and shaping characteristics, and it is a joy to work with. It is both unfortunate

Holly. *Though prone to distortion and staining, holly is the first choice whenever a design calls for a pure white wood.*

and frustrating that its propensity to distort and its tendency to blue-stain lead so many woodworkers into what can be described only as a love-hate relationship with this alluring and yet so demanding wood.

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

Flattening a warped panel

I'm having a difficult time keeping solid panels flat. I glued up a panel of red oak about 18 in. square. When I took the panel out of the clamps, it was perfectly flat. Ten days later, it had a decided cup in it. I don't want to plane it because I have the thickness I want. Is there any way to straighten it without making it thinner?

—Steven Diggs, Charlottesville, Va.

Lon Schleining replies: There are several reasons why panels cup, but in your case I'm sure it's because one surface has more moisture in it than the other.

As one surface gains or loses moisture, it grows or shrinks accordingly. If one side of the panel grows or shrinks differently than the other, a cup is the result. Innocently laying your panel flat on the bench can often lead to cupping because one surface is open to the surrounding air (damp or dry) and the other side is not.

One way to perceive the problem and hint at the solution is to remember that boards invariably cup toward the sun. Here's a fun little field test for you to try. In warm weather, lay a nice, flat board, about a foot square, in some grass where it will be in full sun. In a matter of minutes the board will cup toward the sun.

The sun dries out the top surface, shrinking that side. The bottom draws moisture from the grass, expanding it. The result is that the previously flat board now has a cup in it. If you take this same board and simply turn it over, not only will it flatten out again, but if you leave it there a bit longer, it also will cup the other way.

In winter, try laying the piece on a damp towel with a couple of bright incandescent lights shining on the other side to provide heat. If you remember that the board will always cup toward the sun, a bit of trial and error will eventually make the panel flat again, although this method is much slower than direct sun.

When the panel is flat once again, place it inside where air can freely circulate around *both* sides of the piece. If it stays perfect, great. But if it cups again, simply repeat the process. Eventually, the piece will stabilize where you want it, although if you again innocently lay the panel on the bench for a week, it will cup again just as it did before.

[Lon Schleining lives and works in Long Beach, Calif.]

Do you have a question you'd like us to consider for the column? Send it to Q&A, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470-5506, or e-mail it to fwqa@taunton.com.

Tablesaw jig for cutting compound-angle tenons

BY STEVE BROWN

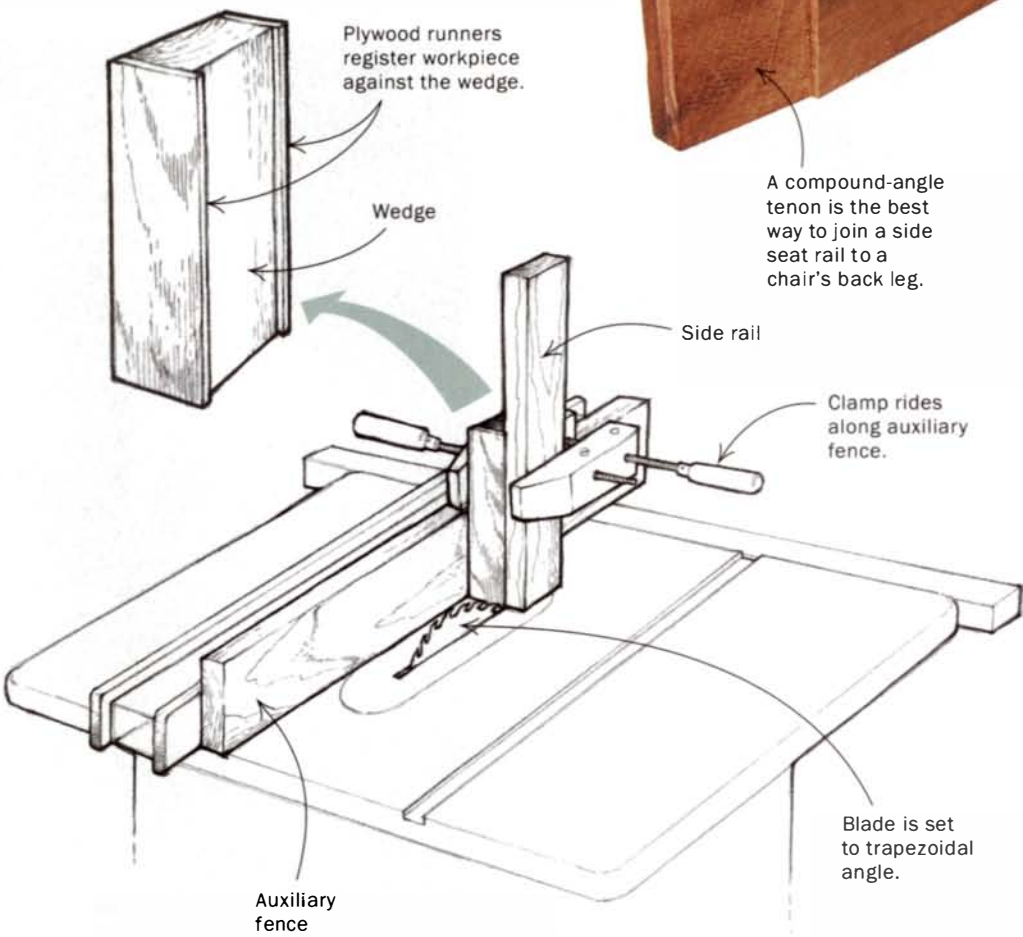
One of the best things about working at North Bennet Street School is that I'm able to work with other woodworkers to discover the best way to solve construction problems. When Will Neptune was making a set of four Chippendale side chairs, I began to wonder if there was a way to jig up the rails to cut tenons at the correct compound angles. (For more on laying out and cutting this joint by hand, see the article on pp. 60-65.) I'm always looking for the most efficient way to execute a task—especially when multiples are needed. I wanted to find a method of making this tenon quickly and accurately. In addition, I needed to deal with the fact that half of the tenons were lefts and half were rights.

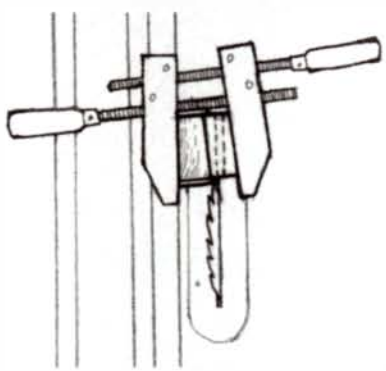
When cutting a compound-angle tenon by hand, the layout lines on the rail can come directly from the drawing and, theoretically at least, are reliable. With this approach, there is a temptation to assume that you can take that same

WEDGE IS THE HEART OF THE JIG

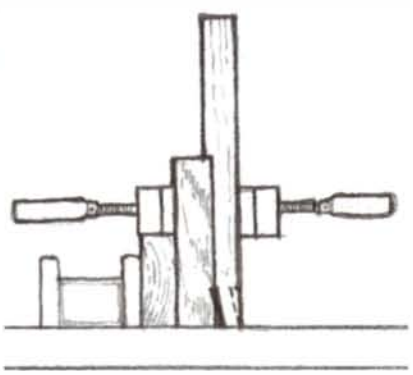
The wedge and blade angle allow you to cut an angled tenon to compensate for the seat's trapezoidal angle and the cant angle of the rear leg.

A compound-angle tenon is the best way to join a side seat rail to a chair's back leg.





TOP VIEW



FRONT VIEW

Drawings: Erika Marks

information from the drawing and apply it directly to the jig and tablesaw. This, however, is not the case. The reason for this can be somewhat confusing, but once understood, finding the corrections can be simple.

To cut the tenon on the tablesaw, the rail can be held upright with the blade set for the trapezoidal angle and with a wedge between the rail and the fence for the cant angle. Two fence settings will cut the cheeks of the tenons. The shoulders can be cut on the tablesaw as well.

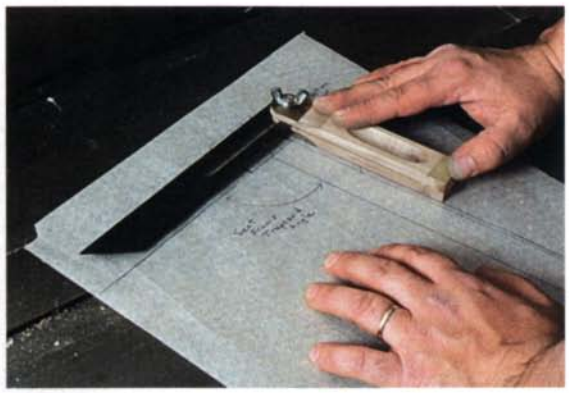
While you are cutting to the layout lines on the rails, the angle settings of the tablesaw blade and the wedge must be adjusted, because you're working with the *combined* angles. When hand-cutting this joint, the angle orientations are based on the three basic views of the drawing, but with the tablesaw method, the orientations are relative to the rail. We're not just concerned with the cant angle of the back leg from the drawing; we're also concerned with the cant angle as it intersects with the shoulder (at the back of the side seat rail) as seen directly through the end of the rail. That apparent angle would be the cant angle but would appear slightly different. Likewise, when addressing the trapezoidal angle in the blade setup, you need to account for the rail being held at the corrected cant angle from the fence. Simply put, you need to find two angles. One angle is based on the cant for the wedge, and the other is based on the trapezoid for the blade angle.

To form the wedge, set a bevel gauge to the actual cant angle, as measured from the back seat rail. Set the cant angle against the raised blade, but adjust that angle by registering it off the trapezoidal angle. Set the blade at this angle. A blank of wood milled to the exact width as the side seat rails can be ripped to the corrected cant angle. Rip the blank to this angle and plane it to clean up saw marks. The ends should be cut square. Two thin plywood runners can be tacked and glued to the edges—overhanging the face and square to the edges. The runners create a space the exact width of the rail and will hold it securely during cutting. The jig needs to be at least as long as the tablesaw fence is high plus 4 in. For added stability and safety, this extra

MAKING THE WEDGE

Use two bevel gauges to determine blade tilt

Start with an accurate cant angle. *When cutting the side seat rail to the back leg, the tenon must be angled to reflect both the cant angle of the leg and the trapezoidal angle of the seat.*



Reliable drawings save mistakes. *Use the full-sized drawing to set a second bevel gauge to the seat's trapezoidal angle.*

Use both angles for tablesaw setup. *The blade is set to the cant angle (upright), but the cant angle must be twisted to match the trapezoidal angle by holding the bevel gauge flat on the tablesaw.*

Rip the wedge and add runners to register the workpiece

Making the jig. *When the blade is set to the correct angle, and stock ripped to the rails' width, rip a length of stock to use as your jig.*

Line up the jig. *Mark out the tenon on the rail, then fit it between plywood runners glued to the jig.*

Photos: Michael Pekovich

WOODWORKER'S MART

See ad index on page **120** for reader service number.

length is needed to clamp the rail in place with a thumbscrew.

The tablesaw blade can now be set for the trapezoidal seat angle. The trapezoidal angle doesn't exist in the chair yet, so it has to be taken directly off the drawing. Any discrepancy in the accuracy of the angle will change the length of the front rail, which can be adjusted accordingly. Again, the trapezoidal angle needs to be corrected according to the cant angle. The new jig can be used for this. With the bevel gauge set to the desired trapezoidal angle, hold the jig against the fence and the bevel gauge against the end of the jig. Now set the blade to the gauge angle.

Whether you are doing one set of rails or 12, you should completely lay out one left and one right tenon and shoulder. One end of the jig can be used for the left and the other for the right simply by flipping it end for end and keeping the same face against the fence. This jig will work with a saw that tilts toward the fence or away from it. As you place the rail in the jig, use the layout lines to avoid confusion. Cut one cheek on all of the rails and then set the fence to cut the second cheek. I cut the tenon a little too thick at first, then adjust the fence until I get a good fit to the mortise. Take care when setting the blade height to account for the angle of the shoulder. One cheek will need a different height setting than the other one.

The shoulders can be cut on the tablesaw as well, but the blade will have to be reset to the trapezoidal angle with no corrections. All inside shoulders can be cut with the miter fence or push block on one side of the blade, then the outside shoulders can be cut on the other side of the blade. Take care to account for the angle of the tenon—cut as much of the shoulder as you can without cutting into the tenon. The rest of the shoulder can be pared with a chisel. Please note that when cutting the shoulders, the waste will be trapped between the blade and the fence and will shoot out. I prefer to remove the bulk of the waste quickly but carefully with a bandsaw or handsaw.

Using this method I was able to execute the joints for eight rails quickly and cleanly with very little handwork.

USING THE JIG

Adjust blade tilt and fence

Set the blade to the correct angle. *After the jig has been made, the tablesaw can be set to the trapezoidal angle of the seat.*

Double-check the cut. *Raise the blade and check to see that the angle of the cut matches the layout lines on your rail.*

Cut the tenon cheeks and shoulders

Use a high fence for a safer cut. *With the rail stock clamped to the jig with a thumbscrew, a careful pass cuts the outside cheek of the rail.*

Once the jig has been set up, multiples move quickly. *A second pass cuts the inside cheek of the tenon. Once you've cut one rail, it isn't necessary to draw layout lines on the rest.*

Cut the shoulders with the blade set to the trapezoidal angle. *Take care to check the angle of the tenon, and be sure you don't cut into the tenon itself.*

WOODWORKER'S MART

See ad index on page **120** for reader service number.

CLASSIFIED

Deadline for the November/December issue is August 25th. The Classified rate is $8 per word, 15 word minimum. Orders must be accompanied by payment, ads are non-commissionable. Send to: Fine Woodworking Classified Ad Dept., PO Box 5506, Newtown, CT 06470-5506. FAX 203-426-3434 (800) 926-8776, ext. 310.

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BY CHRIS MINICK

Varnish: an almost ideal finish

My ideal furniture finish would penetrate deep into the wood, dry quickly, provide good abrasion and stain resistance, rub out easily and look great. Also, I want the option to apply this finish with a rag or a brush or a spray gun. Unfortunately, no finish has all of these properties, but oil-based varnish comes pretty close.

Walk into any well-stocked hardware store, and you'll find a bewildering array of cans of varnish. Alkyd, polyurethane, spar, wiping, bar-top, floor, fast-drying, interior and exterior varnishes are the more common types available. With all of these choices, selecting one that's right for your project can be frustrating. Knowing a little about varnish chemistry may help you decide.

They're more alike than different

All varnishes have one thing in common: The backbone of the finish molecule is composed of vegetable oil. Varnishes are made by chemically combining a modifying resin with a vegetable oil to produce a finish molecule that is liquid when applied to the wood surface but solid after it cures to an impervious film in a short period of time. Linseed oil and soybean oil are the most common vegetable oils used in the manufacture of furniture-grade varnish resins. Tung oil is also used, but because it is relatively expensive, you find it only in wipe-on varnish mixes and traditional exterior varnishes. The *type* of oil used in a varnish resin has less effect on the finish properties than does the *amount* of oil used.

WITH ALL OF THESE CHOICES, SELECTING ONE THAT'S RIGHT FOR YOUR PROJECT CAN BE FRUSTRATING. KNOWING A LITTLE ABOUT VARNISH CHEMISTRY MAY HELP YOU DECIDE.

The long and short of it—The ratio of oil to modifying resin—known as oil length in the industry vernacular—determines the flexibility of the dried film, curing or drying time and application method. Varnish resins containing 75% or more oil are called very long-oil varnishes, and they're typically used for wipe-on finishes, the so-called Danish oil finishes. Very long-oil varnishes dry slowly, have great wood penetration and are extremely flexible when cured; but the dried finish film is extremely soft, has poor abrasion resistance and damages easily. These varnishes perform adequately, provided that no detectable finish film is left on the surface of the wood.

Long-oil varnishes are 60% to 75% oil and are primarily used in the manufacture of oil-based paint but recently have been introduced to the wood-finishing arena as fast-dry wipe-on finishes. Long-oil varnishes do dry faster than traditional Danish oil finishes. However, they share many of the same problems that plague their very long-oil brethren.

Medium-oil varnishes contain 45% to 60% oil and form the basis of all brush-on varnishes used in wood finishing. They have reasonably short drying times, good abrasion and stain resistance, penetrate the wood to accentuate its beauty and form a hard but flexible protective surface film. Best of all, medium-oil varnishes can be applied by the three most commonly used methods: wiping, spraying or brushing.

Short-oil varnishes are less than 45% oil and typically require heat to cure, so they are not used for finishing wood. Short-oil varnish resins are used to make the paint for refrigerators, stoves and metal office furniture.

Modifying resins vary in strength—The modifying resin used in a varnish will determine how well the dried finish film holds up when it is exposed to moisture, ultraviolet (UV) light and general wear and tear. Alkyd varnishes, a term coined in the 1930s to describe an important class of polyesters, traditionally use phthalic anhydride as the modifying resin. Typical alkyd varnishes have good flexibility, very good abrasion resistance, great adhesion, moderate moisture resistance and take a relatively long time to dry and cure (8 to 10 hours to dry to the touch and 16 to 20 hours to re-coat). Alkyd varnishes targeted for furniture making are difficult to find these days, but they remain a mainstay of hardwood floor finishing.

Replacing some or all of the phthalic anhydride with toluene diisocyanate yields the familiar polyurethane varnish, which is also called uralkyd by finish chemists. This modification to make polyurethane decreases the drying and curing times to more tolerable levels and increases the moisture resistance of the finish film, but it sacrifices the UV resistance in the process.

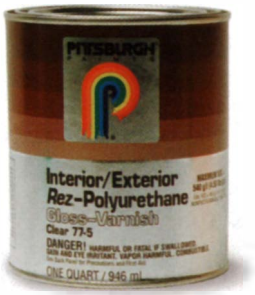
Fast-dry varnish, also called VT varnish, uses styrene or vinyl toluene as the modifying resin to produce a product with remarkably fast drying times. Properly formulated VT varnishes will dry and cure almost as quickly as nitrocellulose lacquer—dry to the touch in 30 minutes and cure to re-coat in less than two hours. However, fast-dry varnishes have slightly less protective proper-

Photos: William Duckworth, except where noted

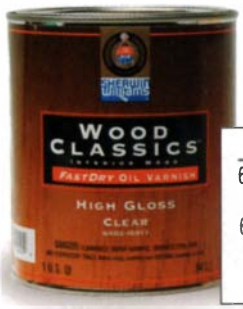
ties than standard alkyd varnishes. Still, they are suitable for most furniture applications. But I would not recommend them for heavily used kitchen or dining-room tabletops.

Phenolic resins combined with tung oil produce a varnish with superior water resistance, good hardness, exceptional flexibility and good alkali, grease and UV resistance. It's called spar varnish. Unfortunately, the drying times are excruciatingly long, and spar varnish has a deep yellow color that only gets worse as it ages. Still, spar varnish is the best choice for projects, such as outdoor furniture, that will be exposed to the elements.

Alkyd varnish. *Once the mainstay of the furniture-finishing trades, this class of varnish is increasingly hard to find.*



Polyurethane varnish. *Polyurethane dries fairly quickly and exhibits good moisture resistance, but it does not hold up well to the degradation brought on by ultraviolet light.*



Fast-dry varnish. *The vinyl toluene and naphtha listed on the label identify this as a fast-drying finish.*

CAS No.	Ingredient
64742-89-8	V.M. & P. Naphtha
Unknown	Vinyl Toluene-Oil Polymer
64742-88-7	Mineral Spirits
1330-20-7	Xylene
100-41-4	Ethylbenzene

Spar varnish. *Tung-oil-based phenolic resins are found in most brands of spar varnish, and they are the ingredients that help this product stand up to the elements.*

Ingredient
Tung Oil Phenolic Resin
Alkyd Resin
Stoddard Solvent
Mineral Spirits
Dipentene

Most people choose to brush it on

You can apply varnish with a brush, a rag or a spray gun. Wiping it on is definitely the easiest method (a fast and easy method is described on pp. 57-59), and spraying is the fastest. But brushing is the time-honored technique for applying varnish.

Your success with a brushed-on varnish will depend on practice and attention to detail. I've found that most varnishes are too thick to use right out of the can, so I thin them to about the consistency of whole milk. Prior to dipping the brush into the varnish, you should prewet the bristles with the same solvent used to thin the finish. Prewetting conditions the bristles and prevents the buildup of dried finish at the base of the brush, making it easier to clean later. Shake out the excess thinner, then fill the brush by dipping it into the thinned varnish by no more than half the bristle length. Capillary action will automatically fill the brush reservoir with the proper amount of finish. Tap the bristles on the inside of the can to remove the excess varnish, and always finish the unseen areas of the project first, such as the inside of cases or the underside of tables. You'll be able to judge the flow and leveling properties of the varnish before tackling the show side of the piece. If the viscosity doesn't seem right, add varnish or solvent.

Most finishing projects require more than one brush. I use a 1-in. ox-bristle sash brush for coating small or intricate areas such as moldings and spindles. A good-quality 2-in. china bristle brush is ideal for large, flat areas. Larger brushes are inappropriate for furniture finishing because they're just too hard to control.

You don't want a big brush for varnish. *A 2-in. or 2½-in. china bristle brush works best for laying a varnish onto flat surfaces.*

Avoid the choppy, back-and-forth stroke used to apply house paint—it will result in an uneven surface and lots of bubbles. Instead, slowly pull the brush across the panel in one continuous motion until the brush reservoir is empty. Hold the brush at about a 45° angle when it first contacts the surface and gradually increase the angle to almost 90° by the end of the stroke. As this bristle angle increases, more varnish is released from the reservoir and flows to the wood surface. I usually get a stroke length of about 18 in. or 20 in. with a fully loaded 2-in. brush.

After the entire surface has been coated, "tip off" the varnish by lightly dragging the bristle tips through the wet finish. Tipping off with an unloaded brush levels out the uneven areas in the wet varnish film and removes unwanted bubbles at the same time. You don't need to sand between coats of varnish unless you have to remove some defect. Simply sanding to increase adhesion is not necessary unless the dried varnish coat is older than six months.

Avoid the pitfalls of using varnish—Extended drying time under certain conditions is the biggest problem I've experienced with oil-based varnishes. High humidity drastically prolongs the drying time of most varnishes. Anybody that has varnished during the dog days of summer knows just what I'm talking about. I avoid varnishing on those dripping-wet days, if possible; if not, I let a dehumidifier run in my shop for a few days beforehand.

Also, old varnish dries more slowly than fresh varnish. This too has to do with the metallic driers that gradually lose their catalytic powers as the varnish ages. The best way to avoid the problem is to make sure you always use only fresh varnish. Typically, I don't use varnish that is more than one year old. I may waste a few dollars, but I save a mint in frustration.

Photo, this page (right): Michael Pekovich

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A Small Cabinet with a Big History

Last January this cabinet sold at auction at Christie's in New York City for $2,422,500, shattering the world record for a piece of 17th-century American furniture. Called a *valuables* cabinet, this is one of four similar pieces attributed to the Salem, Mass., shop of James Symonds, who made it in 1679 as a wedding gift for Joseph and Bathsheba Pope. Through the generosity of an anonymous donation, the Peabody Essex Museum in Salem bought the cabinet for its permanent collection—a deserving home, considering that the Popes figured prominently in historical records as accusers in the Salem witch trials of 1692. The museum hired Phil Lowe, a frequent contributor to *Fine Woodworking* (see the article on his workbench on p. 50), to replicate two missing pieces of applied molding on the center panel of the cabinet door.

Forget glue, get out the wax

One thing Americans have learned from the currently popular *Antiques Roadshow*, seen on public television, is that you destroy the value of an antique when you irreversibly repair or refinish it. To replace the missing molding on this cabinet, Phil Lowe hand-carved and finished maple with milk paint, dyes and shellac to match the 300-year-old patina, then attached the molding using a conservation-approved microcrystalline wax instead of glue.

Photos, left: Courtesy of Christie's Images Ltd. 1999; above: William Duckworth