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Used with the proper techniques, a basic set of bench chisels can accomplish a multitude of tasks.
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Contributors

Mark Edmundson ("A Better Way to Build Drawers") grew up around Boise, Idaho, but settled in the mountains of the Idaho panhandle region. He and his wife discovered the area during a skiing trip. They bought an abandoned homestead in 1993, and Edmundson tried his inexperienced hand at building a house. This led him, by necessity, to the woodworking section of the local library and eventually into the furniture program at The College of the Redwoods. He graduated in 1997, built a shop and began making furniture professionally.

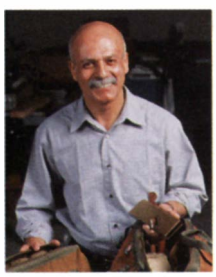
Peter Tischler ("Wood Pulls Tailored to Fit") earned a degree in forestry and wildlife management. When he first got out of school, after being unable to find a job in his chosen field, he switched gears and began working as a house painter. Boredom set in, and he combated it by studying furniture making at North Bennet Street School. After several years of working for others in custom and production furniture shops, he struck out on his own in 1991. Now he builds custom furniture, cabinetry and large, bent-laminated sculptures at his shop in Pine Brook, N.J.

John Nesset ("Shopmade Marking Gauge") builds one-of-a-kind furniture on his front porch in Minneapolis, Minn. He prefers to use only hand tools not only for their precision and the subtle character they impart but also because machines won't fit on the porch. He saves his bandsawing for a side job as a meat cutter. Nesset's organic, sculptural pieces—furniture, screens and boxes—have drawn wide acclaim and high prices for two decades.

After two years in the cabinetry trade, **Mike Weiss** ("Smooth Tambours") is beginning to think that his associate degree in education might have some use after all. Each commission he receives is a learning experience. He is currently working on converting an attic to a master bedroom. To pacify the building inspector he has taken a crash course in CAD programming. When cabinetmaking, he works out of his parents' well-equipped shop in upstate New York, where the herding dog, Ginger, keeps any tool from straying too far.

Jeff Miller ("Planing Corner Joints") has been a professional furniture maker in Chicago for 17 years. Before that he was a classical musician. Miller has written two books: *Beds* and *Chairmaking and Design*, both published by The Taunton Press. Currently, he is working on a book about making children's furniture.

Marlo Rodriguez (Master Class) teaches at The Fashion Institute of Technology, Restoration Department, and at the Technical Labor College, both in New York City. On weekends and during the summer, he teaches workshops at The Center for Furniture Craftsmanship, Marc Adams School of Woodworking, Northwest Woodworking Studio, Thaddeus Stevens Institute and the Woodcraft School of Fine Woodworking. Rodriguez, a *Fine Woodworking* contributing editor and a book author, has also written for *Fine Homebuilding* and *Fine Gardening* magazines. In this issue he has the distinction of having written, photographed and illustrated an article, a rare feat for most authors. In his spare time Rodriguez indulges a newfound interest in opera. Knowing how he immerses himself in a subject, it wouldn't surprise us if someday he wrote, scored and performed one of his own.



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Letters

The engineers weigh in—I read with interest Bruce Gray's article "Testing Joints to the Breaking Point" (*FWW* #148, pp. 74-79). In the article, Mr. Gray concluded that the traditional mortise-and-tenon joint was the strongest joint tested. As a mechanical engineer and woodworker, I've always been suspicious of these kinds of findings. To start, cabinets and furniture do not fail in the manner outlined in the article. Wood movement over time causes joinery to self-destruct much more commonly than the gross overloading performed in Mr. Gray's test. Aside from that, I believe a major point was altogether missed in the article.

Only one wood species was considered during this testing: hard maple. One advantage that biscuit and dowel joints enjoy is the superior material that the parts are made from, typically beech and birch. Many times these woods are much stronger than the parent wood used in the joint. The loose-tenon joint enjoys the same advantage. What if Mr. Gray had made his mortise-and-tenon joints using poplar, mahogany or pine for the parent material? Then provided loose-tenon joints made of the same parent material but with a maple or birch loose tenon? I believe the traditional mortise-and-tenon ranking would vary greatly from his printed data. At a minimum, they were not even considered. To conclude that the traditional mortise-and-tenon joint is the strongest joint for cabinetmaking, without regard to material, is misleading.

—Randy E. Benway, Horicon, Wis.

Mr. Gray's article "Testing Joints to the Breaking Point" was fantastic. As a mechanical engineer and a woodworker, I would say the methodology was superb. The graphics in the article were terrific. You even covered sample size and method of test terrifically. I've used Instron machines in years past, so this all came across to me as a technical job done with polish and complete thoroughness.

I really enjoyed your previous article on router bits (*FWW* #137, pp. 84-89) for

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Introducing a new annual issue

Last year our extra 25th-anniversary issue was a huge success with readers and advertisers. Packed full of the kind of high-quality information for which we're known, the issue received lots of praise from readers, who said it gave them a little something extra in their valued subscriptions.

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This issue will not contain the familiar long lists of product specifications seen in tool buyers' "guides." It will be an intensive look at how woodworkers are making their tools and shops work for them in the most creative, efficient and money-saving ways. Like our regular issues, it will be written by our most knowledgeable readers and will contain some of our most popular departments. Unlike the other issues, it will be about only your workshop and the tools you use there—and it will have some new shop-oriented departments of its own.

Call for entries—One change from normal will be apparent in Current Work. In the Tools & Shops issue, Current Work will feature exquisite tools handmade in the shops of our readers. If you've made a tool from scratch that you're particularly proud of, or if you're about to finish one, send a photo by July 31 to: Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470. Entry forms are available at www.finewoodworking.com. Be part of an issue that we trust will be a much-anticipated part of every woodworker's winter. *—Tim Schreiner, editor-in-chief*

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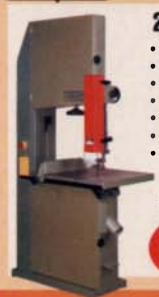

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similar reasons. You're bound to get some naysayers, but you do handle this very well.

–Robert Schneider, San Jose, Calif.

Redesigning a Grizzly drum sander— I am a little late getting this in the mail, but I have some comments on your review of drum sanders (*FWW* #145, pp. 46-51) and the comments that followed (*FWW* #147, pp. 8, 10).

I own a Grizzly G1066 and consider it a lot of sander for the money and Grizzly a good supplier. There are a number of improvements that can be made, and I was aware of some of the problems when I bought it but felt that I could make the improvements at a lower cost than buying an RBI or Woodmaster.

I am a retired mechanical engineer with design experience and a well-equipped shop. I have built quite a bit of furniture for my family.

Here is a list of the changes I made:

The sanding drum runs backward for best performance, so I turned the machine around and put a reversing switch on the feed motor.

Dust collection was unacceptable. I took off the top cover and replaced it with one that contains internal baffles to direct high-velocity air to the point where sawdust leaves the drums.

I replaced the sleeve bearings on the conveyor belt with ball bearings.

I installed bronze flange bearings top and bottom on the four thickness adjusting screws.

I built a gauge to indicate finished wood thickness.

The sanding speed was too high to sand Brazilian hard cherry without burning. In order to slow it down, it was necessary to change the drive motor to one with 1,750-rpm speed and change the pulley.

I changed the paper-attachment method to one that works much better and is simple. I also devised a simple method to preload the spring tension and hold it while installing the paper. This makes it easy for one man to change the paper.

Once I had the rolls in alignment, I doweled the bearing blocks.

These changes, except for the drive motor, were rather inexpensive. I now have a good drum sander at a low total cost.

–M. Allan Horton, Waco, Texas

Risks of power sanding—I must take issue with a statement made by Teri Masaschi in Finish Line (*FWW* #149, pp. 113-114). She cautions against using an electric sander because of "the slight risk of polishing lubricant entering an electric sander and causing a shock." It is my understanding that the mineral spirits and linseed oil she uses do not conduct electricity.

–Howard Kelly, Rock Hall, Md.

CHRIS MINICK, CONSULTING EDITOR, REPLIES: Howard Kelly is correct. Mineral spirits does not conduct electricity under ordinary conditions. However, much greater hazards are explosion and fire. Mineral spirits, though nonconductive, is combustible, and the brushes on the sander motor are a convenient ignition source. Combustible mineral spirits vapors can be drawn into the sander via the motor cooling fan and ignited by the brush sparks. I agree with Teri Masaschi: The air-powered sander is a safer choice when using mineral spirits as a sanding aid.

A cheaper way to clean your blades and bits—After reading "Blade and bit cleaner" (*FWW* #148, p. 34), I am surprised that nobody ever mentions the use of household ammonia for the same purpose. While I am sure that the product mentioned in the article works just fine, common, everyday household ammonia available in most grocery stores for a buck a gallon will work as well. Use it in the same manner described in the article, and you will get the same results.

–Lee Holdren, Bellevue, Wash.

Shopmade tension gauge—The article by John White (*FWW* #147, pp. 80-83) presents an excellent method for directly measuring bandsaw blade tension: His gauge is what we call an "extensometer". However, the sidebar (p. 83) refers to a spring "going soft" and implies that it is fatigue that would cause this. The stiffness of a spring is a function of its chemical composition (here, steel) and its geometry, the diameter of wire and coil, as well as the number of coils. Unless it was chock-full of fatigue cracks, the softness encountered must be elsewhere in the load train. His recommendation of buying a better spring still holds.

–Rick Queeney, raq1@psu.edu

Still more theories on the saw nib— Somewhere in the annals of *Fine Woodworking* I recall a discussion about the purpose of the "nib" on a handsaw. Recently my dad shed some light on the subject. He refers to it as a "gunsight." He said that the old-timers would place

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Aug. 2-5: Most of the *Fine Woodworking* staff, as well as authors Brian Boggs, Lon Schleining and Sandor Nagyszalanczy, will be in our booth at The Association of Woodworking and Furnishings Suppliers (AWFS) show, the biggest woodworking exhibition of the year, at the Anaheim Convention Center in California.

Aug. 12-14: Associate Editor Tom Begnal, who edits our Tools & Materials department, will be scouring the National Hardware Show in Chicago for the new tools that will be on sale late this year and early next year.

All summer: If you weren't able to attend our January conference on 18th-century chairs at Colonial Williamsburg, finewoodworking.com contains reports on most of the presentations by distinguished researchers, woodworkers and chair makers.

Writing an article

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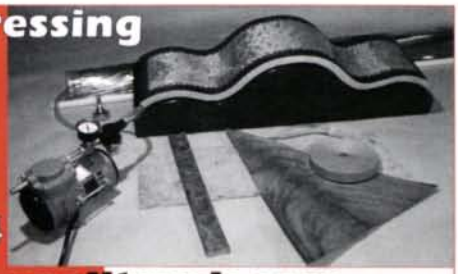

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a square on a board that needed to be cut and scribe a line using the nib or gunsight. This saved the extra step of having to reach for a pencil. He also said that the master craftsmen would leave a tiny fraction of the scribe line on either side of the cut.

–Leif Warnberg, Mosier, Ore.

Copy machines are not accurate—Be careful. In your Methods of Work item on making a see-through ruler (*FWW* #148, p. 14), the author said to use a copy machine. The problem is that all copiers do not copy 1:1. The clear ruler should be checked with the original.

–N.L. Frederiksen, Richardson, Texas

Turning bowls from green wood—In each of two recent issues of *Fine Woodworking* you have published an excellent article on wood turning. As a woodworker whose interests lie almost exclusively in turning, I wish to thank and commend you for these articles. I particularly enjoyed Howard Lewin's piece in issue 147. This is a no-frills bread-and-butter article on green wood turning that helped me considerably, particularly as I was struggling with a piece of wet pecan the day the magazine arrived!

Thanks again for your attention to our slice of the woodworking pie.

–Lawrence J. Genender, Dallas, Texas

The special edition—The 25th-anniversary issue was a masterpiece. It captured the essence of woodworking in America and the important niche *FWW* filled for serious and interested woodworkers.

With the quality and consistency of *FWW*, it should go on forever. I look forward to the 50th-anniversary issue.

–Robert J. Lentz, Pungoteague, Va.

Author's tone a concern—It is the dismissive, irrational tone of Jon Arno's piece (*FWW* #146, pp. 65, 67) that concerns me most. Like the environment and the forests that surround us all, the Forest Stewardship Council is not perfect. No system that brings age-old enemies—such as environmental and timber interests—together could be. But it's a good system, based on sound science and common sense. It delivers real accountability, and it works toward a balance that gets people talking to each other and gets things done. It's a balance that brings companies like The Home Depot and major timber companies to the same table as Greenpeace and the World Wildlife Fund to talk about the future of our forests. It's also a balance that helps local manufacturing companies, foresters and landowners of all sizes work together to develop new markets for wood products and conserve forests.

There is always progress yet to be made, and we look to individuals and groups of all sizes and perspectives to join FSC's rational discussion.

–James S. French, president, Forest Stewardship Council-U.S., Washington, D.C.

A light settee in cherry—Matthew Teague has shown us how to construct a handsome, elegant settee (*FWW* #147, pp. 61-67), but I take issue with some of his joinery. Matthew joins the center seat rail to both front and rear seat rails with mortise-and tenon joints, a method which is known to weaken these rails because the tenon cheeks glue poorly to the end grain of the mortise walls, leaving a chopped-out rail to take the full brunt of the center weight.

A stronger method would be to half-lap a dovetail at both ends of the center rail into a cleat which is glued and screwed to the front and rear rails as in constructing a table-frame top which houses a drawer. Dovetailing the upper half of the center rail directly into the long rails is another possibility, but this would be a shade weaker.

Matthew also miters the tenons of the long and side rails into the leg mortises, stating that the mitered tenons provide more glue surface. True, but unfortunately the miter won't hold because the end grain of the miters absorbs too much glue from the surfaces. The strength of a mortise-and-tenon joint is in the long grain of the tenon cheeks and the miter walls, not in the ends or shoulders. This method has the added disadvantage that glue from the side mortise will squish into the long-rail mortise during glue-up, another bit of unneeded anxiety. Better to have the front (or rear)-rail tenon fit into a square mortise and have the shorter side-rail tenon fit to a mortise whose end is perhaps ⅛ in. from the longer mortise. This completely avoids the glue-up problem and produces a strong joint.

–N. David Charkes, Wynnewood, Pa.

If anyone goes to the trouble to make Matthew Teague's pleasant settee, he or she should hesitate before using reed for the seat. It's nasty stuff. Trouble is, one might not realize it until much later. But the eye, in comparing it to oak splits or hickory bark, will see that it does not develop a patina, a sheen. It merely gets dirty. Even new, it looks what it is: fibrous, stringy. Try to stain it, and it blotches horribly. (If paint is contemplated, then it's okay.) Reed baskets at craft shows are instantly recognizable as poor third cousins to the (few and far between) oak ones. Its dull regularity gives it away. Buy oak splits—or make them. It's not hard. Hickory-bark strips are even easier. Hickory and oak look good immediately—and better as they age.

–Harriet Hodges, Salem, Va.

Model numbers set straight—A review of the Makita cordless blower (*FWW* #149) misstated two model numbers. The correct battery charger is model No. DC1801, and the battery is No. 193159-1.

Router noise levels—In the review of midsized plunge routers (*FWW* #149, pp. 46-53), a reference was made to the Makita and Porter-Cable machines tying for lowest noise levels. Actually, the Bosch is the least noisy of the routers tested, as indicated in the chart.

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-in-chief

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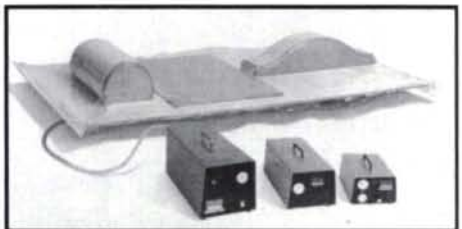

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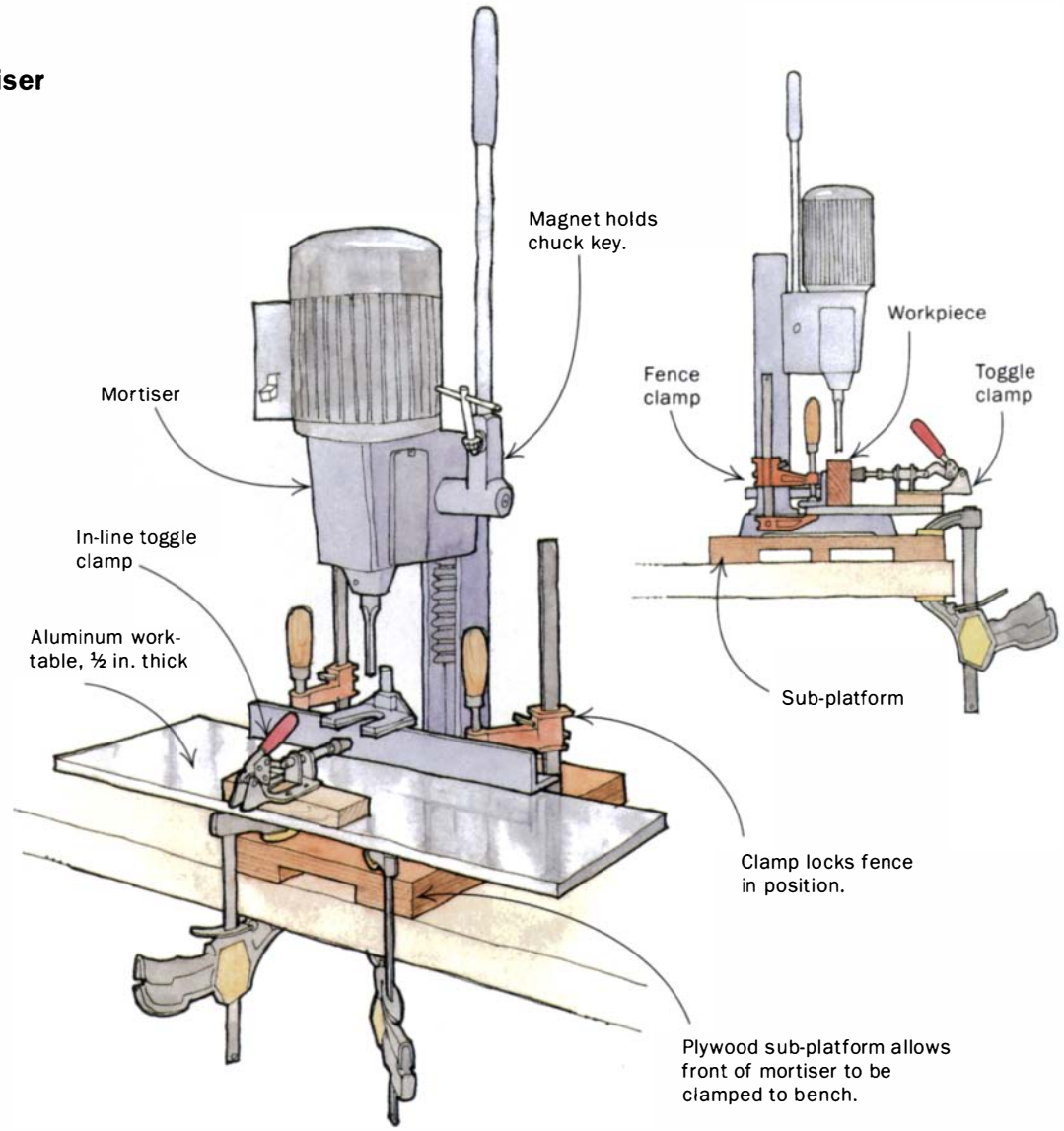
Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Upgrading a benchtop mortiser

The first year of using my benchtop hollow-chisel mortiser was an exercise in frustration. I found it hard to believe that a machine so simple and effective in concept could be so difficult to use. The biggest problem with the machine occurred when extracting the chisel. The hold-down did not lock the workpiece securely and thus caused the chisel to jam in the mortise. This happened more frequently with bits larger than ⅜ in., and they became more difficult to free after making a plunge cut.

The jamming also revealed another problem—the inherent instability of the machine. When I attempted to free the chisel by pushing up the handle, the entire machine had a tendency to tip back. Clamping the machine to a workbench was impossible because there was no place to mount a clamp at the front of the machine. Also, the worktable was just too small to support the longer workpieces I was cutting.



After studying these problems, I came up with several upgrades. The first thing I did was attach the mortiser to a permanent sub-platform made of two layers of laminated ¾-in. plywood. The sub-platform raises the mortiser 1½ in. off the benchtop and provides a lip at the front for clamping the unit securely to the benchtop.

Next I removed the small medium-density fiberboard (MDF) worktable that came with the machine and replaced it with a 10-in. by 24-in. aluminum plate, ½ in. thick. This size worktable provides much greater surface area to support the workpiece and makes sliding the work across the worktable much easier.

To hold the workpiece more firmly in place during mortising, I installed an in-line De-Sta-Co toggle clamp at the front of the worktable. I attached the clamp by tapping mounting holes into the aluminum plate. The De-Sta-Co clamp applies tremendous pressure against the fence. Often, I found that the pressure of the clamp against the workpiece would cause the fence to slide back regardless of how tight the handle was tightened. So now when my setup is perfect I lock down the fence with quick-action bar clamps.

I made a couple of other adjustments to make the machine easier to use. I replaced all of the original adjustment setscrews with long socket-head screws that are easier to access and adjust. I also placed two rare-earth disc magnets on the machine in handy spots to hold the hex key and the chuck key near where they are needed.

—David Nastri, Wolcott, Conn.

Continued on p. 16

A reward for the best tip

David Nastri won an engraved Lie-Nielsen handplane for his winning tip on retrofitting a benchtop mortise machine to make it more user-friendly and efficient. Nastri turned to woodworking as a form of rehabilitation after suffering some serious head injuries in an automobile accident. He often makes and donates furniture for charitable auctions. Send us your best tip, along with any photos or sketches (we'll redraw them), to Methods of Work, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

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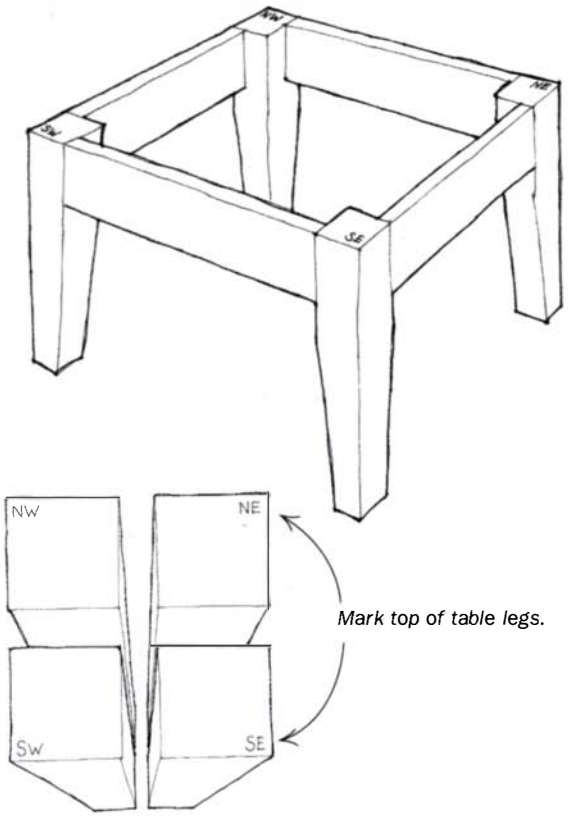
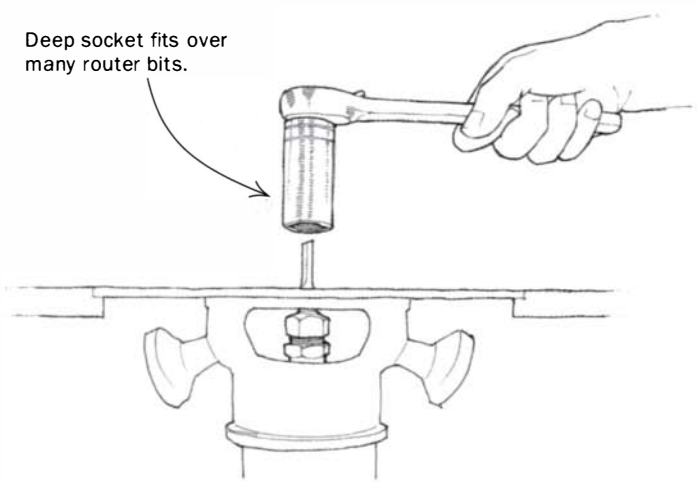


I use a simple compass-based marking method to orient table legs. The system shows the position of each leg relative to the other, as well as the outside corner of each leg. It helps me keep the pieces oriented correctly and avoid cutting a mortise in the wrong side.

—Kirby Snively, Harbor Springs, Mich.

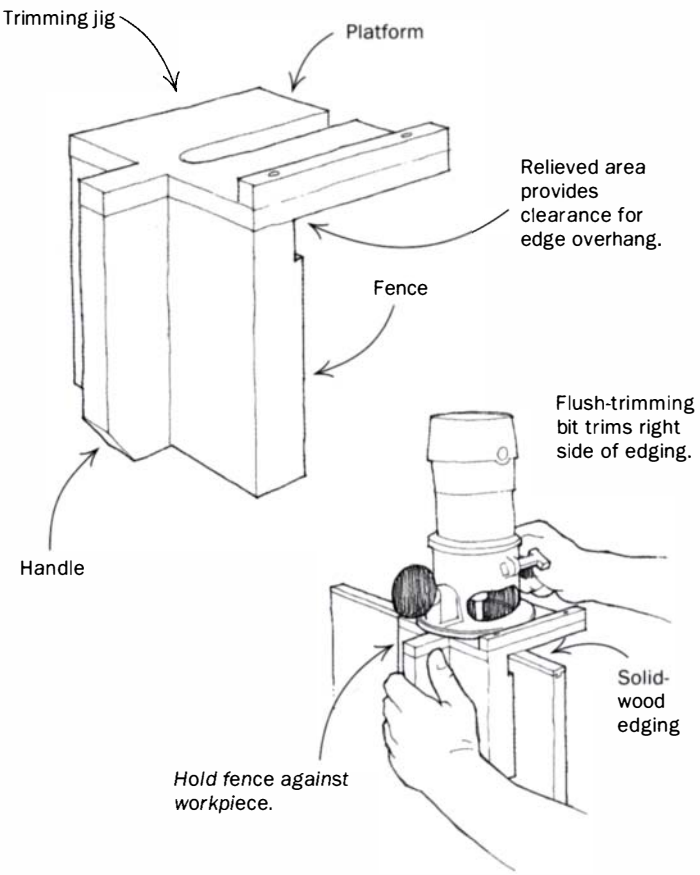
Deep socket fits router collet



Until I made this discovery, every time I needed to change bits in my table-mounted router I had to lift it out of the table to get at the collet nut. Over the duration of a project, the time spent removing and replacing the router adds up. But I just discovered that a deep socket (in my case a ⅞-in. spark-plug socket) will fit my router's collet nut and has plenty of room to fit over many of my router bits. Use of the socket greatly reduces the effort required to change a bit. This method should work with any router that has a shaft lock feature, although the size of the socket may vary.

Make sure your router is unplugged before you try this, because a socket-driver handle spinning at 20,000 rpm could really put a crimp in your workday. *—Robert F. Reynolds, Columbia, Md.*

Trimming solid-wood edging on plywood



I prefer to cover the raw edges of plywood cabinets with hardwood strips that I join to the cabinet pieces with tongues and grooves. I cut the strips a little wider than the thickness of the plywood to ensure complete coverage. This, of course, requires that the overhang be removed after gluing. I first tried a belt sander to trim the excess, but the sander was always just one little slip away from sanding right through the veneer.

After such a slip, I decided that a trim router with a flush-trimming bit would do a better job. But the narrow edge of the plywood did not provide an adequate support base for the router. So I built the trimming jig shown above, which consists of a handle, a platform and a fence that rides against the plywood. Cut a slot in the top of the platform for the router bit, and attach a stop to the back of the platform to keep the bit centered in the slot. Relieve the fence at the top of the inside surface so that it will clear the overhanging edge and any squeezed-out glue.

To use the trimming jig, clamp the plywood in a vertical position and, with your left hand, bring up the jig's fence to the left side of

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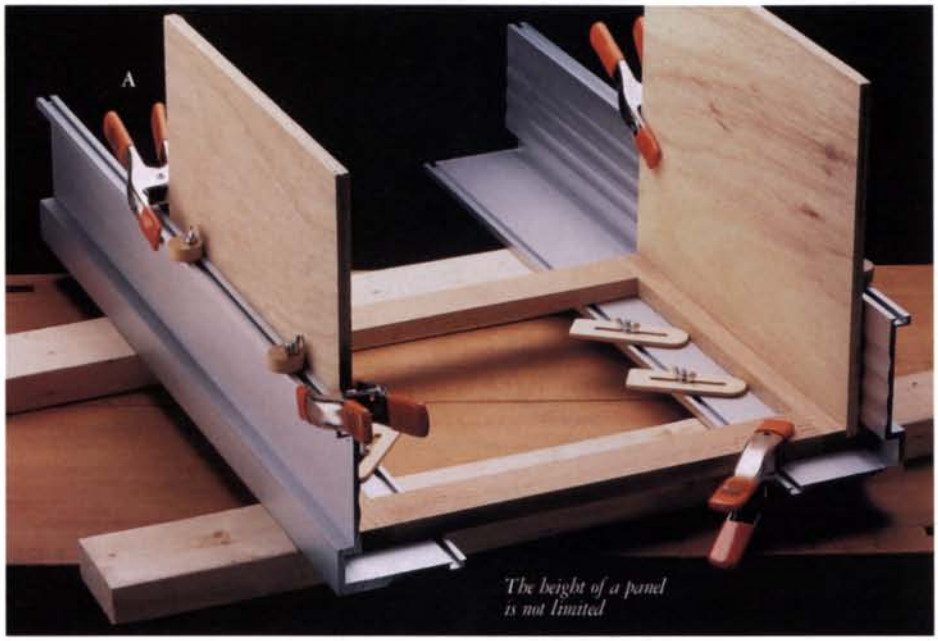

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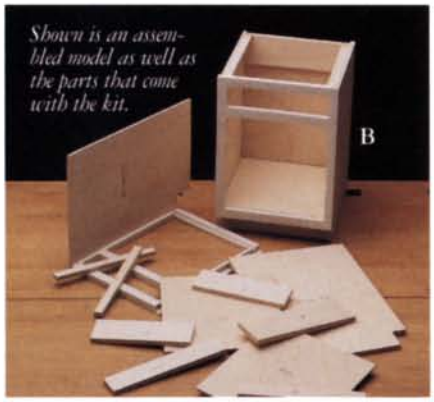

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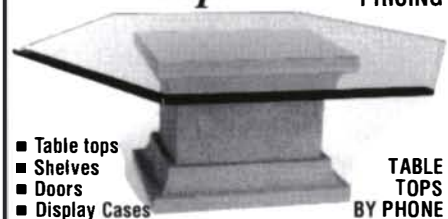

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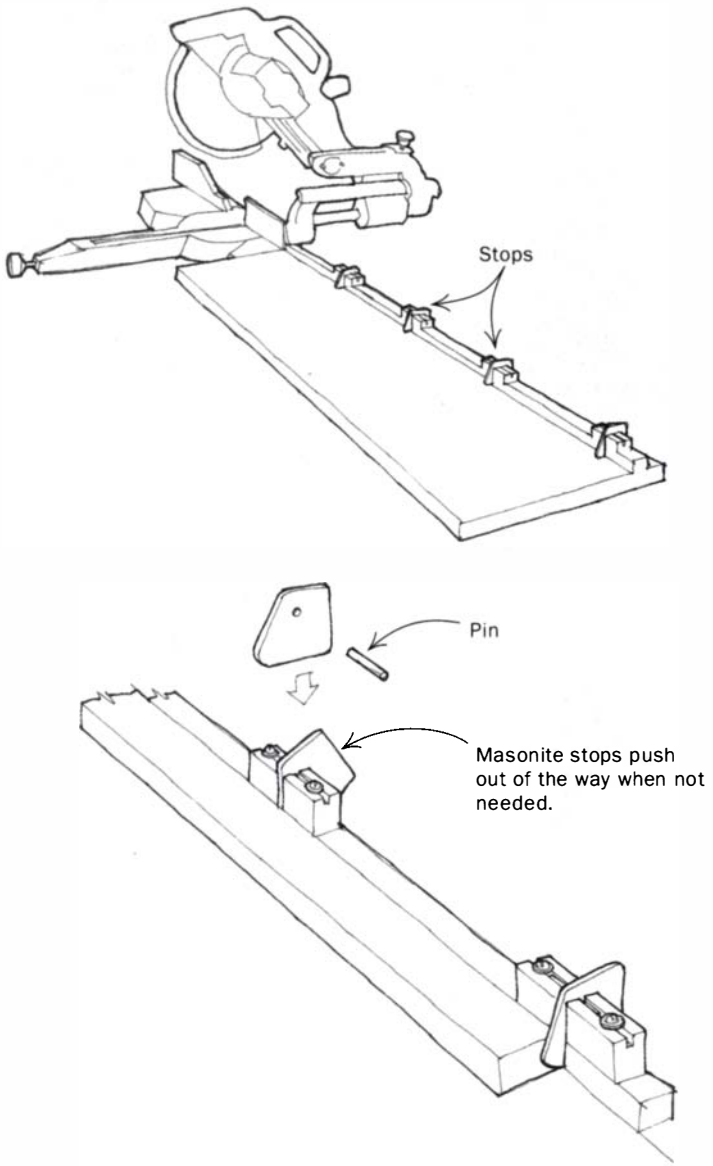
the plywood. Insert the router so that the flush-trimming bit is riding along the right side of the plywood. Push the jig away from you while exerting a little pressure on the router to keep the bit bearing against the plywood. This will trim the edging neatly without marring either the plywood or the hardwood edge.

—Paul Heiser, Reno, Nev.

Multiple cutoff stops for standard lengths



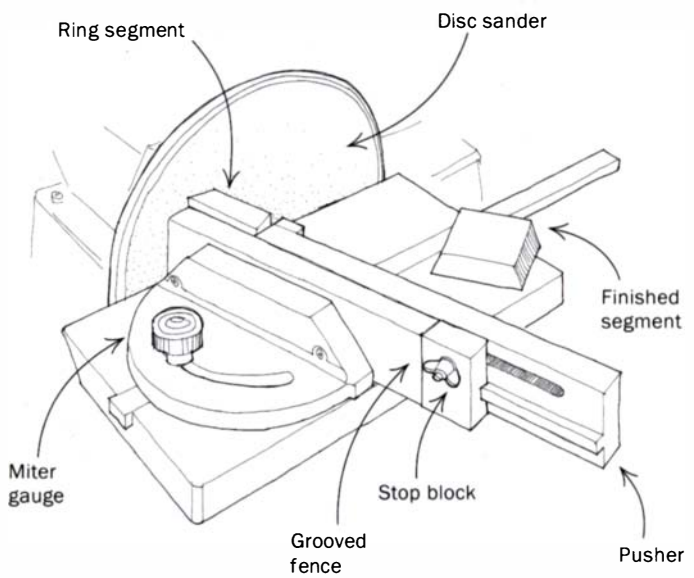
I developed the system of cutoff stops shown above to address a problem in a molding shop. After we removed knots and defects from a piece of molding, we needed to trim the remaining piece, which could be any random length in feet. This system eliminated the necessity of lining up one end of the molding against a mark and allowed the operator simply to butt the stock against any of a series of stops, pushing the rest out of the way as the molding was pressed against the fence. This same idea could be incorporated into a production setup, where any one of several standard lengths needs to be cut quickly. The beauty of the system is that there is nothing to move or adjust. A positive stop exists at each position. Any one particular stop can be used without adjustment and without deactivating any other stop.

The basic operation is as follows: Suppose the 7-ft. stop is needed. Simply place the end of the stock against the 7-ft. stop, then push the stock back against the fence. The other stops between the blade and the 7-ft. stop, extended only by their counterbalanced shape, fold effortlessly out of the way.

The stops are made from ⅛-in.-thick Masonite paneling. To make them, I stack a dozen or so rough blanks together, drill the hole for the pin, then bolt the stack together. I shape them all at once on a belt sander. I keep extras, and if one gets broken, worn or damaged, it's a simple matter to replace it.

—Roger Alan Skipper, Oakland, Md.

Segmented turning blanks on a disc sander



I like to turn bowls from ring assemblies that have been laminated from segmented blanks. The problem with building ring assemblies is that any minor discrepancy in the bevel angle or the size of each segment will accumulate into a large gap when you glue them all together. To avoid that problem, I devised this jig, which ensures that each segment is exactly the same.

You can make the jig from any close-grained hardwood. It consists of three simple parts: a grooved fence that attaches to the miter gauge; a pusher that slides along the fence; and a stop block.

To use the jig, first miter the segments on a tablesaw to a rough size and angle. Allow about 1/16 in. extra in length. Scribble pencil marks on the miters of all of the segments and then—with the miter gauge set at the correct bevel angle—sand one end of all of the segments on the disc sander until the pencil marks disappear. Find the shortest segment and sand the remaining end miter of this segment to produce a master. Use the master to set the stop block on the jig and tighten the wing nut to lock it into place. One by one, place the remaining segments against the fence and sand the

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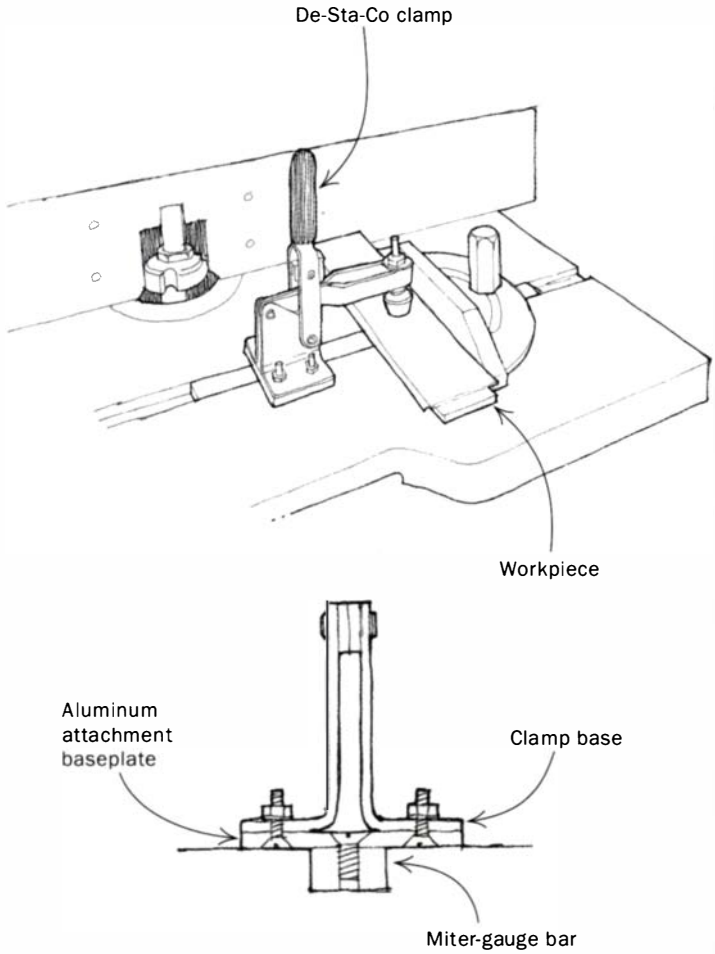
other ends, sliding the segment into the sander until the pusher hits the stop block. All segments should now be the same length and be beveled at the same angle.

—Bob Deacon, Gorleston-on-sea, Norfolk, England

Quick tip: I use a food vacuum-storage setup for small veneering jobs. Because the bags are sealed, the vacuum pump doesn't have to run continuously, and you can do as many projects as you want with only one vacuum tool. With the proper attachment, the device will draw air from Mason jars to enable long-term storage of finishes with no skin forming on the top.*—Tom Love, Delmont, N.J.*

Miter-gauge hold-down

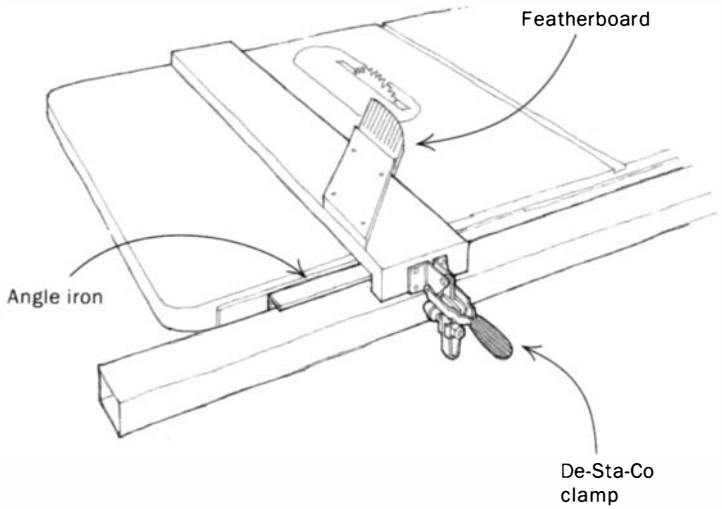


I was having trouble shaping the ends of cope-and-stick rails on my shaper. The narrow pieces were difficult to hold tightly to the miter gauge, and they often shifted position during the cut. So I came up with the clamping miter gauge shown above. It is inexpensive, easy to make and works beautifully. The same idea could be easily adapted to a router table or a tablesaw.

I used a De-Sta-Co No. 210 clamp (available from many mail-order suppliers). Attach the clamp to your miter-gauge bar by first screwing a ¼-in.-thick aluminum baseplate (about 2 in. by 3 in.) to the bar. You will need to drill and tap the bar to attach the baseplate. Drill holes through the baseplate to match the holes in the base of the De-Sta-Co clamp and attach the clamp with machine screws.

—Bjarn Sorensen, Tempe, Ariz.

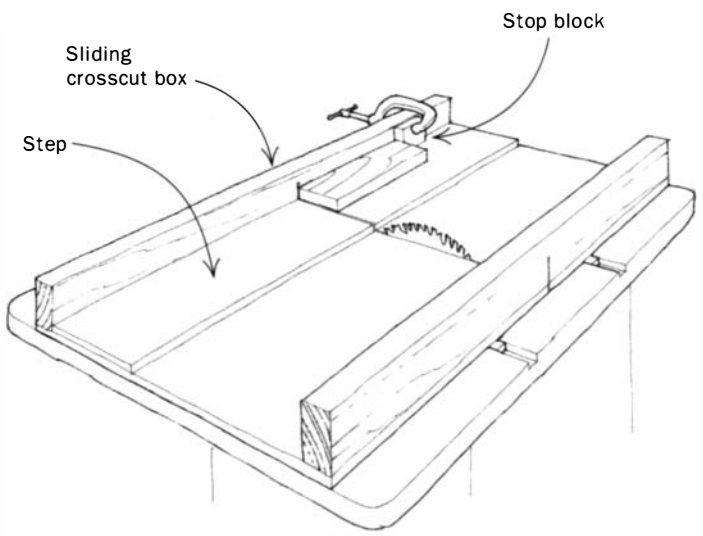
Quick-locking featherboard



I was unable to find a featherboard that I could adjust as quickly and lock in place as solidly as my Biesemeyer fence. I finally took inspiration from the locking mechanism on my fence and made the featherboard shown above with a toggle clamp, a length of angle iron and some scrap pieces of wood.

—Mike Miller, Milwaukee, Wis.

Stepped crosscut box



I added a removable step to the sliding crosscut sled for my tablesaw, as shown above. This gives me two fences to work with. I use the front fence to square one end of my stock and the back fence to cut the stock to length using a stop. Another advantage of this setup is that I can replace the step at any time and saw a fresh kerf so that I can better see the exact cut line. Also, I can remove the step to cut wider pieces.

—Anthony Leighton, Navarro, Calif.

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Notes & Comment

Turned lampshades from green wood

A large blank of aspen. *The delicate lampshade begins as a blank of green aspen (left) weighing up to 200 lbs. Each finished piece has a unique pattern, but they all cast a soft, warm light.*

Starting with a blank weighing up to 200 lbs., New Hampshire turner Peter Bloch produces 90 gal. of shavings to yield a translucent lampshade weighing only a few ounces.

The lampshades are made of quaking aspen, which is harvested locally. Bloch turns sections 20 in. long, with diameters ranging from 15 in. to 24 in., until they are thin enough to be almost transparent. Because he is working green wood (a fine spray of water often accompanies the initial cutting), the risk of the wood cracking is a constant problem. To eliminate this, once he has begun turning, Bloch has to continue cutting away the waste until the wood is at its final thickness and free to flex without checking.

Bloch mounts the blank on a 2-hp Oneway lathe and turns it at a speed of 400 rpm to 600 rpm (see the photo above). He alternates cutting between the outside and the inside until a central cone is removed. When the wall has reached a thickness of ½ in., he shines a light from the outside to help judge the translucency of the turning. Eventually, Bloch takes the wood down to a uniform 3⁄32-in. thickness, using the light and his fingers to find thick spots.

Once the shade has been shaped, he blasts out much of the remaining moisture using compressed air. Then Bloch sands the shade, allows it to dry for a day or two, then gives it three coats of a polymerizing rubbed-oil finish. Despite its frail appearance, the shade is surprisingly robust.

For more information, call Bloch at (603) 526-6152, or visit his web site (www.woodshades.com).

—Mark Schofield, assistant editor

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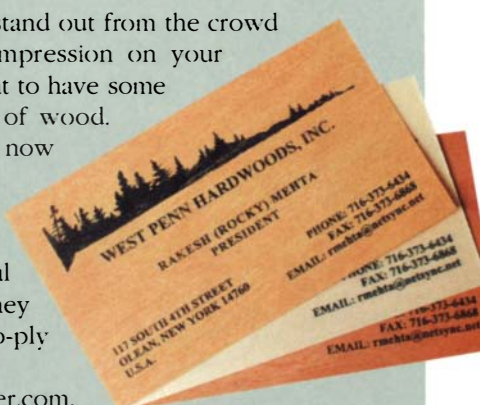

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Photos, this page: Mark Schofield

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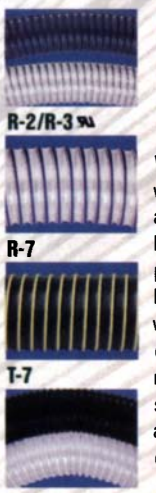

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New books cover a range of furniture styles

Five books recently sent to *Fine Woodworking* cover the whole range of furniture style and sophistication. The annual volume of *American Furniture* (edited by Luke Beckerdite, University Press of New England; 2000. $55 softcover; 258 pp.) is now in its eighth volume. The books provide a forum for research on furniture design, production, use and appreciation. To be included in the volume, furniture must have been made or used in the Americas from the 17th century to the present. Subjects covered in the 2000 edition include the early furniture of Job and Christopher Townsend and furniture by the Potthast Brothers of Baltimore (1892-1975). The contents are detailed and sometimes academic in tone, but any dryness is livened by numerous illustrations.

Three of the books focus on a particular style of furniture: *In the Shaker Style* (The Taunton Press; 2001. $24.95 softcover; 160 pp.) and *In the Craftsman Style* (The Taunton Press; 2001. $24.95 softcover; 176 pp.) feature articles from *Fine Woodworking* and *Home Furniture* magazines. They cover the history of their respective styles as well as construction techniques and projects to build. *Authentic Arts and Crafts Furniture Projects* (Popular Woodworking Books; 2000. $24.99 softcover; 128 pp.) features 22 projects that have appeared in *Popular Woodworking* magazine.

A different genre of furniture is covered in *Built-in Furniture* (by Jim Tolpin. The Taunton Press; 2001. $24.95 softcover; 216 pp.). This book—originally published in hardcover—is more of an ideas book than a how-to book, with each chapter showing built-in furniture in different areas of the house. —*M.S.*

Something for everyone. *Five books recently received by* Fine Woodworking *cover many styles of furniture.*

Father-and-son week at The Windsor Institute

The chairmen. *Stevan and Mike Pekovich display their products at the end of a week at The Windsor Institute.*

This past summer, as a birthday present to my father—and an excuse to hang out with him for a week—I enrolled us in a chair-making class at The Windsor Institute in New Hampshire. The school is run by noted chair maker Mike Dunbar and his wife, Sue, who takes care of the business end of things. We took a five-day class in making a sack-back Windsor, the course Dunbar recommends for first-time students.

My dad and I have very different woodworking backgrounds. I spend quite a bit of time in the workshop, but my dad's experience is limited to furniture refinishing and an occasional repair. Despite this difference in skill level, we entered the class on equal footing, due to the fact that the tools and techniques used in Windsor chair making are so specific to the craft. Learning to use a drawknife, scorp and gutter adze was a challenging experience, to say the least. Dan Faia and Barry Mann, two very capable craftsman, helped watch over the class of 16 students. Fortunately, even the most serious-looking missteps were quickly corrected.

Dunbar began the class with a slide show and lecture about the history of the Windsor chair, but it wasn't long before the students got to work shaping and steam-bending the arms and bow of the chair. Along the way the class worked its way through shaping the seat, whittling spindles and finally drilling and assembling the chairs. The class curriculum and pacing had been fine-tuned through 20 years of teaching, and the lectures and work periods flowed smoothly.

Dunbar said that most students take the class intending to build more chairs in the future and that roughly 80% to 90% actually do. I'd eventually like to fill out a set for my kitchen table. For my father, though he enjoyed the class, I think he is content having built just one chair.

Contact The Windsor Institute at (603) 929-9801 (www.thewindsorinstitute.com).

—*Mike Pekovich, art director*

Photos, this page: Erika Marks (top) and Darlene Pekovich (bottom); page 26: Jon Binzen

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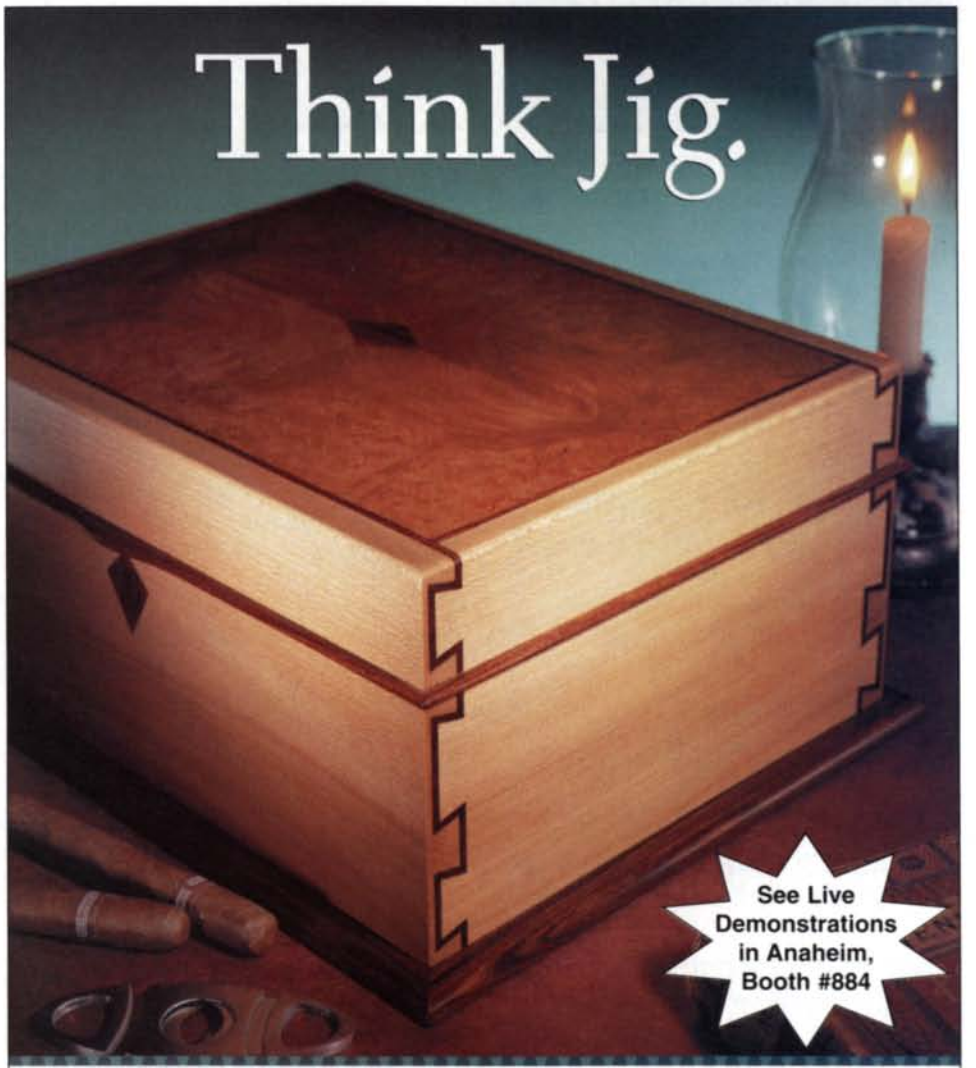

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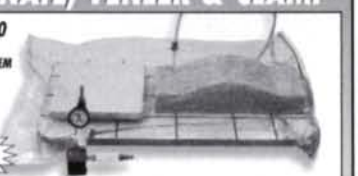

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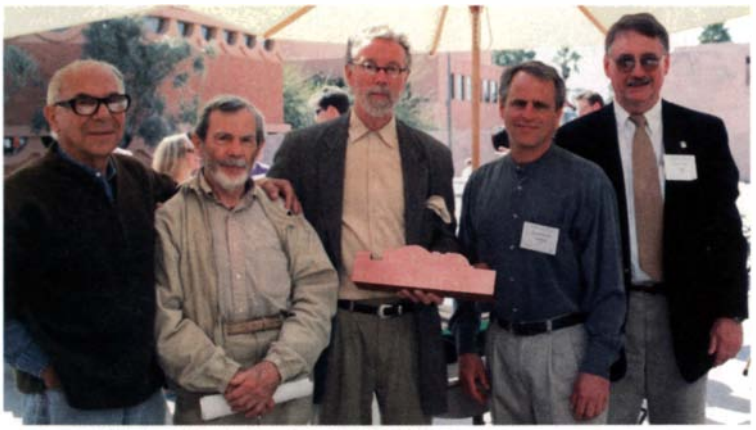
Furniture Society recognizes lifetime achievement

Five legendary woodworkers, all well-known to *Fine Woodworking* readers, received the Award of Distinction for lifetime achievement at the Furniture Society's fifth annual conference in March. Sam Maloof, Art Espenet Carpenter, Wendell Castle, James Krenov and Tage Frid were honored. Their friends, former students or colleagues presented the awards.

"In my 30 years in the field," Castle said in his acceptance speech, "I have won many awards, but this one has special significance because it was conferred by my peers." Castle, Maloof and Carpenter were present to receive their awards. Krenov was represented by a College of the Redwoods colleague, and Frid was represented by his son. All five honorees are known for their hand-made furniture and for their teaching of the craft of woodworking. Each one has written for *Fine Woodworking* at some time in his career.

The Furniture Society is an international nonprofit organization dedicated to the promotion of the art of furniture making. This year's conference was held at Arizona State University. *Fine Woodworking*, one of the sponsors of the awards, also sponsored several presentations at the conference and was the subject of a panel discussion on its 25th anniversary.

—Tim Schreiner, editor-in-chief



Woodworkers recognized. *Furniture Society awards for lifetime achievement in woodworking were accepted by (left to right) Sam Maloof, Art Espenet Carpenter, Wendell Castle, David Welter, on behalf of James Krenov, and Peter Frid, on behalf of Tage Frid.*

Notes & Comment

We welcome stories, anecdotes about woodworking, photos of unusual work—anything woodworkers might like to know about. We pay for material we use. Send submissions to Notes & Comment, Fine Woodworking, *P.O. Box 5506, Newtown, CT 06470-5506.*

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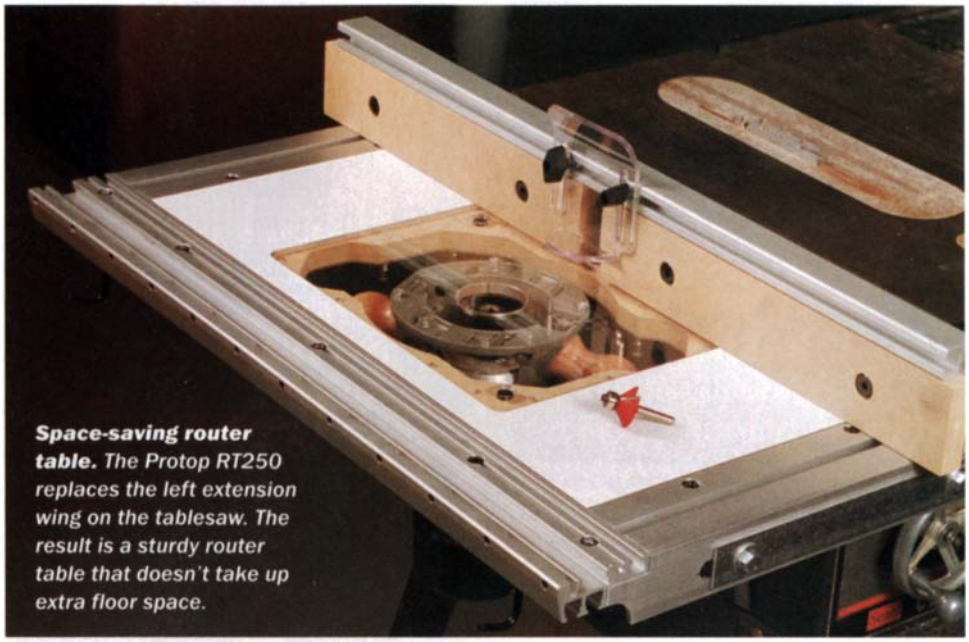
READER SERVICE NO. 97

Tools & Materials

Router table mounts to tablesaw



Space-saving router table. *The Protop RT250 replaces the left extension wing on the tablesaw. The result is a sturdy router table that doesn't take up extra floor space.*

Empty floor space can be hard to find in many shops. That's why a new product from Bench Dog, the Protop RT250, caught my eye. It's a router table, complete with fence, that installs on the left side of most tablesaws, replacing the extension wing. You end up with a router table without taking up any more room in the shop.

The Protop fits most popular tablesaws. But it won't fit saws with the motor on the left side of the base (when viewed from the front), such as the Powermatic 66.

There's a slot in the left end for a miter gauge (not included). A series of Allen screws along the slot allow you to create a snug, sliding fit for the bar of the gauge.

The fence slides in a pair of T-slots, one located on each end of the table. A pair of T-handles makes it easy to lock the fence in place. There's also a dust port and bit guard. The fence has two adjustable faces made of medium-density fiberboard (MDF). When a cut requires "burying" the bit in the fence, you simply create an opening for the bit by sliding the faces as needed.

It took a few hours to install the Protop on my 20-year-old Craftsman tablesaw. But before I could start, I needed to buy a couple of 30-in. lengths of ⅛-in. by 1¼-in. steel bar stock and some bolts, washers and nuts to fasten them. And I had to drill a few ⅜-in.-dia. holes in each bar. (Only the Craftsman and Delta Unifence saws require the bar.) When assembled, the Protop measures 14⅞ in. wide by 27 in. long.

The router mounts to a removable acrylic plate that's just under ⅜ in. thick. The center hole in the plate measures 2 in. dia. To ensure the plate ends up perfectly flush with the surface of the router table, it's supported by 12 leveling screws.

Once the Protop was mounted, a quick check with a level showed it to be flush and level with the top of the saw table. I couldn't detect any front-to-back movement when I did some pushing and pulling. However, the router table deflected a little when I leaned pretty heavily on the T-track, but it was not significant.

I made an assortment of cuts, using a straight bit, a round-over bit and chamfering bit. The table and fence felt secure during each of the cuts, with no more than the usual vibration.

The Protop RT250 is priced at $319.95. For more information, contact Bench Dog at (800) 786-8902. *—Tom Begnal*

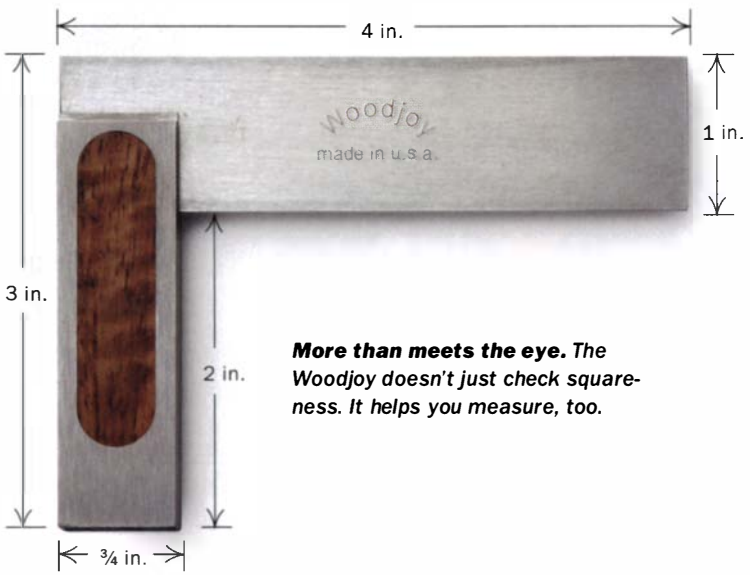
A square with extras

Woodjoy is a relative newcomer to the world of fine hand tools. The company makes a small but growing line of spokeshaves as well as beading, measuring and marking tools.

The Total Square is one of my favorites. This little square with a 4-in. blade is the perfect size to keep in your shop apron. But it does a lot more than most squares. The Total Square is built with various parts at specific dimensions, all unmarked. Once you memorize them, the square becomes an effective measuring device. For example, the blade is 1/16 in. thick and 1 in. wide; the handle is ½ in. thick, ¾ in. wide, and where it meets the blade, it has a 1/16-in. by ⅛-in. notch. Several other dimensions are built into the square, and half the fun is locating them and figuring out how they might be used.

The Total Square costs $40. For more information, contact Woodjoy at (508) 669-5245 (www.woodjoytools.com).

—Anatole Burkin



More than meets the eye. *The Woodjoy doesn't just check squareness. It helps you measure, too.*

Photos, except where noted: Erika Marks; this page (top): Tom Begnal

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See The Best Reviewed Against The Rest by Fine Woodworking, March/April Page 68

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A fully tensioned bandsaw blade puts several parts of the saw under a lot of stress. That sometimes causes problems. Tires can go out of round. Or blades can become brittle, causing them to break prematurely. So whenever a bandsaw is expected to sit idle for more than a few hours, it's a good idea to release most of the tension on the blade.

Some saws have a built-in quick-release mechanism for just that reason. But many don't. Carter Products has just introduced a gadget called the Quick Release, which allows you to add or remove blade tension quickly. It fits the Delta 14-in. bandsaw and most of its clones.

The most obvious component on the Quick Release is a hefty steel lever, which extends from the saw like an automotive stick shift. Pushing or pulling the lever moves the tensioning bolt up or down in ½-in. increments, with one intermediate stop, effectively adding or removing blade tension in a matter of seconds.

The Quick Release is designed so that when the tension is removed, the handle of the lever rests on the table of the saw, just behind the blade. That way, the lever serves as an instant reminder to reapply the tension before starting the saw.

Installation didn't take much more than an hour. The upper wheel and cover had to be removed. Also, two ¼-in.-dia. holes had to be drilled in the cast-iron frame of the saw, but the installation kit included a drill bit that easily cut through the cast iron.

The Quick Release will reduce wear and tear on the saw and help extend the life of the blade. The device is priced as $149. For more information, contact Carter Products (616-451-2928; www.carterproducts.com).

—John White

Handle provides a heads-up. *With the tension released, the red ball on the handle ends up just behind the blade, reminding the user to reset the tension before making the cut.*

Stick a sock on it

Woodworkers who pamper their handplanes have been known to store them in old socks to protect them. Now the Sack-Up company makes a heavy, socklike "sack" that's treated with silicone. So when you slip your favorite plane into the sack, it gets both mechanical *and* rust protection. However, I wondered if the silicone might transfer to the workpiece and affect the finish. But after doing a quick finishing test, I couldn't find any evidence of a problem. Sacks are available in four lengths, ranging from 7½ in. for block planes to 22½ in. for jointer planes. For more information, call (800) 873-7225. *—T.B.*

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11-990	12" Bench Drill Press	184
11-090	32" Radial Bench Drill Press	279
22-540	12" Bench Top Planer	254
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36-220	10" Compound Mitre Saw	169
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6547-22	6546-6 Kit with 2 batteries	115
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LS1013	10" Dual Compound Slide Miter Saw	529
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DW682K	Biscuit Joiner with case	169
DW705	12" Compound Mitre Saw	339
DW621	2 HP Plunge Router	199
DW677K	3-1/4" Planer with case	155
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READER SERVICE NO. 175

Two new bench planes

A pair of performers. *The Clifton No. 5 jack plane (left) and the Veritas No. 4½ smoothing plane (right) have some clever features not found on other planes.*

Quality handplanes, an endangered species since World War II, are making a comeback. As further evidence of this renaissance, two new bench planes have just become available. Recently, I had a chance to try out both of them in my shop.

Clifton No. 5 jack plane

Clico Tooling Ltd., a Sheffield, England, manufacturer, is offering a new line of planes based on the classic Stanley Bedrock planes, first made in 1898.

I found plenty to like about this plane. Both the frog and frog bed are machined to exacting standards, and they work flawlessly. The sole and cheeks check out flat and square. And the handle and knob, made of bubinga, feel great in my hands. The blade is a fine piece of steel, with a nicely ground edge.

One of the best features of any Bedrock-style plane is that the mouth opening can be set without first removing the lever cap and iron. Just loosen two screws at the back of the frog bed, then move the bed either fore or aft via the captive head screw in the middle. The blade moves with the frog, thus adjusting the mouth opening.

The Clifton has a unique top-piece cap iron. *The bottom piece simply lifts off, a time-saver when sharpening the blade.*

Clifton has one clever feature that wasn't found on Bedrock planes. The Clifton cap iron has two pieces, with the shortest piece closest to the front of the plane. The two pieces interlock, so when the lever cap is removed, the short piece simply lifts off the blade, while the cap-iron screw keeps the long piece secured to the blade. That way the blade can be sharpened without having to remove the cap iron. And once the blade is sharpened, this unique cap iron also makes it easy to reassemble the parts. The Clifton No. 5 jack plane sells for $199. For more information, contact Highland Hardware at (800) 241-6748 (www.highlandhardware.com).

Veritas No. 4½ smoothing plane

As an ardent plane collector and user, I'd have bet there was nothing new you could show me in a bench plane. That was until Veritas recently unveiled its new No. 4½ smoothing plane, based on the venerable Norris adjusting mechanism.

With the Norris system, the lever provides two adjustments. A knob on the end of the lever adjusts the blade height. And the lever itself provides lateral adjustment. Veritas enhanced the mechanism by putting grub screws at both sides of the throat, so the blade can be perfectly centered in the mouth opening.

The body is made from a ductile iron casting, which is superior to the gray iron castings used in most other planes. Also, Veritas has reinforced the wood handle by adding a cast-iron rib and extending it from the top of the frog to the top of the handle, with a steel pin in the handle.

The main innovation of the plane, however, is the frog. It extends to the bottom of the sole. And because the frog and the body of the plane are ground as a pair, the end of the frog is absolutely flush with the sole. Another neat thing about the frog is that it can be adjusted front to back without removing the iron or lever cap.

The plane also has a thick blade made of A2 tool steel, which holds an edge well and is less likely to chatter. I didn't find any burrs or sharp edges on the blade or cap, giving the plane a look and feel of one that was previously owned. I like that. And the blade came sharp, right out of the box.

Lever does double-duty. *The lever on the Veritas, based on the Norris design, controls both the depth and side-to-side movement of the blade.*

After making the proper adjustments, I took a few passes with the plane on a workpiece and was rewarded with beautiful shavings and a perfect surface.

The plane retails for $159. For more information, contact Veritas at (800) 871-8158 (www.leevalley.com).

—Ernie Conover

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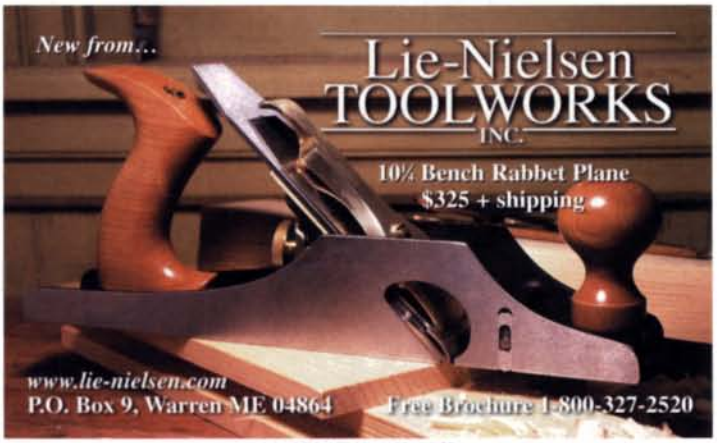

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READER SERVICE NO. 174

Sandpaper sharpening kit

With all of the high-tech sharpening gizmos being pitched at woodworkers, is there a place for a low-tech system in your shop? Mike Dunbar thinks so. Dunbar, master chair maker and author, is now selling the simple sandpaper sharpening system used at The Windsor Institute, the school he runs in Hampton, N.H.

Called Easy Sharp, the main component of the system is a piece of flat, aluminum plate ⅜ in. thick by 5 in. wide by 24 in. long. When sandpaper (included with the kit) is adhered to the plate, you end up with a flat abrasive surface that's perfect for honing the edges of plane irons and chisels. Once the work with the sandpaper is over, an abrasive-charged leather strop (also included) is used to hone the edge until it's highly polished and razor-sharp.

An assortment of wood dowels and blocks are also part of the package. These are for sharpening curved edges, such as those on carving and turning gouges. To do curves, sandpaper is adhered to dowels or blocks. Then the dowels are used to hone the inside of the curved edge. The flat blocks work on the outside.

I used the kit to generate a keen cutting edge on several chisels and plane blades. Compared to the more traditional sharpening methods that use waterstones or oilstones, Easy Sharp gave me faster results with less fuss. And, because a grinding wheel isn't used, I didn't have to worry about overheating the edge, a condition that causes steel to lose temper.

At $110, Easy Sharp seems a bit pricey, but it works. A 20-minute video (included) takes you through the entire procedure, start to finish. For more information, contact The Windsor Institute (603-929-9801; www.thewindsorinstitute.com).

—Dennis Preston

Scary sharp in a box. *The Easy Sharp kit provides everything you need to sharpen tools with sandpaper. It even includes a video (left).*

Titanium hammer is no lightweight

Seems like just about everything is being made of titanium today, from cell phones to space stations, even hammers. For some products, titanium is a fad. I had my reservations about titanium hammers until I actually started using a Stiletto finish hammer.

You can carry a titanium hammer in your tool belt all day and not even know it's there. And that's good news if you suffer from back problems. Due to the tool's light weight, you have to make up for it somehow to equal the striking force of a heavier tool. So you end up swinging it faster, which is a breeze. The action feels weird at first, as if someone has played a joke on you and hollowed out the head.

The Stiletto really excels when you have to swing the hammer sideways or in an upward arc. Less weight translates to more control, at least for me, in awkward positions. Stiletto makes an entire line of hammers, for all applications. For light-duty work, I like the 10-oz. finish hammer (FH10C), which sells for $55. For more information, call (800) 987-1849 or visit Stiletto's web site at www.stilettotools.com.

—A.B.

Tom Begnal is an associate editor; Anatole Burkin is executive editor; John White, contributing editor, is writing a book on tool maintenance and helps keep the Fine Woodworking *shop running smoothly; Ernie Conover works wood in Parkman, Ohio; Dennis Preston is an engineer and woodworker living in Brookfield, Conn.*

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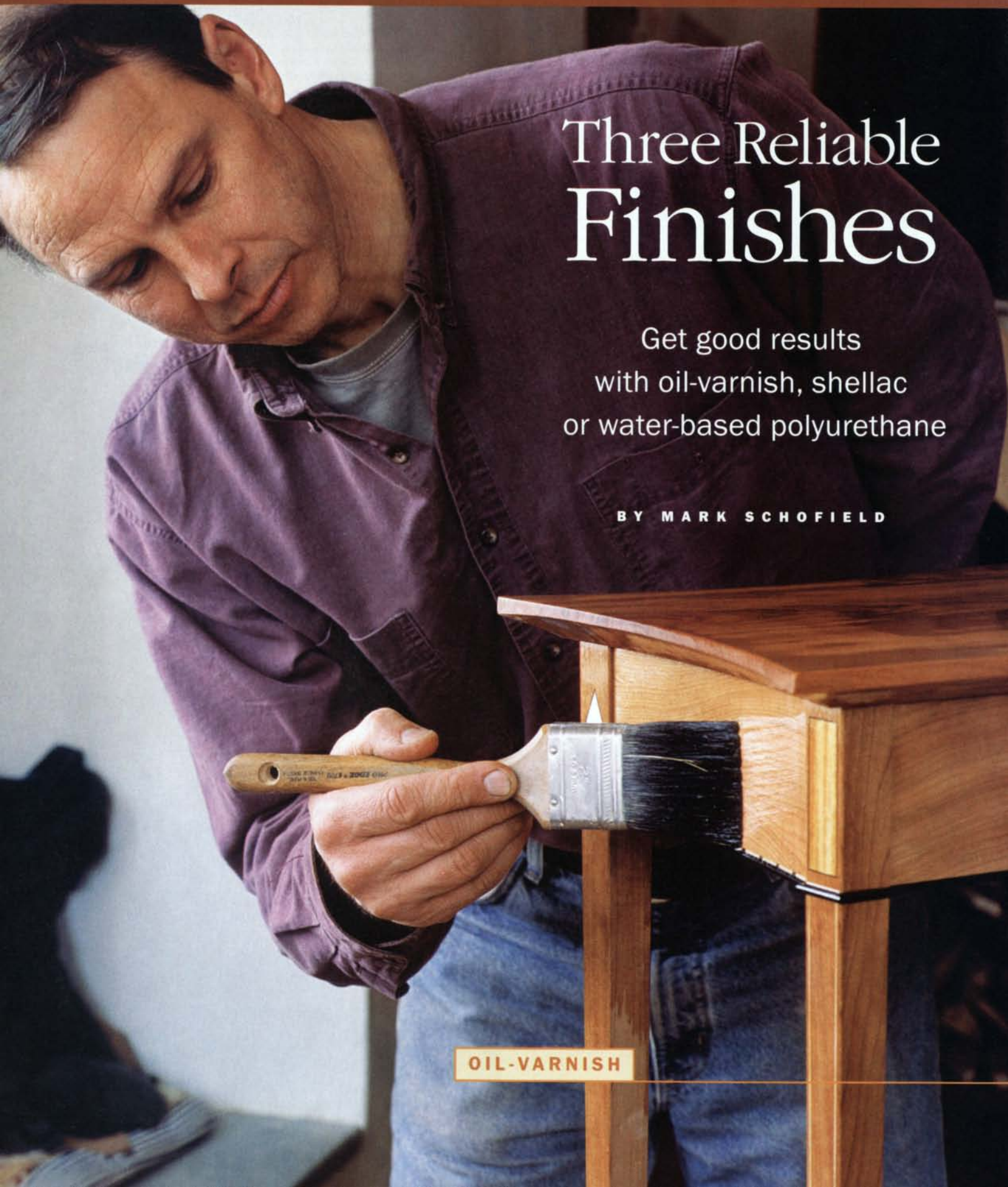


Three Reliable Finishes

Get good results with oil-varnish, shellac or water-based polyurethane

BY MARK SCHOFIELD

OIL-VARNISH

If the furniture of Garrett Hack, Phil Lowe and Dolly Spragins are contrasts in styles, then so are their approaches to finishing. Hack relies on a home-brewed wipe-on mixture; Lowe's method is as traditional as the period pieces he builds; and Spragins favors cutting-edge spray equipment and water-based finishes. What they have in common is a method of finishing that favors their style of furniture and at the same time is easy to apply.

None of these woodworkers would describe finishing as their favorite job, but all three know exactly how they want each finished piece to look. By experimenting with different finishes and methods of application, they all found a finish flexible enough to yield a range of looks to suit their furniture.

Garrett Hack: Oil-varnish is easy to make, apply and repair

Anyone who studies furniture knows that furniture makers are creatures of habit. They sometimes try new things, but when it comes to finishes, makers rely on what they know. Hack is no different. He has a favorite finish that he has been using for years, a simple mixture of equal parts varnish, tung or linseed oil and turpentine. It combines all the virtues of a good finish: It is forgiving in the proportions of ingredients and how they are mixed. It can be tinted, it is easy to apply, and it is durable and renewable. Hack has used it for everything from elegant inlaid tables to kitchen cabinets to hoe handles.

The recipe is pretty simple—A finish chemist could tell you about long and short oil varnishes and the nitty-gritty of this mixture. Hack's nonscientific view is to think of it as a thinned-out wiping varnish. It combines some of the durability of varnish with the workability and appeal of an oil finish. Mix it heavy with a hard varnish like urethane, which has lots of tough synthetic resins, and you can build up a very protective and glossy finish suitable for a dining-room table. For a long time Hack used spar varnish, a flexible varnish applied to wooden boats, that is high in natural resins. Since his local hardware store stopped carrying it, he has tried other varnishes, all with good results.

Hack uses linseed or tung oil. Boiled linseed oil tends to have a richer color than tung oil and is somewhat less expensive. Tung oil

Photos, except where noted: Mark Schofield; facing page: Michael Pekovich

Brush it on. *Oil-varnish is applied liberally and allowed to sit for 15 minutes. The first coat soaks into the wood, bringing out the color and depth.*

Rub off any surplus. *After the first coat, little rubbing is required, but for subsequent coats the surplus finish must be wiped off before it becomes tacky. After the bulk of the surplus has been removed, switch to clean cloths for a final buffing.*

How many coats to apply is a matter of taste and judgment—what look you want and how much protection you need.

yields a slightly harder and more durable finish. As for the proportion of oil in the mixture, heavier on the oil gives it lots of workability and a satiny sheen, but you have to build up more coats. A blend with more oil would be good for a piece of bedroom furniture, where less than maximum protection is fine.

Thinning the varnish mixture gives it workability and lets you build up thin layers of finish—always better than a few thick ones. Although it's becoming hard to find, Hack prefers real turpentine over turpentine replacement or similar solvents because it works and he likes the smell of it. He once tried paint thinner and through some chemical quirk ended up with a white blush to the finish.

For the first couple of coats, Hack thins the finish to get better penetration; he adds a touch more varnish for the final coats, especially when building more sheen or increasing durability. To tint the mixture, add either artist's oil colors or one of the Minwax stains. Every coat adds a glaze of color, so a little tinting of the mixture goes a long way.

Finish is brushed or wiped on—The key to success with any finish is a properly prepared surface. For Hack, nothing beats a handplaned surface, with a clarity and sheen that a finish only enhances. For detailed moldings and parts that need sanding, he works up to 320 grit. One of the beauties of Hack's finish is that dust—in the shop or on the wood surface—doesn't present a problem. Apply the oil-varnish mixture with a brush or with a rag, saturate the surface, wait 15 minutes or longer until it starts to tack up, then wipe the entire surface. Any dust gets worked into open pores or wiped away.

How long it takes for things to tack up depends on a few variables. A hot or dry shop speeds up things considerably. A mixture heavy on varnish will get tacky more quickly than one heavy on oil or turpentine. Some varnishes, especially urethanes, go from slightly tacky to very tacky in minutes. If you get overly ambitious, and surfaces become tacky before you can wipe them, brush on more finish to soften the tackiness. Though the first coat soaks into the wood and never gets overly tacky, subsequent coats require a thorough wiping, getting into every corner and edge. Use a cotton rag in each hand to do the preliminary wiping, then two more clean ones for a final wiping. Wait at least 24 hours between coats.

A rough finish can be caused by not wiping a surface thoroughly, or it simply may result from open-grained wood. About every third coat, rub out the entire surface, while wet, with 0000 steel wool, paying special attention to these rough areas. This step helps fill the pores in open-grained woods such as ash or oak.

How many coats to apply is a matter of taste and judgment—what look you want and how much protection you need. Two coats are a minimum; with four or five coats you start to build up a

Photos, this page: Michael Pekovich

nice sheen. Finish with a topcoat of a good paste wax. Hack mixes beeswax, linseed oil and turpentine to the consistency of room-temperature butter. He wipes on the wax with fine steel wool and buffs it out to a nice, satiny sheen.

Oil-varnish is easy to repair or rejuvenate—Hack's finish can be repaired easily. If the finish is damaged slightly or becomes dull or dirty, brush on a fresh coat of finish. Rub it out with fine steel wool to loosen any stubborn dirt, such as fly spots or children's hand prints. A thorough wiping leaves the surface as good as new. This is a nice trick, indeed, one that few other finishes can match.

Phil Lowe: Nothing to match shellac

As a restorer of antiques, Lowe has had plenty of opportunity to examine the finish on many pieces of furniture up to 300 years old. Most pieces were finished with shellac, a durable finish that develops a patina that collectors prize so highly. Lowe has a single word that describes the value of shellac: versatility. The colors of shellac range from nearly transparent to reddish brown. Methods of application include spraying, brushing and padding. The finished sheen can range from an open-pored satin to a French-polished gloss. It is compatible with almost any other finish, whether applied before or afterward.

Shellac offers an unmatched choice of colors—Seedlac is orange-colored, garnet and ruby shellac have a reddish hue, buttonlac gives a brown/green tint, and blond shellac is almost clear. Lowe chooses the type of shellac based on what wood he is using and on what look he is seeking. When he built a walnut jewelry chest-on-frame for his wife 15 years ago, Lowe wanted to let the wood develop the sun-bleached look of many walnut antiques. While no type of shellac gives protection from ultraviolet rays, the oranges and browns of darker shellacs would mask the eventual bleached wood. He therefore used blond shellac, resulting in a piece that is well on its way to the aged appearance Lowe desired but with no deterioration in the actual finish.

For a just-completed Queen Anne chair, Lowe used a 2-lb. cut of buttonlac. This dark brown color with a greenish hue will combine with the purple/brown of the walnut to produce the rich brown found on many older pieces. For an amber tone, he would use seedlac. For Federal-style pieces, with their different-colored inlays and veneers, Lowe uses blond shellac, which lets the natural

SHELLAC

Lowe has a single word that describes the value of shellac: versatility.

The first coat goes on thin. *To allow for greater penetration of the first coat, Lowe thins the shellac with additional denatured alcohol.*

A shellac for every wood. *The slightly greenish hue of buttonlac combines with the purple hue of walnut to yield a rich, brown color.*

A great advantage of water-based finishes is that they dry quickly. In under an hour you can sand the first coat and apply another.

Load the spray gun. *Pour the finish through a filter as a precaution against a clogged spray gun.*

hue of the different woods show through. Shellac is not a suitable finish for heavy-use tabletops. For these areas Lowe uses Epithane varnish over the shellac.

Finish can be sprayed, brushed or padded on—Not having the facilities to spray, Lowe applies shellac with a brush or a pad. He uses an imitation double-fitch brush made from skunk hair. Such a brush holds a large amount of finish, even when tipped off, which allows him to brush on long, even coats. With less need for recharging the brush and consequent overlapping, the finished surface has a consistent color.

For padding on shellac, the size of the pad depends on the size of the area to be finished. Lowe's pads consist of cotton batting surrounded by white, finely woven cotton or cotton-muslin.

Begin by sealing the entire piece with a couple of coats. The next day, lightly dab the working surface of the pad in raw linseed oil before adding shellac. This gives more elasticity to the shellac and makes it dry slower. Gradually build the finish until you get the desired fullness. Let the piece dry overnight and then, if needed, level the surface with steel wool or silicon-carbide paper.

Many woodworkers associate shellac only with French polishing, but it can be used to obtain a variety of looks to suit all styles of furniture. You can apply everything from a thin sealer coat for a wax-only look to one that is highly built and rubbed to perfection.

Another advantage of shellac—especially for a shop with no dedicated finishing area—is its quick drying time. Dust contamination is not a problem because shellac is tack-free almost instantly.

Shellac is repairable—If a shellac finish gets damaged, first remove any wax with mineral spirits or with 0000 steel wool. If there is a heavy scratch or gouge, use shellac sticks and a burn-in

Spray the finish. *This high-volume low-pressure (HVLP) spray gun produces the very fine atomization necessary for water-based finishes.*

knife to fill the depression. Then apply more shellac with a pad. If the natural colors of liquid shellac do not match the rest of the piece, aniline dyes can be added, including black to ebonize the wood.

Dolly Spragins: Water-based finishes are clearly better

Like many converts to water-based finishes, health and safety concerns about spraying solvent-based finishes in a garage with no proper spray booth led Spragins to investigate alternatives.

Besides "not wanting to set myself on fire, blow myself up and kill brain cells," there were also artistic reasons for trying water-based finishes. She clearly remembers her first sight of unfinished exotic wood veneers, and how beautiful they were in their natural state. Applying a solvent-based finish always changed the look, imbuing the wood with a slightly amber tone. While sometimes it was still beautiful, often Spragins wished she could preserve the original appearance.

Then there is the issue of depth. While on many occasions woodworkers seek to increase the depth when applying a finish, with a solvent-based finish you have no alternative. A water-based finish provides more options. You can use oil or shellac as a first coat to bring out the depth, or in the case of pear and other pale, simple, flat woods, you can preserve that "fresh wood look" by spraying a water-based finish as the first finishing step.

You can apply more than one coat per day—When Spragins wants to show off highly figured veneers, such as the burl on the tabletop shown here, she seeks clarity and depth. She achieves this either by spraying a coat of shellac, or in the case of this table, wiping on a coat of slightly diluted water-based finish. After sampling many different water-based finishes, Spragins has settled on Target Coatings' Oxford Super Clear Polyurethane because it is easy to work with, dries quickly and clearly and sands out well.

A great advantage of water-based finishes is that they dry quickly. In under an hour you can sand the first coat and apply another. The goal, particularly on tabletops, is a perfectly flat surface. With porous wood, Spragins initially sprays two coats before sanding with 240- to 350-grit paper until there are no shiny spots left. Some pieces may require three to six coats, sanding between each, but because of the quick drying time, it can often be done in a day or two. Fill deep spots with a slurry of sawdust mixed with the finish and applied with a knife. Fill smaller depressions with a drop of the finish. When dry, sand level and apply additional coats.

For a satin finish, sand up through 800 grit and then apply a polish. For a gloss finish, use Abralon cushioned abrasive pads without lubricant, working up through 4,000 grit. Let the surface rest for 48 hours, or longer, to cure, then polish using an automotive rubbing compound, such as one made by McGuires or 3M. If you have a variable-speed buffer, use a slow speed. The compound may also be rubbed out by hand. Wipe off the compound prior to polishing to check the level of gloss and to remove abrasives.

For a high-gloss appearance, buff with an automotive liquid wax. On dark woods, you may find that there is a slight chalky appearance left in voids. This can be avoided by adding to the wax a few drops of water-based dye, such as Transtints, to match the wood. □

Mark Schofield is the assistant editor.

Touch-up. *After the first coat has been applied and sanded, fill any cracks and depressions. This can be done with a slurry of sawdust and finish or with finish only. Here, Spragins fills a small void with the point of a scalpel.*

A wet gloss look. *Automotive liquid wax applied with a buffer quickly brings up a high-gloss appearance.*

A final buffing. *A soft, clean cloth removes any traces of wax to leave a surface that is slippery smooth.*

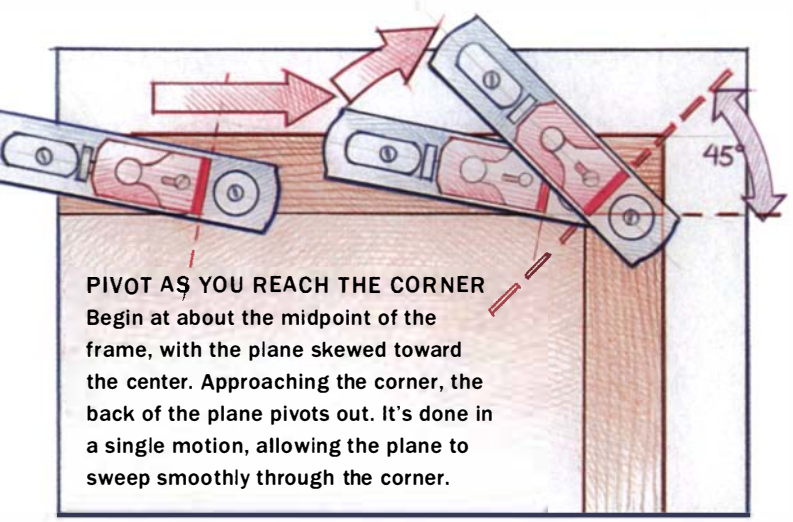
PLANE AROUND THE CORNERS TO PRODUCE A FLUSH JOINT

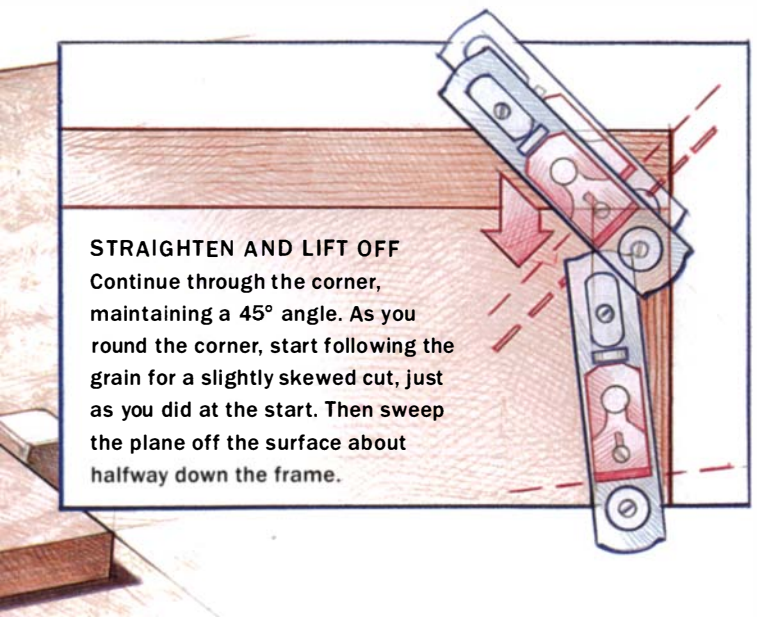
A glued-up corner joint that's not perfectly flush can be quickly smoothed and leveled. All it takes is a sharp handplane and a technique that steers the plane around the bend in one motion.

Planing Corner Joints

Set a plane for thin shavings, and take sweeping strokes

BY JEFF MILLER





Drawings: Bruce Morser

Not all corners meet exactly as planned. Sometimes, despite the best efforts at cutting and fitting, parts end up glued together with surfaces that aren't quite flush. When this happens, many woodworkers reach for a random-orbit sander. But if you're not careful, a random-orbit sander can create more problems than it solves. It sands quickly and indiscriminately, so you could end up rounding over edges in no time or inadvertently removing material from low spots, when it's only the high spots that you want to sand.

So when flushing up surfaces that meet at a right angle, I prefer to start with a handplane, which allows me to remove just the right amount of stock without having to worry about distorting surfaces or rounding over edges. I still use a random-orbit sander on occasion but only after the surfaces have been pretty well flattened with a handplane.

Start with a well-tuned handplane

For this procedure to work, your plane must be sharp enough to slice thin shavings. If it's not, some extra honing and adjusting is in order (tune-up information can be found in *FWW* #99, pp. 67-71).

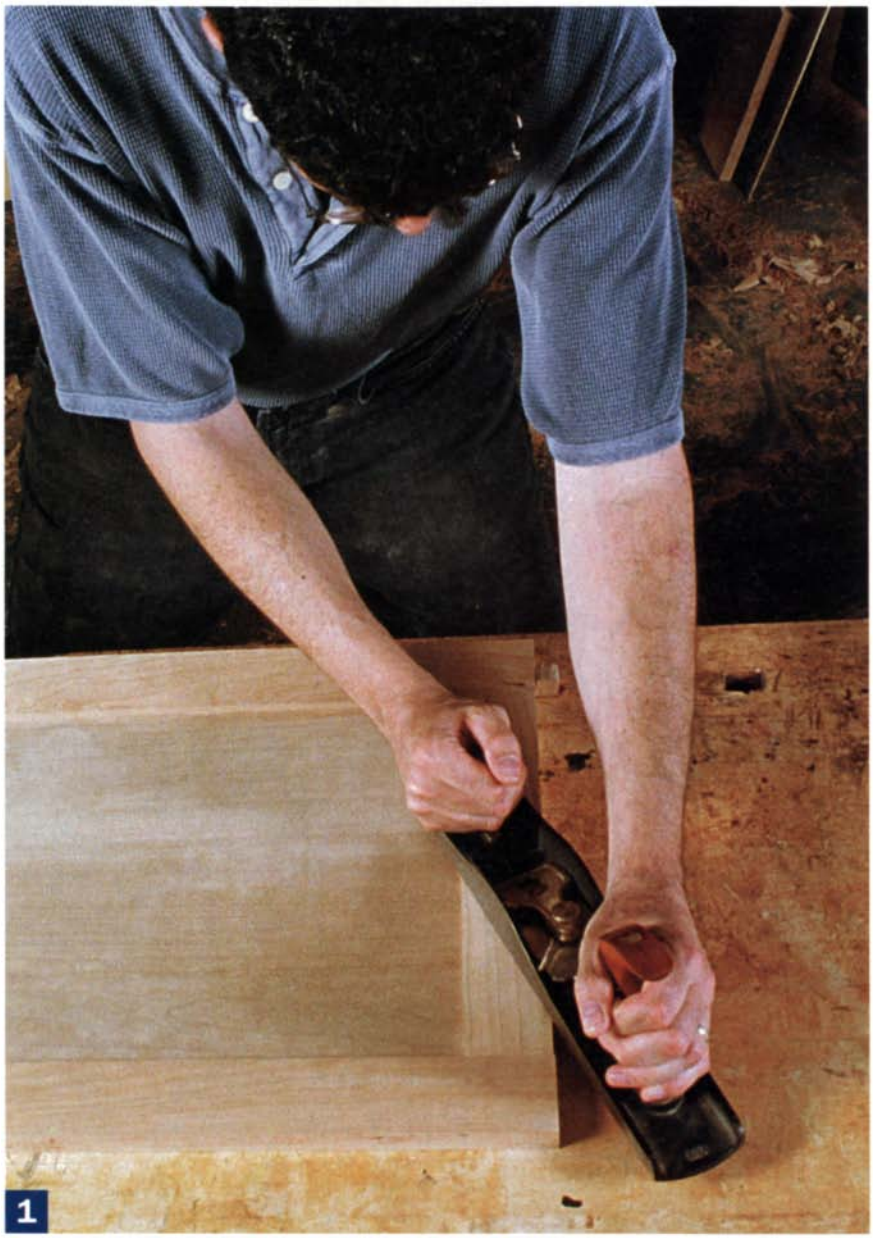
This side up. *On a block-style plane, the bevel of the blade faces up.*

Although you can use any smoothing plane or jack plane, I prefer to use a block-style, low-angle smoothing plane. Unlike the standard jack or smoothing plane, which has the bevel of the blade facing down, a block-style plane has the blade bevel facing up. I sharpen the blade to between 35° and 40°, much steeper than the original 25° angle. So the cutting edge of the plane meets the wood at a steeper angle than a typical smoothing plane and does a better job of cutting difficult grain. Then, I adjust the mouth so that it's close to the blade, between 1/32 in. and 1/64 in.

Plane surfaces flush

The procedure for getting the surfaces flush can be distilled into two main steps: roughing, which removes most of the wood, and

A PULL STROKE IS ALSO EFFECTIVE



1. Start pulling. *At the midpoint of the frame, with the front of the plane pivoted in, hold the plane by both handles and pull it toward your body.*

2. Make the turn. *At the corner, pivot the front of the plane toward the center of the frame while pivoting the back of the plane to the outside. It's the same sweeping motion used when the plane is pushed.*

3. And finish. *Aim the plane along the grain for a slightly skewed cut, then sweep it off the surface about halfway down the frame.*

smoothing, which gets the parts perfectly flush. The handplane does all the work in both steps, although the planing technique for each one is different.

Rough planing gets the joint close—Before beginning this step, check the offset between the parts. If the parts are almost flush, you can skip right to the smoothing step. But if there's a pronounced step in the joint, remove the high section first.

However, just because I call it roughing work doesn't mean you're going to take heavy cuts. Instead, you want to use light, controlled cuts, working slowly until the offset parts are nearly flush. And try to plane in the same direction as the emerging grain; otherwise, you risk tearing out the wood.

Keep the plane level and point it toward the outside of the frame. Lift the plane off the frame on the return stroke. And be careful. You can easily smack the front or back of the plane into part of the frame, producing an unwelcome dent. Once all of the parts are nearly flush, you could skip the smoothing step and immediately move to the random-orbit sander equipped with fine sandpaper. With the parts now relatively flush, the sander is less likely to do harm. But to get the best results, you'll want to include the smoothing step.

Planing around the corner smooths the joint—This step is a little unusual, because rather than planing routinely in a straight line, you direct the plane around the corner. That's the trick to getting the mating parts flush.

Clamp the frame to your bench and make sure the plane is set to take the lightest possible cut. Then, starting about halfway down the frame, plane toward a corner with the tool angled about 45° toward the center of the frame.

As you approach the corner, start turning the toe of the plane

onto the adjoining piece while swinging the heel of the plane to the outside. The idea is to sweep around the corner with a smooth, uninterrupted planing cut.

You can make this cut by either pushing or pulling the plane through the corner. When pushing, start the cut with your elbows locked, and use your legs to drive the plane. Then, as you approach the joint, use your arms to guide the plane and push it across the right angle (see the drawings on p. 43). The other approach is to pull the plane toward you through the corner, using a hand on the back of the plane to sweep it around the right angle (see the photos on the facing page). Either way, the plane should give you a nice, smooth cut on both parts, despite the difference in grain direction.

If the parts are narrower than the plane blade, you can probably get them perfectly flush in just one or two passes. But a wider part might require several overlapping passes to plane the entire width.

Sand the parts smooth

As a final step, if the plane hasn't smoothed everything perfectly, do some light sanding. Here's where the random-orbit sander can be put to good use. But to avoid rounding-over problems, use only fine sandpaper (220 grit or finer).

If you don't have a random-orbit sander, or if you're apprehensive about using one at this late stage, simply hand-sand the parts. I use a sanding block, which helps keep the surfaces flat. Ideally, the block should be about the same width as the part. A block this size gives you more control, making it easier to sand exactly where you want to. A block that's too wide tends to round over the edges, the problem you've been trying to avoid.

To prevent the block from sanding into a cross-grain joint, clamp a scrap piece along the very edge of the joint line. The scrap stops the block right at the line. And by positioning the sandpaper at the front edge of the block, you can sand right up to the line.

Sometimes, however, it's easier to work without a block. In cases like that, you can create an automatic stop simply by making a 90° fold in the sandpaper.

The techniques can be used on drawers and face frames

As you become familiar with these techniques, you'll discover that rail-and-stile and frame-and-panel construction are not the only places they can be put to use. For instance, they can be used to flush up the top and bottom edges of drawers or to repair face frames that have misaligned faces. Keep in mind, though, that drawers (and many face frames) are often narrow, making it difficult to keep the plane level. This makes it easier to bang the toe or heel of the plane into something you don't want dented. So proceed slowly and always hold the plane level.

Crosslap joints can be extra fussy. Rough-plane the parts to get them pretty close, then sand them. Be aware that with a random-orbit sander the edges of the sandpaper tend to catch on a narrow crosslap joint. Use a light touch, and concentrate on holding the sander perfectly level.

One last point. A misaligned corner joint is never going to be welcomed in the shop. But by applying these techniques, you'll have a joint that's going to look and work just fine. And you might just keep your nose from going out of joint in the process. □

Jeff Miller builds furniture in Chicago.

It's okay to sand lightly with a random-orbit sander. *But use only 220-grit (or finer) sanding discs. Be careful to hold it level to avoid rounding over edges.*

A stop block can help when hand-sanding. *To avoid sanding across the grain at the joint, clamp a stop block at the joint line. With the paper wrapped flush to the end of the block, you can sand right up to the line without cross-grain scratches.*

Sandpaper stop. *A simple bend in a piece of sandpaper can serve as a stop. When the bend butts against the board, the sandpaper stops right at the joint line.*

Photos, this page: Erika Marks; facing page: Anatole Burkin

An Elegant Jewelry Box

Hand-cut mitered dovetails make the best of a subtle design

BY STROTHER PURDY

Corner joinery adds ornamentation. *Dovetails with mitered edges require a few extra steps. But for the effect gained, it's time well-spent.*

Simple, rectangular jewelry boxes are easy to make. What's difficult is making them look nice. Without the benefit of curves, complex patterns or inlays to give a box definition, the wood, joinery and proportions become the all-important elements of the design. This box is made of curly Swiss pear, lined with apple on the inside and fitted with a walnut pull. The luscious grain and color of Swiss pear don't need additional embellishment to look stunning. I chose the apple and walnut primarily because they look good with the pear.

For the joinery, hand-cut dovetails with skinny little pins are classic, but they look like butt joints from the top and bottom edges. For a drawer, this detail doesn't matter. But on a jewelry box, framing the lid that way does not look attractive to my eye. To solve this problem, I mitered the dovetails on the lid and the bottom of the box (for more on the technique, see pp. 48-49). Mitered dovetails add interest and formali-

Photos, this page: Erika Marks

ty to the box without drawing undue attention to themselves.

As for the design and overall proportions, this jewelry box has shallow trays, so it should be relatively flat compared to its width and length. For the proportions, I used dimensions based on the golden rectangle, with a width-to-length ratio of about 1:1.6.

Mill the lumber for the best match

A box is a great project to eat up some of the scrapwood lying around the shop. But there's nothing like making a box from a single, thick board. The color and grain will be very consistent, and by means of resawing, you can book-match panels. For this box, you'll need a board about 2 in. thick by 9 in. wide by 4 ft. long.

First, chalk out the parts, looking for the best grain patterns for the top and the least exciting for the trays. It's possible to resaw a 2-in.-thick board twice, making slices 9/16 in. thick, and get three identical pieces with two options for book-matching.

Lay the boards on edge for a few days, with air circulating between them. This will help release any residual stresses in the wood. After that, mill the sides and top to dimension and glue up the top panel.

Finish the top and bottom panels before assembly

For the top of the box, book-match the nicest pieces of wood and raise the panel. A raised-panel top softens the look of the box. For the bottom, use whatever wood is left over and leave it flat.

After cutting the dovetails and dry-fitting the sides of the box, take the dimensions for the top and bottom panels from the inside measurements, figuring in the added depth of the grooves. You can make the panels fit just so along their length, but across the width you need to account for changes in the relative humidity and subsequent shrinking or swelling that will occur. Rabbet the edges of the raised field, making them slightly too thick to fit the grooves, then fine-tune the fit with a shoulder plane, scraper or sandpaper. Chamfer the top edges with a block plane—if you want machinelike precision, use a tablesaw or router.

Sand and pre-finish the panels before assembling the box. A pre-finished panel won't show an unfinished edge when it

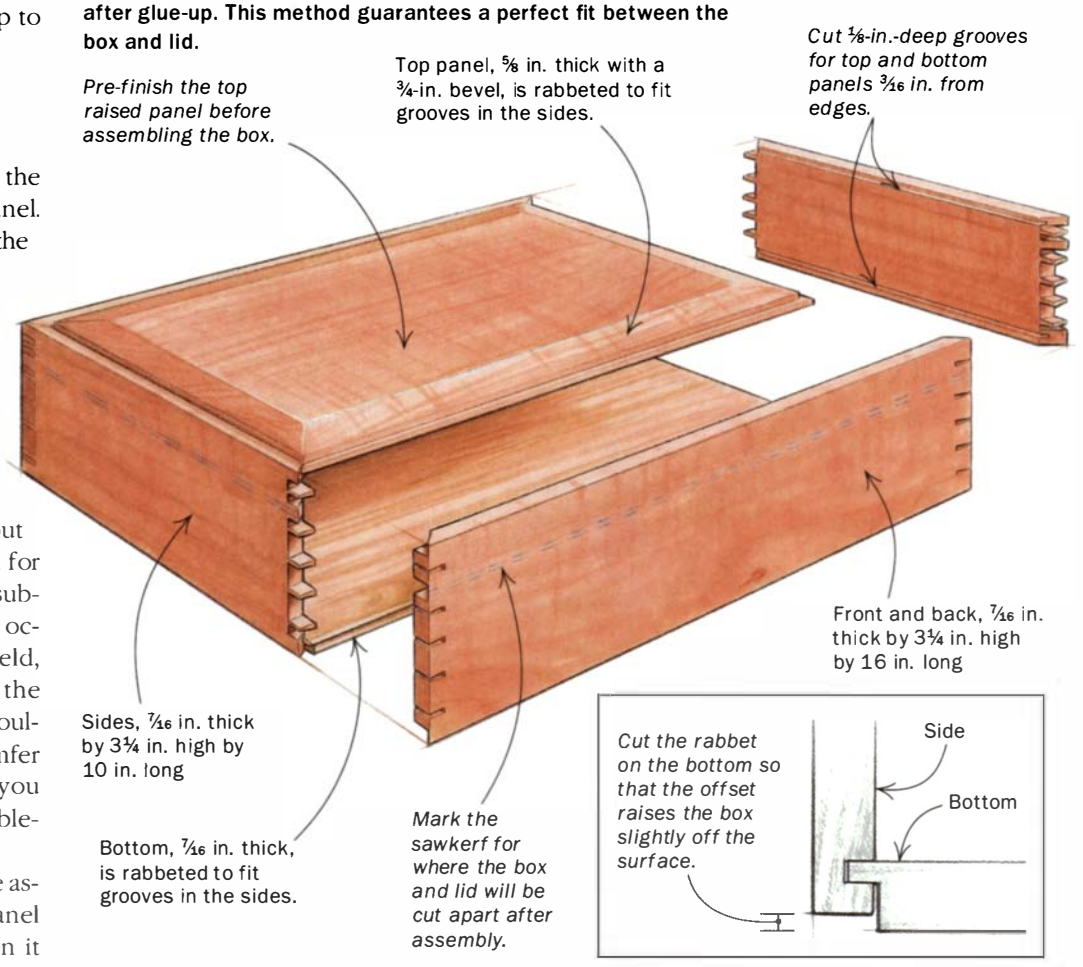
MAKE A BOX FROM A BOARD

One board, one box. *A single source for the outside parts of this project ensures a more even grain and color match to the finished box.*

Resawing offers two benefits. *By cutting thinner pieces of the same board, you can get book-matched panels and waste less lumber.*

ASSEMBLE THE BOX, THEN SAW IT APART

The box and lid are constructed as a single unit and then cut apart after glue-up. This method guarantees a perfect fit between the box and lid.

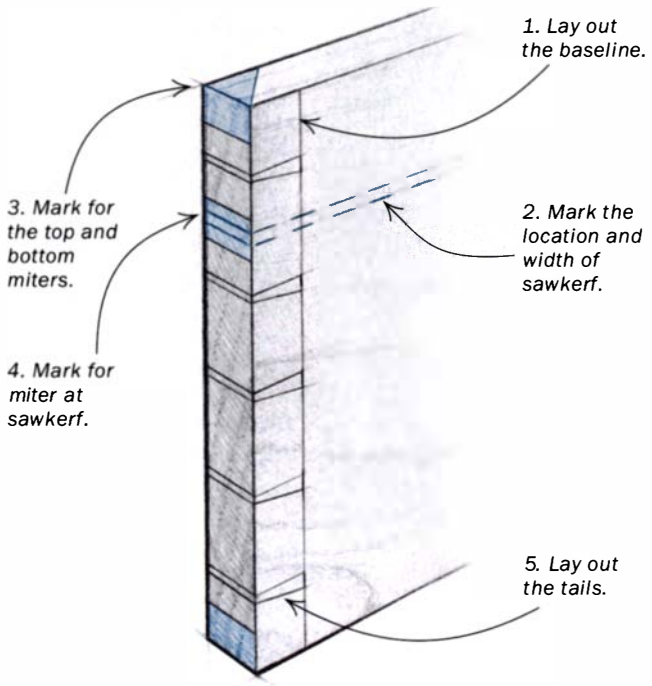


Photos, except where noted: William Duckworth

Mitered dovetails refine the look of a box

Dovetails with mitered edges are cut much like garden-variety dovetails, but they require a few extra steps. You have to be more careful marking the pieces, and they take a little longer to lay out and assemble.

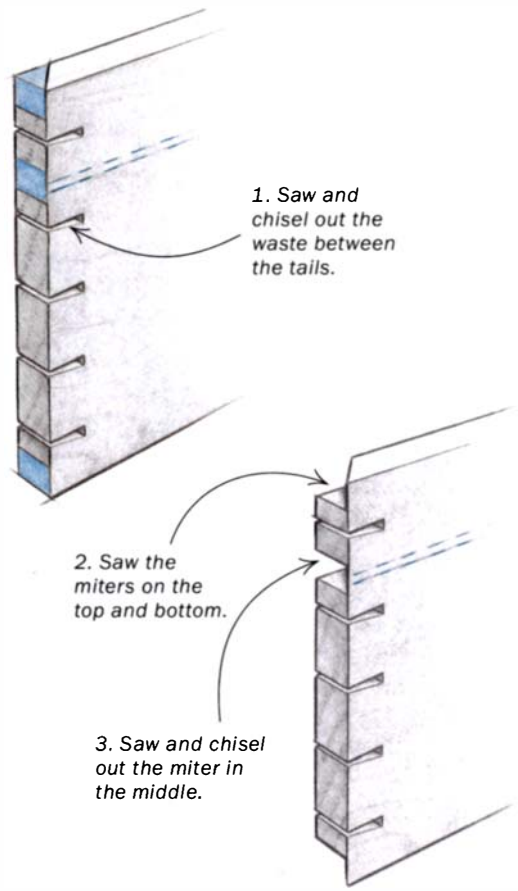
1. LAY OUT THE TAILS



Use a marking gauge to lay out the baselines on the faces of the boards. Lay out the sawkerf that will separate the lid from the box. Mark for the miters about ⅜ in. from the top and bottom edges. These lines represent the height of the miters. Now, scribe a line ⅛ in. above and below the sawkerf. Continue these lines from the baseline and around the edges on the inside faces of the pieces only. Finally, scribe the 45° angle on the top and bottom edges.

The mitered ends take the place of the traditional half-pins. There isn't room for a complete tail above the sawkerf, so you need to cut two half-tails. Below the sawkerf, divide the space equally to get three whole tails between four pins. I like to place the tails very close together, leaving only the width of a backsaw blade between them.

2. CUT THE TAILS AND MITERS



To clear out the waste between the tails, use a fine-toothed backsaw because you need to leave a very smooth surface on the inside. You can't go back later and clean it up with a chisel—there simply isn't room. After you cut one side, start the saw in the same kerf, angled the opposite way, to cut the second side.

To cut the miters on the edges, saw slightly off the line both from the edge and from the inside face. Cutting out the miters in the middle (where the lid and bottom will be cut apart) is a little harder. You can only cut them on an angle from the back, so you have to chisel out the waste. Pare the faces of the miters flat and smooth. You can make a jig to guide the angle of your cut if you prefer, but I find it's easier to do freehand.

shrinks out of its groove. Also, lightly sand and pre-finish the inside of the sides (I give them a few coats of shellac). The apple lining will cover most of the inside of the box, but not all of it.

Glue up the box (I use yellow glue), clamping evenly across the faces of the joint. Even pressure is important to avoid putting tension in the box. Later, when you saw apart an unevenly clamped box, the top and bottom could twist in different directions, making a bad fit. If the pins protrude from the tails, you'll need to make clamping cauls with fingers that put pressure only on the tails.

Let the glue cure thoroughly, then sand the exterior of the box to about 320 grit. Separate the lid from the bottom on the tablesaw, sawing the box in two parts along the layout lines. Clean up the inside edges with a block plane, scraper or sandpaper until the lid and bottom fit together seamlessly. The edges don't have to be perfectly square—I find they're easier to fit if they're angled in slightly. Sand the box to 400 grit, and finish it as you did the top panel.

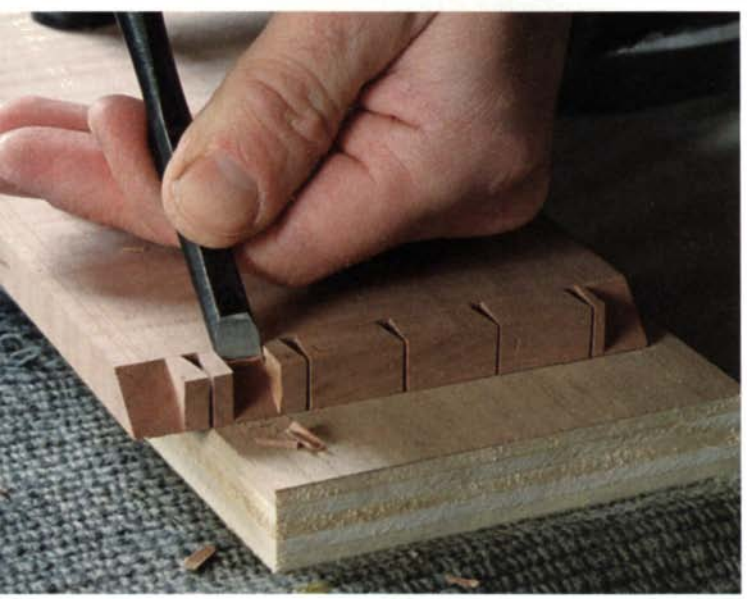
Fit hinges to the box and lid

Small box hinges (Brusso brand) are perfect for a project like this. The hinges are

Drawings: Bob La Pointe

Cut the tails. *A fine-toothed backsaw makes a clean and narrow kerf, and it offers good control over the cut.*

Chop out the waste. *The tight spaces left for very small pins require a ⅛-in. chisel to clean them out.*

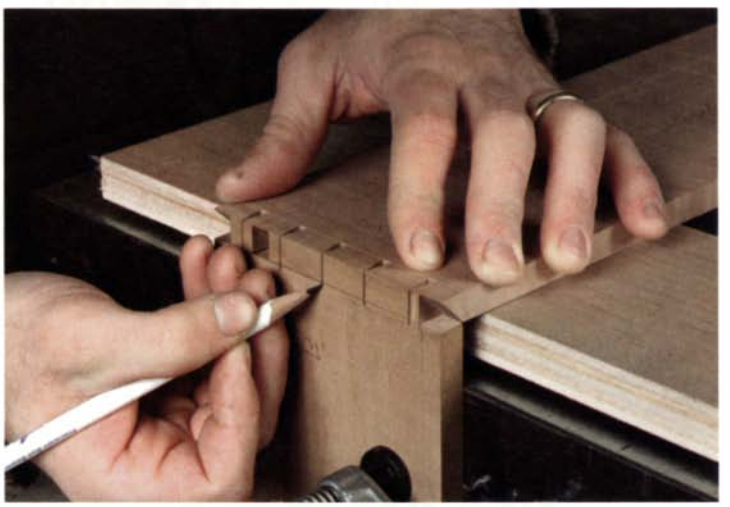


Rough-cut the outside miters with a saw. *Then pare them to your pencil line with a chisel.*

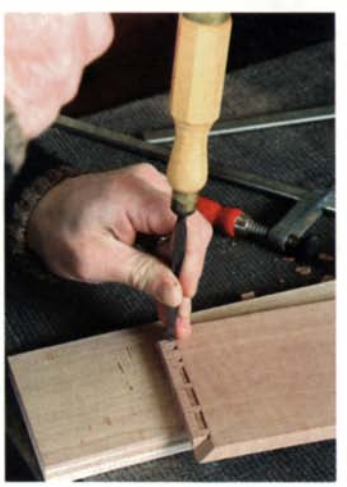
3. CUT THE PINS AND THE GROOVES FOR THE PANELS

Just as you would for a regular set of dovetails, transfer the locations of the tails to the pin boards. At the same time, transfer the locations of the miters, and cut them as you did on the tail boards.

Now is also a good time to cut the grooves for the panels. Put a rip blade in the tablesaw that cuts a flat-bottomed kerf. Set the blade to the desired depth and groove the panels along the inside top and bottom edges.



Mark the pin boards from the tail boards. *A clamp is worth as much as a steady hand when transferring the locations of pins.*



Make all necessary saw cuts in the pin boards. *Chop out the waste between the pins (left). Pare the miters with a chisel (above).*

well made, and they have a positive stop when opened a little more than 90°—so you don't have to add a chain to keep the top from flapping open too far. (Mortising for butt hinges is an art in itself. I'll cover the process briefly, but for more detailed information, see Philip C. Lowe's article in *FWW* #119, pp. 68-72.)

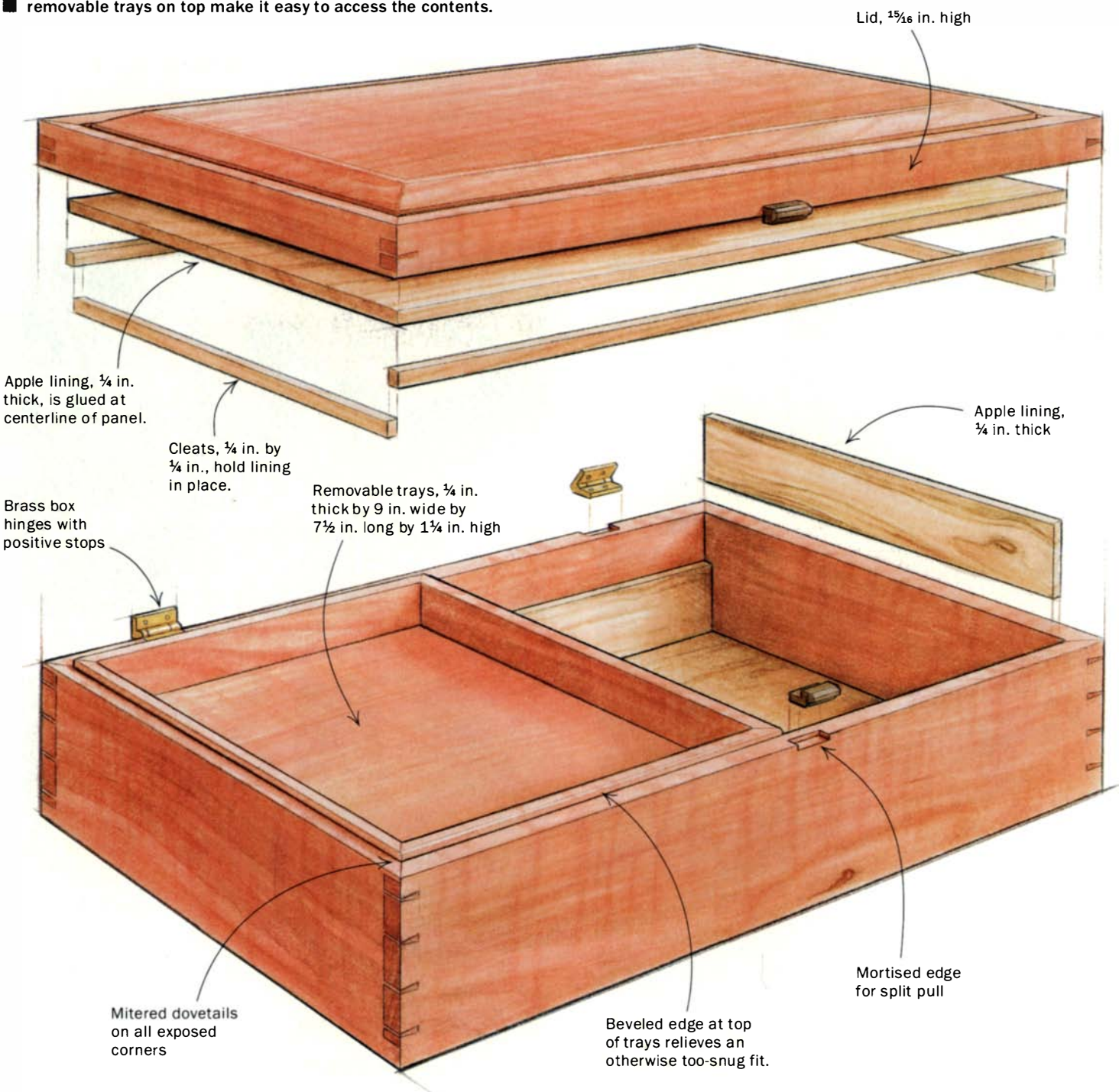
Use a marking gauge and a knife to lay out the position of the hinges. With a sharp chisel, chop out the waste, paring as necessary until each hinge leaf fits tightly. Now attach the hinges with two #3 steel screws. Instead of drilling for the screws—because they're so small—I made a pilot hole by tapping a small brad into the wood. When fitting the hinges, don't use the brass screws that come with them, because the brass is so soft that the screws will either break or their slots will get mangled. Put the brass screws in once and only once, after everything is done.

Line the inside and add the trays

The apple wood I used to line this box came from a dead tree in my backyard. Without such a source, I would have used another light-colored wood, such as cherry or maple. The lining should be thin enough to take up little interior space but

CLEAN LINES AND SIMPLE DETAILS

Stunning wood, accomplished joinery and pleasing proportions give this box a visual appeal. The shallow dimensions and removable trays on top make it easy to access the contents.



not so thin that it warps—about ¼ in. thick is a good compromise.

Mill all of the lining pieces you'll need. Glue up panels for the inside of the lid and the bottom of the box if you don't have pieces wide enough. Sand them and apply several coats of shellac. These pieces need to be finished so that the bare wood does not come in contact with the contents of the box. Because wood is acidic, it will tarnish jewelry and ruin any valuable papers.

Fit the linings for the lid and box first, with a spot of glue in the center. Cut them so that they fit tightly along their lengths, but be sure to leave a little space on their sides to allow for wood movement. Cut the side pieces for the lid and box slightly long and press-fit them in place. Fit the long sides first, then the short sides. If the wood is especially flexible, spot-glue the liner parts in place.

The trays are simply smaller boxes made from the pear wood. Don't bother with fancy joinery for them—miters on single dovetails at the corners are fine. You can cut grooves for the bottoms, if you wish; but because these trays will never take much

SAW APART THE BOX AND INSTALL THE LINING

A tablesawn joint needs a little help. *After setting the fence to the layout lines marked on the box, add masking tape around the outside of the box to minimize tearout during the cut. Clean up the sawn edges with a block plane, scraper or sandpaper.*

Leave a little breathing room for the lining. *After scraping off the shellac from the center of the underside of the lid, the author adds a bead of glue to secure the lining.*

Trim to fit. *The side pieces are cut to fit and secured with a spot of glue.*

weight, simply gluing on the bottoms works quite well.

The height of the trays is critical. They sit proud of the seam between the box and the lid and form an airtight seal, keeping dust out of the box. Chamfer the top edges of the trays so that they are not abraded every time the lid is closed. To test-fit them, put the trays in place and open the lid. If the trays rise with the lid, they're too tight. Plane or sand the top edges until the trays stay in place when the lid is opened.

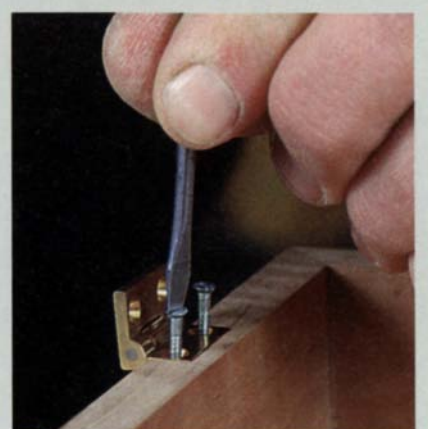
A pull with a twist

The small split pull I designed for this box doesn't call attention to itself, but it adds interest to an otherwise plain-looking front. When closed, the pull looks like one piece, but it's actually two pieces—one attached to the top edge of the box, the other to the underside of the lid. To open the lid, you need to twist your fingers one way. Trying it the other way makes it seem as if the lid is locked.

Make a slightly oversized rectangular piece of walnut for the pull, and saw it in half. Mortise the two pieces so that they come together just so when closed, then glue them into place, unfinished. Cut and sand them to shape after they're installed.

Finish the outside of the box with a Danish oil mixture, shellac, varnish or lacquer. Let the finish cure for a few days, then give the surface a good coat of wax and buff it to a high shine. Put the hinges back in, and your box is done. □

Installing hinges



Brass screws wear out easily, so it's best to use steel screws to temporarily fasten the hinges. Steel heads are less prone to stripping. Use the brass screws only for the final fit.

Strother Purdy is a woodworker in Bridgewater, Conn., and a former associate editor of Fine Woodworking.

Fixed-Base 2-hp Routers

A midsized machine may provide all the power and versatility you need

BY TOM BEGNAL

For all-around shop use, midsized fixed-base routers make sense to me. At 2 hp to 2¼ hp, they have enough testosterone to handle most cuts without the bulk that can make bigger versions a chore to run freehand. And as a general rule, fixed-base routers are easier to use in router tables than plunge routers. So as a sequel to my review of midsized plunge routers (*FWW* #149, pp. 46-53), I gathered all of the fixed-base 2-hp to 2¼-hp machines currently on the market. And with the *Fine Woodworking* shop serving as a test lab, I gave each router a hands-on examination.

The test had three main parts. First, I considered ergonomics of the routers, using them by hand and in a router table. Then I checked them for noise, runout and vibration. And finally, they were given a handheld run to see how effectively they plowed through wood.

Eight routers were tested: the Bosch 1617EVS and 1618EVS; Craftsman 17506 and 27500; Jepson 7112; Makita RF1100 and

Router-table manners

When using these routers inverted in a table, a motor-mounted switch is an asset. It is relatively easy to activate the switch on the two Bosches, the two Makitas and the Milwaukee. For the motor-mounted switch to work on the D-handled versions of the Bosch and Makita, the switch on the handle must be locked on.

Because the tests were done using a mocked-up table with a one-piece top, my bit-changing evaluations for some of the routers are based on how easy it is to remove the motor from the base. If your table has a removable top plate, the bit-changing procedure should be easier. The highest bit-changing marks go to the two Bosch routers. By removing the motor from the base, the bits can be changed on top of the table with little fuss. The Makita router motors are easy to remove from their bases, but that slipping wrench is an annoyance.

Removing the motor isn't an option with the two Sears models. However, with the spindle locked in place, it is reasonably easy to use the single wrench to turn the collet.

The motors on the Jepson and Milwaukee routers can't be removed from their bases, either. Because two wrenches are required, it is awkward to change bits.

Putting the router in a table doesn't change anything when it comes to setting the cutter depth. I still favor the Bosch, with the Makita second.

Router-table mock-up. *To judge accessibility, each router was mounted to a piece of MDF clamped to a pair of sawhorses.*

RD1101; and Milwaukee 5682. Four have variable speed. Three have a D-handle, a style preferred by some woodworkers. Four have a soft-start feature that briefly limits the speed of the router at startup, so the tool doesn't twist in your hands when it's turned on.

User-friendliness is a big plus

A router should feel good in your mitts. And it shouldn't require a lot of fiddling and fussing of the controls and adjustments. So I spent a good part of my quiet time looking to see how much effort it took to install a bit, set it to just the right depth and fire up the router.

Keep in mind that some of the tests are subjective, in which cases the conclusions are based on the size, shape and flexibility of my average-sized hands. And what feels good to me might not appeal to you.

Comfortable handles are a good start— Among the routers with conventional handles (those with identical handles on each side), the single-speed Craftsman 27500 makes my hands feel most at home. I can wrap both hands around the handles, so the router always feels secure in my grip.

With its large, classy-looking wooden knobs, the Bosch 1617EVS also feels pretty good, and I rate it just behind the Craftsman. The Makita RF1100 has knob handles, too. The knobs feel okay, but they don't fit my hands quite as well as the Bosch handles do. The handles on the variable-speed Craftsman 17506 seem too big for me; the Milwaukee's feel too small.

In the D-handled category, the Makita RD1101 has the best feel, mostly because the D-handle has an upward angle that aligns perfectly with my arm. With its lower-angled D-handle, the Bosch 1618EVS just doesn't work as well for me. The same is true for the Jepson.

Machine should be easy to turn on and off— When handheld, the D-handled Bosch 1618EVS, Craftsman, Jepson and D-handled Makita RD1101 routers are dirt-simple to turn on. Simply squeeze a spring-loaded trigger in the handle to start the router; release the trigger to shut off the machine. By the way, in addition to the trig-

BOSCH 1617EVS, 1618EVS (D-HANDLE)

(877) 267-2499

Both of these routers can accept large bits, and bit changing is a snap. The micro-adjust features work well, and the housing locks are rated as the best (tied with the Makita). Both score well in the vibration category and have soft-start and variable-speed options. The 1617EVS has the most comfortable of the knob-type handles. The switch and switch lock on the 1618EVS are easy to use. This model did well in the runout test, although it is a little noisier than average.

Street price (average)	$184; $204 (D-handle)
Amperage	12
Horsepower	2
Collet size	¼ in., ½ in. (⅜ in. and 8mm optional)
Soft start	Yes
Variable speed	Yes (8,000 to 25,000 rpm)
Dust port	No
Size of opening in plastic subbase	2 1/16 in.
Runout	0.0050 in.; 0.0015 in. (D-handle)
No-load noise level	95 dB; 97 dB (D-handle)
Vibration rating at handles	Good

Photos: Erika Marks

CRAFTSMAN 17506

(800) 697-3277

The 17506 has an easy-to-use switch and switch lock, changing bits is easy, and the dust bag works well. But the motor rotated during test cuts, and the depth-adjusting ring is sticky. The locking knob isn't easy to turn. It accepts only ¼-in. shank bits. The machine is less user-friendly in a table.

Street price (average)	$100
Amperage	9
Horsepower	2
Collet size	¼ in.
Soft start	No
Variable speed	Yes (15,000 to 25,000 rpm)
Dust port	Yes
Size of opening in plastic subbase	1⅝ in.
Runout	0.0015 in.
No-load noise level	96 dB
Vibration rating at handles	Fair

CRAFTSMAN 27500

(800) 697-3277

The 27500 has an easy-to-use switch and switch lock. Bit changing is a breeze, and it can accept large bits. But it's a little noisier than average. There is no variable-speed option, and the depth-adjusting ring can be sticky. The motor locking lever is hard to turn. The machine is less user-friendly mounted in a table.

Street price (average)	$130
Amperage	9
Horsepower	2
Collet size	¼ in., ½ in.
Soft start	No
Variable speed	No (25,000 rpm)
Dust port	No
Size of opening in plastic subbase	2½ in.
Runout	0.0050 in.
No-load noise level	97 dB
Vibration rating at handles	Fair

ger switch in the D-handle, the Bosch 1618EVS and Makita RD1101 also have a toggle switch on the motor. The handle switch won't work until the motor-mounted switch has been turned on.

The Milwaukee has an on/off switch on the body that works pretty well. But I have to reposition my right hand to reach the switch with my thumb.

The Bosch 1617EVS and Makita RF1100 have a toggle switch on the motor. The Bosch switch is high on the side of the motor. And although it is awkward to reach the switch with my thumb, I can manage it without releasing my hand from the router. The switch on the Makita is on the very top of the motor, so my hand has to come off the handle to reach it. And that's something I don't like to do.

CONSIDER THE SWITCH LOCATION

A trigger switch on the handle, like the one shown here on the Craftsman 17506 (left), is simple to use. Both of the Makita routers have the switch on top of the motor, so you have to let go of one of the handles to reach it.

Switch lock should engage easily—When making long cuts with a handheld router, I like to lock the switch in the on position to give my trigger finger a rest.

The Bosch 1617EVS, Makita RF1100 and Milwaukee have toggle switches that stay on until you shut them off. Among the remaining routers, I favor the switch locks on the two Craftsman routers. These locks engage easily, requiring little more than a subtle push by the inside of my thumb. The Jepson and the D-handled Makita RD1101 work fine, too; they just feel a little harder to engage than the two Craftsman. On the other hand, it is a chore to lock the Bosch 1618EVS, mostly because it takes some awkward thumb work to engage its recessed button.

Changing bits shouldn't be a challenge—Except for the two Craftsman machines, all of the routers come with a pair of wrenches. One wrench holds the arbor nut; the other turns the spindle. The Craftsman routers have a system for locking the spindle in place. Once locked, it takes just one wrench to turn the spindle. For handheld work, I prefer the one-wrench Craftsman system.

Among those using two wrenches, the Bosch routers work nicely. A large opening in the side of the base makes it easy to work the wrenches. Using another accepted option, the entire motor may be removed from the base to change bits.

The two Makitas have somewhat smaller openings in the sides of the base, so it's not quite as easy to use the wrenches. So I removed the motor when changing bits on the Makitas.

On the Milwaukee, the motor doesn't easily remove from the

The Bosch (far left) and Makita motors quickly remove from their bases, so it's easier to get at the collets with the wrenches. The Jepson motor (near left) can't be removed, and with smallish openings in the sides of the base, bit changing is more challenging.

base. That makes it more of a challenge to loosen the collet with the wrenches. I rate it just behind the Makita in this category.

The Jepson router has a pair of flats machined in both the spindle and the collet. So there aren't a lot of options when it comes to placing the wrenches in a convenient position for tightening or loosening the collet. Plus, because the wrenches are close to being the same size (the larger one goes on the spindle), you have to guess which one goes where.

Setting the cutter depth is fairly straightforward—Once the bit has been mounted, setting the cutter depth is just a matter of raising or lowering the motor on these routers. The two Bosch routers have a motor that simply slides straight up and down. A series of three coarse-adjustment notches serve as stops and allow you to get close to the desired depth of cut. Then, a fine-adjustment knob is used to set the exact depth. To me, it is the easiest of the bunch to adjust.

The motors on both Makitas are threaded. The parts are nicely machined, and the system works well. The Jepson motor slides up and down, but the ride isn't all that smooth. The Milwaukee slides in much the same way, although it's a little smoother going.

The Craftsman routers use a depth-adjusting ring to control the depth of cut. But both are difficult to turn, so I rank them at the bottom of this category.

Motor should lock securely—Once the depth of cut has been set, you want to be able to lock the motor in place. The Bosch and Makita routers use a simple lever system. Snap the lever shut, and the motor is locked tight. It's quick and easy, and it works well.

On the Jepson, the left handle also serves as the locking knob. Just rotate the handle a turn or so to lock the motor. The Jepson's large handle/locking knob is easy to turn, so I rate it just behind the Bosch and Makita routers.

The variable-speed Craftsman 17506 and the Milwaukee also use a locking knob, but they're located on the back of the router. Both use a star-type knob that takes some effort to turn, so I don't find them especially friendly to my fingers. Ranked at the bottom of the pack is the single-speed Craftsman 27500. It has a good-sized clamping lever on the back. But it is hard to pivot the lever from either the locked or unlocked position.

The locking mechanisms scored in the same order when the routers went in the table. But because the levers on the Bosch and Makita are easy to use, I'd say they would prove even more of a plus when used in a cramped table setup.

A look at vibration, noise and runout

While some of the router testing is subjective, other attributes can be looked at through the eye of a coldly objective instrument. So I

JEPSON 7112

(800) 456-8665

The Jepson has an easy-to-use switch and switch lock (though they are less user-friendly in a table), and the knob for locking the motor works well. The housing tends to stick as it slides, and the machine is the noisiest of the lot. There's no variable speed, and the depth-adjusting ring is hard to read.

Street price (average)	$114
Amperage	10
Horsepower	2
Collet size	½ in. (sleeves accept ¼-in. and ⅜-in. shanks)
Soft start	No
Variable speed	No (25,500 rpm)
Dust port	No
Size of opening in plastic subbase	1 9/16 in.
Runout	0.0050 in.
No-load noise level	100 dB
Vibration rating at handles	Good

MAKITA RF1100, RD1101 (D-HANDLE)

(800) 462-5482

Both routers have a housing that slides smoothly and locks easily. They score best in the noise and vibration tests. Soft start and variable speed are also pluses. But the adjusting rings are hard to read. And the openings in both subbases are small (a subbase with a larger opening is an option). The RF1100 has the switch on top of the motor, so when handholding the router, a hand must be removed from the handle to engage the switch. But the top-mounted switch becomes a plus when the router is in a table. The RD1101 is the most comfortable of the D-handles. Plus, the switch and switch lock are easy to use.

Street price (average)	$186; $215 (D-handle)
Amperage	11
Horsepower	2¼
Collet size	¼ in., ½ in.
Soft start	Yes
Variable speed	No (24,000 rpm); Yes (D-handle, 8,000 to 24,000 rpm)
Dust port	No
Size of opening in plastic subbase	1 3/16 in.
Runout	0.0045 in.; 0.0047 in. (D-handle)
No-load noise level	90 dB; 91 dB (D-handle)
Vibration rating at handles	Excellent

ADJUSTING THE DEPTH OF CUT

The two Bosch routers use a fine-adjustment dial to fine-tune the depth of cut, with each graduation on the dial representing 1/256 in. (0.0039 in.). It's a step above the ring system used on all other routers in the review.

put a few tools to work to check the vibration, noise and runout of the routers. Look for individual results in the charts.

Vibration—There is just no avoiding vibration with a router. But less is more here, because a router with minimal vibration is indicative of a well-balanced tool.

To check for vibration in each of the routers, I used a rather unconventional test method, with a dial indicator serving as the measuring device. And when the test was completed, I rated the vibration levels as excellent, very good, good or fair.

Routers were placed on a steel plate and allowed to run while a dial indicator, whose stylus was pressed against the tool's handle, measured the amount of movement. To isolate the vibration, the steel plate rested on a piece of foam laid on top of a heavy jointer. The test produced numbers that range from less than 0.001 in. (an excellent rating) to 0.010 in. (a fair rating). The Makitas aced this test.

Noise—All routers are noisy; so ear protection is a must. When you consider that the noise level doubles with each 5-decibel (dB) increase, some routers are considerably noisier than others.

The tests were done with a decibel meter fixed to a tripod. The meter was positioned 24 in. above and 12 in. in front of each router, a point that's about ear level. Again, the Makitas rated best.

Runout—In short, runout is the amount a bit wobbles as it spins. Too much runout can affect the accuracy of a cut. The test was done with a test pin in the collet. Then, with the dial indicator measuring the pin at a point 1 in. above the collet, the pin was slowly turned to get a reading. All of the measurements fell within acceptable standards, but the D-handled Bosch and the variable-speed Craftsman 17506 have the least amount of runout.

Most machines handled the test track pretty well

I gave the routers a short test drive. Each router was equipped with a ½-in.-dia. straight bit and was set to make a ¼-in.-deep cut. The routers with variable speed were set to the highest setting. Then, using a straightedge to guide the router, I made three, 36-in.-long plowing cuts in fir plywood while moving the router right to left at what I considered to be a reasonably fast pace (roughly 12 ft. per minute) for such a cut. By the way, the same ½-in.-shank bit was used in all the routers except the variable-speed Craftsman 17506, which was fitted with a ¼-in.-shank bit, the only size it accepts.

My goal here simply was to find out whether any of the routers bogged down. But all of the routers handled the cuts without any noticeable struggle. So I'd expect each one of them to have enough power for most cutting assignments.

But one problem did show up. As I cut with the Craftsman 17506, the motor slowly rotated, lowering the bit farther into the plywood. At the end of the 36-in.-long cut, the bit had lowered more

Why choose a D-handle?

Having never owned a D-handled router, I had almost no experience using one. But the three D-handled routers reviewed in this article feel pretty good in my hands. And that leads me to ask why more woodworkers don't favor D-handled routers.

As it turns out, those who like them simply feel the D-handle offers more comfort, control and safety: comfort because they can wrap their fingers around the big pistol grip; control because the D-handle position lets you easily shift the pressure from one area of the base to another, a feature that's especially handy when doing edge work with a bearing-guided bit; and safety because the on/off switch is on the handle, always within reach of your finger.

But a D-handle has a least a couple of drawbacks. When at a workbench and moving the router around a large shape (a rectangle, for example), it can become awkward to keep the handles in a comfortable position. And then there's the matter of cost—you'll pay a few bucks more for the D-handled version.

Because I often find myself holding the router at odd angles, I'll always need a router with conventional handles. But now, for the first time, I'm starting to think about adding a D-handled router to my shop for all of the routine cuts I make.

than ¼ in., and it was cutting through the ½-in.-thick plywood. (One bright spot: The router made the cut without bogging down.)

At first I suspected I hadn't tightened the locking knob enough. But even after retightening it, the motor still rotated, although to a lesser extent. It wasn't until the depth of cut was reduced to ⅛ in. that I was able to make a cut without the motor rotating. In fairness to Craftsman, the company does not recommend making any cuts deeper than ⅛ in. with the 17506. Still, I was surprised that a ½-in.-dia. bit making a ¼-in.-deep cut would create such a problem.

Bosch scored best overall, but it was a tight race

All things considered, I rate the Bosch 1617EVS as my favorite of the conventional-handled routers. It receives honors for the categories of handle comfort, bit changing, depth setting and motor lock. Plus it has soft start, variable speed and low vibration. And it adapts well to the router table.

The Makita RF1100 comes in just behind the Bosch. I like its depth setting and handle-lock features. The soft start and variable speed are pluses. And none runs quieter or smoother. But I prefer not to have to reach on top of the housing for the on/off switch (although in a router table, the switch location is an advantage). Like the Bosch, it takes well to the router table. However, reading the depth-adjusting ring is a real eye-strainer. And perhaps it's just me, but when changing bits, the lower wrench always slips off the spindle nut.

I like a lot of things about the single-speed Craftsman 27500. The machine has comfortable handles, easy-to-reach on/off switch, simple switch lock and a collet lock for faster bit changes. And it adapts well to the router table. But it doesn't have variable speed. Also, the depth-adjusting ring tends to stick. My main complaint, however, is that the motor locking lever is a struggle to turn, especially when unlocking it.

The Milwaukee 5682 is a compact, rugged-looking machine that doesn't offer soft start or variable speed. It doesn't excel in any categories, generally ending up around midrange. Runout is higher than the others, and it is noisier than most.

The variable-speed Craftsman 17506 has a good on/off switch, switch lock and collet lock. The dust bag (or dust port) is a nice feature. But the depth-adjustment ring is often sticky. And even though I took a deeper-than-recommended test cut, I was surprised to find the motor had rotated, causing the bit to lower.

When it comes to choosing my favorite D-handled router, it's a toss-up between the Bosch 1618EVS and the Makita RD1101. The handle angle on the Bosch isn't perfect for me, but most everything else is a plus. The Makita has the most comfortable of the D-handles. And it has the lowest noise and vibration ratings.

For the price, the Jepson might be just the right tool for someone who plans to use a router only occasionally. It doesn't score high marks often. But, like all of the others, it has enough power to handle most cuts. □

Tom Begnal is an associate editor.

MILWAUKEE 5682

(262) 781-3600

Handle comfort is okay on the 5682. But it has a small opening in the subbase and the highest runout. The machine is a little noisier than most and doesn't offer variable speed. Black graduations on a black background make it hard to read

Street price (average)	$260
Amperage	12
Horsepower	2
Collet size	¼ in., ½ in.
Soft start	No
Variable speed	No (26,000 rpm)
Dust port	No
Size of opening in plastic subbase	1¼ in.
Runout	0.0060 in.
No-load noise level	97 dB
Vibration rating at handles	Fair

Smooth Tambours

Flat, veneered slats give the illusion of solid-wood doors

BY MIKE WEISS

Tambours are universally recognized for their rounded, canvas-backed slats and may be found on everything from rolltop desks to appliance garages. But there's a lesser-known type of tambour that masquerades as a smooth, solid-wood door. The first time I came across a door constructed this way, I pulled on it, assuming it was hinged, to the amusement of the desk's owner.

Suitably impressed with the illusion, I set out to make a set of these tambours for a contemporary entertainment center. My tambours are made of veneered medium-density fiberboard (MDF) cut into slats and held together by canvas, like traditional tambours. The biggest challenge of this project was figuring out how to rip apart the slats with minimal kerf loss and without interrupting the grain on the front of the tambours.

Tambours demand lots of planning

When building tambours, allowances must be made for the considerable loss of material that results from ripping stock into lots of narrow slats. Then the slats must be dimensioned so that they

Designing a cabinet for tambours

The finished cabinet appears to have solid-wood doors. *The panels on both edges conceal the parting of the slats as the doors are opened.*

operate smoothly when going around the interior corner of the case. And the end slat should be double the width of the others so that a handle may be attached.

I used a full-sized drawing to figure out the dimensions. The slats for the entertainment center are ⅝ in. wide with 1 1/32-in.-thick pins, which ride in the tracks. The end slats (handle attachment points) are 1⅜ in. wide. The tracks are ⅜ in. wide to allow for smooth operation without excessive play. Where each track enters the case, it makes a 90° bend through a 2-in. radius. (For more on machining the tracks and making a carcase for tambours, see the story below).

Veneer the back and cut slats

Use ½-in.-thick MDF as the substrate for the slats. MDF is stiff enough for doors of this size (31½ in. high), and the material's uniform density allows it to hold up well where it makes contact with the track.

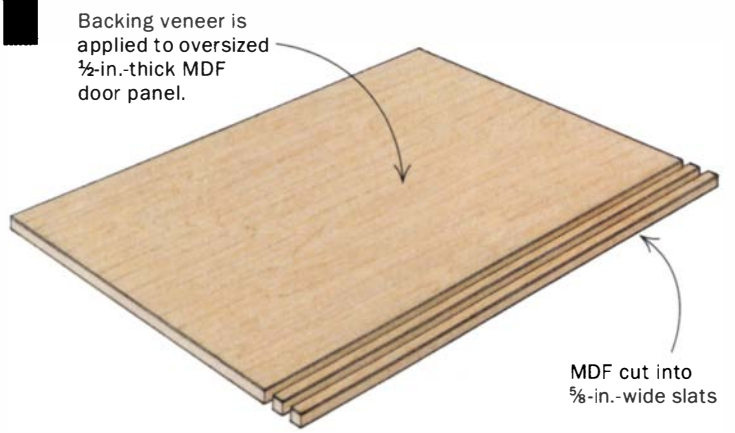
To begin, cut an MDF panel oversized and glue a backing veneer to one side. The substrate must be veneered on both sides to prevent it from warping (the face veneer goes on later).

Next, rip the panel into slats. I made up a double-thickness push stick that allowed me to apply uniform pressure on both sides of the sawblade. The added control of such a push stick produces clean cuts. After cutting, number the slats on their ends and sand away any saw marks. When assembled in order, it is critical that the slats fit together tightly; otherwise, excess glue may find its way into the gaps when applying the face veneer.

Glue the face veneer onto the slats

To hold the slats in position, I built a jig from two layers of ½-in.-thick MDF (see the bottom left photos on p. 60). The jig is slightly oversized to allow for sawing the slats to the final length. A wedge provides clamping pressure to the slats. And to prevent damage to the veneer bag, I rounded over all the hard edges of the jig. I have used two-part liquid urea resin glue for its slow setting properties,

1 RIP THE PANEL INTO SLATS



Cut the slats. *After applying backing veneer to one side, rip the panel into slats. A double-width push stick and a slow, steady feed rate help keep the slat tight against the fence.*

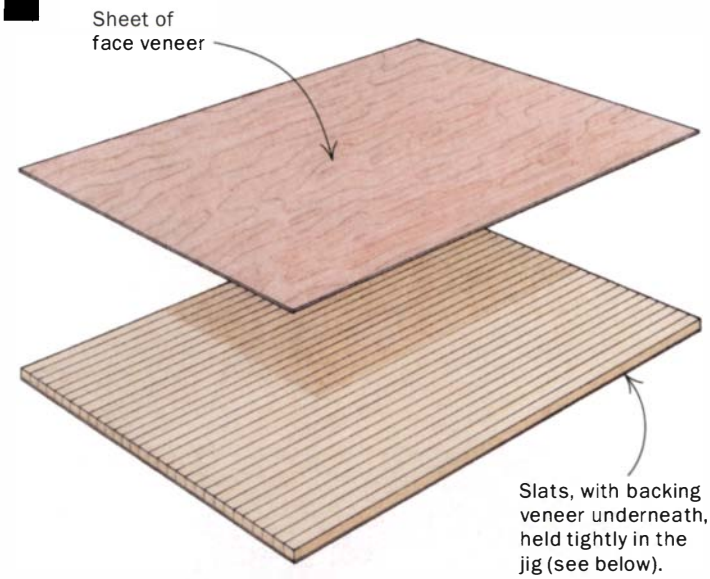
A cabinet made for tambours requires a track on the inside top and bottom panels. The track must break through the rear on one side of the cabinet so that the tambours may be installed. To ensure that the tambours slide smoothly In their tracks, use a template when routing the grooves so that both the top and bottom tracks are exactly in line.

To hide the back of the tambours when they are opened, I add two partition panels dadoed into the top and bottom of the cabinet and slid in from the rear. I also place two panels at the front of the cabinet on both sides of the tambours. By hiding the corner of the tambours, the doors simply disappear Into the case as they are opened.

See how they run. *With the back of the cabinet removed (far left), the two tambours can be fed in from the right rear side and slid around to their respective positions. Then the two partition panels are fitted so that the tambours are concealed when the doors slide into the case (near left).*

Photos: Mark Schofield

2 GLUE ON THE FACE VENEER



Simple jig keeps slats aligned

The jig is made from two layers of ½-in.-thick MDF. The tambour slats are held tight by a sliding wedge that is tapped home.

Roll an even coat of yellow glue onto the slats in the jig. *Carefully align the face veneer, top with a caul of melamine-coated particleboard and place the assembly in the vacuum press.*

After the glue has set, trim the face veneer. *Use a router and a flush-trimming bit to remove the face-veneer overhang. To remove the veneer tape, first moisten it with water, then scrape it off.*

but on this occasion I used yellow glue. Once the slats are all positioned tightly together, spread the glue, lay on the face veneer and place the assembly into a vacuum press.

After carefully removing the door from the vacuum press (remember, it is a bunch of individual slats joined together only by a continuous sheet of face veneer), trim the face veneer flush with the substrate using a router. Moisten the veneer tape with water, then scrape and sand away the tape and any traces of glue.

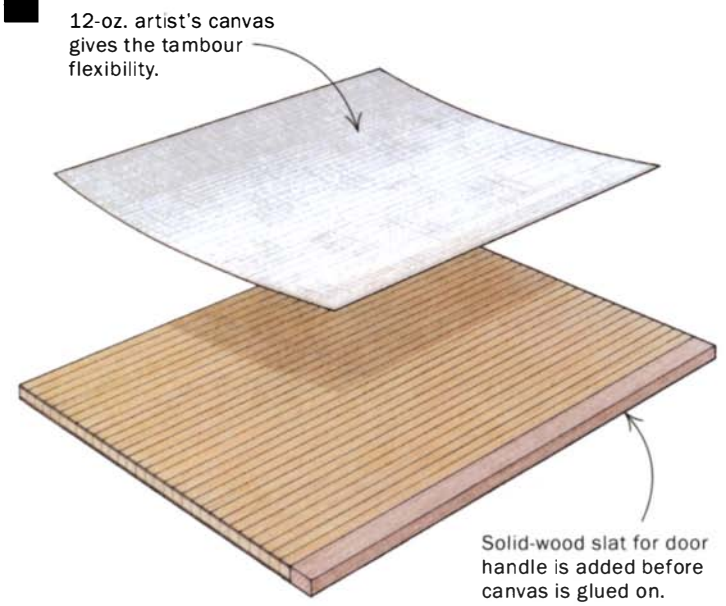
Trim the face veneer with a knife

I achieve the nearly seamless appearance of the tambours by cutting apart the slats using a fine knife and another jig. The jig employs an acrylic rod partially embedded in a piece of MDF.

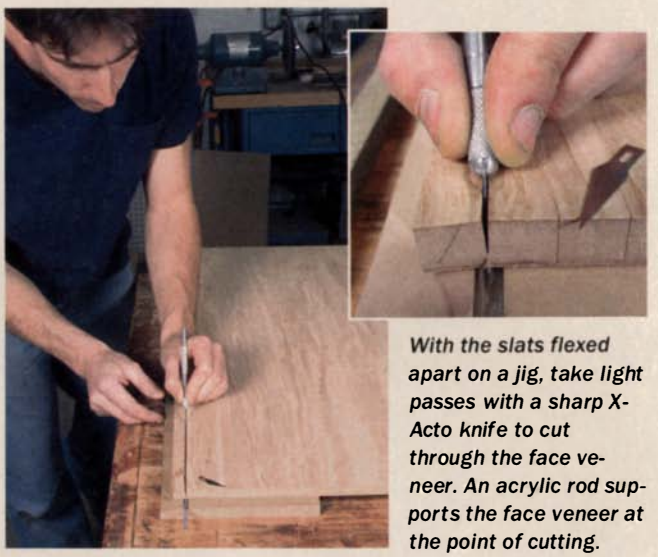
To cut the face veneer, place the slat assembly on the jig, backside up. Then flex apart two adjacent slats over the length of the acrylic rod, and cut the veneer using an X-Acto knife (see the

Drawings: Vince Babak

3 SLICE APART THE SLATS AND GLUE ON THE BACKING



The key to continuous grain



With the slats flexed apart on a jig, take light passes with a sharp X-Acto knife to cut through the face veneer. An acrylic rod supports the face veneer at the point of cutting.

Apply the canvas backing. *Cut the canvas a little oversized to allow for shrinking after the glue dries. The slats are held tight in the same jig used for applying the face veneer.*

Cut the pins. *Because the slats are held together only by the canvas, an antikickback device applies downward pressure while the pins are cut. Featherboards would work, too.*

Reduce the drag. *Chamfer the front edges of the top and bottom pins. In addition, ease the side edges of the bottom pins.*

photos above). Gentle pressure with repeated strokes seems to produce the cleanest cuts. Replace the blade often and rotate the acrylic rod slightly for each new cut so there is a fresh, smooth surface supporting the veneer as it is sliced.

Apply the canvas, machine the pins, then apply a finish

Once the slats have been separated and the edges cleaned of any glue, reassemble them in the holding jig face veneer down. Then add the solid-wood handle-attachment slat to one end of the tambour. Because you are unlikely to find a piece of solid stock to match the face veneer, you may want to make the handle slat contrast with the rest of the door.

For the backer, I use 12-oz. artist's canvas, cut slightly wider than needed, and fasten it with yellow glue. To prevent the canvas from sticking to the vacuum bag, place melamine-coated particleboard or plywood over it.

With the glue-up completed, cut the tambour to its final size on the tablesaw. Then machine the rabbets on the upper and lower edges to form the pins, which guide the door along the tracks. Cut the rabbets on the faces of the tambours so that the panel overhangs the bottom track, hiding it, when the tambours are shut.

To minimize friction, chamfer the front edges of all the pins with a chisel. Additionally, ease the side edges of the bottom pins.

I sprayed a lacquer finish on the tambours and cabinet shown here. If you use a rubbed-on finish, I suggest that you place the tambours in the jig to keep the slats tight and to lessen the chances of tearing an edge of the face veneer.

After the finish is dry, apply wax to the pins and track to further reduce friction. Last, glue a narrow strip of wood to the back of the hardwood handle slat to cover the edge of the backing canvas. □

Mike Weiss is a woodworker in Delaware County, New York.

Bench-Chisel Techniques

Used correctly, a simple set of chisels covers all of your chopping and paring needs

BY GARRETT HACK

A few thousand years ago someone clever hammered out a hunk of bronze into a narrow blade, fitted a handle to one end, sharpened the other against a stone and produced a chisel. Generations of craftsmen since have tweaked the design: Tough steel replaced soft bronze, the shape and length of the blade were modified to suit various tasks, but in essence, chisels have not changed much. They are still simple in form and, when used effectively, one of the most useful tools in the shop.

Every week catalogs arrive, full of a dizzying array of different chisels: long, fine-bladed paring chisels; stout mortise chisels; heavy and wide framing chisels; stubby butt chisels; intriguing Japanese chisels; and many sets of bench chisels. Few other classic hand tools are still available in such variety. Unless you work entirely by hand, all you really need is a good set of what I call bench chisels or, as some prefer, firmer chisels. These are chisels with blades about 4 in. to 6 in. long, in a wide range of widths from about ⅛ in. to 2 in. and with a wooden or plastic handle.

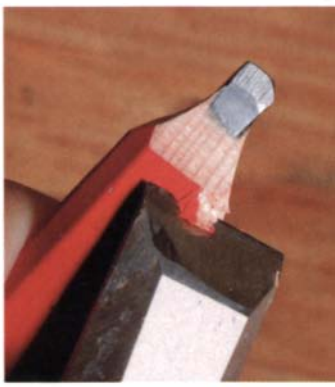
The only substantial differences between sets of bench chisels

The most versatile tool in your shop

No bench is complete without a chisel. Generations of woodworkers have come up with multiple uses for the chisel far beyond its original purpose. The five photos to the right show a chisel replacing tweezers, a hollow-chisel mortiser, a pencil sharpener, a scraper and a handplane.

Better than tweezers. *Perhaps best not done in front of children, removing a splinter with a chisel works faster than tweezers.*

Squaring up mortises. *When squaring up a machine-made mortise, a block of wood clamped to the workpiece can act as a guide.*



Handy pencil sharpener. *A test of a chisel's edge is how fine a point you can put on a pencil.*

Photos, except where noted: Michael Pekovich

are the quality of the steel (*FWW* #139, pp. 52-57) and the shapes of the blades. The blades on my everyday set of Swedish bench chisels are slightly tapered in length and beveled along the long sides. Tapering the blade yields a tool stout enough for the hard work of chopping a mortise yet light enough to pare one-handed. A blade with flat sides is stronger than one with beveled sides and is less expensive to manufacture. But a beveled blade can reach into tighter places, such as for cutting small dovetails.

Prepare the chisel

As with many other tools, the performance of a chisel is determined by how well it is tuned. The back of the chisel—the unbeveled side—must be dead flat for at least ¾ in., and preferably 1 in. to 2 in., behind the cutting edge. This flat plane guides and controls the cut: A curved back will rock and provide little control.

Another common problem is a slight rounding of the cutting edge on the back side. The back might still be flat except for this tiny back-bevel. Sloppy technique, not keeping the back absolutely flat on a sharpening stone while honing, creates this sort of rounding. The result is a chisel that will not cut while resting on its back because the rounded edge is in the air. A chisel with a rounded edge must be angled forward slightly, thus losing the back as a source of control. Flattening the back of a bench chisel right to the cutting edge is tedious but important. Work through the range of grits until you get a bright polish on your finest stone.

Once you have flattened the back, choose a cutting bevel angle based on the type of work you do. The finer the bevel, the more easily the tool slices through wood fibers. A fine bevel, 15° to 20°, is a little delicate, but it works for a chisel reserved for light paring cuts in softwoods. To chop tough end grain, a stouter 30° to 35° bevel would hold up better. For everyday bench work I aim for a 25° bevel whose width is about twice the thickness of the chisel. This is a compromise between ease of cutting and the durability of the edge.

Lightly hollow-grinding the bevel every three to four sharpenings speeds the honing process by reducing the area of steel in contact with the stone. I use a grooved block of wood that holds the chisel handle, set at a distance from the wheel to achieve the desired bevel angle. I then hone the edge on a medium India stone and a fine black Arkansas stone using kerosene as a lubricant. I try

Clean up glue squeeze-out. *A scraper works best for large areas, but for small areas a chisel offers more control.*

Paring pegs. *A chisel with a flat back offers more control than a plane and is neater than a sander when leveling a pin.*

Photos, this page (top, second from top and inset): Mark Schofield

HONING A CHISEL

First flatten the tool's back. *At least the first ¾ in., and preferably the first 1 in. to 2 in., of the chisel's back should be perfectly flat. The back guides and controls the cut and ensures a fine edge.*

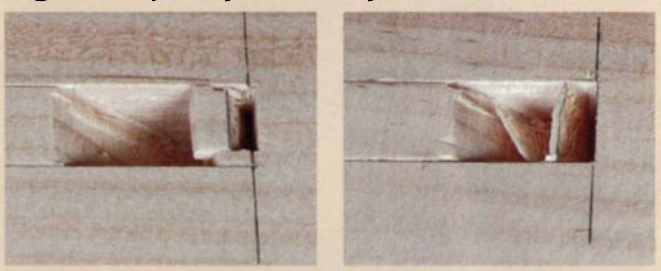
Grind and hone. *After hollow-grinding a 25° bevel on the grinder, the author hones the bevel on a medium and then a fine oilstone. The author guides the chisel freehand, but a honing guide can help until you master the technique.*

Ready to cut. *The tuned chisel should be flat on the back and have a narrow band of honed steel along the cutting edge, with a slightly concave ground surface just behind. If you can leave a clean cut on pine end grain, your chisel is ready for action.*

VERTICAL CHOPPING AND PARING

The right angle for chopping. *With experience you will be able to hold the chisel at the correct angle merely by sighting across and down it (left). A square set on end acts as a guide when squaring up the end of a mortise (right).*

Lighten up as you near your mark



Particularly in softwood, chopping too much waste at once makes the bevel push the chisel back over the line (left). It is better to take small cuts (right) and sneak up to the line.

to hone at a consistent 25° bevel with little or no microbevel along the cutting edge. The only exception is when I need a slightly tougher cutting edge for an extremely hard wood, such as rosewood, where I raise the tool handle to hone a microbevel of 30°. For a final strop I use some 0-to 2-micron diamond paste smeared on a piece of Baltic birch plywood. I prefer this to a leather strop, which being softer and more uneven, increases the risk of rounding over the bevel.

How to tell if your chisel is sharp

It's worth repeating that a chisel must be very sharp to work well. A dull edge takes far more power to drive through the fibers and, more importantly, is harder to control. Everyone has a special way to test the sharpness of an edge: dragging it against a fingernail, shaving arm hair or plucking the edge with a finger. The problem is that these tests are all a bit subjective.

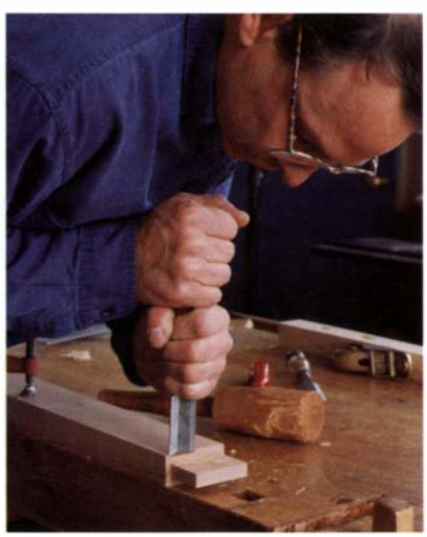
I test the sharpness of a chisel by paring a block of end-grain white pine and then looking at both the shaving and the cut surface. Because softwood fibers are weak and easily torn from the surface, only a really sharp edge will cut a thin and whole shaving. Looking at the end grain, ideally it should be uniformly polished. But more likely there will be light flecks in the surface where fibers were torn away, or it will exhibit fine tracks where tiny nicks in the chisel's cutting edge scraped across the wood.

Next lay the chisel with the back flat on one of the long-grain sides of your block. If you can pare a shaving without lifting the chisel, the back and cutting edge are flat. If you have to lift the chisel to get it to cut, the back or cutting edge is rounded.

Proper technique ensures good results

For most of us, the days of working with hand tools alone are long gone. Whereas chisels would once have been our primary tools for cutting all manner of joints, today we typically use them more often to adjust joints cut on a machine.

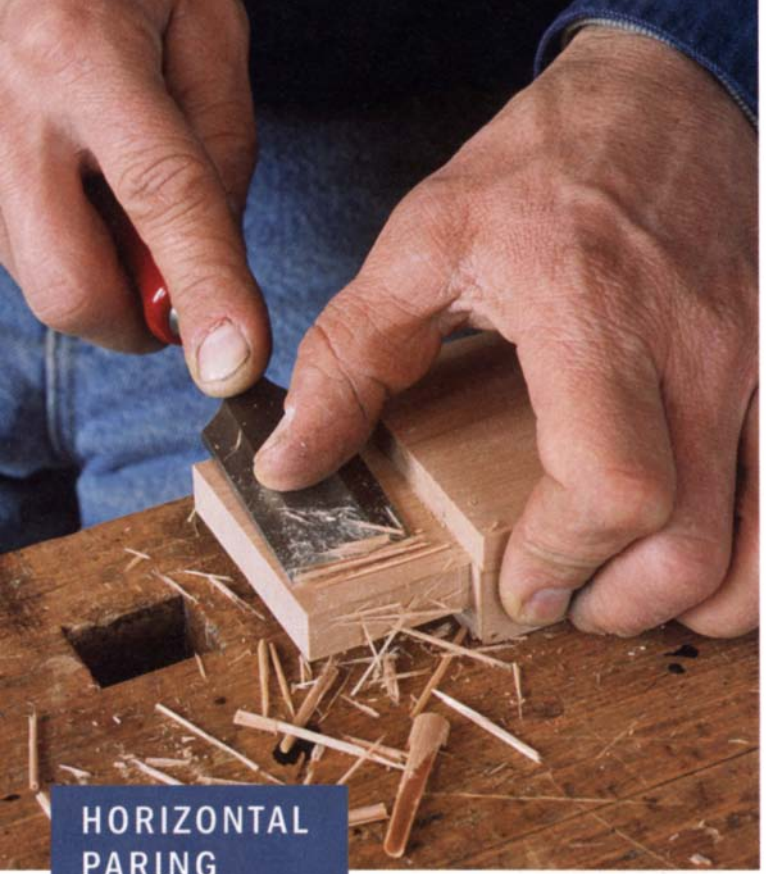
Chiseling tasks can be simplified to chopping, paring or some combination of the two. Cutting end grain, such as excavating a mortise, is chopping. A mallet usually delivers the driving force, so everything works best when you chop vertically, down against your bench, preferably directly over a leg. Paring is often a hand-powered operation, using the chisel horizontally or vertically to slice away a thin shaving. This can be against the end grain or along the grain. I also pare with the chisel in one hand and use my thumb as a lever, much the same way you would use a knife.



Chop, then pare. *Lightly chopping all the way around defines the shoulder of a tenon (left) before a final paring with hand power (above).*

Chopping to a line vertically— Cutting with a chisel held plumb is an acquired skill. Finding the right angle is easiest when you are only slightly above the work and looking across the chisel. Sighting against a square set on end helps, as does good light shining toward the work and you. Holding the chisel plumb

Photos, this page (top row, middle row): Mark Schofield



HORIZONTAL PARING

When cutting horizontally, the smoothest cuts are made with a slight shearing action, cutting both forward and sideways. The need for a perfectly flat chisel back is apparent when fitting a tenon.

greatly speeds any chopping task. If this is hard for you, or if you have to cut an angled mortise, saw a waste block to this angle and clamp it in place to guide your chisel. For heavy chopping, driving a chisel with a mallet allows you to concentrate all of your efforts on directing the tool.

Light cuts yield more accurate results. Think about the cutting edge sinking into the wood. The back is trying to guide the chisel plumb while the beveled side of the cutting edge presses the chisel against the back. With a light cut this pressure breaks out the chip and holds the back right to the line. Try to chop too large a chip, especially in softwood, and the pressure will push your chisel beyond your line. Take little bites, waste up to your line, and then take a final light cut right on the line. Because I have a good selection of chisel sizes, I waste as much wood as I can with a chisel narrower than the mortise. The final cut is with a chisel snug in the mortise and right on the line.

Paring to a line vertically—Paring end grain gives you a whole new appreciation for the toughness of wood. Good paring takes both muscle and a feel for controlling the cut. A sharp chisel and a light cut give you the best chance for doing accurate work.

After you have removed the bulk of the waste using a mallet, switch to a light paring cut right on the line. This provides greater accuracy and control and allows you to undercut slightly. Also, it's just plain quicker than reaching for the mallet each time after moving the work. Work around all four sides of a tenon to establish the shoulder line and to give you something to sight against when paring. Position your body above the work for paring the final shaving or two, using the weight of your upper body to drive the chisel and both hands to guide it.

Paring to a line horizontally—Given a choice, I prefer the control of a plane to shave a surface. But there are plenty of times when I don't have the right plane close at hand or when it's simply quicker to pare a few shavings with a chisel. Long and thin-bladed (for flexibility) paring chisels are the tools of choice here, but a well-tuned bench chisel will work almost as well.

For maximum control when paring, I find it's best to have one hand on the chisel handle and the other as close to the work, or cutting edge, as practical. This way you can raise or lower the handle slightly to control the depth of cut, while the hand close to the cutting edge holds the chisel steady and helps guide the cut. This hand also acts as a brake, smoothing out the pressure delivered by the hand on the handle. The smoothest and easiest cuts are made with a slight shearing action, slicing both forward and sideways.

Paring while using the thumb as a lever—Holding the chisel like a penknife or a potato peeler, with the blade cutting toward you, takes some getting used to. Once mastered, this technique allows for fine controlled cuts, even in end grain. I use it to pare the end of a table leg, to shorten a tenon and to chamfer its ends.

Cutting bevel-side down—When paring the bottom of a groove, the flat back of a chisel can no longer be used as a guide, and the natural inclination of the chisel is to dig in. Turn the chisel upside down and use the bevel to guide the cut, raising or lowering the handle to adjust the depth of the cut. This method is useful to deepen a mortise or dado (or shape a curved one) or to smooth the bottom of a recess for an inlay.

As with all tools, there are many paths to accurate and satisfying results. Sharpen a few chisels and practice these basic techniques. Some of them might not feel comfortable at first, but everyday use at your bench is the surest way to master them. □

Garrett Hack is a furniture maker in Thetford Center, Vt.

DELICATE CUTS

Using the chisel as you would a penknife allows you to make delicate cuts such as slicing end grain or beveling a tenon.

Photo, this page (bottom): Mark Schofield

A Better Way to Build Drawers

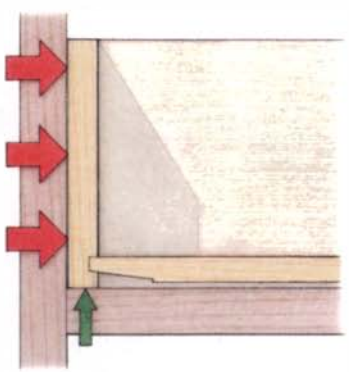
NK-style drawers are easier to fit, offer smoother action and have a longer life than traditional drawers

BY MARK EDMUNDSON

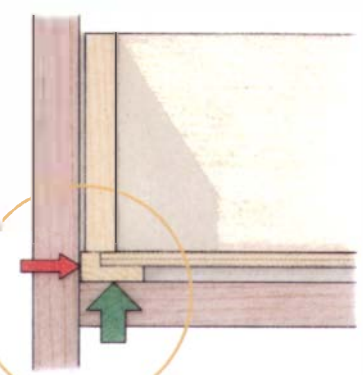
THE NK ADVANTAGE

NK drawers, named for the Swedish furniture manufacturer that popularized them, use a separate bottom assembly to eliminate the drawbacks of standard drawer designs.

TRADITIONAL DRAWER
Thin, tall sides create a large friction surface area and are prone to sticking. Narrow glide surfaces wear out quickly.



NK DRAWER
Short, wide runners in the bottom assembly reduce the friction area and provide a wide, long-wearing glide surface.



Consider a dresser drawer that is 16 in. deep and 30 in. wide. Let's say that every time it's opened it travels 12 in. out and 12 in. back in. If this drawer is opened once a day for 30 years, it will have traveled more than four miles, carrying its load of sweaters and jeans solely on the thickness of the drawer sides. By then it's probably running like a brick over a cheese grater. Worse, if the wear extends into the groove for the drawer bottom, it will damage not only the drawer but also the carcase itself.

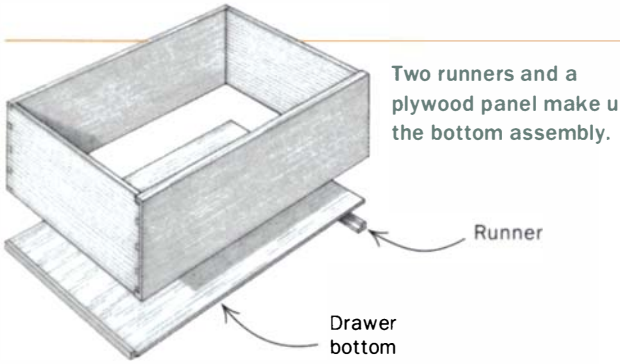
Side-hung drawers avoid this problem by having the drawer run on rails dadoed into the drawer sides. French bottoms avoid the wear by adding slips to the bottom of the sides, which increase the surface that bears the weight of the drawer. In both of these cases, however, the sides still rub against the drawer opening. This is especially a problem in deep drawers, where the tall sides are difficult to fit to the carcase and are prone to sticking.

A style that solves both problems—excessive wear and too much friction—is the NK (pronounced "enco") drawer, developed in the early 1900s by a Swedish manufacturer, Nordiska Kompaniet. I started building NK drawers, which require no hardware, for deep drawers. Now I make almost all of my drawers this way.

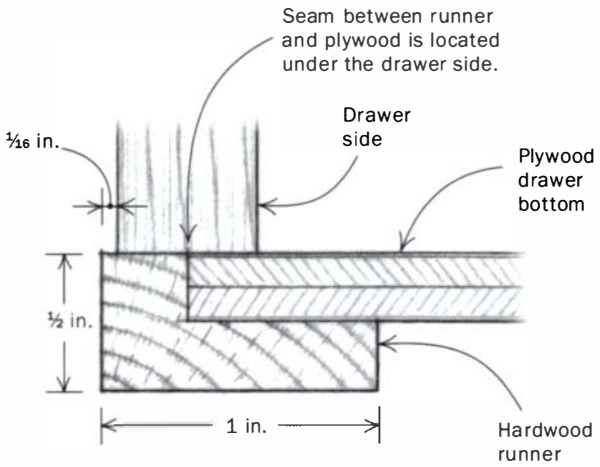
The NK drawer is quite different from a standard drawer. For one, the front is slightly wider than the sides, except where the dovetail pins have been pared flush. Runners glued to the bottom of the sides also protrude from the sides, making them even with the sides of the drawer front. The last big difference is the bottom. It's made of plywood and glued into a rabbet in each runner.

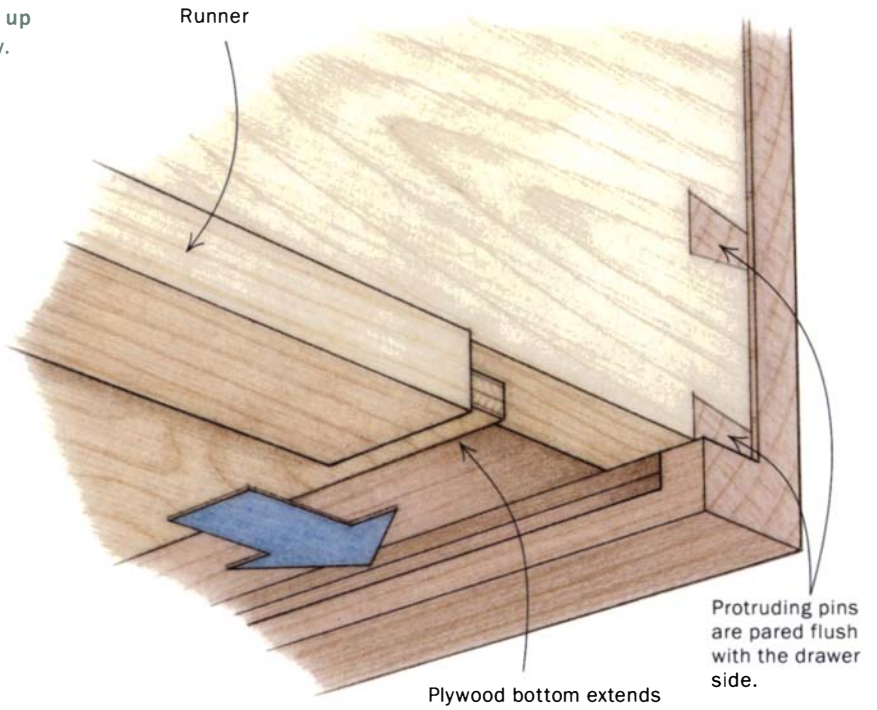
The NK drawer has a few advantages over a standard drawer. The runners provide extra surface area where it's needed—under the drawer—and reduce the amount of surface area rubbing at the sides. Also, fitting this drawer means fitting the bottom assembly

Photos: Asa Christiana



Two runners and a plywood panel make up the bottom assembly.





only, which is easier than fitting a standard drawer, especially if it is large. Without the front, sides and back of the drawer to obstruct your view, it's easy to see where the runners are binding. Finally, even if the box isn't glued up perfectly square, the drawer will operate smoothly, because the bottom sits proud of the sides.

Build the bottom assembly first

The construction of the NK drawer is as different as its design. The bottom assembly comes first, because it determines the dimensions of the drawer box. The bottom assembly is composed of three parts: two runners and a plywood bottom. Fine plywoods are available in a variety of species, but I often make my own drawer bottoms with veneer chosen to match the drawer front, laid up on a thin plywood core.

The runner dimensions must be sized to minimize the friction against the carcase sides and maximize the support of the drawer's weight. On the dresser featured here, the drawers are 16 in. deep and 30 in. wide, with heights ranging from 5¾ in. to 8 in. I made the runners ½ in. high and 1 in. wide.

Because the runners butt up to the drawer front, their lengths are determined by subtracting the thickness of the drawer front from the drawer depth. In this case, the front is ¾ in. thick, so the runner length is 15¼ in. The runners are rabbeted to accept the bottom. The rabbet depth is the same as the thickness of the bottom, and the width of the rabbet is such that the edge of the plywood will end up directly underneath the drawer side, splitting its thickness. Because the runners provide all of the support for the drawer, the drawer sides can be thinner than ½ in. For these large drawers I resawed 5/4 stock and ended up with sides that are ½ in. thick.

Once the runners have been rabbeted, place them into the draw-

Start with the bottom assembly. *With the runners in place, determine the width of the plywood bottom. Cut the bottom a bit wider than necessary. Then trim it to fit.*

The drawer pocket is the best place for gluing up the bottom assembly. *The author uses clamping cauls and small sticks wedged against the drawer divider above.*

Drawings: Vince Babak

Each part determines the size of the next one. *Lay out the groove in the drawer front directly from the bottom assembly. Then measure to the groove in the drawer front to determine the height of the drawer sides.*

er opening and measure the distance between the walls of the rabbets. Cut the plywood panel a hair wider so that you have some wood to work with when making the final fit. You may want to glue a strip of solid wood to the back edge of the plywood to conceal the core. The bottom must extend past the front of the runners into a groove in the drawer front, so make the bottom ¼ in. longer than the runners. Once these pieces have been cut to size but before gluing them together, test the fit in the drawer opening. If the fit is tight, you shouldn't have too much work to make it run smoothly, but if it won't fit at all, reduce the width of the bottom. If it's too loose, place a shim between the plywood's edge and the rabbet during glue-up. Once these pieces are to your liking, they may be glued up.

The bottom assembly may also be glued up in the drawer pocket itself, to ensure a close fit from the get-go. This way you also can align the front edges of the runners with the carcase during glue-up, which in turn will cause the drawer front to be parallel with the front of the carcase. You will need two ½-in.-square clamping cauls cut to the same length as the runners. Place the bottom assembly in the drawer pocket and set the cauls on the outside edges of the plywood. The easiest way to clamp down the cauls is to wedge small sticks against the drawer divider above. Make sure that the back of the runners and the back of the bottom remain flush.

When the glue is dry, you can begin fitting the bottom assembly to the drawer pocket. This definitely will be the easiest large drawer that you will ever fit. The bottom assembly should fit the pocket tightly and only need a few plane strokes to make it run smoothly, but there is always at least one renegade in the bunch that will need a little bit more coaxing. Begin by flipping the assembly upside down and fitting the front few inches of it into the opening. If the back is still off, check the dimension of the back end of the bottom, fitting from the back of the cabinet. Once this is done, plane the runners so they are once again straight. Check the fit frequently to avoid removing too much material.

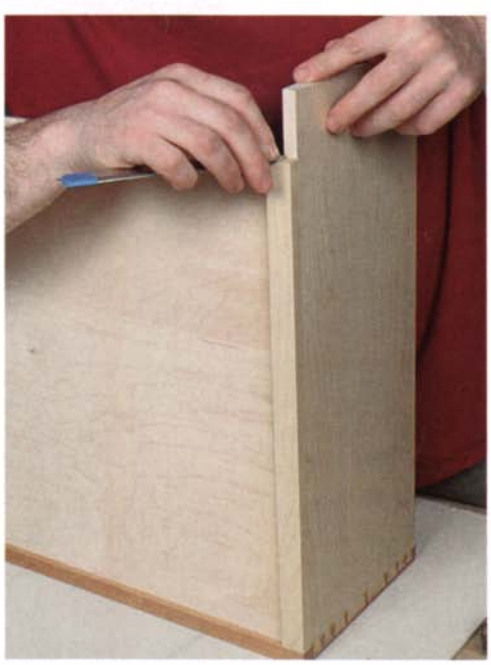
To test whether the bottom assembly fits and is running smoothly, pull it out about three-quarters of the way (you may have to place a weight at the back of the assembly to keep it from tipping) and try to close it by pressing at either the right side or the left side. If the assembly goes in without binding, it's ready. If it sticks it probably needs a little bit of sanding to create a smoother run.

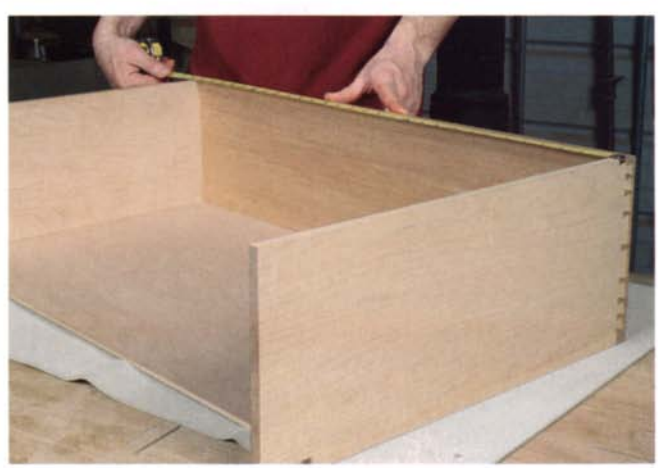
If, in the excitement of fitting the bottom assembly, you take off a little too much wood—which I've done more than once—and the fit becomes sloppy, just rip about ⅛ in. off the side of the runner, glue on a slightly thicker strip and start again.

The runners must line up evenly with the front of the opening to ensure a consistent reveal around the drawer front. If the runners don't line up, use the front of the carcase to determine how much

DRY-FIT AND MEASURE FOR SIDES AND BACK

The drawer side is set in from the bottom runners and the sides of the drawer front (above). *When laying out the half-blind pins, set a marking gauge about 1/16 in. heavier than the thickness of the drawer sides.*

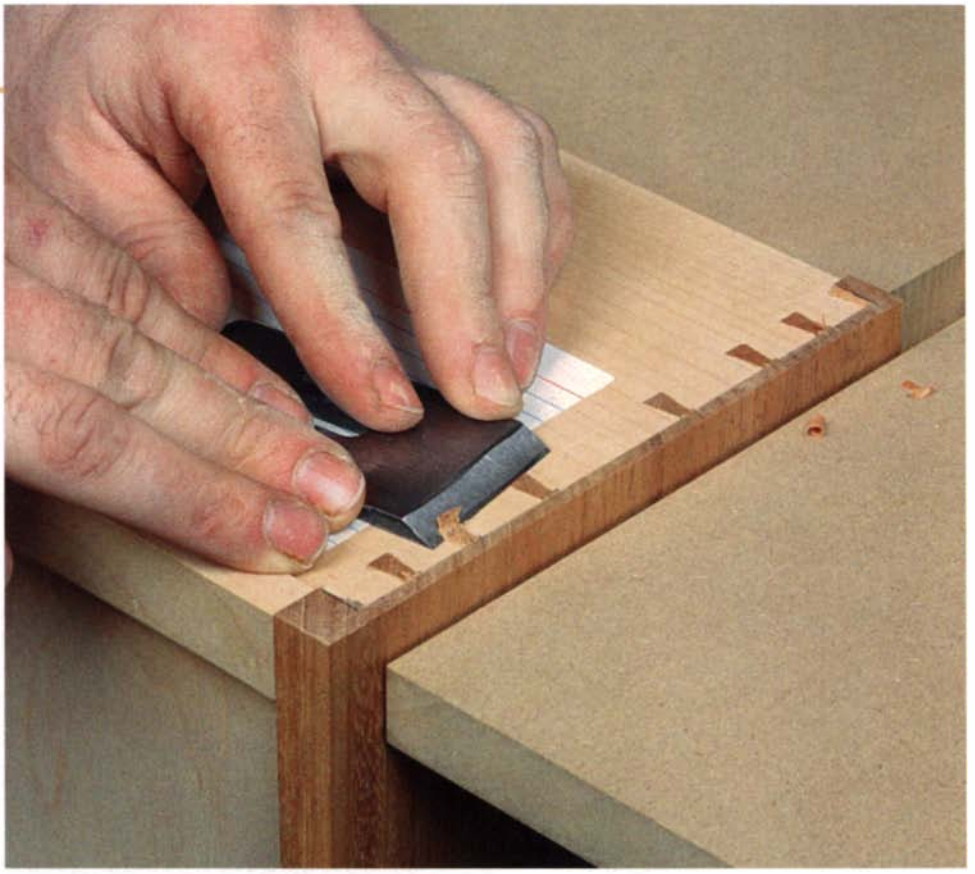




Temporarily attach the bottom assembly to find your next dimensions. *Use the back of the drawer runners to scribe the length of the sides (left). Then measure across the sides to find the length of the drawer back. Cut the sides and back to length, then cut the through-dovetails at the back corners.*

PARE THE PINS AFTER ASSEMBLY

A small dowel at the back helps keep the drawer box aligned during glue-up. *Just be sure that the edges of the drawer front line up exactly with the sides of the runners.*



Paring back the pins. *Use a small stack of index cards and a plane blade to pare away the pins without tearing out the short grain. Remove one card at a time until they're gone and the pins are trimmed flush. Sections of the half-pins at the top and bottom are removed, leaving them square.*

to trim the longer runner. Scribe a line and clamp a square guide block to the runner, then pare away the excess with a chisel.

Size the drawer front

Cut and plane down the edges of the drawer front until the drawer fits snugly in the carcase opening. Using the bottom assembly as a reference, locate the groove in the drawer front that will receive the protruding edge of the plywood.

Now measure from the top of the drawer front to the top of the groove to find the height of the drawer sides. Add a fraction more to the height to allow for slight misalignment of dovetails.

Cut the half-blind dovetails—Cut the tails first. Then, to hold the sides in from the runners and the drawer front, set a marking gauge 1/16 in. heavier than the drawer side's thickness when laying out the pins in the drawer front. Any more than 1/16 in., and the drawer front's protruding end grain will be too fragile.

I leave the sides long until I've finished the joinery at the front. This way, if I mess up a set of tails, I can cut them off and do them over again. Usually I cut all of the pins in the fronts, choose the worst-fitting side and redo its tails, working in reverse and marking from pins to tails. This second chance takes a little pressure off cutting dovetails.

After the joinery has been cut for the sides and fronts, dry-fit the parts and place the box on top of the bottom assembly. If everything looks good and the runners are snug against the drawer front, use the runners to mark off the lengths of the sides. Then cut the sides to length.

Now measure the distance from the outside of one drawer side to the outside of the other at the front, and cut the back to that dimension. After the joinery has been completed but before the glue-up, finish-sand the drawer sides; otherwise, the protruding runners and drawer front will make sanding difficult.

Glue up the drawer

Gluing up an NK drawer can be a bit fussy. Start by gluing up the front, sides and back. Once that assembly is dry, you're ready to attach the bottom assembly. Line up the sides and runners carefully: If the front overhangs a runner on one side, it will come up too short on the other, and all could be lost.

The back corners of the drawer should be centered on the bottom assembly. To ensure alignment, while the assembly is clamped up during the dry-fitting, drill a small hole at the back of the plywood bottom, up into the drawer back. During glue-up, slide a dowel into this hole. The front will stay put, because the plywood bottom slides into the groove in the drawer front.

All that's left now is to pare down the protruding pins on the drawer front. A sharp chisel will do, but I like to use a freshly sharpened plane blade and some index cards as shims. If you take off too much at once, the end grain can crumble. Start with a stack of index cards slightly lower than the pins, lay down the blade and make small shearing cuts. Then remove a card or two and repeat as necessary. Finally, pare away the slope of the half-pins at the top and bottom, leaving horizontal lines.

NK drawers are more complex than standard drawers, but they make fitting large drawers a much less nerve-wracking job. And it's a comfort to know that these drawers will continue to run smoothly as the years and miles pile up. □

Mark Edmundson is a furniture maker in northern Idaho.

Post-and-Rung Stool

Nontraditional approach simplifies round-tenon joinery without sacrificing strength

BY BRIAN BOGGS

I suspect that for many readers the idea of building a simple stool seems rather mundane. But when taken as an exercise in perfecting your round joinery, there is more challenge here than meets the eye. Even after building 1,500 chairs, making a perfect round joint keeps me on my toes.

And there are lots of other reasons to get into stool making. Apart from providing compact, inexpensive seating, stools can serve as steady footrests and portable desks. Also, they can be adapted to serve as benches or bar stools or even as end tables or coffee tables. Finally, if you've never made a chair, a stool is a great first step. All of the joints in this stool are at 90°.

While there are lots of ways to construct a stool, I prefer the post-and-rung frame. It's very lightweight, which is important because the stool will be moved around. Also, the round rungs can withstand a lot of racking and twisting without damaging the joint. And the parts, including the tenons, can be turned fairly quickly, and the mortises are simply drilled.

Round joints built to last

Round joints are often seen as a cheap, inferior way to join wood parts. After all, this is the joint in ladderback chairs that has kept many repair shops busy and many chair owners frustrated. But there are very old chairs with round joints that have held up for generations of use. My mother-in-law has a fine example of a post-and-rung chair that's more than 200 years old. The joints are in great shape, and there is no evidence of repairs. So, how can we make our chairs do that? There are at least two ways, and I have used them both.

The traditional method—The old locking joint is the most interesting. There are

Photos, except where noted: Jonathan Binzen

WET-DRY JOINERY REDUX

The author's post-and-rung joint does not rely on green wood. The rungs are dried to 4% moisture content in a simple kiln before assembly. But the legs are at 10% to 12% moisture content, a normal shop level. The leg-to-seat-frame joint relies on the same principle.

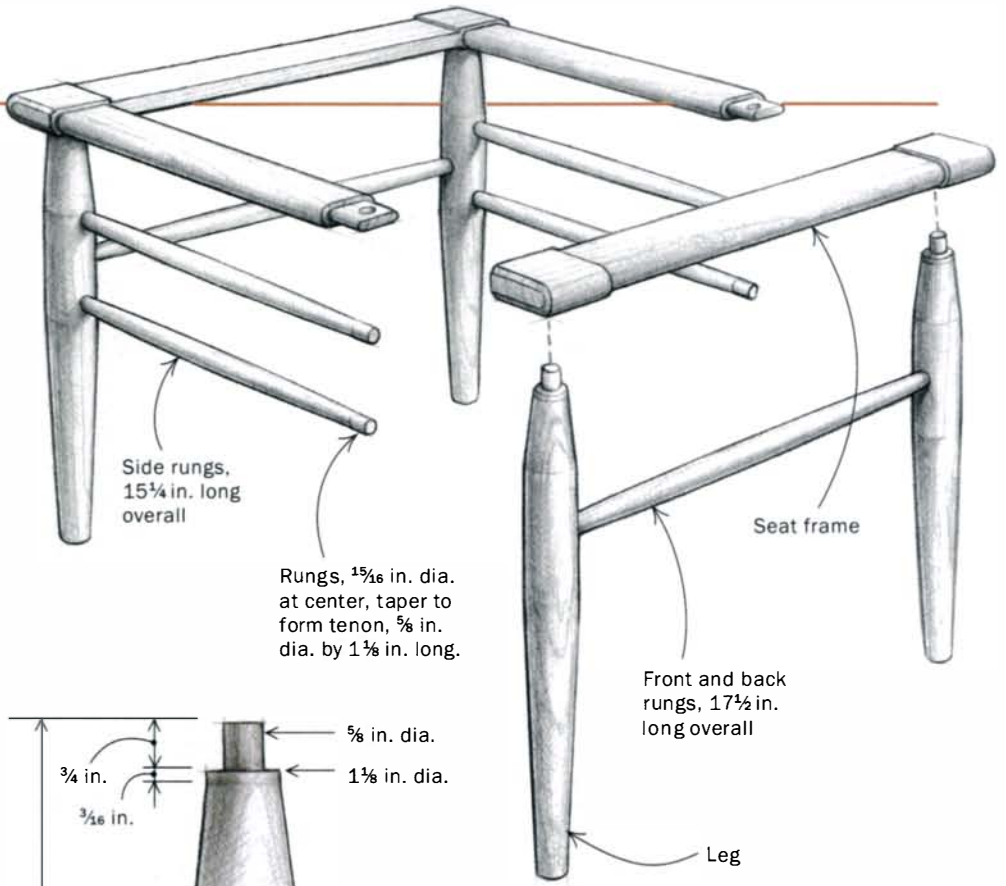
three requirements for success. First, the rung should be made of a very tough wood, such as oak or hickory, and the leg should be a slightly more elastic wood, such as maple. Second, the tenon is left slightly oversized, and a small notch is cut into it. Finally, the leg needs to have a high moisture content at the time of assembly—between 15% and 20%—with the rung dried to 4% or less. As the leg dries and shrinks, the mortise deforms to the shape of the notched tenon, locking the joint. Glue is not necessary and may even weaken the joint by filling the locking notch.

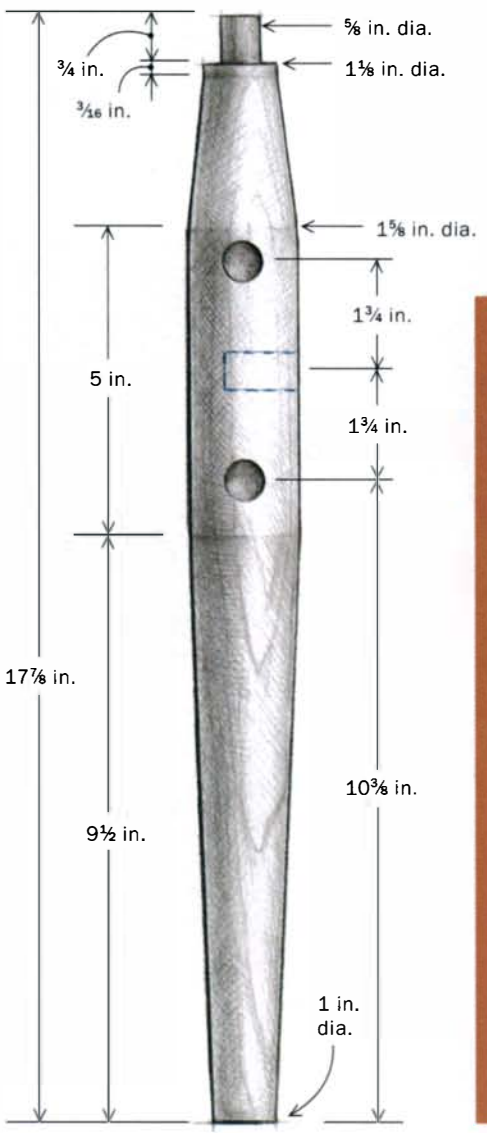
My hybrid version—The traditional locking joint works fine in this stool. However, I now prefer a hybrid version of this joint—one that doesn't require the locking notch or extra moisture in the legs. It also allows me to build chairs out of a single species of wood, even a softer species such as cherry or walnut.

The joint works by combining the super-dry rung with a near-perfect fit between the mortise and tenon. Glue is added for strength. I use the same method for the leg tenons that fit into the seat frame.

The wood for the legs is at about 10% moisture content after sitting around my shop. I wouldn't want anything wetter than 15%. Then I super-dry the rungs and just the tenon portion of the legs in a simple light-bulb kiln (see the photo at right).

Once dry, I cut the tenons to within a few thousandths of the mortise diameter. Because drills vary, you should drill the hole first and then carefully measure it. I use a dial caliper for measurements like this (I think every woodworker should own a pair). Torn fibers in the hole can weaken the joint, so use a very sharp bit, ideally a good brad-point (for more on drill bits and





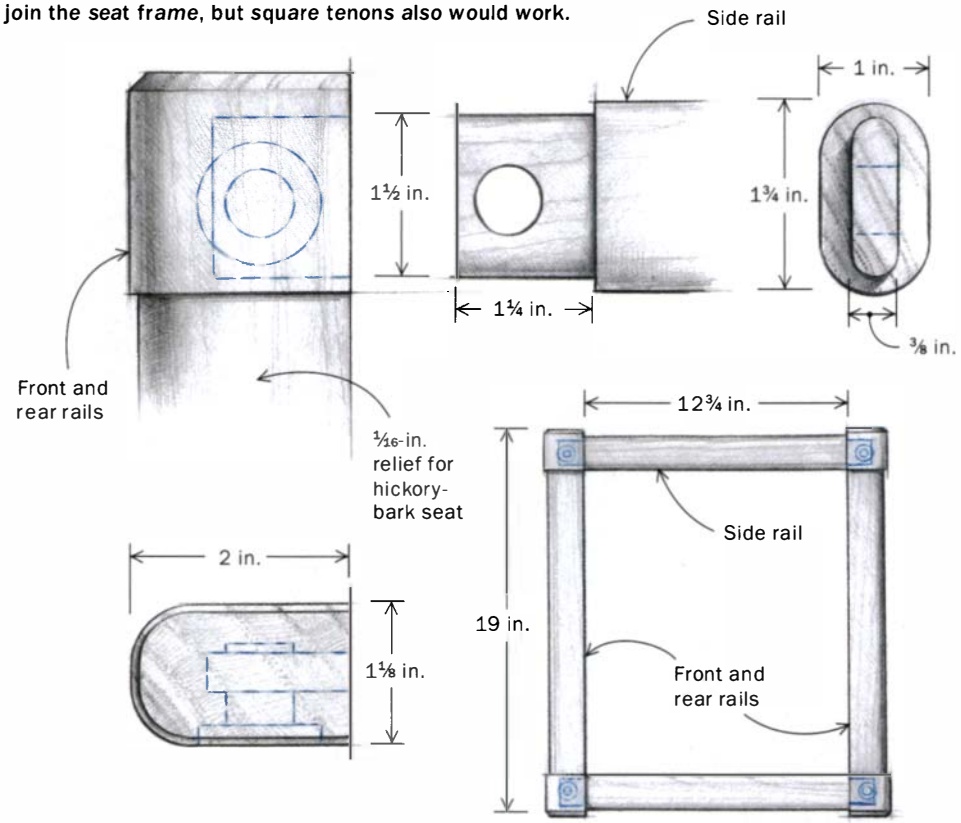
DRYING THE TENONS

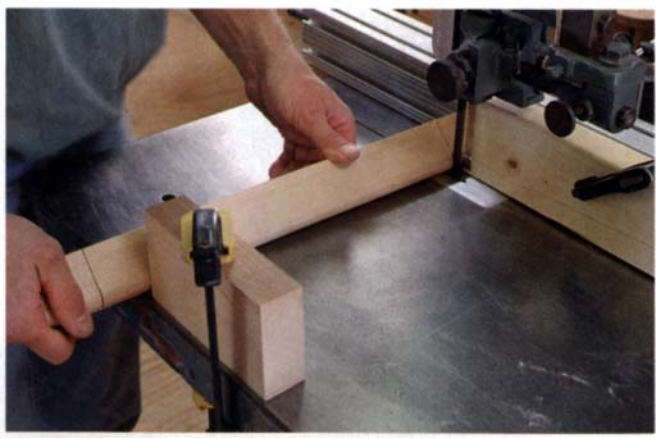
Super-dry tenons are critical to the author's locking joint. The rung stock is placed inside a shopmade kiln, and the legs are inserted in holes at the top, to expose just their tenoned ends to the dry heat. The kiln is simply a plywood box lined with insulation board. A light bulb provides the heat.

Drawings: Bob La Pointe

BUILDING THE SEAT FRAME

The author uses round-cornered *mortises* and tenons to join the seat frame, but square tenons also would work.





Make the seat frame while you wait for the other parts to dry. *After routing the ½-in. roundover on the edges of the front and rear rails, create the relieved section for the hickory-bark seat. Cut the shoulders of this section first by setting stop blocks 1⁄16 in. behind the front edge of the bandsaw blade. Rotate the rail against the blade direction.*

Then bandsaw away the three sides of the relieved area. *Set the rip fence 1⁄16 in. away from the outside edge of the blade, and start the cut just past the shoulder. Reverse the workpiece to finish each cut. Use a 7⁄16-in.-radius router bit to round over the edges of the relieved section.*

their recommended uses, see *FWW* #138, pp. 64-69).

After assembly, the tenons swell and tighten the joints as they approach equilibrium moisture content. However, without a good glue bond, the chair would depend only on the wood's resistance to compression to prevent racking. Hickory and oak can take this, but I want the support of a good glue joint for cherry or walnut. Make several test joints and check them after a few days.

Start with the right materials

Anytime you need strength without a lot of bulk in a wooden product, the quality of your material is paramount. Without clear, straight-grained material, you just can't make a very good post-and-rung stool. The ultimate material is riven from a straight log section. However, the parts of this stool are thick enough that—as long as the wood is straight-grained—sawing out the parts will do just fine.

I prefer making the rungs with green wood for cost reasons and because I can follow the grain better when resawing an entire log section. But you can use kiln-dried wood for all of the parts, especially if you don't have time to wait for green wood to season. You can resaw 8/4 kiln-dried stock to get the quartersawn seat-frame parts you need.

To speed the drying process and to prevent checking, bandsaw the rung stock into 1⅛-in. octagons and turn the straight and tapered sections and stepped tenons on the legs to about ⅛ in. oversized before placing them in the kiln. I made my simple kiln with plywood and insulation board, but I have had success with an even simpler cardboard kiln with sticks driven through it to support the stock. Just keep the heat source away from direct contact with the wood or cardboard. A 150-watt bulb brings the temperature inside the kiln to 160°F to 180°F, and two or three days should be enough to get the rungs and leg tenons down to a moisture content of 4%.

I generally make one or two extra rungs per chair to cover drying and turning mishaps—not that I've ever had any.

Make the seat frame

While you're waiting for the rungs and leg tenons to dry, you can get the seat frame out of the way. The frame is constructed with round-cornered mortise-and-tenon

TURNING PRECISE TENONS

Square tool, square plunge. *To create the uniform tenons so critical to the post-and-rung joinery, the edge of the ⅜-in. beading/parting tool must be ground to 90°, and the tool must be fed in squarely.*

Each adjacent plunge cut is made until a ⅝-in. wrench (acting as a caliper) just slips over the spinning tenon. *To finish the rung, use a gouge and skew chisel to blend each tapered section from its 15⁄16-in. peak down to its tenon.*

joints, all at 90°. Use dry, quartersawn material to minimize movement. The only hard part on this frame is making the relieved sections on the front and rear rails. This 1⁄16-in. relief keeps the exposed corners at the same height as the finished bark weave and helps keep the bark from shifting outward.

First, dress all of the parts and cut them to their final lengths. Round over the side rails with a 7⁄16-in.-radius router bit, then set them aside. Then, with a ½-in.-radius bit, round over the full length of the front and rear rails.

For the relieved section, use the bandsaw to cut the shoulders first. Set the rip fence at 2 in. and clamp a stop block 1⁄16 in. behind the teeth. With the round end down against the table, cut the first shoulder. Then carefully roll the rail backward and up, exposing the round edge to the teeth. Keeping the teeth engaged in the cut, continue to rotate the workpiece until the shoulder is complete. Rotate the workpiece against the cutting direction of the blade. Going the other way will get your fingers slammed against the table. Don't ask me how I know this.

To saw out the relieved area on the bandsaw, set the rip fence 1⁄16 in. away from the outside of the teeth to control the depth of cut. You will probably need a fence extension, because both ends of the piece should ride on the fence once the cut is under way. Start just past the shoulder, letting the blade slowly work its way to full cutting depth. Cut to the opposite shoulder, then flip the part and cut the other way to finish the relief. After relieving three sides, round over the edges of the relieved area with a 7⁄16-in.-radius router bit, working as close to the end sections as you dare. Finish up with a rasp and a file.

Cut the mortise-and-tenon joints and glue up the frame, being careful to keep it square. This is a good time to apply finish to the seat frame. I use Minwax Antique Oil on my chairs and stools because it's easy to pad on with a rag, builds to a thin film and gives cherry a warm, natural glow.

Turn the rungs and legs

When the rungs and legs are out of the kiln, it's time to turn them. I do the rungs first. The thicker legs will not have warped as much, so they can be remounted between centers the same way they came off them. For the thinner rung stock, the usual method of centering the ends won't work. I center each one by eye, lightly cranking in the tailstock and adjusting the part until its center runs true. The ends get tapered only, so they can run out a bit. Before turning, I drive the centers home firmly.

It's always a good idea to create full-sized plans. I used full-scale drawings of this stool's parts to create story sticks and guides for drilling and turning. To lay out the tenons and tapers on the legs, for ex-

TURNING THE LEGS TO FINISHED SIZE

After removing their tenoned ends from the kiln, turn the rough legs to size. *Define the straight section by making plunge cuts to final depth at both ends. A strip of masking tape on the tool rest acts as a story stick.*

Then turn the tenons and connect all of the cuts. *Bring the stepped tenon down to size, and complete the straight and tapered sections using the previous cuts as a reference.*

DRILLING THE MORTISES

A sharp drill produces a clean hole and uniform chips. *Pay a little extra for a good brad-point bit, and adjust it in the chuck until it runs true.*

Drill the mortises for the front and back rungs first. *The author's drilling jig is a block with two V-grooves and a simple hold-down.*

Assemble the front and rear frames, and drill for the side rungs. *Lay the frames flat on a wide drill-press table.*

ample, I transferred lines directly from the plans to a strip of masking tape along my lathe's tool rest.

The trick to good tenons—First, for each rung, rough out a cylinder with a gouge. Then, with a ⅜-in. beading tool, carefully cut the tenons, using a wrench as a caliper. The wrench allows you to check the work while it is spinning. From the back of the workpiece, hold the wrench firmly against the tenon as you make the cut. When it slips over the tenon, stop cutting.

It is very important that the ⅝-in. wrench you use exactly match the size of the hole your drill bit actually cuts. When a tenon fits just right, I can barely push it all the way into the hole, and it pops like a cork when I pull it out. To adjust the fit you can hammer the wrench to close it up a bit or file it to make a bigger tenon. Mark this wrench and keep it by the lathe. This is a caliper now, not a wrench, and you don't want to mar it just to loosen a bolt.

When the tenons are done, turn the tapers, moving from the widest diameter at the middle of the rung down to the ⅝-in. tenon. I use a skew chisel for the final pass. The holes in the legs will be ⅛ in. deeper than the tenons, allowing the tapered shoulder of the tenon to be driven slightly into the mortise, hiding the glueline and the slight shoulder.

Legs need a straight midsection and a stepped tenon—Next, finish turning the roughed-in legs. The tapers and tenons are different. The midsection needs to be very straight, because the barrel will be used as a reference for drilling.

When turning the tenons, use the same ⅝-in. wrench to gauge the top portion and a regular caliper for the larger shoulder. To set your caliper for the shoulder, you need to know the exact size of your counterbore. Drill some test holes first and measure the counterbored portion carefully. Set your caliper to this exact dimension.

The rungs and legs are most easily sanded and finished before they are removed from the lathe. Just be careful not to get finish on the tenons.

Drill the legs and assemble the undercarriage

Before drilling the holes in the legs, make up a story stick with all of the rung locations marked—the single front and back rungs and the double side rungs.

It doesn't matter which side of the legs you drill first, but I drill and assemble the front and rear frames first (each with a single rung). Place two legs in a drilling jig, which is simply a block with two V-grooves and a hold-down (see the photo above left). Orienting the grain at 45° keeps shrinking and swelling of the leg equal on all rungs, and it keeps the elliptical grain pattern on the outside corners of the legs. Clamp the legs in the jig and mark the elevation of the rung. You might want to mark the center as well, but I just center the hole as I drill, sighting down the leg.

The accuracy of your holes depends on a number of factors. Assuming you have a good bit and a decent drill press, tighten the bit in the chuck with just hand pressure. Turn on the machine and watch the center of the drill to see if it runs true. If you see any vibration, loosen the bit, rotate it slightly and try again. Start the plunge slowly for a clean entry into the legs. Fine chips indicate a smooth hole. Also, if you raise the bit to clear the chips, don't bring it

Drill the stepped mortises in the seat frame. *Center the undercarriage on the seat frame and mark the mortise locations (left). The author uses a commercial counterbore bit (above) to machine the two-stage mortise accurately, in one shot.*

all the way out of the hole or it may tear the edge of the hole upon reentry.

Once you have drilled the front and back frames, assemble these parts. I use liquid hide glue for these frames because it gives me more time to get the whole thing assembled. I prefer Old Brown Glue from Antique Refinishers (619-298-0864). Coat both the mortise and tenon thoroughly. To align these parts, use the legs as winding sticks by sighting across one leg to the other. I use a deadblow hammer to drive the parts together. Drive every tenon as deeply as possible. You will hear the tone change when the tenon bottoms out.

To drill the mortises for the side rungs, mark the holes from the story stick and lay each two-leg frame flat on the drill-press table. If your table is too small, clamp a piece of plywood to it as an auxiliary table. After drilling, assemble the undercarriage by driving all of the rungs into one frame first. A bear hug will get the other side started, and the hammer finishes the job.

Attach the seat frame

With the undercarriage assembled, it's time to lay out and drill the stepped holes in the seat frame. Instead of laying out these according to measurements, I prefer to go by what the lower frame actually came out to be. Depending on how deep you drove the rungs, the distance between the tops of the legs can vary. With the seat frame upside-down on the table, center the leg tenons on the corner blocks of the seat frame and mark their locations.

To drill the stepped mortises I used to use a Forstner first, followed with a counterbore I made by gluing a plug over a spade bit. Now I prefer to use a commercial combination counterbore bit, which makes the job as easy as drilling a single hole.

If the counterbored hole is drilled to the right depth, attaching the undercarriage to the seat frame is pretty simple. Use plenty of glue and drive the leg tenons into the mortises evenly.

All that's left now is weaving the seat. I prefer to use hickory bark, but you could also use splint or Shaker tape. □

Brian Boggs is a chair maker in Berea, Ky., and teaches seminars on ladderback chair making.

Weaving a bark seat

If you've ever woven a chair seat in any material, you'll find weaving a bark seat a very manageable task. The hardest part could be finding the material (see Sources at left). If you are ambitious, follow the chapter on harvesting bark in John D. Alexander's book, *Make a Chair from a Tree* (Astragal Press, 1994).

I cut the bark that I harvest into ⅞-in.-wide, 1/16-in.-thick strips and soak them in hot water for about 45 minutes to make them pliable. Thicker material will need more time. Try to weave the seat in one day; otherwise, you'll have to wet the seat and wrap it in plastic to stop it from drying overnight.

As each strip ends, knot it onto the next one. *This won't be possible without first whittling down the ends. All knots should end up underneath the seat.*

Bark tends to cup toward the inside of the tree, and you want these cupped edges down for comfort. The innermost bark has a darker, smoother surface. The weaving pattern and technique is similar to the reed seat featured in *FWW* #147, pp. 61-67. But this is a two-over/two-under twill pattern instead of a three-over/three-under pattern. Also, no brads or nails are necessary. Tie the first strip on the back rail to start. Once you finish the seat, just tuck the last splint in on the bottom. As the bark dries, it becomes fixed in place.

Rub in a light coat of thinned linseed oil (equal parts oil and solvent) to bring out the color, then burnish with burlap. Walt a few days to sit on it. By then the weave should be dry enough that it won't sag. (For a more extensive guide to weaving a bark seat, visit www.finewoodworking.com.)

BARK SOURCES

The Unfinished Universe, 525 W. Short St., Lexington, KY 40507; (859) 252-3289

The Caning Shop, 926 Gilman St., Berkeley, CA 94710; (510) 527-5010 or (800) 544-3373

Brian Boggs, chair maker, 118 Lester St., Berea, KY 40403 (bark occasionally available May to July); (859) 986-4638, ask for Pat

Photo, this page (stool): Erika Marks

Wood Pulls Tailored to Fit

Shop-built knobs and pulls can dress up your cabinets better than most store-bought versions

BY PETER TISCHLER

Photos, except where noted: William Duckworth; this page (bottom right): Erika Marks

Door and drawer pulls serve two major functions. On the obviously practical side, they provide a handhold to open doors and drawers. But in a less tangible realm, they also complement the finished furniture with an important visual detail. I often incorporate wood pulls in my furniture as a focal point and as a means to harmonize the overall design. I like to use dense tropical hardwoods because they make a more durable pull, allow me to shape fine details and exhibit exotic colors and grain patterns.

Design and function are related

I learned the hard way that it's important to consider the aesthetics of pulls early in the design process, to avoid ending up with pulls that don't appear as a unifying element in the overall design of the furniture. I often attempt to shape pulls so that they'll be comfortable to open in more than one hand position, because not all people prefer the same technique. Before designing any pulls, you might find it helpful to observe people opening a variety of doors and drawers to get a better idea of how different pulls work. Whatever the final shape you end up with, it should complement the shape of the furniture.

While turned pulls are perhaps the easiest to make, I use them only when the design calls for a simple look or when a customer specifically requests a turned pull. Commercially available pulls are usually too heavy-looking for my tastes, so I turn my own using one of the tropical hardwoods (such as ebony or rosewood), most of which polish beautifully. One trick that I use to polish turned knobs, which would work equally well on store-bought pulls, is to chuck the tenon end into the drill press set at its highest speed and sand the knob with very fine sandpaper.

For an unobstructed or flush front on a piece of furniture, you may want to consider a concealed pull. In such cases, I will often notch the dividers between drawers and cut a slight finger recess into the inside bottom edge of the drawer front. The shape and size of the notch in the divider can add its own visual interest to the overall design.

Other design decisions to be made involve color and size. Do you want a color contrast that makes the pulls stand out or a similar tone to blend in with your doors and drawer fronts? And the size, like the shape of the pull, should be proportional to the piece of furniture.

A GOOD VISUAL FIT

The shapes of these two-part pulls, made of rosewood and ebony, echo the shape of the feet of the dresser on which they are installed. Also, matching pairs of pulls mounted on four drawers are sized differently for each drawer.

Modeling clay as a design tool. *Rather than working from drawings, the author often sculpts initial prototypes in clay, and then makes a second-stage prototype in wood.*

No special tools required. *A kitchen knife and a spoon are all you need to work this malleable material.*

Blend hand and machine work

Making pulls often requires a combination of hand and machine skills. Because the parts are typically small, safety is a primary consideration. Know what length of wood can be safely jointed and planed on your machines. Use push sticks and featherboards whenever possible to keep fingers away from cutting edges. Make multiple

Photos, this page (second from top): Erika Marks; bottom: Peter Jacobs

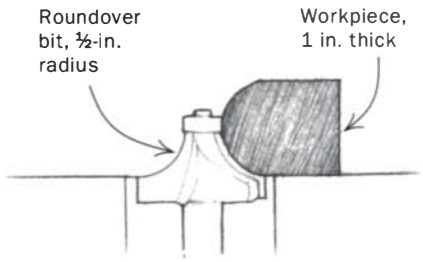
MOSTLY MACHINE MADE

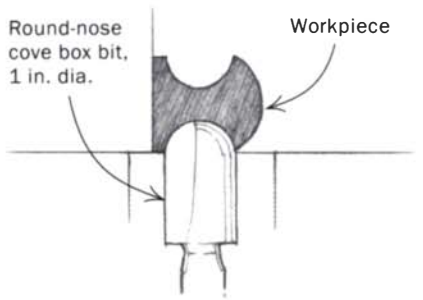
When a project demands that you make a large number of pulls, a design such as this one that relies primarily on machine work will save you time.

Production sequence for a lot of matching pulls. *Coved sides, held down firmly with a push stick, can be cut in long lengths on the router table. After individual pulls have been cut to length, the author uses a drill bit (matched to the size of the cove, mounted in a drill press and fitted with a stop block) to cut the same coves on the ends of the pulls.*

TWO BITS FOR ONE PULL

The two router bits shown below, mounted in a table, shape the convex and concave curves for this pull.





UNIQUELY HAND-CARVED

The ebonized mahogany pulls shown at left were first conceived as clay prototypes. The author made them deliberately small to maintain a low visual profile on this walnut cabinet.

Hand and machine work combine to do the job. *After cutting this pull to rough shape on the bandsaw, gouges, rasps and carving knives are all required to complete what is essentially a hand-carved pull.*

passes, taking away only a small amount of material at a time. Sharp bits are necessary for a clean, safe cut. If you feel that something is too dangerous to cut with a machine, do it by hand.

As you can see from the examples on these pages, many of my pulls are roughly shaped first by using a router table, then refined by hand. To provide finger clearance, I often use a bullnose bit, or a coving cutter with a bearing mounted at the bottom, under the cutter. It's especially important, when working with small pieces of wood, to keep the hole (for the cutter) in the router table as small as possible. Having more table surface to bear upon will make the cutting operation safer. Also, it's sometimes necessary to make a curved fence for additional support, when you have to feed a curved blank into a cutting edge.

I often bandsaw the desired top profile, clean up the saw marks with a balloon sander, then glue the roughed-out blank to

Drawings: Erika Marks; photos, this page (desk and cabinet): Peter Jacobs

a long scrap of wood to keep my hands away from the cutter. To separate the pull cleanly from the scrap, you can glue brown paper between them. However, I usually cut off the scrap on the bandsaw instead of bothering with the layer of paper.

After routing or bandsawing pulls to shape (it's always a good idea to mill at least a couple of extra pulls to allow for rejects), I'll complete the shaping process any number of ways. Some pulls require more machine work, using the tablesaw or a drill press. I often design more sculpted pulls in three dimensions, using synthetic modeling clay (available at any hobby or art-supply store), then shape them using a combination of rasps, chisels and gouges.

Place pulls within easy reach

After the pulls are made you must decide where to put them and how they will be attached. Place the pulls based on where they will be the most comfortable and convenient to use. Because custom-made wood pulls are often a visual focal point of a piece of furniture, you need to take care when deciding where to put them. Use double-stick tape on a paper pattern or on a mock-up of the pulls to preview what they will look like.

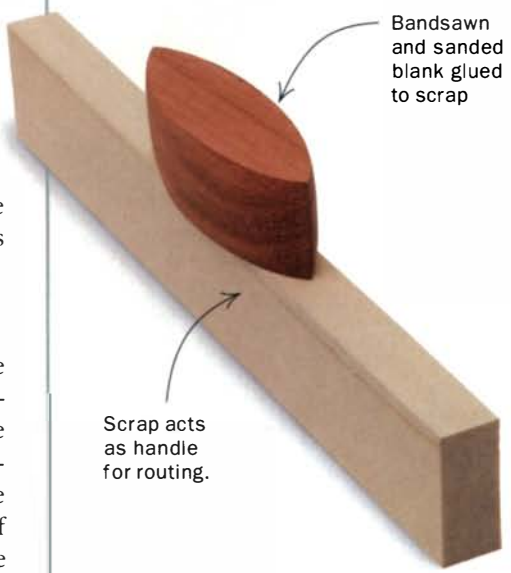
I sometimes use mortise-and-tenon joints to attach pulls that are fashioned entirely by hand and those that are turned. But this procedure is time-consuming and, admittedly, a bit of overkill. More typically, after I locate the pull and mark it on the drawer front or door, I drill a pilot hole using a bit slightly smaller than the diameter of the screw that I'll be using to fasten the pull. Tropical hardwoods require extra care because they seem to have a greater tendency to split. After dry-fitting, I remove the pull, add a small amount of five-minute epoxy, then reattach it, checking carefully for alignment. Excess epoxy cleans up easily with a chisel after it sets up but before it reaches a full cure.

Using wood pulls enables me to embellish my furniture, functionally and artistically. I'm convinced that combining hand and machine skills is the best way to make each pull unique and harmonious to the overall feel of the piece of furniture. The possibilities are unlimited. □

Peter Tischler builds custom furniture in Pine Brook, N.J.

DESIGN AND FUNCTION MERGE

These pulls, shaped by a combination of hand and machine work, suit the credenza on which they're mounted. They work equally well mounted either horizontally or vertically.



Keep fingers away from blades. *A scrap of wood glued to the top of a pull blank keeps fingers above the spinning cove bit on the router table.*

Curved shapes are softer. *After routing, the scrap is cut away on the bandsaw and sanded to a curved shape. The author uses a balloon sander.*

Photos, this page (top left and second row, left): Erika Marks; bottom right: Peter Jacobs

Shopmade Marking Gauge

Simple but clever design makes this wide-fenced tool accurate and easy to use

BY JOHN NESSET

When I set out as a woodworker, a marking gauge was one of the first tools I bought. A straight line parallel to a straight edge is—along with a perfect right angle—the foundation of woodworking. No matter how you eventually shape a piece, if your layout lines aren't true, that table will not stand level, that drawer will not open smoothly, and those joints will be sloppy. After examining several marking gauges, I chose one made of rosewood with brass hardware, inlaid brass wear plates and graceful scrolling on its faces. It was a handsome tool that came in a nice box. However, I found it difficult to use.

For one thing, making adjustments required tightening and loosening a thumbscrew, an awkward procedure when I also had to hold the fence in place. In use, it was difficult to keep the short fence running snug against the edge of the board. Hard or soft spots in the wood and diverging grain patterns grabbed the pin and made it skip or go off track. I usually had to go over lines several times, with miscues marring the stock.

About that time, back in the mid-1970s, Japanese tools began to appear in the popular woodworking catalogs. I marveled at their simple but clever designs, but I didn't find many of them adaptable to my Western woodworking techniques. There were, however, two notable exceptions. The first was those wonderful, precise pull saws, and the other was the *kebiki*, a Japanese marking gauge. My first pass with it was a spiritual moment.

Easy adjustment and no skipping

The kebiki is a perfect piece of engineering. A wedge holds the fence in place on the arm. Precise adjustments are made by tapping one end of the arm or the other on the workbench while holding the kebiki in one hand and checking against a measuring device or workpiece held in your other hand. And the marking process is trouble-free, thanks to the long fence and the design of the pin.

The pin is actually a small knife that is beveled on one side—away from the fence—and set in the arm at a slight angle. The result of this design is that the blade wants to pull away from the fence, drawing the gauge snugly against the workpiece. Irregularities in the wood will not divert the sharp blade, and it leaves a clean mark.

Photos, except where noted: Asa Christiana

My kebiki became a true friend I could always count on. I find it indispensable for a number of common tasks, such as marking the depth of cut for dovetails; marking dadoes and rabbets; marking mortises or tenons from a straight edge; marking grooves on the inner edges of frames for accepting panels; and marking the thickness or width of stock once one side has been planed flat and straight.

Making a kebiki

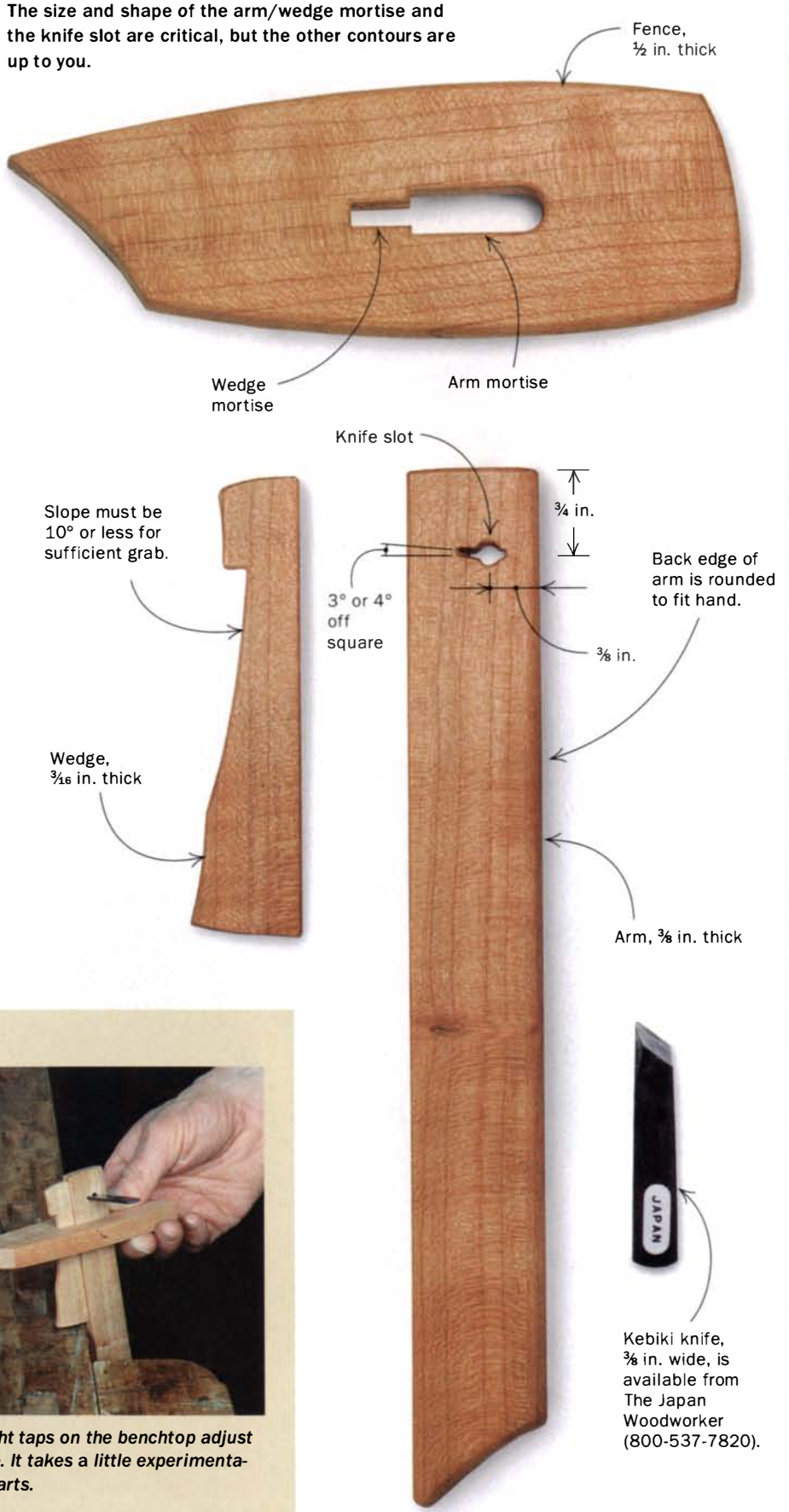
The kebiki I purchased so many years ago was made of Japanese white oak, but any hardwood will do. The fence should be about ½ in. thick, the arm around ⅜ in. thick, and the wedge about 3/16 in. thick (see the photos at right). If you are left-handed, reverse the orientation of the arm and knife.

Two important mortises—After thicknessing the stock, use paper templates to find pleasing grain areas for each part and trace their outlines. Before cutting the fence to its final curved shape, lay out and cut the mortises for the arm and the wedge (see the top photos on pp. 82-83). The arm will be rounded on its back edge to sit comfortably in the hand during use. That means the mortise for the arm must also be rounded at one end. Start by drilling a ⅜-in.-dia. hole through the fence and then marking the rest of the mortise off that. Chop out the mortise, checking it against the thickness of the arm stock.

The wedge securing the arm to the fence

THE TOOL HAS FOUR PARTS

The size and shape of the arm/wedge mortise and the knife slot are critical, but the other contours are up to you.



ADJUST THE MARKING GAUGE

Fine adjustments are made with one hand. *Light taps on the benchtop adjust the arm, and another quick tap tightens the wedge. It takes a little experimentation to get used to the interplay between the two parts.*

Photos, this page (of parts): Erika Marks

CUT THE ARM MORTISE

Start with paper patterns. *Use them to find the best grain location for each part. Then use the fence pattern to lay out the mortise for the arm.*

Use a marking gauge to lay out the sides. *A ⅜-in.-dia. hole defines the rounded end. The mortise extends from the edges of the hole.*

Chop out the rest. *Insert one corner of the arm stock to test the width of the mortise.*

When the arm and wedge mortises are complete, cut out the arm and fence. *The author shapes the roughsawn parts with hand tools, using a shallow gouge and a block plane.*

is a critical element. The angle should not exceed 10°, and the mortise that it wedges against should be cut to exactly the same angle. Cut the wedge first, then use it to determine the angle of the mortise wall.

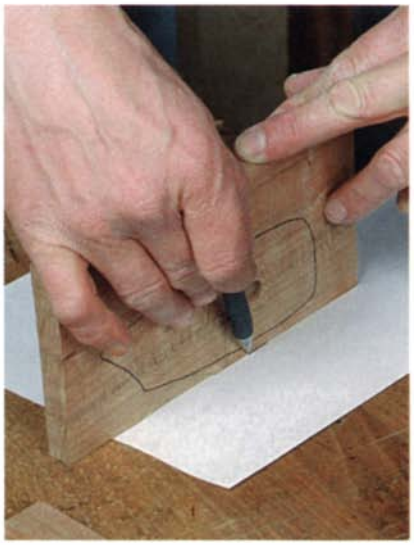
After giving the edges of the mortises a slight bevel to protect them, you can shape the fence block. I saw out the rough outline and then smooth it with a block plane or spokeshave rather than with sandpaper. The tool marks give the kebiki character, and they remain there as a satisfying reminder of the work you did.

Finally, saw and shape the ends of the arm, and use a block plane to round its back edge. Before rounding this edge to fit its ⅜-in. mortise, lay out lines 3⁄16 in. down from the edge on each side, to guide your work. When you reach these lines, the rounded profile should be correct. A little fine-tuning of the arm and wedge gets them working smoothly in the fence block.

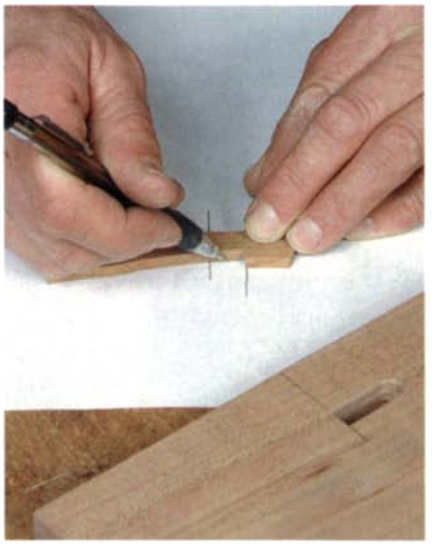
Adding the knife—Kebiki knives, made of laminated steel, are now available for under $10, but I've also had success adapting a Japanese marking knife. In fact, any piece of good steel will work. Grind the edge to a shallow angle (without overheating the steel) and hacksaw it off at the desired length. Always leave enough length to grip when resharpening the blade. (I use locking pliers to remove the knife from the arm and to hold it in place on the grinding

Photo, this page (top left): Erika Marks

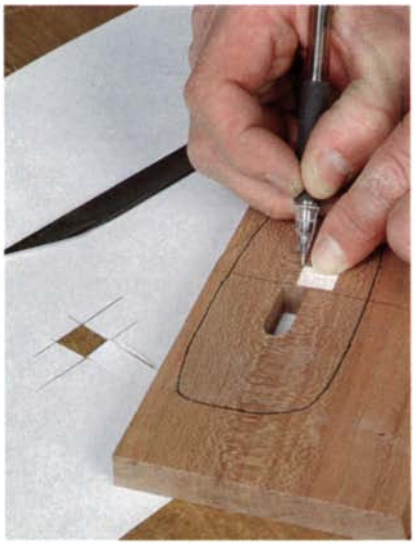
CUT THE WEDGE MORTISE



More fun with paper. *To make an accurate angled mortise, start by tracing the thickness of the fence onto paper.*



Then overlay the wedge to trace a cross section of the mortise needed. *Use the narrowest portion of the wedge.*



The resulting paper block now contains the exact lengths of each side of the angled mortise. *Lay out each side and chop out the mortise.*

wheel or sharpening stone.) Smooth the rough edges on a grinder or with a file.

For the tool to work properly, it is critical that the knife be square to the surface of the arm but turned slightly away from parallel with the fence. Make practice runs on scrap stock until you get it down. Start by marking a 3°or 4° line on the arm, then drill a ¼-in.-dia. hole on that line. The hole and the slot that follows must be exactly perpendicular to the bottom face of the arm. Next, with a sharp knife, chisel or thin keyhole saw, cut a notch just slightly thinner than the blade on each side of the hole, following the angled layout line and using the hole as a guide.

To tap the knife in, place the arm over a benchdog hole in your workbench so the blade tip can emerge below. The blade tip should protrude no more than ⅛ in. and be securely wedged.

Now and then your kebiki will need fine-tuning. Occasionally, you'll need to sharpen the blade. Eventually, you may have to replace the wedge as it wears, or at least give the edges that get the most wear a few licks with a plane or chisel. Otherwise it should serve you for many years. Like me, you will come to cherish this simple, useful and elegant little tool. □

John Nesset is a furniture maker in Minneapolis, Minn.

SET THE KNIFE

The slight angle is critical to the tool's cutting action. *The thin slot is laid out 3° or 4° off square, but it will be square vertically through the arm.*

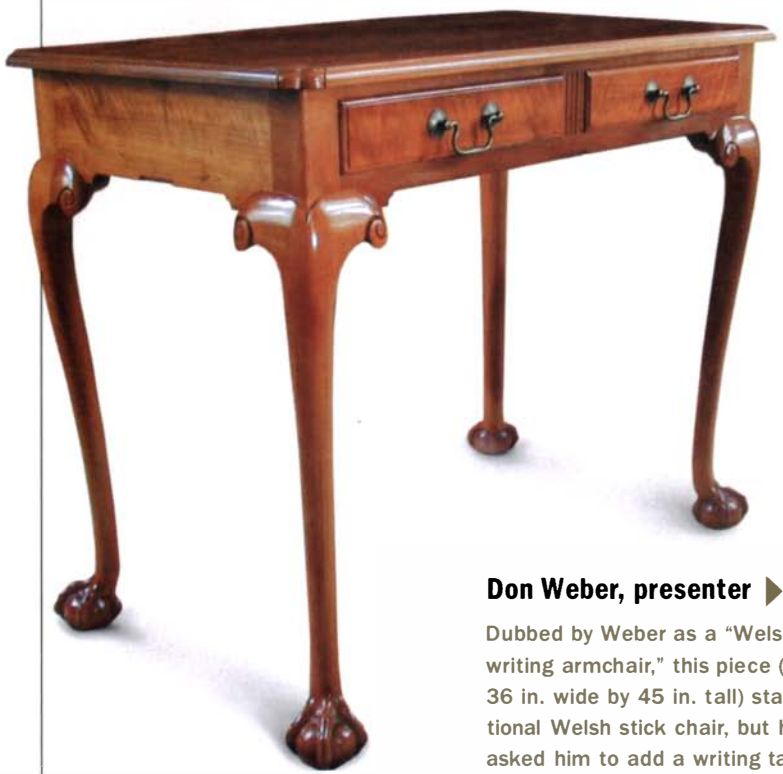
Lay out and drill the ¼-in.-dia. relief hole. *With the center relieved and only the front and back of the slot to worry about, the blade will be easier to fit.*

Whittle out the two ends of the slot, fitting them to the blade. *Only ⅛ in. of the blade should protrude from the bottom of the arm.*

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

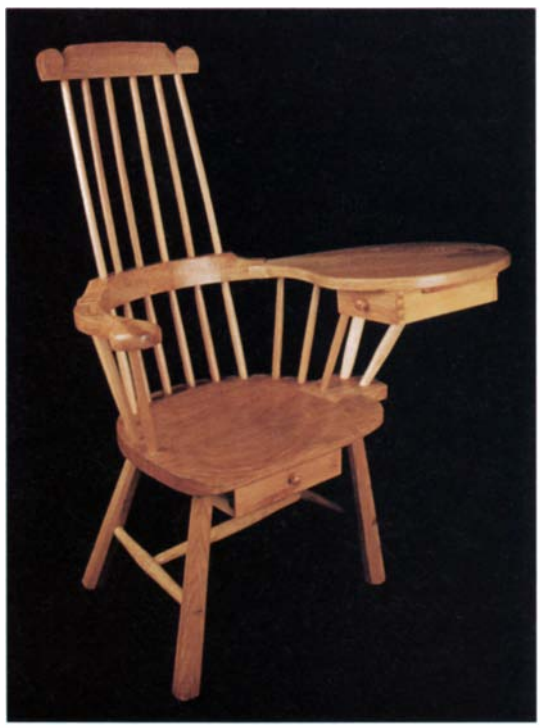
Current Work

The annual Colonial Williamsburg conference on 18th-century woodworking, cosponsored by *Fine Woodworking*, draws hundreds of furniture makers each year. The gallery seen here is a collection of work from attendees and presenters at this year's conference, which focused on chair making. For future issues, we'd like to see photos of your work. For more details and an entry form, visit our web site: www.finewoodworking.com. Send photos and entry forms to Current Work, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470.



Mack Headley, presenter

Based on a piece in the Museum of Early Southern Decorative Arts' collection, Headley made this cherry side table for use in his home. The table (21 in. deep by 31 in. wide by 28 in. tall) features hand-cut mortise-and-tenon and dovetail joinery. The table rests on ball-and-claw feet. The finish is shellac.



Don Weber, presenter

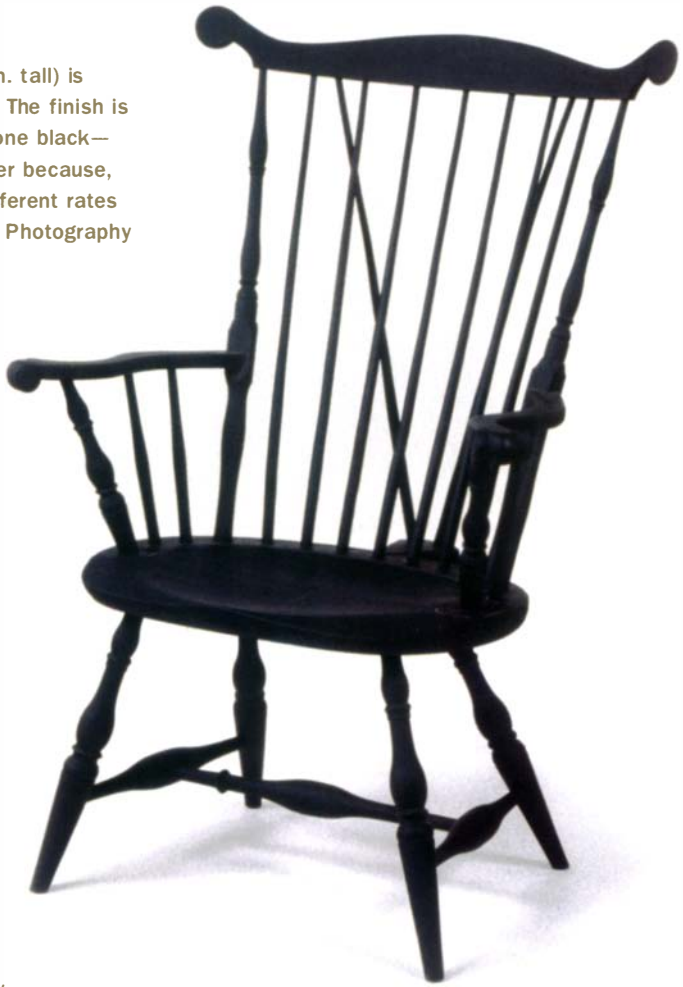
Dubbed by Weber as a "Welsh left-handed writing armchair," this piece (18 in. deep by 36 in. wide by 45 in. tall) started as a traditional Welsh stick chair, but his client asked him to add a writing table. The extension is hand-dovetailed into the seat to support the table. It is constructed of elm, oak, hickory, pine and cherry. The finish is a mixture of marine spar varnish, tung oil and gum turpentine. Photo by Terry Nelson

Ronald L. Patton

This Newport-style Chippendale chest (19 in. deep by 36 in. wide by 34 in. tall) is one of a pair. The case is made of 20-in.-wide Honduras mahogany to avoid jointing smaller boards, while the drawer fronts are constructed of ribbon-strip Cuban mahogany. The finish is a mahogany stain and dewaxed garnet shellac; the top received 18 coats of hand-rubbed shellac. Photo by Thomas Hahn

Mike Dunbar, presenter

This fan-back Windsor chair (26½ in. deep by 31 in. wide by 44 in. tall) is made of hard maple, eastern white pine, red oak and mahogany. The finish is four coats of milk paint—two Lexington green, one barn red and one black—and two coats of Danish oil. Dunbar applied the finish in this order because, he said, "sitting in the chair cuts through the various layers at different rates and creates a very pleasing appearance." Photo by Andrew Edgar Photography



Lloyd Parcell

Parcell, a chemist who retired early to pursue a career in woodworking, built this Newport tall clock (10 in. deep by 18¾ in. wide by 95½ in. tall) as a gift for his former neighbor. Made of Honduras mahogany with yellow pine as a secondary wood, it is finished with a water-soluble aniline dye and a hand-rubbed nitrocellulose lacquer. The clock is a reproduction of one Parcell saw in *American Furniture in The Metropolitan Museum of Art* (out of print). The movement is from the Kieninger Clock Co. in Germany. Photo by Philip Neff

Kaare Loftheim, presenter

This china table (21⅛ in. deep by 33⁵⁄₁₆ in. wide by 27½ in. tall) is made of Caribbean mahogany and finished with shellac. A reproduction of a 1770s table on display at Williamsburg, the table has a mahogany veneer over a mahogany top. The pierced fretwork on the top was carved by David Salisbury.

Charles E. Rinehart

Adapted from a design of a Philadelphia side chair he saw in *American Furniture in The Metropolitan Museum of Art* (out of print), Rinehart built five of these Chippendale-style chairs. Each chair (21 in. deep by 21 in. wide by 38 in. tall) is made of mahogany and finished with a diluted dye stain, Water Lox, wiping varnish and an asphaltum glaze. Photo by Campbell Photos Inc.

John R. Goyer

Inspired by a similar table on display at the Chicago Art Museum, this 18th-century tea table (29 in. deep by 19 in. wide by 28 in. tall) is made of walnut. Goyer, a retired CE and member of the Society of American Period Furniture Makers, used many traditional hand tools and only hide glue in its construction. He finished the table with five coats of shellac, two coats of an oil-varnish and wax.

Edward H. Willer

Willer started making this cradle for his first grandchild, but it took him a little longer than expected and wasn't completed until his second grandchild was born. Based on an 18th-century Maryland cradle Willer saw at a museum in Raleigh, N.C., the cradle (25 in. wide by 42 in. long by 26 in. high) is made of walnut. The sides are joined by double-beveled hand-cut dovetails. The finish is a water-based aniline dye, Danish oil and wax.

Jerry Lilja

This Shaker case of drawers (18 in. deep by 36 in. wide by 72 in. tall) is made of cherry, poplar and walnut. Lilja broke from traditional Shaker design, however, by modifying the drawer pattern, placing smaller drawers at a height where they are more accessible. He also converted the top two drawers into sweater compartments with hinged, upward-swinging doors. It is finished with hand-rubbed oil. Photo by Burt Levy's Studio L.

Dennis Bork

Bork, who was a wood pattern maker for 12 years, turned his furniture-making hobby into a business in 1985. This Philadelphia highboy (23 in. deep by 43 in. wide by 97 in. tall) is an exact reproduction of a piece his client saw in *Treasures of State* (out of print). Made of walnut with curly walnut drawer fronts, all of the boards were handplaned. The case is joined with hand-cut dovetails. It took Bork approximately 10 weeks to complete the piece. The finish is shellac and tung oil. Photo by Greg Gent

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. *The furniture will appear more three-dimensional if it is lit so that each plane has a different brightness. Take care, however, to avoid excessively bright highlights or dark shadows.*
4. *To be sure the photos will be free of distortion, avoid the use of wide-angle lenses, and photograph with the camera positioned even with the center of the furniture both vertically and horizontally.*
5. *Photograph the furniture from several angles. Include some head-on shots, as well as some shots that show both the front and side of a piece.*
6. *Keep the background simple. A cluttered or otherwise distracting background may draw the viewer's attention away from the subject.*

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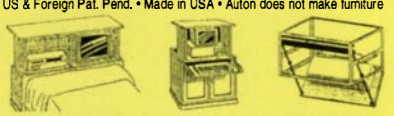

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Rules of Thumb

BY MIKE DUNBAR

Four tools you shouldn't overlook

You have finally set up your shop just the way you want it. You've built your workbench. You have bought your tablesaw, thickness planer, jointer and bandsaw. On your shop wall you have sharp chisels, a dovetail saw and smoothing and block planes. You feel equipped to handle any project, but you may be overlooking a few very useful hand tools.

I find the following four tools indispensable: drawknife, shallow gouge, spokeshave and shoulder plane. The first two are used generally for roughing; the others are used for fine work. However, all are so handy that it would be impossible to describe all of their uses. Put them to work, and you will soon come up with jobs I haven't thought of. As a bonus, only the shoulder plane will cost more than $100. The other three tools are priced closer to $50.

With some practice, hand tools like these are faster than machines, easier to control and pose less danger to a semifinished workpiece. While they cut a little more slowly than a bandsaw or router, they don't require any setup or test cuts. Just pick up the tool, do what you need, and move on. Frequently, the job is over before you could set a fence and flick a switch.

DRAWKNIFE
This tool is plentiful at flea markets because every woodshop used to have one.

SHALLOW GOUGE
A wide, shallow gouge is handy for much more than carving.

SPOKESHAVE
A wooden spokeshave has a lower cutting angle than a metal-bodied shave, making it easier to control.

SHOULDER PLANE
If you don't have a shoulder plane, your joints probably don't fit as well as they could.

Drawknife

There is only one explanation for why old drawknives are so plentiful. Until this last generation, every woodworker owned one. The tool is so useful that I cannot imagine a shop without one. It is used for quick stock removal along the grain and across the grain and for concave and convex curves. It will cut away heavy amounts of wood far faster than a bandsaw can.

Here are couple of tips on using a drawknife. It is a slicing tool, not a two-handled hatchet. Hold it askew and draw the edge through the wood the way a butcher slices meat. You will be amazed at how effortlessly and cleanly it works. Use the drawknife with the bezel (the ground surface often called the bevel) and manufacturer's stamp up. Many woodworkers use the knife upside down, because they think it gives them more control. However, because they cannot take a heavy chip in this position, they sacrifice the tool's most important ability: fast stock removal. Far better that you learn to use the knife the proper way. You will be able to take paper-thin shavings that rival those made with a plane or hog off slices as thick as your finger.

The drawknife can be used to shape complex contours, such as those on chair parts, or quickly remove waste, such as when a turner cuts away the corners of a square blank before mounting it on the lathe. I often use my drawknife in an unconventional way. If I have a crooked or irregular board that needs one edge jointed straight, the drawknife gets me a straight edge as quickly as a bandsaw. First, I snap a chalkline, and then, after determining the grain direction so I am working with it rather than against it, I use the knife as a lever, prying loose the waste close to the line. A few passes over the jointer, and I have a straight edge.

Buy an old drawknife or a good replica made by a smith who understands the tool. Most modern knives are ground as steeply as chisels, and this edge will not slice like a knife.

#3 sweep-35mm gouge

Not a day goes by that the #3 sweep-35mm gouge is not in my hands many times. The tool handles rough stock removal in places where the drawknife is too large. Depending on the size of the job, it

Photos, this page: Erika Marks

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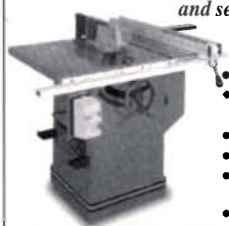

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Used bezel-side up, the drawknife quickly slices away material. *The tool is held at an angle and pulled across the work as it's pulled through, to create a shearing action. Here, a blank is prepared for turning.*

can be driven with the heel of my palm or with a mallet. The gouge trims joints in far less time than a saw does. It whittles pins and wedges for mortise-and-tenon joints, and because it is so constantly at hand, I use it in place of a jackknife. Because its edge is a shallow curve, it is far less likely to dig in and scar your work than a flat chisel, making it ideal for trimming pegs flush.

At the recent *Fine Woodworking* conference "Working Wood in the 18th Century" at Colonial Williamsburg, I was surprised to see the center's master cabinetmaker, Mack Headley, pull out a gouge nearly identical to mine. Driving it with a mallet, he used it to rough out the concave curves of a crest rail on a Queen Anne chair. This is a job most of us would have done on a bandsaw, but Headley did it with the part already glued in place, by blending the contours of the rail smoothly into the back posts. The gouge Headley used was a modern copy of an old one archeologists dug up in Williamsburg at the site of an 18th-century cabinetmaker's shop. Those old boys also knew how handy this tool is.

When I'm shaping parts, fitting tenons or whittling pins, I usually hold the chisel handle against my chest and pull the wood toward the blade. This gives me more control, and it's safer when working around other people.

Wooden spokeshave

This tool is as close to magical as any you will ever use. It is the equivalent of using a photo-editing program to work on a picture. You can smooth curves and blend elements together.

Do not confuse the wooden shave with the metal tool that bears the same name. They have very little in common. The wooden shave's blade is set nearly parallel to the sole with the bezel up, so it has a low cutting angle. This makes it ideal for end grain. A sharp shave will take clean shavings from end grain that hold together like those taken from edge grain.

A wooden spokeshave is ideal in many of the situations where woodworkers would use a rasp, such as cabriole legs, but the shave leaves a surface so smooth that it is almost ready for finish. Often a spokeshave is used to refine the larger facets left by a drawknife or gouge.

A shave can be pulled—when whittling—but it is primarily a pushing tool. While its handles seem to imply that you grip them, you should instead hold the central body of the tool between your fingers with your thumb behind the blade. This position makes it a lot easier to control.

A sharp spokeshave fairs complex contours. *Hold the tool near its body for better support and control of the blade. Here, the author shaves away bandsaw marks on a chair leg.*

When setting up your shave, cock the blade so that the cutting edge is higher on one side than on the other. This gives you high, medium and low settings all in one. When you need to take a shaving of a different thickness, just move the shave to a different point along the edge. It saves a lot of time making adjustments.

Shoulder plane

No matter how precise your joinery, you will have to make fine adjustments. Often, there is no practical way to do this with machines. That's why every shop should have a shoulder plane. This plane has an extremely narrow mouth, which allows it to make cuts so fine that the chips just crumble to dust.

As its name implies, a shoulder plane can be used to snug up the shoulders on mortise-and-tenon joints. But the tool is far more versatile than that. Because its mouth and blade are as wide as its sole, it can reach completely into a corner to trim a rabbet joint or the shoulders on a tongue-and-groove joint. Many woodworkers also use a shoulder plane to shave away the cheeks of a tenon to create a perfect friction fit. (While doing this job, use the plane to chamfer the end of the tenon so that it slides in easily.) It is also ideal for truing, trimming or smoothing the flat fillets on moldings.

A shoulder plane is unmatched at trimming joinery. *The tool works all the way into corners and can take very fine shavings.*

Shoulder planes are not cheap, and I would be leery of one that is. However, you will never wear one out, and it will make an important difference in the quality of your work.

Try these hand tools. Each of the four is sure to speed up and refine your work. □

A wide gouge with a shallow sweep can whittle or trim. *Here, the author uses his favorite version—#3 sweep-35mm wide—to pin the joints in a frame-and-panel door.*

Photos, this page: Asa Christiana

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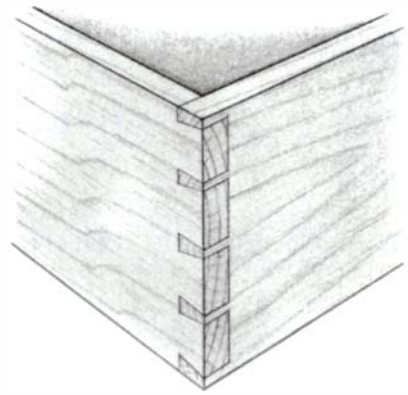
Q&A

Dovetail size and spacing



How should I space my dovetails? I have seen examples from different eras and various furniture makers that exhibit various proportions. Is there a right way?
—William Donovan, Altoona, Pa.

Philip C. Lowe replies: If you look at dovetails on early or primitive pieces of furniture, you often will see pins and tails close to the same size. The angles of these pins and tails are usually very steep, so much so at times that the end grain of the tails became fragile. But as furniture making evolved in this country, and as each craftsman's skills evolved, the pins became smaller and the angles less acute.

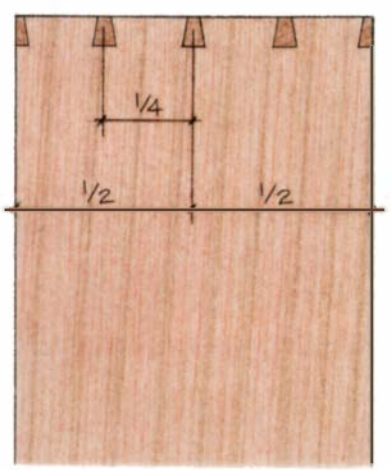
Generally, narrow pins are considered to be the finest work. If you cut many dovetails yourself, you will begin to appreciate why this is so. Narrow pins require a perfectly square sawcut—especially when they come almost to a point—so they showcase a furniture maker's skill. Further, a row of very thin pins creates a refined look. Because the end grain of pins tends to be darker and stand out, the row of pins is what draws the eye and is the key to the joint's appearance.

Here are two layout methods that have evolved for dovetails. One common technique for drawers is to put half-pins at the edges of the board, then find the center and lay out a pin there. If the drawer is tall enough, two more pins are laid out halfway between the edge pins and the center pin, producing three full pins and two half-pins at each edge. If this method is used for a case, the spaces between the pins are split again until a pleasing amount is created and the joint's strength is sufficient (usually a pin every 2 in. to 2½ in.).

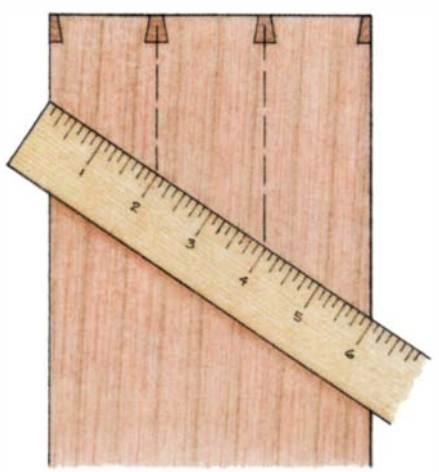
Another technique used to lay out dovetails is to divide the width of the board into equal spaces by holding a ruler on a diagonal until the markings line up appropriately. Small marks are made on the inside face of the drawer or carcase and then transferred to the end. Again, the layout marks locate the centers of the full pins, and the two half-pins go at the edges.

[Philip C. Lowe runs a woodworking school and builds period furniture at his shop in Beverly, Mass.]

DIVIDING FOR DOVETAILS



SPLIT THE SPACE; REPEAT
To get an even number of spaces, divide the overall width in half, then halve the spaces again as needed. Because the eye excels at dividing a space in half, this method can be done without measuring.



THE SLANTED SCALE
Another trick is to angle a scale until the appropriate number of increments line up with the edges of the board. If an inch scale doesn't work, try a metric one. This method will deliver an even or odd number of divisions.

Shellac inside, oil outside?

I have seen several articles about hope/blanket/storage chests that recommend finishing the inside of the chest with shellac to protect items from wood odors and finishing the outside with an oil finish. Won't this finishing method cause uneven moisture absorption and eventual warping?
—Dave Young, Avinger, Texas

John McAlevey replies: In my experience furniture with shellac on the inside and an oil finish on the outside will suffer no problems with nonuniform or uneven moisture absorption.

Remember, the exterior of a blanket chest, bureau or similar case piece will be subjected to different conditions than the closed-up inside. A shellac and oil finish combination is, in fact, the most compatible finish that can be used for a closed chest.

Many of the antiques that I see in my area of the country (New England) are rarely finished on the interior, and they have survived with few ill effects. They have made the transition from drafty, old houses with uneven heat to our modern-day, centrally heated homes.

The piece of furniture needs to be well-designed using mortises and tenons for frame-and-panel construction and dovetail joinery for slab-type work. Poorly made work will fall apart eventually no matter how it is finished inside and out.

[John McAlevey's article, "A Blanket Chest with Legs," appeared in *FWW* #129, pp. 38-43.]

Removing excess glue

What is the best technique for removing excess PVA glue, so it doesn't hinder or discolor the finishes that come later?
—Mark Newfield, Minneapolis, Minn.

Mario Rodriguez replies: I've heard of applying wax to the exposed cabinet/furniture surfaces to prevent glue penetration. After the piece has been

Drawings, this page: Vince Babak

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Peter Korn, Director

A wet rag and a putty knife remove glue squeeze-out. *Dip the rag in warm water, wring it out and wrap it around the blade. Reposition the rag or rinse it out as glue builds up. This method offers a firm scraping action and a controlled amount of heat and moisture.*

assembled, the wax is scraped off along with any excess glue. It can also be wiped off with a rag dipped in paint thinner. Another method is to allow the glue to jell slightly and scrape it off with a chisel. Still another is to let the glue dry completely, then chip it off with planes and scrapers.

However, I prefer a simpler method that removes the glue right away. Soak a clean rag in warm water, then wring it out and wrap it around the blade of a flexible putty knife. The warm water loosens the glue, and the blade lifts it from the surface. Rewrap the blade with a clean section of the cloth as glue accumulates, and rinse out the rag frequently. This method allows you to restrict and focus the amount of water (and heat) being applied, so don't worry about excessive moisture penetrating the glue joint and causing failure. This method works well for getting glue out of inside corners. [Mario Rodriguez is a contributing editor.]

Reducing and enlarging arbor-hole sizes

I have some blades with arbor holes that are too big for my tablesaw. Can I use them? —D.R. McKearney, Houston, Texas

John White replies: To reduce the size of a saw's arbor hole, you need to install a machined steel bushing in the blade. The bushing and blade are slipped over the saw's arbor, and the blade flange is tightened as normal.

Freud (800-472-7307) has a complete selection of bushings, listing 26 sizes. Sizes from ½ in. O.D. to 1¾ in. O.D. are available, as well as sizes that convert metric holes to fit ⅝-in. and 1-in. arbors. Woodworker's Supply (800-645-9292) carries the most common sizes and can special-order others.

Some woodworkers also end up with older or European saws with arbors other than today's standard sizes: ⅝ in. and 1 in. However, because the center of a sawblade is not hardened steel, arbor holes can be enlarged, usually at a cost of $10 to $20 per blade. Forrest Manufacturing (800-733-7111) and Ridge Carbide Tool Co. (800-443-0992) both offer the service by mail for any brand of blade. Freud will rebore its own blades. Other blade makers and some sharpening shops offer similar services. Your local machine shop is another option. It isn't a necessity, but Forrest recommends resharpening a blade after changing its arbor-hole size to guarantee that the blade runs absolutely true. [John White is a contributing editor.]

Wood veneer and contact cement

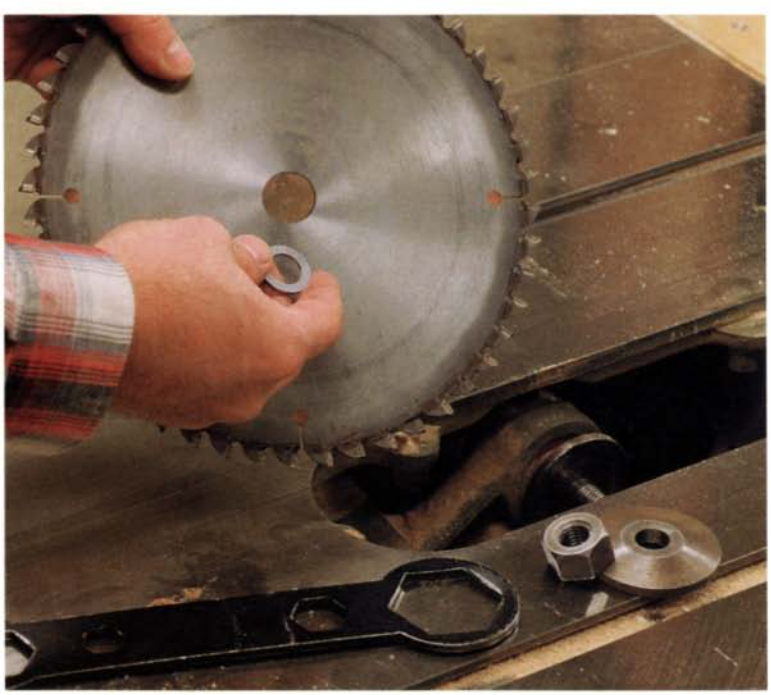
Recently I built an office suite of furniture, using paper-backed veneer over particleboard, with contact cement as the adhesive. A few weeks after finishing and installing it, the lacquer topcoat began to crack in the direction of the grain. I have used these same products before with success. Why did this happen? Should I have used phenolic-backed veneers?

—Joe River, via e-mail

William Duckworth replies: Your problem arose because the solvent in the lacquer soaked through the veneer and delaminated the contact cement. Paper-backed veneers are exceptionally thin and prone to this problem. This probably hasn't happened to you before because other veneers you used were thicker or the sealer coat of lacquer was applied lightly enough that it dried before reaching the contact cement.

While it's true that a phenolic backing would have stopped the lacquer penetration, that is not the real lesson here. To solve this problem in the future, never use contact cement as an adhesive for wood veneer. It really is that simple.

Contact cement is essentially rubber mixed with solvent. Aside from dissolving upon contact with lacquer thinner, the rubber is too flexible. It stretches easily and allows too much "creep" when the wood is affected by seasonal moisture changes. The weak glueline allows the



Thin bushings are available for reducing saw-blade holes. *This bushing converts a 30mm arbor hole to fit a ⅝-in. arbor.*

Photos, except where noted: Erika Marks; this page (bottom): Asa Christiana

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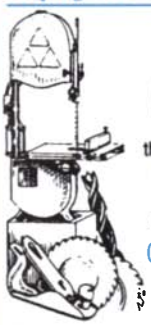

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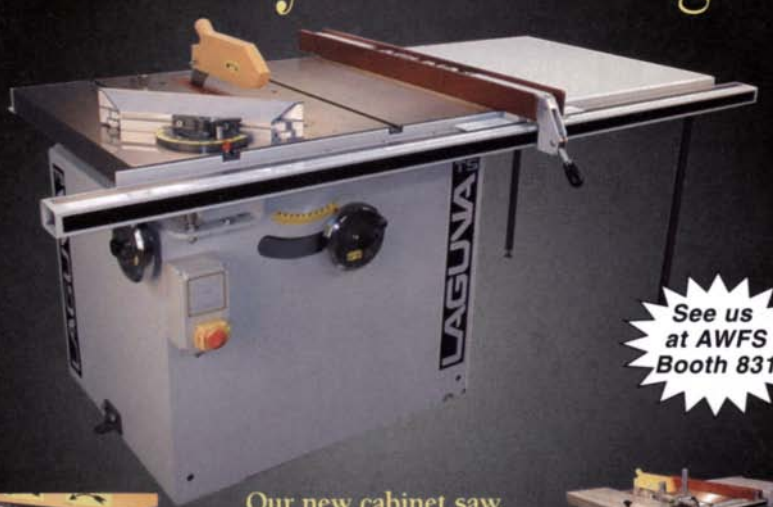

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veneer to move too freely, which can cause the topcoat to crack, joints to open and the veneer to delaminate.

Yellow and white PVA glues allow some creep but usually not enough to matter. If you really want to eliminate any such risks, hide glue, urea resin, resorcinol and polyurethane glues all have excellent creep resistance.

[William Duckworth is an associate editor.]

Rail-and-stile bits for ½-in. stock

Where can I get an ogee rail-and-stile cutter set that is sized for ½-in.-thick stock? ***—Lou Delphine, Austin, Texas***

Asa Christiana replies: "Miniature" or "junior" rail-and-stile sets that will make ⅜-in.- to ¾-in.-thick raised-panel doors are now available from Eagle America (800-872-2511, www.eagle-america.com); Jesada Tools (800-531-5559, www.jesada.com); and CMT USA (call 888-268-2487 or go to www.cmtusa.com to request a catalog and dealer list). One advantage of these bits is that the ogee profile is scaled down, which may better suit the appearance of a small, thin door frame.

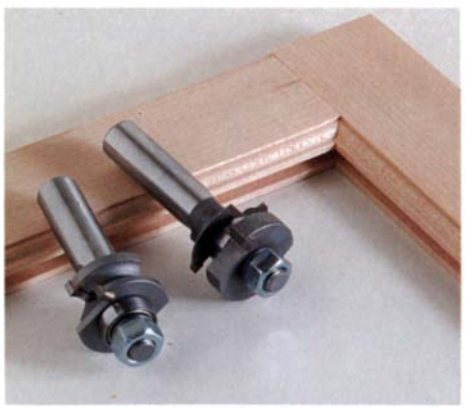
Router guru Pat Warner suggested the following for woodworkers who don't want to spring for the smaller bits. He said you can get presentable, solid results using standard bits and without changing the milling process much.

Leaving the cutters set up as supplied—with a bearing as a spacer—and milling as if the stock were ¾ in. thick will yield a stub tenon that will not be housed but will fit one-sided like a half lap. Running the profile cutter along the inside of each rail and stile will essentially produce a rabbet, instead of a slot, along with its particular profile—in this case, ogee. The rails and stiles will still have enough glue surface for a strong joint, especially if a plywood panel is glued in place. A solid, floating panel may leave this joint too weak on anything but a small door.

Another drawback of using a solid panel is that it must be held in its rabbet by an applied molding, called a bolection molding (see *FWW* #129, p. 75).

Another option, of course, is to abandon the idea of matched rail-and-stile bits and use standard mortise-and-tenon joinery. Steve Latta's solid-panel method (see *FWW* #135, pp. 75-79), for example, will produce very strong doors in a wide range of thicknesses.

[Asa Christiana is an associate editor.]

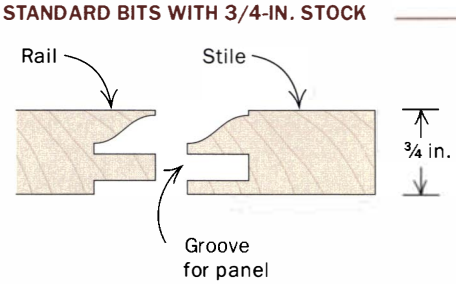


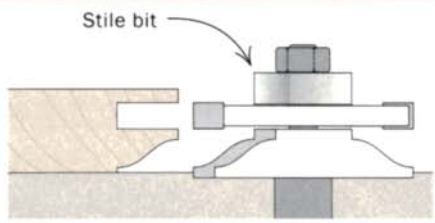
"Miniature" cope-and-stick bits are sized for ½-in.-thick stock. *One advantage of these specialty bits is that the sized-down ogee profile is better-suited to the appearance of a small, light door frame.*

MOLDING THIN FRAMES WITH STANDARD BITS

You can get an adequate glue joint on ½-in.-thick door frames using rail-and-stile bits sized for thicker stock.

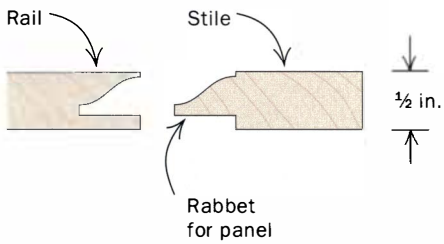
STANDARD BITS WITH 3/4-IN. STOCK

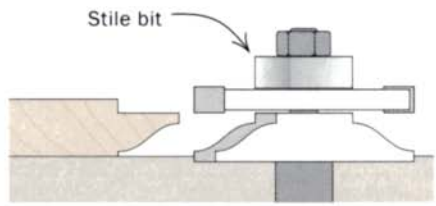




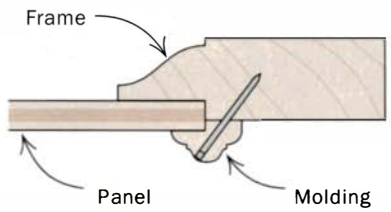
Used on ¾-in.-thick stock, standard rail-and-stile bits deliver a fully formed groove to house both the panel and the stub tenons on the rails.

STANDARD BITS WITH 1/2-IN. STOCK



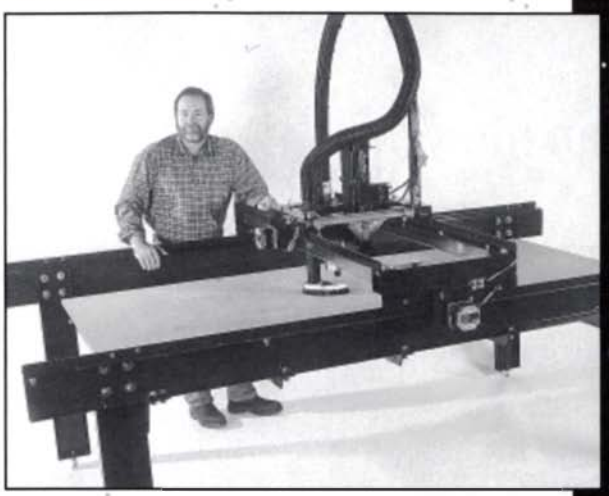


To mill ½-in.-thick rails and stiles, leave the bits at their standard height for milling. The result will be a rabbet instead of a groove to receive the stub tenons and panel.



An applied molding holds in the panel. *The thin strip, called a bolection molding, also hides the panel edge. A plywood panel, glued in place, is recommended for this door.*

Drawings, this page: Michael Pekovich; photo, this page (bottom left): Asa Christiana



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READER SERVICE NO. 2

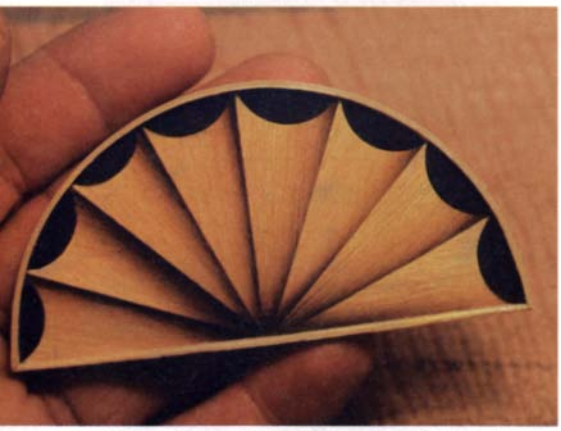
BY MARIO RODRIGUEZ

Make a shaded fan inlay

One of the most beautiful and decorative ornaments in the repertoire of the 18th- and 19th-century furniture maker was the inlaid fan. It often was central to the design of semicircular tables, clock cases and chests of drawers. Although inlaid fans were made from simple materials, the appearance was sophisticated. The appeal of this inlay lies in its three-dimensional quality. Dark shading along the edges of each segment helps the inlay look like a real fan with its leaves arrayed in a semicircle.

Selecting the materials

Period fan inlays get their golden color from the pigments contained in the shellac used to finish them. Shellac imparts a warm glow to the cooler and lighter colors of the holly or maple commonly used.



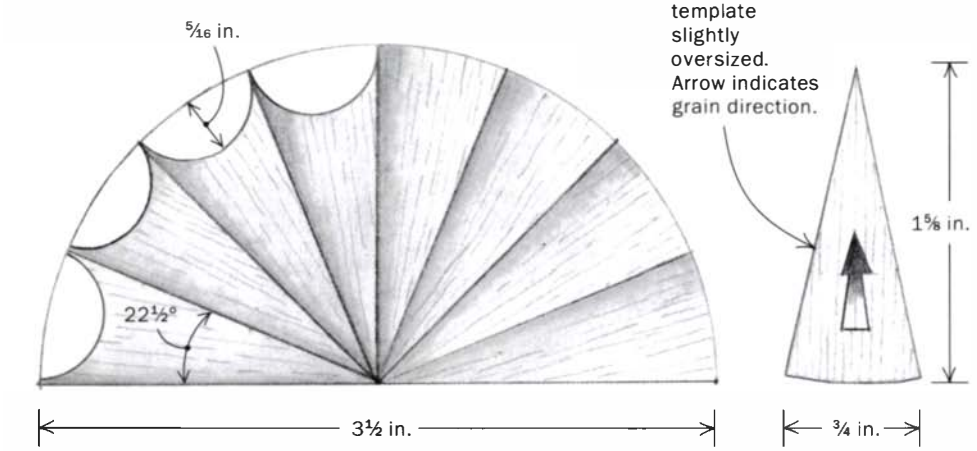
Three-dimensional inlay. *Careful stock selection and shading create an uncanny illusion of depth in the finished inlay.*

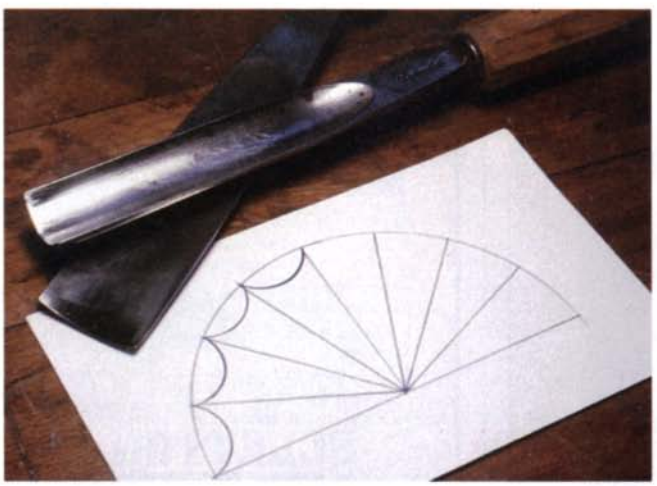
It's best to use fine-grained veneers for inlay work to avoid a jarring visual effect. The fan inlay requires a number of different species and tinted veneers. Although old-timers colored their own wood, modern woodworkers have available to them a wonderful range of dyed veneers. Unlike stained veneer, dyed veneer has color all the way through and won't change color when sanded.

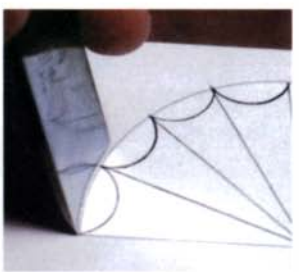
For the accent pieces on this fan, I chose a dense, black-dyed veneer. It has no discernible grain, and it can be worked without much difficulty. For the fan segments, I used a veneer dyed a beautiful cornmeal

AN ACCURATE TEMPLATE IS THE KEY

A compass and a protractor are all you need to create a template for a shaded fan inlay on index-card stock.







Match tools to the template. *After laying out the fan on index-card stock, select gouges that match the two curves on the pattern.*

CUT AND SHADE EACH SEGMENT

Rough cut. *With a veneer saw and the single-segment template, cut out the segments and several extras.*

Into the sand it goes. *Fine sand spread evenly in a metal container and heated on an electric hot plate or stove element scorches the edge of each fan segment.*

Photos and drawings: Mario Rodriguez

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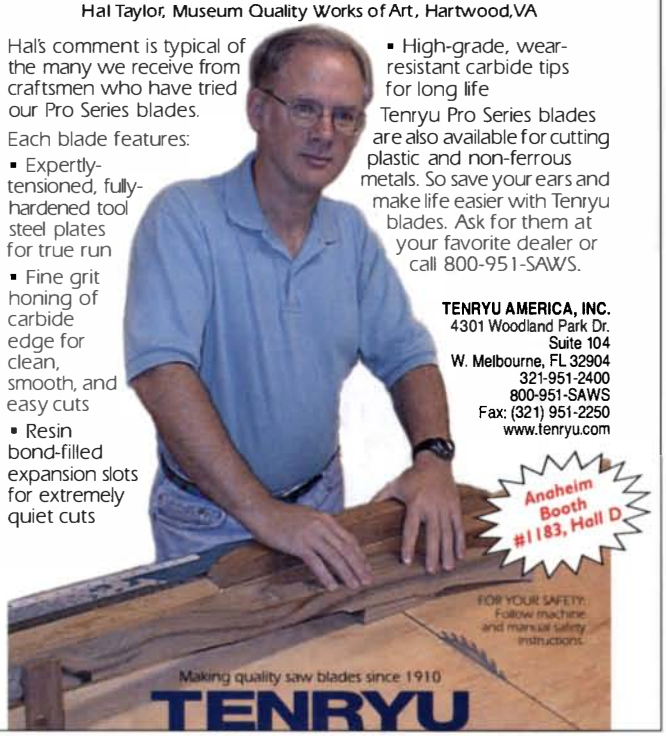

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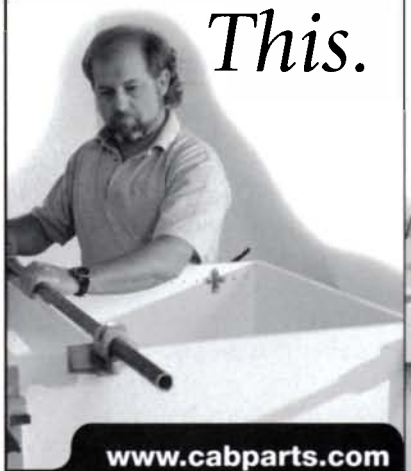

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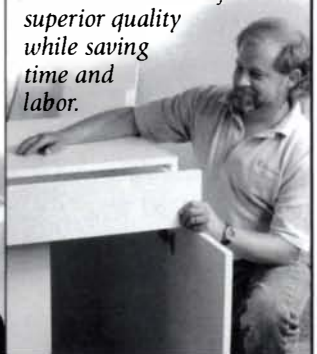

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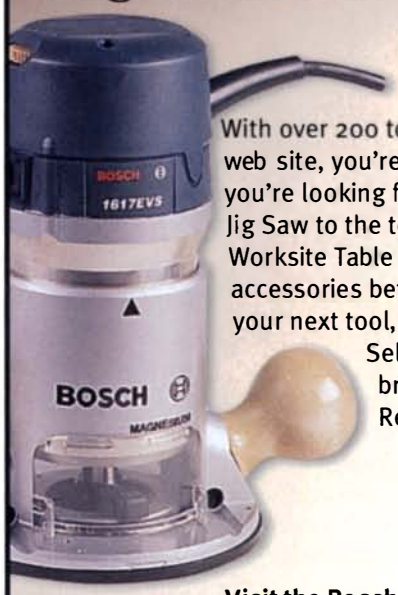

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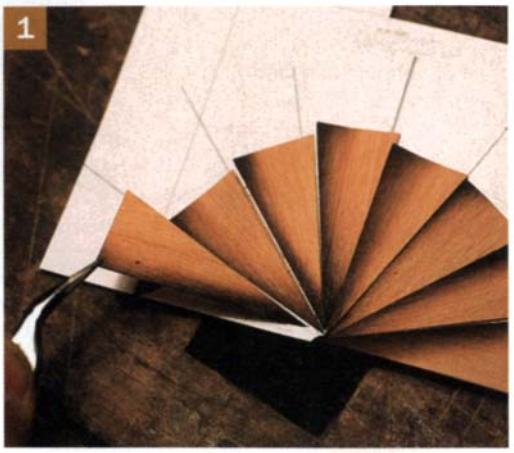
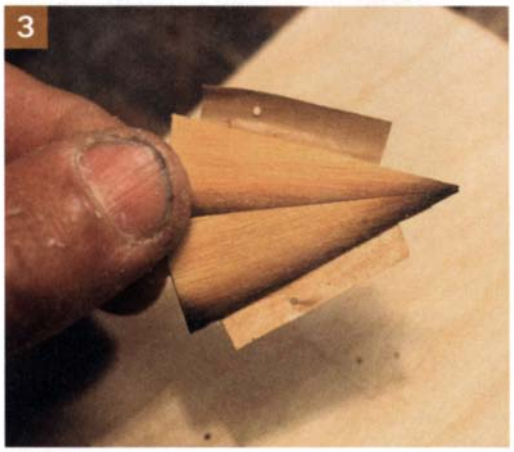
READER SERVICE NO. 158

ASSEMBLE THE SEGMENTS INTO A FAN

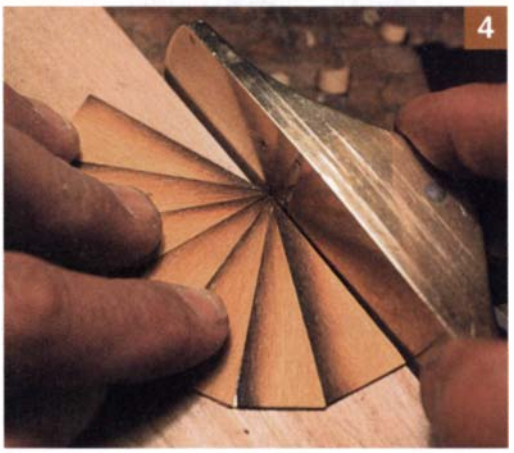


Find the best order. *Arrange the segments loosely on the template. Look for a smooth transition from light to dark, but don't worry if the shading appears too dark. Final sanding will remove some color.*

Get a final shape. *Segments can be trimmed to size with a block plane and a makeshift shooting board. To avoid grain tearout, start planing from the wide end of the segment. Delicate pieces of veneer can be reinforced with veneer tape.*



One segment at a time. *A fan starts to take shape as neighboring segments are joined with veneer tape. Tape is applied to what will be the finished face of the fan. If a joint shows even a small gap, redo it.*



Straighten the baseline. *With all but the last segment in place, use a block plane to make a straight edge along the bottom of the fan. Then fit the last piece. If the entire fan is assembled before it is trimmed, the plane will tear the edge of the last segment.*

yellow. This is brighter than what would have been used originally, but I wanted something dramatic and eye-catching.

No matter what colors you choose, make sure the veneer stands out from the piece you're decorating. It also helps to choose a border material that delineates your work.

Developing a template

I designed this fan for a decorative drop centered in the bottom edge of a Federal-style chest of drawers. It measures 3½ in. wide by 1¾ in. high and is divided into eight equal segments. Each segment measures ⅝ in. across at its widest area and tapers to a sharp point. To create a working template, you can draw this fan on index-card stock.

After drawing the semicircular border with a compass, lay out the segments with a protractor. For shaping the curves later, you will need two gouges—one to cut the outside border and a second for the dark accent pieces. I used a 1⅜-in. #5 sweep for the border and an 11⁄16-in. #8 sweep for the accents.

All of the segments are exactly alike, so make just one segment template. It should be oversized, 1⁄16 in. or so all around, to give you a small margin for planing.

Cutting and shading

Using the single-segment template, cut enough segments for two fans using a veneer saw. Later, after shading, you can pick the best ones, but for now it is smart to have extras. Be sure that the grain runs straight along the length, and avoid pieces with any defects.

Shading along the edges of the veneer segments creates the illusion of depth and shape. To be successful, the shading must be smooth and even, and that requires fine sand. Heat it up on a hot plate in a small metal dish. When the sand gets hot, arrange a couple of segments in the dish so that one edge is buried. The deeper the veneer is placed in the sand and the longer it remains there, the more pronounced the shading. Check the pieces often.

Making and trimming the fan

With a number of segments in hand, arrange them on the large template to form a fan. The oversized segments should overlap slightly. When you're satisfied, use a block plane to trim them to size, checking them frequently against the template.

Now you can begin to build the fan. Pieces are held together with veneer tape, but remember that the tape is always applied to what will be the finished face of the fan. When the inlay is done and glued in place, the tape will be gently scraped away and sanded.

Begin by pinning any two adjacent segments facedown on a small board. Don't worry—the small pin pricks do not show when the fan is finished. Use veneer tape to hold adjacent edges together. A small, hard rubber roller is the perfect tool for applying the tape. When the veneer tape is

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dry, flip over the piece and inspect the seam closely.

When all of the segments but one have been joined, plane the bottom edge straight. Add the last segment before marking the curved outside edge with a compass and roughly cutting the fan to size with a straight chisel.

Adding the accent pieces

Use the smaller gouge to cut the inverted curves on the ends of the segments. The corners of the gouge should be set flush with the edges of the segments just where they meet the outside border. A sharp gouge will pop off the end of each segment while the tape prevents the delicate ends from breaking.

Accents at the end of each segment are made from pieces of black veneer that start out a little wider than the fan segments. When the ends of these pieces are cut with the smaller gouge, they will fit into the scalloped recesses perfectly.

To fix the pieces in place, apply veneer tape to the face of the fan with just a little overhang. Turn over the fan, moisten the overhang with a swab and set the back accents into place. When everything is dry, use the larger gouge to trim the outside curve of the fan to its final shape.

Making a string border

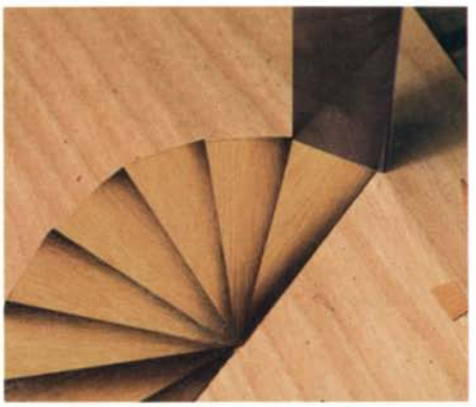
Using scrapwood, make a form with the same radius as the fan. The form will be used to shape the string inlay that forms the curved outside border.

This piece is made from two strips of veneer, about ½ in. wide, that are laminated to the tape-covered form and attached with yellow glue. At the same time, make some straight border material by gluing two pieces of veneer together. When the curved and straight pieces have dried, use a marking gauge to cut several strips about ⅛ in. wide.

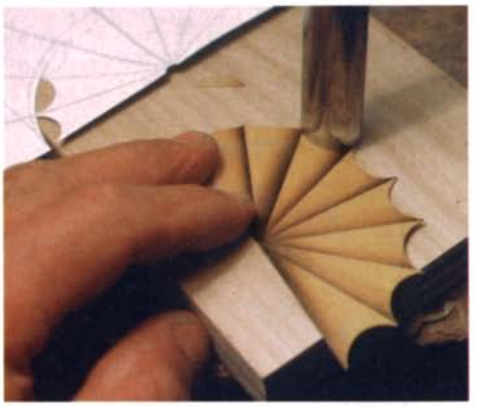
The curved border should be placed on the fan to find the location of the miters. Then cut through both the curved and straight borders with a single stroke of a wide chisel. Turn over the inlay again and apply tape to the back, allowing a small overhang for the border. Apply yellow glue to the tape and set the border pieces onto the fan. They are held in place with push pins. When the glue dries, trim off any excess veneer tape. □

ADD THE ACCENTS AND STRINGING

1. TRIM AND SCALLOP THE FAN



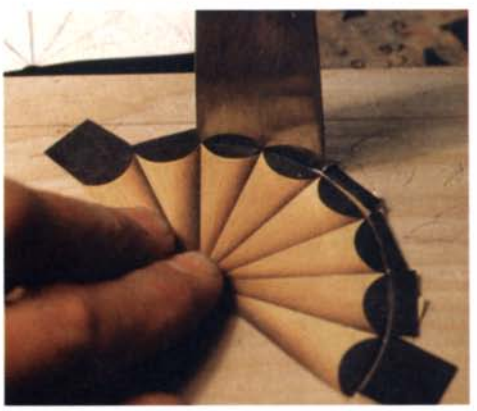
Lay out the border. *Use a compass to mark the outside border of the fan. Chop away most of the waste with a straight chisel.*



Make room for the accent pieces. *Line up the gouge exactly with the segment edges and the outside border, then make the cut.*

2. ADD THE ACCENTS AND TRIM THE FAN AGAIN

Striking accent. *Black veneer accent pieces will fit the scalloped edges of the fan perfectly because they are cut with the same gouge.*



Final shaping. *The large gouge cuts a perfect curve along the outside of the fan. For a smooth line, overlap each cut by about a third.*

3. FORM AND APPLY THE STRINGING

Make a curved form. *The form for the string border has the same curve as the outside of the fan. Tape prevents the two ½-in.-wide strips of veneer from sticking as the lamination dries. A two-ply straight piece will be needed for the bottom of the fan.*

String border completes the fan. *Use a marking gauge to cut ⅛-in.-wide strips from the laminations. Curved and straight pieces are mitered at the corners and glued on the perimeter. Push pins hold the stringing in place as the glue dries.*

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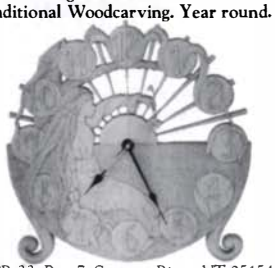

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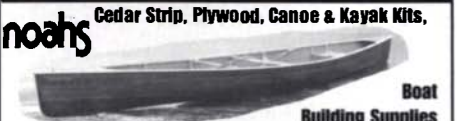

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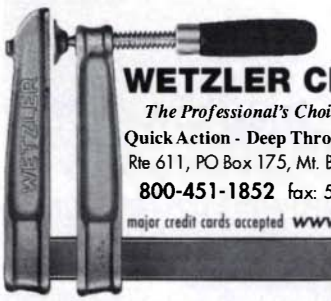

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Finish Line

BY JEFF JEWITT

Dramatic effects with dyes and glazes

Glazed and gilded. *This ash bowl is treated with a turquoise water-based dye, then glazed with gold mica powder.*

The idea of putting a contrasting color into the pores of wood is hardly new. Gustav Stickley used black-tinted wax for his Mission-style pieces. But it was George Frank who opened my eyes to the stunning effects that can be achieved with dyes and glazes. In his two books, *Adventures in Wood Finishing* (The Taunton Press, 1981) and *Wood Finishing with George Frank* (Sterling, 1988), Frank showed how to control both the background color of the wood and the color of the pores to create different effects. The technique can be used as an entire finish or simply as an accent.

The final appearance is determined by the grain structure of the wood. Any open-grained wood will work, but ring-porous woods, such as oak, ash, elm and chestnut, work best. The large pores, concentrated in the earlywood, form deep vessels to accept the glaze, while the smaller, latewood pores do not hold the glaze.

Ash is my favorite because it has hard, flat grain, which resists the glaze, and very deep pores, which readily accept the glaze. This results in a very clean division between the dyed background color and the contrasting pore color. When plainsawn, ash has very prominent cathedral-shaped patterns. When quartersawn, the effect is quite different, because the pores are very straight.

Diffuse-porous woods such as mahogany and walnut can also be used, but the technique typically gives these woods a busy look. The pores in birch are usually too small to accept the glaze.

Water-based dye and oil-based glaze create the color pattern

To color the wood, Frank used water-based dyes, as I do. They are available in a stunning array of colors and are pretty inexpensive when purchased in powder form. The only negative is that they substantially raise the grain of woods such as oak and ash. I mitigate this by preraising the grain with distilled water.

Frank used pigmented wax as a pore filler because it was cheap, simple to make and most importantly, easily wiped off. However, wax limits the type of topcoat you can use because some finishes won't bond well to it. And wax softens under moderate heat, which can ruin the finish.

Instead of wax, I like to use a neutral oil-based glaze as a filler and color it with pigment. I've successfully used McCloskey, Zinsser and Benjamin Moore brand glazes. To tint the glaze you will need dry pigments, Japan colors, artist's oils or universal tinting colors (UTCs).

I prefer oil-based glazes over water-based for two main reasons. First, a water-based glaze contains solvents that soften, or "bite," most finishes used as sealers. Second, an oil-based glaze is thicker, so it hangs up in the pores while not adhering to the hard, flat-grained areas. This contrast of glaze-filled pores and glaze-free flat-grain is the key to this whole technique.

FROM SUBDUED TO EXOTIC

Mission oak. *Replicating the look of Stickley but using an oil-based glaze instead of black wax gives a more durable finish.*

Ash with an amber accent. *This board was dyed amber and then filled with a black glaze.*

Faux rosewood. *After being stained with a rosewood dye, this ash sample was given a black glaze.*

Know no boundaries. *Color combinations are unlimited. This ash was illuminated by a red dye and a mica-powder glaze.*

Coloring is a five-step process

The steps involve preparing the wood, dyeing the wood, sealing the dye, filling the pores and giving the entire piece a final clear topcoat. It's best to practice both the dyeing and the pore-filling techniques on some scrap. By doing so you will get a feel for the process and the artistic possibilities. You can use any color combination you wish for the dye and glaze, but the most striking effects are produced with a sharply contrasting dye and glaze. Subtle effects are achieved by using a glaze color that's slightly darker or lighter than the dye color but of the same hue.

Prepare the wood—Sand the wood up to 180 grit, then wet it with distilled water to preraise the grain. I use distilled water because it lacks the dissolved iron salts that may react to cause small,

Photos: Mark Schofield

DYE AND SEAL THE WOOD

Color the wood. *Work quickly to apply a generous coating of water-based dye. Blot up the surplus with a clean cloth.*

Seal in the dyed wood. *The author uses a 1½-lb. cut of super-blond dewaxed shellac, but most clear finishes will work.*

grayish spots on the surface of oak and other tannin-rich woods. To prevent warping, be sure to wet both sides as well as the edges. After the wood is dry, machine-sand with 220 grit, then finish by hand-sanding with the grain using 220-grit paper. Make sure you clear the pores of sanding debris. Use either a vacuum cleaner or compressed air. Last, wipe the wood using a clean cloth moistened with alcohol.

Dye the wood—Make up the dye according to the manufacturer's instructions. Apply it liberally and quickly to the surface of the wood. Blot up the excess, and let the wood dry. Even though you've preraised the grain, it still may rise a bit. You can knock it down by lightly rubbing it with a cushioned abrasive, such as Abralon, or a gray synthetic pad.

Seal the dye—Apply a sealer that's compatible with your topcoat. For lacquer, use sanding or vinyl sealer; for most other finishes, dewaxed shellac or a thinned version of your finish is fine. Let the sealer dry long enough that it powders when you sand it lightly with 400-grit paper. Remove all of the sanding debris.

Fill the pores—There are no hard-and-fast rules for how much coloring agent to put into the glaze—it all depends on how intense you want the final color to be. If you use dry pigments, add several heaped tablespoons per cup of glaze. If you use tinting pastes (such as Japan colors or UTCs), start with an ounce or two per cup of glaze. Don't be put off by the natural off-white color of the glaze. It contains chalk or silica to give it body, but they become transparent when the glaze dries.

Use a rag or brush to apply the glaze to the wood. Using a circular or figure-eight motion, work it into the pores. Then wipe across the grain to remove the bulk of the glaze, switching to figure eights to even it out. If it starts to dry, remove the partially dried glaze with a cloth moistened with mineral spirits or naphtha. Wipe the wood so that the glaze is removed from the flat grain while the pores still retain the colored glaze.

I have also had success using mica powders for metallic effects. Apply an uncolored glaze, then sprinkle on the powder and rub it into the pores. This packs far more color into the pores with less waste, an important factor because the powders are not cheap.

Protect the glaze with a finish—If you use solvent lacquer and have spray equipment, you can apply the first coat shortly after the glaze sets up. For other finishes, wait until the glaze fully dries before topcoating. I have brushed on shellac or wiped on a 50:50 mix of polyurethane and naphtha. Because most water-based finishes don't adhere well to oil-based glazes, you'll need to apply a coat of dewaxed shellac before the topcoat. This finish lends itself to experimentation and can be easily customized. □

USE A GLAZE TO FILL THE PORES

Apply the pore filler. *The author adds dry pigment to a glaze to create a pore filler. Brush on the colored glaze generously to ensure that all of the pores are saturated.*

Wipe off the filler. *With a clean cloth, wipe off the filler by moving across the grain. A cloth moistened with naphtha removes any dried excess glaze.*

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A Navy Man's Second Career

Just as Bob Stevenson was nearing retirement after 30 years as a physician's assistant in the Navy, he inherited tools of his great-grandfather and great-uncle, a church builder. "It changed the course of my future," Stevenson said. "I decided it would be more fun to work with wood than to work with sick people." Stevenson received a degree in furniture making and studied with everyone he could find. After 15 years running his own one-man shop, he is still relentless in his pursuit of woodworking knowledge. We learned about Stevenson's work at this year's conference on 18th-century furniture at Colonial Williamsburg. "The conference is like a needed review," Stevenson said. "It makes me want to come home and start working again." The card table seen here is typical of Stevenson's work—which leans toward the Federal period—but he said he makes whatever people want to buy. To view pieces from other conference attendees, see Current Work (pp. 84-87).

Photos, except where noted: Craig Carlson; Janet L. Stevenson (bottom left)