TAUNTON'S

Fine WoodWorking

Tablesaw-blade review

April 2002
No. 155

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Photo: Michael Pekovich

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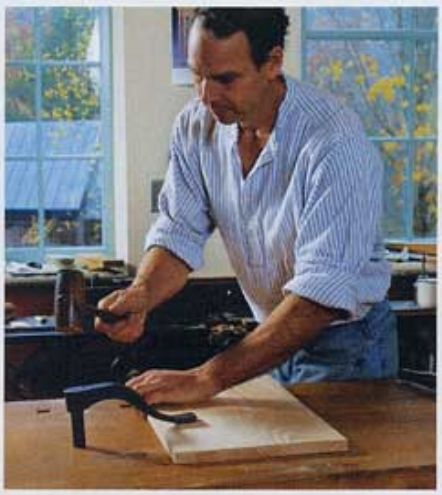

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Letters

Calling all professional cabinetmakers–The Taunton Press is planning to publish a directory of independent cabinetmakers whose work shows good design and solid craftsmanship. To participate you must have been a professional cabinetmaker for at least two years and you must supply four to eight publishable photos. All submissions will be judged by a panel of professional woodworkers. There is no charge to enter or to be included in the directory, if accepted. Call or e-mail now for an entry package: Independent Cabinetmakers, Books Department, The Taunton Press, 63 South Main St., Newtown, CT 06470, or at cabinetmakers@taunton.com. You may also call (800) 926-8776, ext. 514. The deadline for submissions is May 1, 2002.

Hearing protection is no joke—I read William Duckworth's article "Protect Your Hearing in the Shop" (*FWW* #152, pp. 62-65) with great interest. I was very surprised and disappointed that there was no mention of tinnitus.

I have been a woodworker since the early 1950s, and I am one of the millions of people who suffer with tinnitus, very generally referred to as ringing in the ears. With therapy, tinnitus might be diminished, but it will never go away.

As with hearing loss, tinnitus can be caused by trauma to the ear. I spent many years in the shop and on the manufacturing floor without hearing protection. I really didn't give it a thought. Only with the advent of OSHA, in the 1970s I believe, did hearing protection become an issue. For me, it was too late: The damage was done.

The point is, you can live with a little hearing loss, but hearing protection is absolutely necessary to avoid contracting tinnitus.

–Philip Vaughan, Joesport, Maine

Black walnut is toxic—After reading the Cutoffs department "Waste Not, Want Not" in your first annual *Tools & Shops* issue (*FWW* #153, pp. 129-130), I felt the need to warn you that black walnut is quite toxic.

Black-walnut sawdust or shavings will give horses an ailment called founder, which is a systemic reaction like toxic shock syndrome. Do not use black walnut for bedding around horses.

I think I'd be reluctant to use black walnut for bedding for any kind of animal because of its strong odor. And here in the upper Midwest, where walnut trees are very common, those who know won't plant gardens near them. I wouldn't even use the shavings for mulch on delicate plants.

–Margaret Hood, Platteville, Wis.

The forgotten tool—I thought the article "A Woodworker's Apron" (*FWW* #153, pp. 90-91) was great. The apron, to me, is an overlooked tool and one I enjoy every time I put it on. I have one just like the one pictured in the article.

To prevent my neck from aching, I tied a strong string in the center of the neck strap, made an eye on the other end of the string, and then attached an S-hook, which hooks onto a belt loop. Once

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The Woodworking Shows, in conjunction with the Marc Adams School of Woodworking and *Fine Woodworking*, present educational seminars and demonstrations around the country. Editors will be at the following shows this spring:

March 8-10: Associate Editor Tom Begnal will be at the Leon County Civic Center Exhibit Hall in Tallahassee, Fla.

April 5-7: Assistant Editor Mark Schofield will be at the seminars to be held in the Reliant Arena Hall in Houston, Texas.

April 19-21: Executive Editor Anatole Burkin will be at the Odeum Sports and Expo Center in Chicago.

For more information on The Woodworking shows, log on to thewoodworkingshows.com or call (800) 826-8257.

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adjusted to the right length, it saves your neck and holds your pants up as well.

–Mike Zukovich, San Diego, Calif.

More to consider when storing machinery—I just received my *Tools & Shops* issue, and I would like to further comment on the Q&A "Storing woodworking machinery" (*FWW* #153, p. 114), which Lon Schleining responded to.

I suggest that before you store your tools, check with your insurance company in regards to what kind of coverage you have, and also inquire with the storage facility to see about their liability policy. Many insurance firms are reluctant to pay off on losses in situations where the machinery is not stored on your own property, or when they are kept in a storage facility (because so many other people have access to the area). Also check to see if your policy covers damage due to roof leaks, flooding or explosions and fires started in another person's storage container.

–James S. Bou, Attica, Mich.

Sight and sound—I found what appears to be an error in the tool review "Metal detectors in the shop" (*FWW* #152, pp. 38, 40). The review states that the Little Wizard detector only signals the detection of metal with flashing lights, when in fact the one I recently purchased also has a very loud audible sound.

–Leonard Saccaro, Santa Clarita, Calif.

EDITOR REPLIES: You are correct. We goofed.

Praise for first annual *Tools & Shops* issue—I received my new *Tools & Shops* last week and have not been able to put it down since! I think most of your audience works from smaller shops, and the entire issue is really helpful and inspiring. I particularly liked the tip on making a panel-saw setup with 2x4s. You should consider doing this type of thing more often. Keep up the great work!

–Timothy Reimer, Wellington, Colo.

Gender-biased editorial staff?—I love your magazine and would still be a complete amateur without it. But could you please stop using phrases like "one-man shop" (*FWW* #153, p. 50)? There may not be legions of us female woodworkers, but we are out here, and using such gender-specific words makes you all sound like such Neanderthals. You're not, are you?

–Carol H. Peterson, Watsonville, Calif.

Record plane backlash remedy—In his article "Low-Angle Block Planes" (*FWW* #153, pp. 40-47), Chris Gochnour complained about the backlash in the Record plane. The backlash in mine was also one-and-a-half turns. A couple of hammer taps on the end of the screw seated it in the knob and reduced the backlash to a half turn. Be sure to temporarily attach a nut to the end of the screw when hammering it to prevent damage to the threads.

–Bob Klemmer, Clarkston, Mich.

Radial-arm saw blade choice—I read Lon Schleining's response to the Q&A "Radial-arm saw: push or pull?" (*FWW* #153, pp. 116, 118) and agree with his advice. However, I would like to add that if he uses a sawblade with a negative hook the sawing will be much easier. The negative hook will not bite the wood the way a positive hook blade does. Try it, and you will see that it is much safer.

–Rocky Nelson, Milford, Del.

Dovetail method of choice—Every now and then an issue of *Fine Woodworking* comes along where every article holds my interest: The November/December 2001 issue is one of them.

I have to say the article that made the most impact was Steve Latta's "Tablesawn Dovetails" (*FWW* #152, pp. 56-61). I have been looking for a way to speed up cutting dovetails for a long time. Having read probably 20 articles on the subject, I tried a few and even bought the Leigh jig, but they all had their limitations or were difficult to set up. The Leigh, for example, is okay once it's set up, but the dovetails look like they were done in a jig.

Latta's process is brilliant. There was not just one gem of an idea in his process but many: from setting the teeth to an offset angle, cutting multiple drawer parts, rebating the tails and using the scroll saw to remove the waste between the tails. And to finish it off, the dovetails look like they were done by hand.

–Alex Cameron, Surrey Downs, South Australia

Clarification on building code—In the story "Building to code requires some patience but brings peace of mind" in *Tools & Shops* (*FWW* #153, p. 54), there's a statement that is in error. The author says his building department required him to install a fan that changes the air in his shop "six times a minute." The code most likely requires an air change six times per hour. A shop changing air six times a minute would not be possible to heat and would be very drafty. I know for a fact that welding shops require air to be changed six times an hour under occupational heath and safety rules.

–L. Claude Comeau, N.S., Canada

ROSS DAY REPLIES: Yes, you are correct regarding the code requirements. I do have an oversized fan that does better than required, changing the air up to 10 times per hour in my shop.

Correction—Because of editing errors, some dimensions were incorrect in the drawing accompanying "An Everyday Cabinet" (*FWW* #152, p. 70). Correct dimensions are as follows: The back panels measure 10⅜ in. wide by 19⅜ in long; the top and bottom rails of the doors are 10¼ in. long; and the panels for the doors are 10¾ in. wide by 12 in. long.

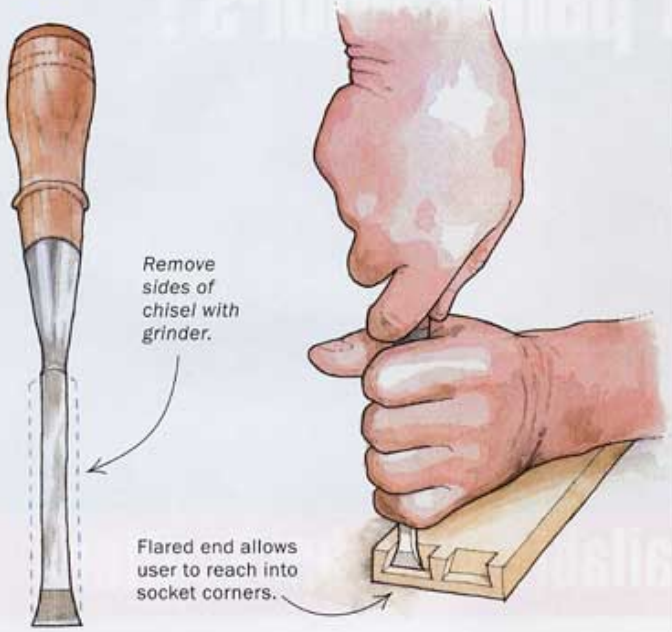
About your safety:
Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't try to perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something 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

Methods of Work

EDITED AND DRAWN BY JIM RICHEY

Flared chisel for dovetail sockets



When I began making half-blind dovetails, I found it difficult to pare the deepest corners of the tail sockets with a regular chisel. So I made a special flared chisel for that purpose by grinding the edges off a regular ⅜-in. paring chisel. The flare at the cutting end should be a bit steeper than the dovetail angle so that you can easily get the tool into the corner of the socket.

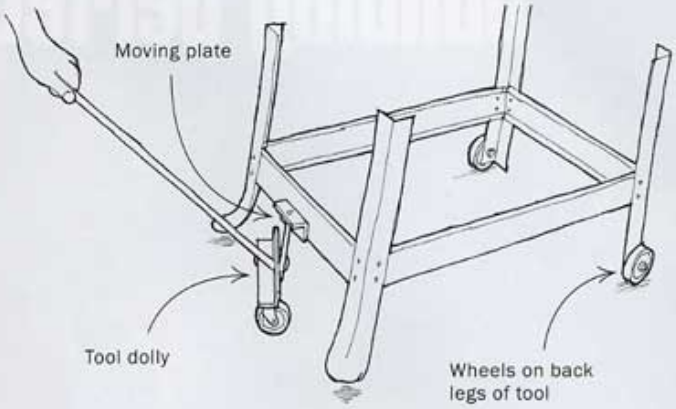
You can use a bench grinder to remove the metal, but be sure to dip the chisel in water frequently to keep the cutting edge from overheating. It takes some patience to grind away all of the steel, but your reward will be a tool that makes an awkward job easier to do.

I try not to use the chisel for other tasks when a regular paring chisel will suffice. Each successive sharpening removes a bit of length from the chisel and therefore reduces the width of the flare. I should say, however, that I've been using and sharpening this tool for more than 20 years, and it still does the job well.

—Randy Leavitt, South Royalton, Vt.

Tool-moving dolly

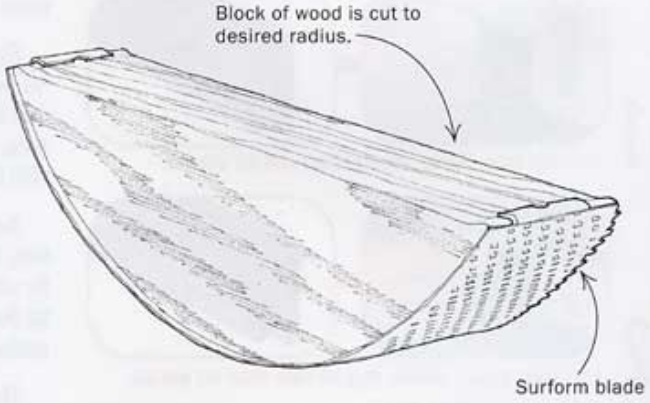
All of my freestanding machines and my assembly table have wheels on the back legs and stationary legs with no wheels on the front. To move any of them, I use a two-wheeled dolly that is fitted with a vertical pin. This pin is ¾ in. taller than the angle-iron moving plates that are fastened to the front of each piece of equipment.



Each plate has a hole in the top that fits the pointed top of the dolly pin. I simply roll the dolly under the moving plate, engage the pin in the hole, and then push down on the dolly to lift the stationary front legs off the floor. I can then easily move the equipment anywhere in the shop.

—Rolland G. Kuhlmann, Canon City, Colo.

Shopmade compass plane



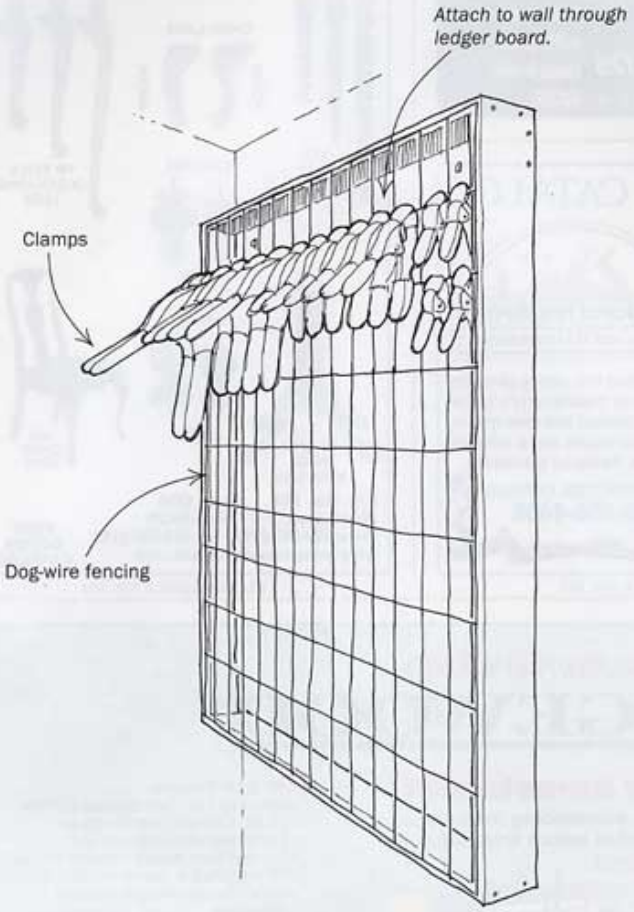
When I needed to smooth a roughsawn large-radius curve, I devised a custom compass plane using a shaped wooden block and a commonly available Surform tool blade. To make the tool, cut the desired radius in a scrap of 2x4. Then wrap the Surform blade around the block and mark where the end clips fall. Carefully cut the block to length, shaping the corners at an acute angle so that the end clips will hook over them. Now bend the blade and slip it

A reward for the best tip

Randy Leavitt is a seventh-generation Vermonter, a custom furniture maker and a musician. His shop is located in an old railroad freight station, and he plays the violin there every Thursday night in a band called Damaged Freight. His custom-ground chisel designed to clean out the bottom of half-blind dovetail sockets is a good example of how good tools are often made better out of necessity. 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.

onto the block. The tool is quick to make, inexpensive and adaptable to a wide range of curved workpieces. I might also add that it is much easier to use on end grain than either a regular compass plane or a spokeshave. —*J.K. McCoy, Kingwood, Texas*

Dog-wire clamp rack



This simple and efficient clamp rack holds a large number and variety of woodworking clamps in a small space. The clamps can be easily hung from it whether they are open or nearly closed.

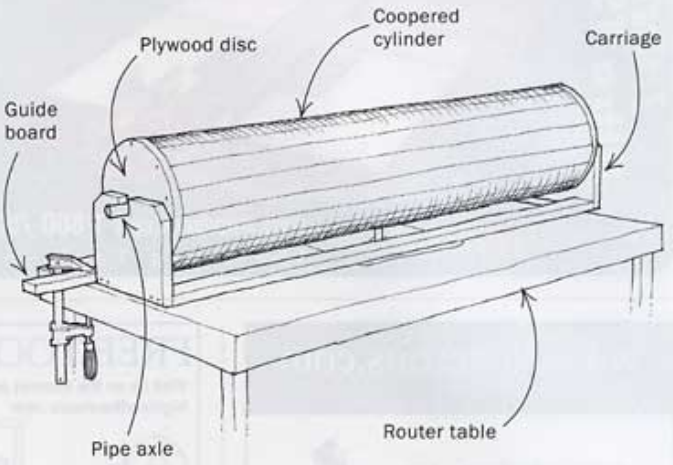
The key to the design is the use of a fencing material that the locals around here call dog wire—a heavy, 12-gauge grid material that easily supports the weight of the clamps. The grid also keeps the clamps segregated for easy attachment and retrieval. The frame is a simple 1x3-pine box with a ledger board at the top to provide a place to bolt the unit into wall studs.

—*Bob Zajicek, Marietta, Ga.*

Making a segmented column on the router table

I recently needed to make a large coopered oak column that was 12 in. dia. by 4 ft. long. Because these dimensions exceeded the capacity of my lathe, I devised a method for making the cylinder on my router table.

First, I glued up the coopered cylinder and removed most of the waste from the corners with a power plane. Then I screwed a plywood disc to each end and drilled centered holes in the discs

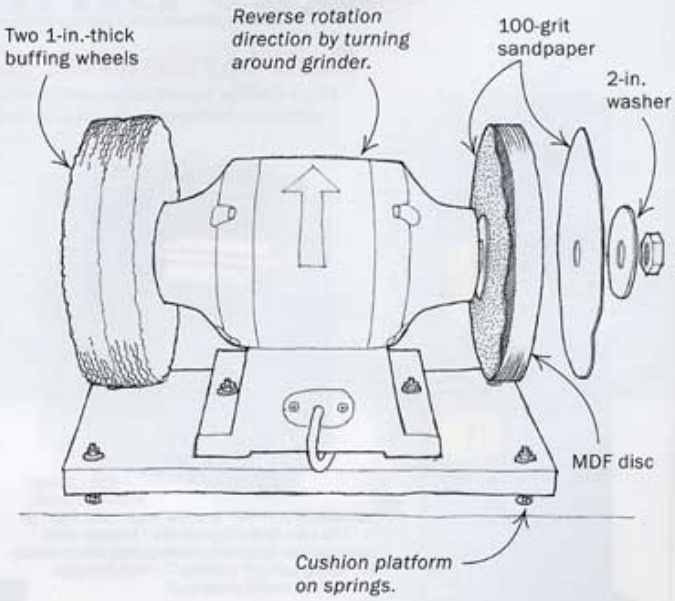


through which I placed a 1¼-in.-dia. iron pipe to serve as an axle. To hold the coopered column in place, I built a carriage with uprights on each end that kept the rough cylinder suspended so that it just cleared the top of my router table. I also clamped a guide board to the router table to keep the cylinder centered directly over the router bit.

By rotating the cylinder over the router bit as I gradually advanced the carriage across the table, I was able to turn a perfect cylinder that required only moderate sanding.

—*Caleb Carlson, Sandpoint, Idaho*

Modifying a grinder to sharpen carving gouges



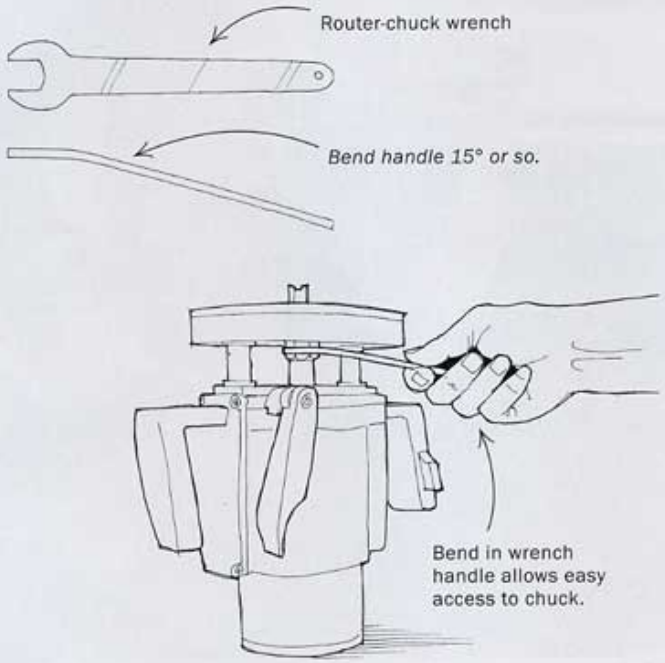
To sharpen wood carving chisels and gouges, start with a common grinder motor and turn around the grinder so that the wheels rotate away from you at the top, which will give you much more control. Mount the grinder on a platform supported by four springs to remove all vibration. Mount a plywood sharpening

wheel (described below) on the right side of the grinder and sandwich two 1-in.-thick cloth buffing discs on the left side to make an oversized buffing wheel.

To make the sharpening wheel, laminate plywood to produce a 6-in.-dia., 1-in.-thick disc. If you don't have a lathe, simply saw the disc to rough shape on a bandsaw, mount it on the grinder and turn it to final shape in place. Mount a disc of fine sandpaper (150 or 180 grit) to each side of the disc and a ribbon of sandpaper to the rim. Don't glue the side pieces to the wheel: They should be allowed to float on a film of air as the wheel rotates. This allows you to apply a very gentle pressure with the gouge, thereby removing the risk of overheating the blade being sharpened. After sharpening the tool on the wheel, move to the cloth buffing wheel to polish and hone the edge.

—Alex Cameron, Golden Grove, South Australia

Improved router-chuck wrench



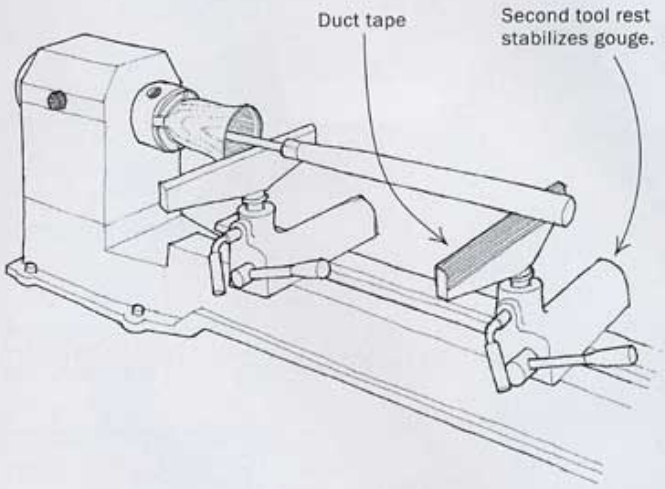
That cheap chuck wrench that comes with your router is an awkward knuckle-banger to use. A low-cost, low-tech remedy to this problem is to clamp the jaw end of the wrench in your vise and bend the handle about 15°. This should angle the wrench just about right to reach in through the opening in the router base.

—Fred Tabshey, Omaha, Neb.

Turning deep bowls

The problem with turning deep bowls is that as the turning gets deeper the distance between the tool rest and the cutting end of the turning tool increases. It becomes more and more difficult to stabilize the turning tool with one hand while trying to compensate by pushing down harder with your other hand, which often causes the turning tool to jam.

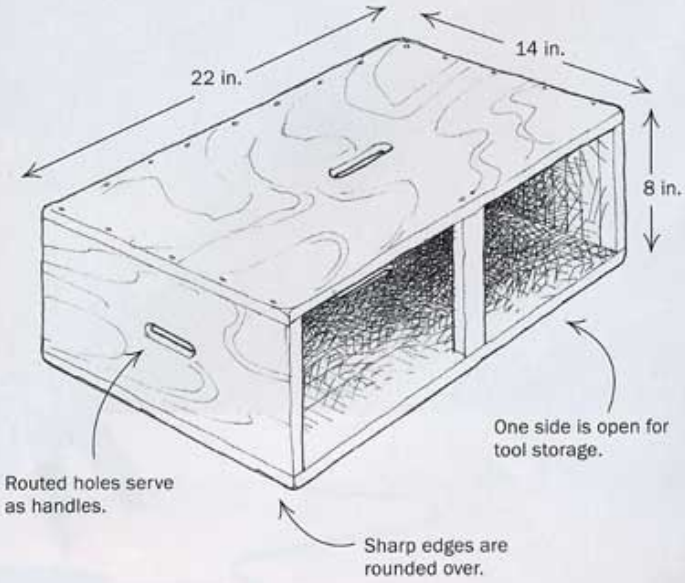
I solved this problem by adding a second tool rest against which



I can firmly hold the handle of the turning tool, as shown in the drawing above. I cover the second tool rest with duct tape to minimize nicks and dents in my tool handles. With this setup I can hollow out vessels like a pro.

—Robert P. Cromwell, Royalston, Mass.

Versatile shop aid



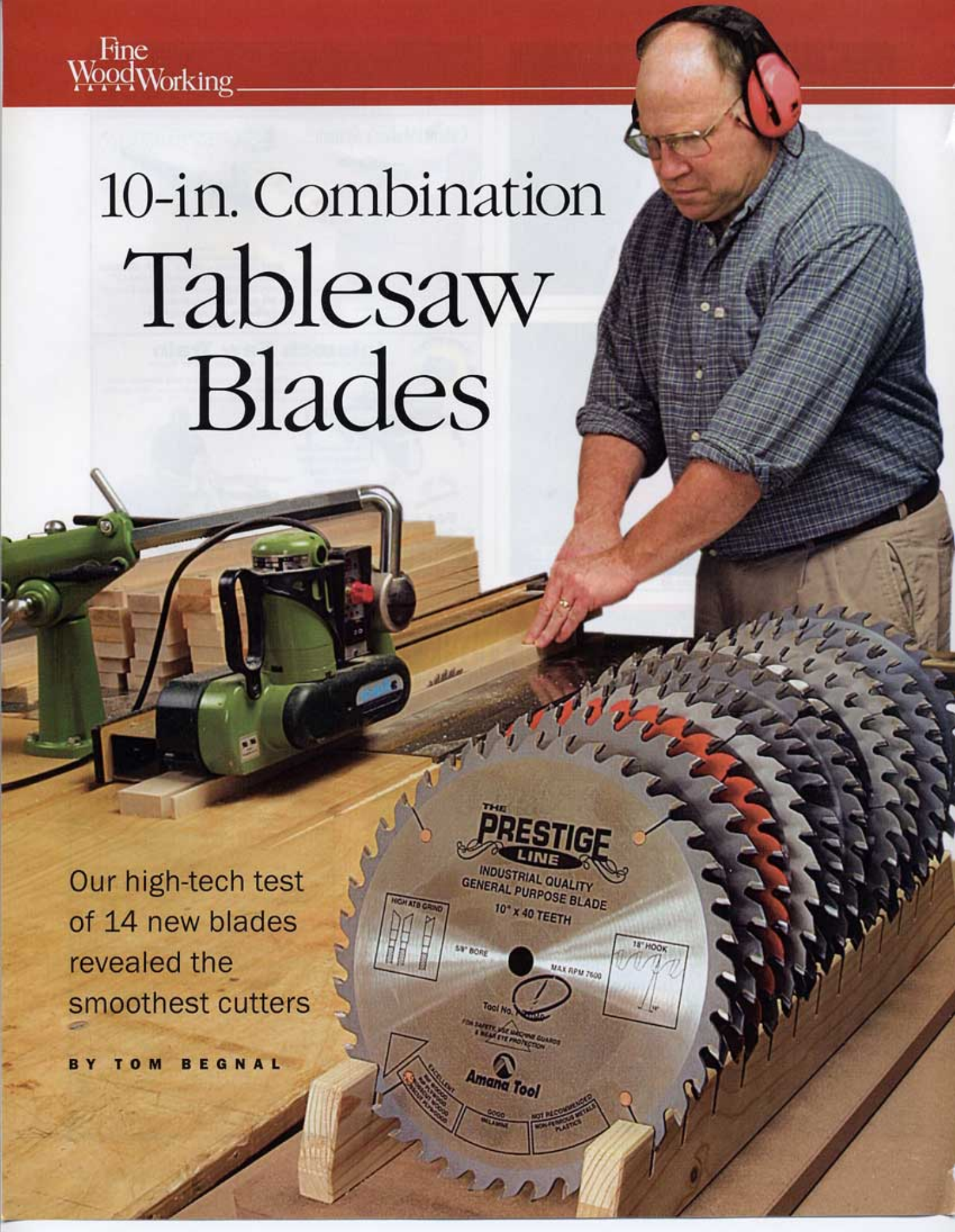
Here's a simple shop aid I made many years ago that I continue to use almost every day. I drill, sand and saw on it. I use it to support panels at the right height below my bench vise. I stand on it to work on an 8-ft. ceiling. I carry tools in it to a job site and use it there as a workbench. And I sit on it to eat my lunch.

I made the box out of some scrap ¾-in.-thick plywood, rounding the edges to keep splinters out of my hands. The drawing above shows the dimensions that I have found useful for my 5-ft. 10-in. frame.

—Paul Darnell, Phoenix, Ariz.

Fine WoodWorking

10-in. Combination Tablesaw Blades



Our high-tech test of 14 new blades revealed the smoothest cutters

BY TOM BEGNAL

A combination blade for the tablesaw makes good sense for many woodworkers. Although a combination blade, also called a general-purpose blade, might not rip as well as a rip blade or crosscut as well as a crosscut blade, it can come pretty close. And using one means you won't have to switch back and forth from rip to crosscut blade. That makes life a lot easier in the shop.

As anyone in the market for a combination blade soon discovers, there's no shortage of choices. That's true even in the top-of-the-line category I wanted to look at. Indeed, 14 of these blades are commonly available.

Curious to learn whether any of these blue bloods stood out from one another, I decided to test all 14 in the *Fine Woodworking* shop (for a complete list of the blades, see the chart on p. 37). But before doing that, I had to consider what exactly I was testing. After all, a combination blade has to do just two things well: make smooth cuts and go a reasonable length of time between sharpenings. So first I needed to figure out whether I wanted to focus on smoothness of cut, on wear or on both.

My ultimate choice was based on a couple of factors. In a preliminary test, using a tablesaw with a 10-in. carbide-tipped combination blade, I was able to cut 2,000 linear ft. of ⅝-in.-thick Baltic-birch plywood before the blade began to show even the slightest sign of wear. Then too, in my research on blades, I came across a test done several years ago at Pittsburg State University in Pittsburg, Kan., where four carbide-tipped tablesaw blades each cut between 4,000 and 6,000 linear ft. of ¾-in.-thick plywood. For most home shops, those kinds of numbers represent years of wear. So as a practical matter, it made sense simply to test for smoothness of cut.

To test each new blade, I first ripped and crosscut a ¾-in.-thick maple board to produce a 2-in.-square sample. After that, the ripped and crosscut edges on each sample were checked for smoothness on a high-tech machine. Then the general quality of each cut was categorized. To keep the test as controlled as possible, I didn't include thin-kerfed blades. Also, no stiffening collars were used. One other point: Blades

Why tablesaw blades get dull

Like any cutting tool, a tablesaw blade gets dull as it is used. And it can become dull for any of several reasons or some combination of them all.

Wear is certainly one reason why a blade gets dull. As each tooth slices through wood, the cutting edge slowly abrades until it no longer cuts as cleanly or easily as it once did.

That's why blades with carbide-tipped teeth are usually favored over high-speed steel (HSS) teeth. Carbide teeth are harder, so they don't wear as easily as blades with HSS teeth. Indeed, some manufacturers claim that teeth made from carbide can last 15 times longer than those made from HSS.

PITCH BUILDUP

Another culprit is pitch buildup. As a blade cuts through wood, some of the resins in the wood stick to the teeth. Those resins can build up to a point that the blade can't cut as smoothly.

Resin buildup also causes the cutting edge of each tooth to run hotter than normal. This is a particular concern for carbide-tipped blades, because each tooth is actually just a bunch of tiny grains of carbide held together by a material, called a binder, that acts like glue. When a blade runs hot, the binder begins to weaken, allowing some of the grains to break away.

Pitch is a problem. *A heavy buildup of pitch on sawblade teeth can lead to poor cutting and shorter blade life.*

Resins can cause problems in still another way. Chemicals in some resins can react with the binder and break it down, again causing grains of carbide to disappear.

NAILS AND OTHER METAL IN WOOD

Because of its hardness, carbide is a great material for tablesaw-blade teeth. But that hardness comes at the cost of brittleness. Granted, brittleness isn't usually a problem when cutting wood. But when carbide teeth have unintentional run-ins with steel, the teeth come away either cracked or chipped. So be sure to remove any nails or screws from a board before cutting.

A tablesaw blade doesn't have to be spinning to encounter a problem. Once, while changing a blade, I chipped a carbide tooth by accidentally hitting it with the arbor-nut wrench.

WHAT TO DO

Because pitch buildup has the potential to be a three-way problem, it makes good sense to regularly clean off any pitch that shows up on your sawblade.

Beyond that, it's mostly a matter of keeping the teeth away from nails, screws and free-swinging wrenches. In the end, your blade is going to enjoy a long time between visits to the resharpening shop.

Photos, except where noted: Michael Pekovich; this page: Erika Marks

PREPARING THE SAMPLE BLOCKS

Tablesaw setup

Sample blocks (left) had to be cut before any test for smoothness could be done. To create them, each blade cut a 2-in. square block from ¾-in.-thick straight-grained soft maple. To ensure consistent tablesaw cuts, a dial indicator helped align the blade and rip fence with the miter-gauge slot (right). A power feeder (below) maintained the same feed rate during rip cuts.

sometimes dull faster than they ought to. Chances are, factors other than pure tooth-to-wood wear are responsible. For more about premature wear, plus some tips on keeping blades sharper longer, see the story on p. 33.

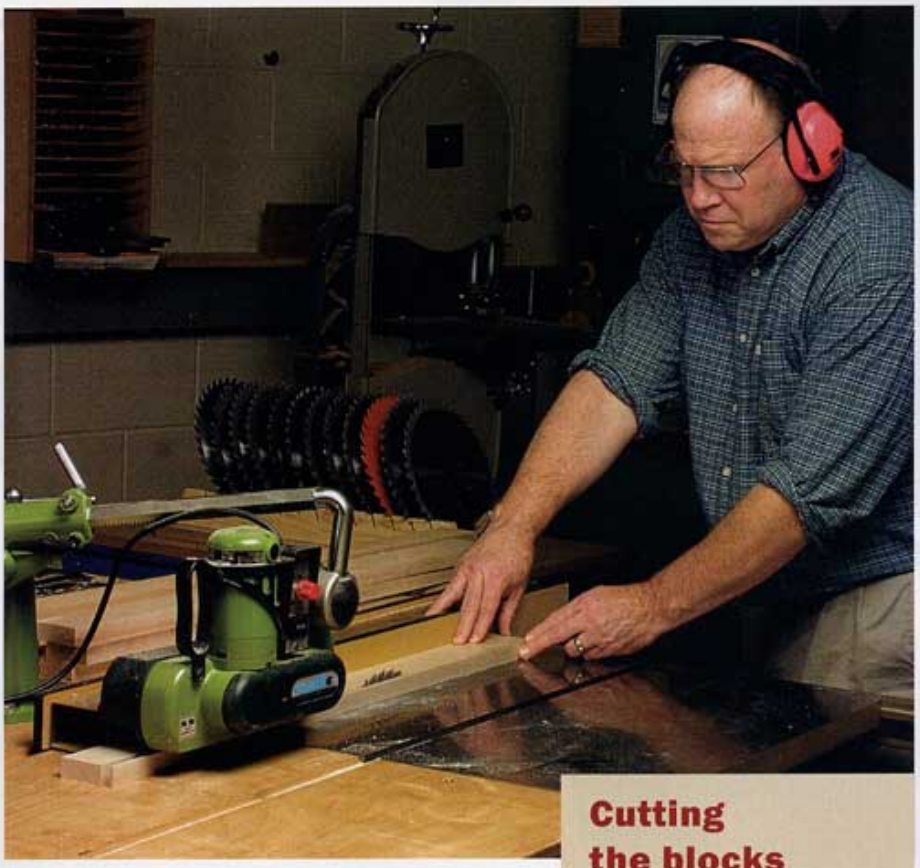
Cutting the sample pieces

For consistency and accuracy, the tablesaw setup was critical (see the photos above). The blade and the rip fence had to be perfectly parallel to the miter-gauge slot. That meant doing some measuring with a dial indicator, with the final check made as the rip fence was positioned for the required 2-in. rip cut.

Also, I added a power feeder to the tablesaw to ensure that all of the test rip cuts were made at the same speed. The power feeder was positioned behind the tablesaw insert so that the blades could be changed and the crosscuts made without having to reposition the feeder. That proved helpful, because it's difficult to reset a power feeder without affecting the cut to some degree.

Because there was no practical way to crosscut the samples using the power feeder, those cuts were made using hand power and a miter gauge (see the bottom photo on the facing page). And although it's pretty much impossible to cut by hand and get the same feed rate every single time, I

Photo, this page (left): Erika Marks



Cutting the blocks

Positioning the power feeder behind the tablesaw insert (above) allowed Begnal to change blades without having to reposition the feeder each time. Once ripped, it took just a couple of crosscuts (left), sans power feeder, to produce each sample block. Handplaning the edge opposite the sawn edge (top right) allowed Begnal to measure and compare the relative smoothness of both edges.

The edge opposite the sawn edge of each block was handplaned flat. *Both surfaces were measured to help account for any differences in the grain of each sample block.*

made a conscious effort to keep them as close as possible.

I used soft maple for the test samples, and it took some serious searching through several stacks of lumber to find a few boards with grain that was reasonably straight. But it was worth the effort, because using straight-grained wood for all of the cuts helped add consistency to the test.

Next, to prepare the samples for the test, I planed each one to the same ¾-in. thickness. Then I jointed the long edges before cutting the samples to 4-ft. lengths.

At this point, a new combination blade was installed in the tablesaw, with the height of the blade set so the gullet cleared the top face of the board by ¼ in. To avoid confusing the test edge with the edge placed against the rip fence, I ran a marker down the entire length of the edge that registered against the fence. Then, with the power feeder adjusted for a cutting rate of 15 ft. per minute, the board was ripped to a 2-in. width.

Next, at a point 1 ft. from the back end (the end that last went through the power feeder), the ripped piece was crosscut twice. The first cut was a trimming cut; the second one created the 2-in. test square. On the top of the sample I marked both the rip and crosscut edges to be analyzed.

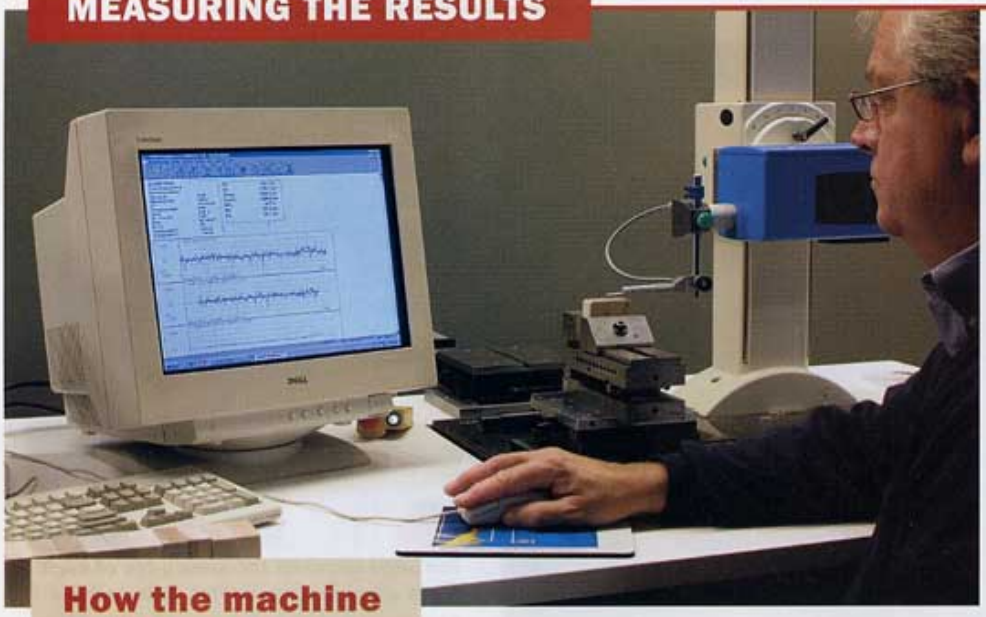
After crosscutting the sample, I used a sharp handplane to smooth the opposite edges of each sample (see the photo above). I'll explain why a bit later.

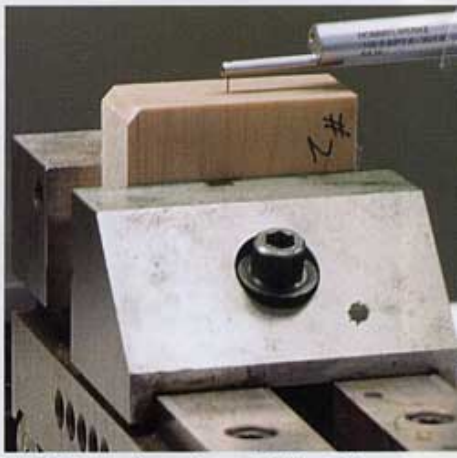
To complete the preparation, the sample was placed in a resealable plastic bag. The bag added some abrasion protection, but more importantly, it kept ambient moisture away from the wood. Any drying or dampening of the wood could have affected the surface quality before the tests were complete. This entire procedure was repeated for each of the 14 blades.

Measuring the surface smoothness

To get an objective measure of how smooth a cut each blade made, I enlisted the help of Hommel America, a company in New Britain, Conn., specializing in sophisticated equipment for checking smoothness. The machine used, called a surface roughness and profiling system, can measure remarkably small surface

MEASURING THE RESULTS

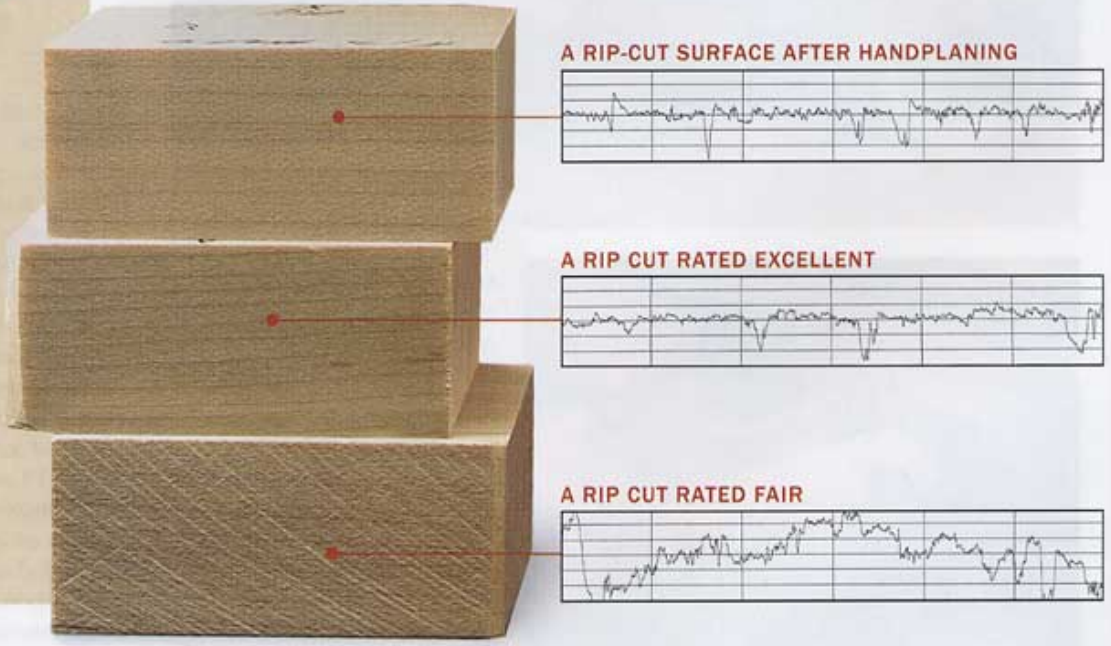




Machine and wood meet at the stylus. *The machine slowly dragged a stylus across the cut edge, measuring smoothness as it went along.*

How the machine scored the cuts

To measure deviations in the cut surfaces of the sample blocks, we used a surface roughness and profiling system. The machine can measure remarkably small surface deviations. As the stylus slid along the surface of a sample block, a digital readout of the ups and downs appeared on a computer screen. The readouts at right represent the average of at least three passes by the stylus. Each horizontal line on each readout represents just over 0.0004 in.



deviations (see the photos above). For example, on a highly polished surface, such as an automotive crankshaft journal, the machine can measure deviations as tiny as plus or minus one-hundredth of a micro-inch. (A micro-inch, by the way, is one millionth of an inch.) But for a relatively rough material, like the wood samples, the machine was scaled back to measure plus or minus 1,250 micro-inches, or 0.00125 in.

To do the test, each wood sample was clamped to a special fixture on the machine, then a delicate measuring device called a stylus was pulled across the surface. And, as the cone-shaped, diamond-tipped stylus moved, it followed every little hill and valley on the surface. It also generated on a computer screen a digital readout that showed the up-and-down travel of the stylus. At the same time, it computed a number that represents the average roughness of the surface. The lower the number, the smoother the surface.

At that point, it might have been tempting just to measure each sawn edge and compare the results. But the test needed to go one step further, because wood is a natural material, which means no two pieces are exactly alike. Concerned that this could skew the results, we measured each sawn surface against the surface on the opposite edge that was handplaned earlier.

Photos, this page (top right and left): Tom Begnal

Rating the blades

Based on the machine measurements, the smoothness of each rip and crosscut were rated as excellent, very good, good or fair. Forrest graduated magna cum laude here, capturing an excellent score for both ripping and crosscutting. Everlast, Jesada and U.S Saw also garnered high honors.

BLADE	PRICE	RIP CUT	CROSSCUT
AMANA PR1040 (800) 445-0077	$85	Very good	Good
CMT 213.040.10 (888) 268-2487	$55	Good	Good
CRAFTSMAN 26789 (800) 697-3277	$35	Fair	Very good
DEWALT DW7615 (800) 433-9258	$69	Good	Very good
DML 74010 (800) 242-7003	$66	Good	Very good
EVERLAST AGP1040 (800) 387-5278	$70	Excellent	Very good
FORREST WOODWORKER II WW10407125 (800) 733-7111	$119	Excellent	Excellent
FREUD F410 (800) 334-4107	$95	Good	Very good
JESADA 110-440 (800) 531-5559	$90	Excellent	Very good
RIDGE TS2000 (800) 443-0992	$119	Good	Very good
SYSTIMATIC 1030 (800) 426-0035	$50	Fair	Good
TENRYU GM-25540 (800) 951-7297	$95	Very good	Good
U.S. SAW (OLDHAM) 100W40 (800) 828-9000	$60	Excellent	Very good
VERMONT AMERICAN 27656 (800) 742-3869	$75	Very good	Very good

Effectively, then, for each sample, we measured the smoothest possible surface for a particular sample (the handplaned edge) against the actual sawn cut. Therefore, as much as possible, this approach eliminated the natural differences in the various samples of wood. And as a result, I had a much fairer set of numbers to use when making an evaluation.

One more point. When crosscutting, it's not unusual to get some splintering on the edges of the wood. It's called tearout, and good tablesaw blades keep it to a minimum. Although the tests didn't directly measure tearout, we found that sawblades that made smoother crosscuts tended to produce less tearout.

The smoothest performers

After looking at the test results, it was clear that some blades were smoother cutters than others (see the chart at right). Of the 14 blades, the Forrest proved to be the smoothest of the bunch. It was the only one to earn an excellent rating in both the rip and crosscut categories. At $119, it's one of the pricier models, but the test suggests that it's money well spent.

The sawblades from Everlast, Jesada and U.S. Saw (the newest blade from Oldham) cut almost as well as the Forrest, getting ratings of very good and excellent. When price is factored in, Everlast enjoys some added appeal in that it sells for about 40% less than the Forrest blade.

Vermont American's blade also received honor marks, scoring a very good rating in both categories. It's about the same price as the Everlast blade. □

Tom Begnal is an associate editor.

A Traditional French Polish

For depth and clarity, no other finish comes close

BY SEAN CLARKE

I became hooked on French polishing at age 15, when I apprenticed with a large firm of period furniture makers in London. I instantly wanted to pursue this incredible art form, and for the following three years I learned all aspects of the craft by studying under master French polishers.

The aim of this technique, developed in France around 1820, is to use as little material as possible to gain the most effect. It's a traditional hand finish that involves working several coats of shellac deep into the wood fibers, and the effect is one of exceptional depth and clarity. Because it is of moderate durability, a French-polished surface is best suited for display rather than hard use. But in my mind, no other finish can compare when it comes to illuminating the natural beauty inherent in wood.

As you would expect with a finish technique that is nearly 200 years old, there are many variations in the recipe, with each claiming to be the true French polish. This version has served me well for the past 18 years.

Before you polish, prepare the surface

Because French polishing magnifies imperfections, good surface preparation is imperative. Begin by sanding all surfaces up to 320-grit paper. Clean off the dust, then evaluate what the finished color of the piece will be by wiping the surfaces with a cloth soaked in denatured alcohol. The Georgian-style side table shown at left was built using Honduras mahogany for the legs and frame, but the drawer, with its highly figured Cuban mahogany veneer, and the single-piece mahogany top were both salvaged from antiques beyond repair. The alcohol revealed that the legs had a pinkish hue, but the top was more orange, and the drawer front was a dark brown.

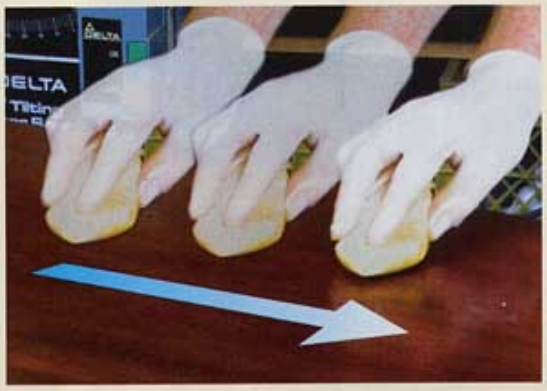
To pull the colors together, I used a mixture of water-based powdered aniline dyes: red mahogany and golden-amber maple. I ap-

The language of French polishing

It is perhaps appropriate that many of the English terms for the different stages of French polishing are double entendres, a legacy perhaps of generations of master polishers embellishing the process with a mystique it doesn't deserve.

RUBBER

The term has nothing to do with latex but is derived from the method of using this tool to rub on thin layers of shellac. The exterior, known as the linen, can either be made from this fabric or more commonly from a 100% cotton sheet. The interior can be any kind of absorbent material, which also gives this tool its other name of tampon.



FLOATING

Floating is the process of applying shellac with the rubber in straight strokes with the grain. The purpose is to achieve a firm base on which to build the body of the finish.

BODYING UP

The stage where the bulk of the shellac is applied to the piece is called bodying up. The rubber can either be used in a padding motion to avoid pulling away a previous layer of stain or in a swirling or figure-eight pattern. Raw linseed oil is used to lubricate the rubber and prevent it from sticking to the shellac.

SPIRITING OFF

The actual polishing stage of French polishing is called spiriting off. The oil used to body up is removed by rinsing the linen of the rubber in alcohol and then lightly floating the rubber across the surface. The alcohol not only removes the oil, but it also melts the top layer of shellac, creating a smooth, high-gloss surface.

plied the dye full strength to all parts of the piece except for the drawer front, where I diluted the stain. Finally, I wiped on a coat of English brown oak stain over the piece to kill the orange hue. Before you apply a stain to a piece with an inlay, apply a 2-lb. cut of super-blond shellac to the inlay using a small artist's brush to seal it, ensuring that it retains its contrast with the rest of the piece. Let everything dry.

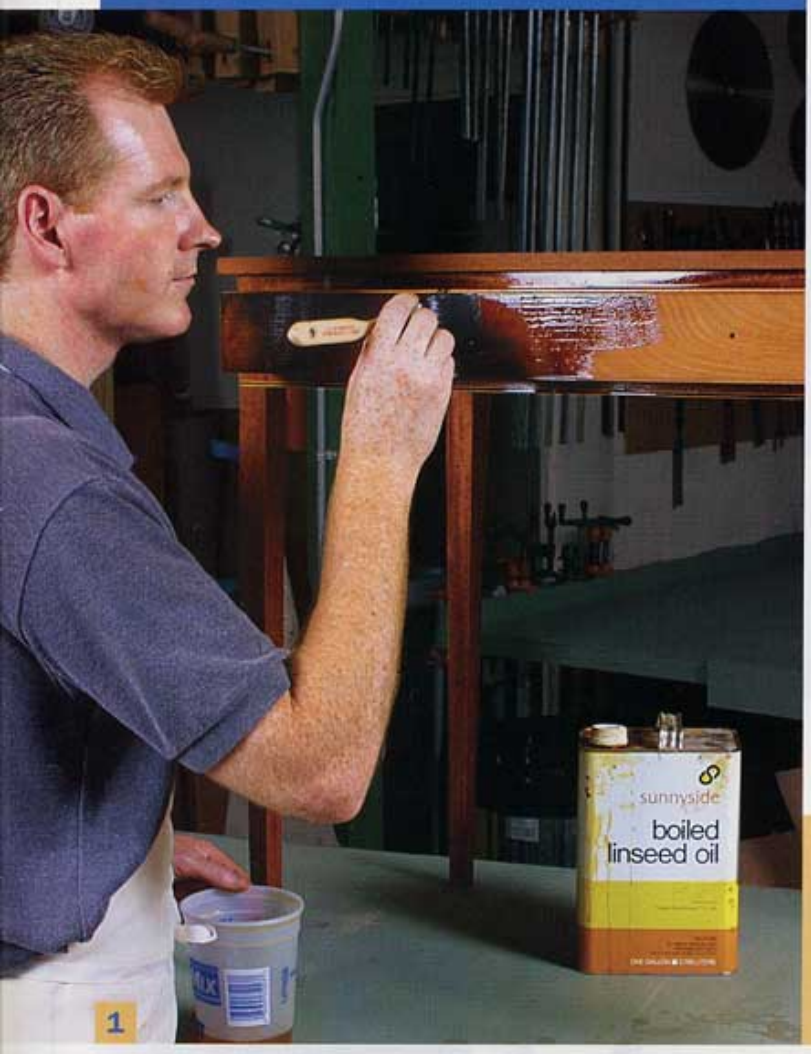
Whether or not you stain the piece, next brush a coat of boiled linseed oil on the whole piece, then let it sit for an hour before wiping it down with a clean cloth. The oil penetrates the wood and gives maximum illumination to the fibers. Then let the piece cure for five to seven days.

Apply the first coat of shellac

Lightly scuff-sand all surfaces with 320-grit self-lubricating paper to knock down any raised grain and dust nibs. Next, apply a coat of super-blond shellac (2-lb. cut) to seal the dyed and oiled surface and to provide a base on which to build the finish. Be sure to use

Photos: Mark Schofield

SURFACE PREPARATION IS CRUCIAL



1


2

1. Brush on a coat of boiled linseed oil, let it soak in for an hour and then wipe off any surplus. The oil takes at least five days to dry.
2. Using a large-capacity badger-hair mop, apply super-blond shellac in the direction of the grain.
3. Use an old brush to apply a pore-filler/glaze mixture. Because the mixture sets up fast, work on small sections at a time.
4. Work quickly before the filler dries to produce a smooth surface.


3


4

the paler super-blond shellac at this stage; a deeper-colored shellac can cause color lines and a streaky effect. I use a large-capacity badger-hair mop brush to apply the shellac to every part but the top, where I use a piece of folded cheesecloth. Apply two or three coats in the direction of the grain, then leave the workpiece to dry for a couple of hours. (I work in southern California; if you live in a more humid region, extend the drying times, as needed.)

Brush on a pore-filler/glaze mixture

Because a French-polished finish requires a uniformly smooth surface, the pores of open-grained woods, such as mahogany, need to be filled. I combine this step with a colored glaze that both harmonizes and ages the appearance. I mix my own glaze so that I can control both the color and the consistency. For this table I used the following recipe: three heaped teaspoons of burnt-umber dry pigment; one heaped teaspoon of vegetable black dry pigment; four heaped teaspoons of fine-grade pumice; 1 oz. of gold size; and 4 oz. of turpentine. Turpentine extends the shelf life of the mixture, whereas mineral spirits tends to form a gel. You can adjust the pigment colors, but do not add more pumice than pigment, which can lead to specks of gray pumice showing up in the grain.

Brush the filler/glaze mixture onto a small section at a time, then wipe it off with a clean cloth. Use a circular or figure-eight motion to remove the bulk of the liquid, then wipe across the grain to deposit more into the pores. If an area dries and becomes difficult to remove, dampen the clean cloth with turpentine. As the photo of the filled top shows (bottom right, facing page), the glazed area is smoother and has the dark appearance of a mahogany antique.

Rub all surfaces with 0000 steel wool to remove any excess filler. In addition, wrap a turpentine-dampened cloth around a block and rub the surface to further remove any filler from the tabletop and deposit it in the pores.

There is one final step before the actual polishing can begin. After forming a rubber (see the story at right), use it to float a coat of buttonlac (2-lb. cut) across the entire workpiece. Floating refers to the process of applying shellac in straight strokes with the grain. This seals in the pore filler, while the darker buttonlac deepens and enriches the color.

Polishing starts by bodying up the finish

Let the piece dry overnight, then start building up the successive shellac coats, a process called bodying up. Still using the 2-lb. cut of buttonlac, brush a couple of coats onto every part of the table but the top. Charge the rubber with shellac, then flick a few drops of raw linseed oil onto the tabletop. The oil serves as a lubricant, allowing the rubber to float smoothly across the surface, laying down coats of shellac without abrading the previous coats. I use raw linseed oil because it has a longer cure time. If the finishing needs to stretch into several days, the oil remains workable.

Apply the shellac by moving the rubber in circles and figure-eight patterns using light to moderate pressure. Recharge the rubber, as necessary, until the finish begins to build. Brush another coat onto the rest of the table, then let the piece rest for an hour.

The last thing to do is sand the piece to remove any remaining imperfections. Flick a few drops of raw linseed oil onto some 320-grit sandpaper. The oil serves as a lubricant. Use a light touch, and avoid breaking through the finish at the edges.

Now resume bodying up the tabletop, this time using the rubber

The right rubber for the job

Every French polisher has a favorite design of rubber. If you have a preference, stick with it. For a table this size, I cut a cotton bed sheet roughly 8 in. square, removing any hems. I then cut a piece of cotton cloth approximately 6 in. square and folded it into a wad roughly 2 in. wide and 3 in. long, with a blunt point at one end.

Charge the wadding with denatured alcohol to increase its absorbency, then squirt shellac onto one surface of the wadding. Place this surface down into the center of the cloth, bring each corner of the cloth to the center, maintaining the point on one end, and twist the ends of the fabric together. Use this twist of fabric as a grip for the rubber. It is critical that the fabric be very smooth against the wadding, because this is the surface that does the polishing. Smack the rubber against the palm of your hand so that the shellac penetrates the cloth, then you are ready to begin French polishing.

Start with a clean sheet. *Use a white 100% cotton bed sheet as the exterior, or linen, of the polishing rubber. Cut off any hemmed edges of the sheet. The cloth encloses a wadded piece of cotton.*

Charge the rubber. *The shellac should be applied directly to the wadding before the rubber is used and each time it needs recharging. When not in use, store the rubber in an airtight container to prevent it from drying out.*

Wrap the rubber carefully. *The cloth should be wrapped tightly around the wadding to form a smooth surface on the bottom that will do the polishing.*

BUILD THE FINISH IN LAYERS

1. To apply the shellac, use a brush on all areas but the tabletop.
2. Polish the top with the rubber, using light to moderate pressure, and keep the rubber moving in circles and figure-eights.
3. Add a few drops of raw linseed oil to 320-grit paper to prevent it from biting into the finish.
4. The sandpaper is rubbed across the tabletop using the heel of the hand rather than wrapped around a block to lessen the chance of cutting through the finish on a high spot.
5. After sanding the piece, resume building the shellac finish. This time use the rubber on the whole table, not just on the top, to create a smoother surface.
6. For rubbing out the finish, unroll the steel wool so that you don't cut through the finish.

on the legs and drawer front as well as on the tabletop. Flick the linseed oil directly onto the rubber when working on smaller areas, such as legs.

Remove the oil by spiriting off

The polishing part of a French polish is variously called spiriting off or stiffing off. This step removes the previously applied oil, which if left on would leave white traces in the cured finish. The aim is to remove the oil without displacing the coats of shellac.

First wash out the cloth of the rubber in denatured alcohol, then wring it so that it is not dripping wet. Charge the wadding with a 1-lb. cut of buttonlac and rewrap the rubber. It is fine to go straight from bodying up to spiriting off without letting the finish rest.

Float the rubber across the surface of the table in straight strokes with slightly less pressure than when bodying up. The cloth of the rubber will start to pick up the oil in the finish. After going over the whole piece, rinse out the cloth in alcohol, but do not add shellac to the wadding. Float the rubber across the surface again and again, regularly rinsing out the cloth, which will become progressively drier. When you don't see any more oil being collected and the sheen has become an even gloss, stop and allow the piece to dry overnight.

Rub out and compound the finish

Your personal preference for final appearance decides the next step. For a high-gloss look, the finish must be rubbed out using 2,000-grit wet-or-dry sandpaper. I used the paper dry on the legs, the frame and the drawer front of the table shown here, but on the top I used water as a lubricant. With a very light touch, sand in the direction of the grain and concentrate on not burning through the finish at the edges. Then apply a polishing compound in a circular motion using a clean cloth.

If you prefer a more satin level of gloss, rub the surface with 0000 steel wool. For the small areas of the table, I tore a strip of wool down the middle and folded it into a small pad that fit my hand. For the tabletop I used a larger wad to distribute the pressure more evenly and to prevent the steel wool from becoming clogged. With this method, always rub the steel wool in the direction of the grain.

Last, add a coat of wax

Because I have always had a preference for an aged appearance to reproduction furniture, I like to add the step of "blacking in" to the wax polishing. I make my own blend of polish using the following recipe: one teaspoon of vegetable black pigment; 1 oz. of slow-set gold size; 4 oz. of Kiwi Bois paste wax; and enough turpentine to dissolve the wax and make the finish easy to apply with a brush. If you prefer, you can leave out the black pigment. The gold size acts as a binder to make the pigment adhere to the finish when it dries.

Apply it to corners, crevices, feet and any light spots. Then rub it with a clean cloth to blend it into the rest of the workpiece. To my eye it gives character and re-creates the soft waxed luster of a piece of furniture that has been taken care of for 250 years. □

Sean Clarke and his wife, Angela, who helped in the preparation of this article, are the owners of Clarke Co. in Valencia, Calif., specializing in the restoration and refinishing of antiques.

A homemade aging process

A black-wax recipe. *Clarke makes his own wax polish and combines it with gold size and black pigment to give the table an aged luster.*

Brush on the black wax. *Using a cheap brush, apply the wax in corners and crevices, at the bottom of the legs and in any white pores left by the steel wool.*

Instant aging. *Clarke leaves the greatest concentration of the black wax in the edges of the cock beading and on the apron below the tabletop overhang. He wipes a thin layer onto the rest of the surfaces.*

SOURCES OF SUPPLY

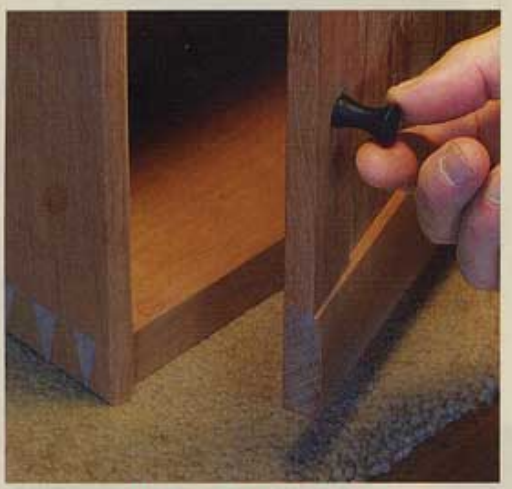
SLOW AND FAST GOLD SIZE
Easy Leaf Products (800-569-5323; easyleaf.com)

BLACK PIGMENT
Homestead Finishing (216-631-5309; homesteadfinishing.com)

KIWI BOIS WAX
Hummer Capital Inc. (800-552-0052; hummercap.com)

Shopmade Catches and Latches

Four woodworkers, four solutions



Hidden Magnets
BY ANDY RAE

Shaker Spinner
BY CHRIS BECKSVOORT

Flipper Catch
BY DOUG NOYES

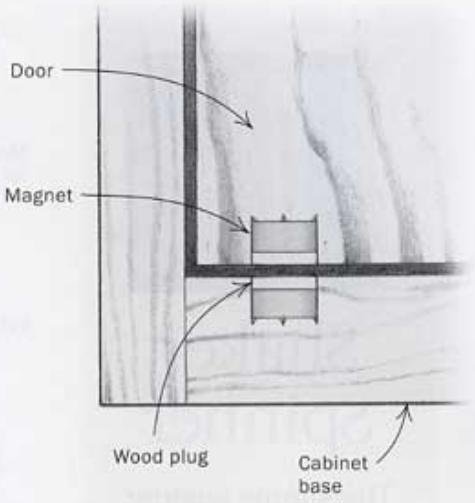
Button Catch
BY MICHAEL PEKOVICH

Look through a catalog of cabinet hardware and you'll find dozens of gadgets made for keeping doors shut. Nonetheless, many woodworkers create their own catches and latches because they're attractive, not difficult to make and cost little. Another benefit is that there is no clunky metal hardware in the cabinet. We asked four woodworkers to show us how they keep cabinet doors closed. The solutions include hidden rare-earth magnets, a traditional Shaker spinner, a wooden flipper catch made popular by James Krenov and a button catch. All of these look a lot better than most store-bought hardware, and they can be customized to fit your needs.

Hidden Magnets

Use the power of rare-earth magnets to keep a door closed

BY ANDY RAE



To keep cabinet doors closed, I often rely on the magnetic attraction of rare-earth magnets, which provide a clean, hardware-free look.

Instead of placing the magnets so that they make contact when the door is shut, I glue them in the top and bottom of the door and the case, leaving them a fraction of an inch apart. The magnets gently pull the door flush to the case once it swings closed—a satisfying effect, especially if the door has been fitted to close tolerances. I cover the magnets with wood plugs.

Keep in mind that this technique works only with free-swinging doors. Avoid self-closing or other spring-loaded hinges.

Investigate your magnets

Rare-earth magnets are my preferred pullers. Ounce for ounce, these slim, ⅛-in.-thick discs pack more power than any other magnet I've seen.

Be sure to size the magnets so that they have the necessary pulling power. I used ⅜-in.-dia. magnets for the small jewelry-box door shown here. Larger ½-in.-dia. magnets work best for typical ¾-in.-thick cabinet doors. With bigger doors you need bigger magnets.

Make mortises for the magnets

Drill the mortises for the magnets in the case pieces before assembling them. Offset the mortise in the base toward the rear, which will help pull the door closed. For my cabinet, I drilled ⅜-in.-dia. mortises in the case top and bottom. Regardless of the diameter of the magnets, make the mortises ¼ in. deep to allow for the nominal ⅛-in.-thick magnets and the wood plugs that hide them. To make flat-bottomed mortises, use a Forstner bit.

Once you've drilled the mortises in the case parts, assemble the case, then build the door. Take your time getting a consistent door reveal. Once you've installed the magnets and covered them with plugs, you'll have little room for adjustments. I aim for a reveal of about 1/32 in. so that the door slows on a cushion of air as it is shut, then is quietly drawn in by the magnets.

Install the magnets

To determine the door mortise locations accurately, the door must be hung first. Then transfer the centerlines of the mortises in the cabinet to the bottom and top of the door. Remove the door from the case and drill the mortises for the magnets. You can rig up a vertical drilling arrangement

Drill mortises before gluing up the case. *One set of magnets is recessed into mortises drilled into both the case top and bottom.*

With the case assembled, transfer the mortise location. *Use a piece of tape to pull the door flush with the outer edge of the case.*

Photos, except where noted: Timothy Sams; facing page (bottom left): Erika Marks

Mark the magnets to ensure that they are oriented correctly. *Glue the magnets in place, add wood plugs, then pare and sand the plugs flush.*

on the drill press to make clean and accurate mortises. But precise mortises can be made with a Forstner bit mounted in a handheld drill—as long as the bit is ½ in. dia. or less. Larger-diameter Forstner bits have a spooky tendency to wander, ruining the cut. Make sure to practice on scrap if you opt for hand drilling, and wrap a piece of masking tape around the bit to flag the correct depth.

Establish the proper polar orientation of each pair of magnets and mark them with a felt-tipped pen. Use epoxy or cyanoacrylate glue to secure the magnets. Reinstall the door and check that it closes properly. If the mortises have been drilled correctly, the magnets will pull the door flush to the face of the cabinet.

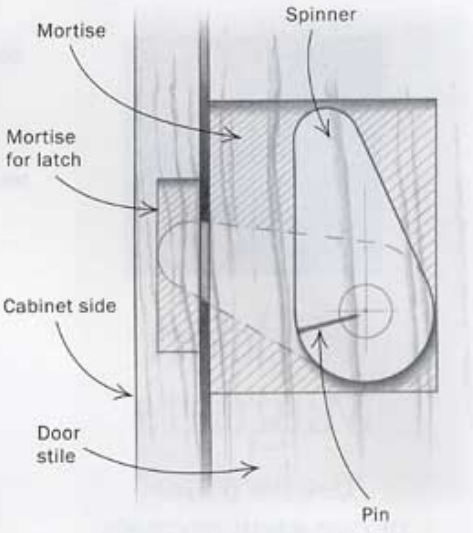
Install tapered wood plugs to hide the magnets, carefully matching the grain orientation. Once the glue has dried, pare and sand the plugs flush. If you've carefully achieved a snug fit, the plugs disappear. And your friends will wonder what kind of magic is holding the door in place. □

Andy Rae is a cabinetmaker, furniture maker, teacher and writer. He is the author of The Complete Illustrated Guide to Furniture & Cabinet Construction *(The Taunton Press, 2001).*

Shaker Spinner

The simple spinner is refined to become an elegant latch

BY CHRIS BECKSVOORT



Spinners have been used for years to keep barn doors shut. I've redesigned the spinner for my cabinets from the simple but effective exterior latch to a refined and almost completely hidden mechanism within the door stile.

The earliest spinners consisted of a small piece of wood with a pin through the center mounted on the frame next to the door. When the spinner is in the vertical position, the door can be opened. With the spinner turned horizontally, the door is locked.

A few years back I decided to incorporate the spinner inside the lock stile of the door frame. I make the spinner into an oval. The result is substantially more work in layout, mortising and fitting, but it's much cleaner looking and almost entirely out of the way.

The door knob must be placed on the centerline of the door stile, and the spinner must extend out of the stile by at least ¼ in.

Lay out the mortise. *With the knob hole drilled in the center of the stile, use a cardboard cutout to determine the spinner's placement. Then mark the mortise 1/16 in. larger than the spinner itself.*

Drawings: Michael Gellatly

when closed yet fit completely within the door stile when in the fully opened position. Begin by drilling the knob hole through the stile. Then make a cardboard cutout of the spinner, sized so that it won't reach into the door-panel groove. Locate the mortise by swinging the cutout in a 90° arc around the door-knob hole. The width of the mortise should be about a third the thickness of the door frame—usually ¼ in. for a ¾-in.-thick frame.

Once the mortise is complete, shape and drill the spinner and check the fit with the knob attached. If all works well, pin it in place with a small brad or brass escutcheon pin. The spinner should not be glued, because there's a great risk of glue getting onto the knob shaft, which will muck up the works.

I aim for close tolerances between the knob shaft and matching hole. For most cabinet doors I use knobs with ½-in.-dia. shafts (⅜ in. dia. for very small doors). To make life easier, I shape all knob tenons with a plug cutter, chuck them into the lathe and turn the knob proper. If you think about it, the knob shaft is the only critical part of the process. The ½-in.-dia. shaft must fit precisely in the matching hole bored into the door. The plug cutter eliminates the most difficult portion of the task.

For a ½-in.-dia. knob shaft, drill a 33/64-in.-dia. hole through the door stile and a ½-in.-dia. hole through the spinner. Now the knob will spin freely in the door frame yet hold the spinner securely. Next, with the spinner in the closed position, align the grain of the knob with the grain of the door frame. Then turn the spinner into the open position and pin it. This detail makes it easy to tell whether the spinner is in the open or closed position.

After 30 years as a woodworker, I was some proud of myself for coming up with this idea of installing the spinner in the door frame. Then in 1996, while shooting photos for *The Shaker Legacy* (The Taunton Press, 1998), I came across a small chest with drawers and doors at the Art Complex Museum in Duxbury, Mass., in which the door knob passed through a mortise in the edge of the door. Although the spinner itself was missing, it was clear that the Shakers had the same bright idea 160 years ago. □

Chris Becksvoort is a contributing editor.

Chop out the mortise. *Becksvoort chisels out the mortise by hand.*

The knob should slide in with a little pressure. *The spinner must swing freely and should be hidden when the latch is open.*

Predrill for the pin. *To avoid splitting the spinner, drill a hole for the escutcheon pin.*

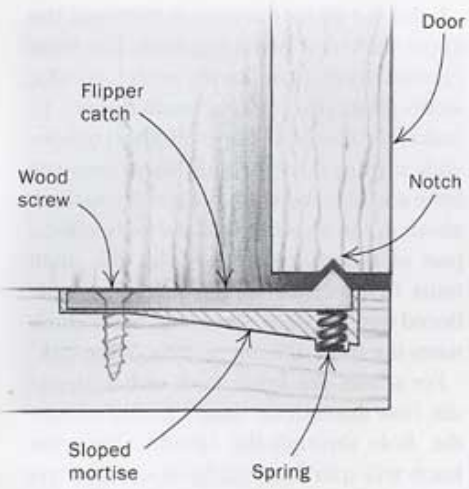
Secure the spinner and knob with a pin. *Instead of glue, use a small brad or escutcheon pin and drive it in using a nailset.*

Flipper Catch

An all-wood solution to keeping doors closed

BY DOUG NOYES

I discovered flipper catches in one of James Krenov's books on cabinetmaking. I like these catches because they are easy to make and allow me to utilize exotic hardwood scraps. The one I frequently use is basically an L-shaped wood flipper that is recessed into a mortise in the case bottom. A small spring provides the necessary resistance to keep the flipper engaged with the bottom edge of the door.



I make the catch out of a contrasting hardwood, such as ebony, because it resists wear. Although I make the catch to fit, the catch for a ¾-in.-thick door typically measures approximately ¼ in. thick by ⅜ in. wide by 1½ in. long.

Sketch the profile on a blank, cut it out with a handsaw, then shape the catch with a file or knife. Drill a slightly oversized hole for the attachment screw to allow the catch to pivot. Countersink the hole so that the screw is flush with the top of the catch.

Next, cut the sloped mortise, which allows the catch to recede when the door is closed. Use a plunge router with a fence to make the mortise. It is a short mortise (only 1½ in. long), so be careful not to cut too deep too fast.

Square up the mortise with a chisel. Drill a hole in the deeper part of the mortise to hold the spring. The hole should be about ⅛ in. deep and the same diameter as the spring. I use ⅛-in.-dia. springs from ballpoint pens trimmed to ¼ in. long, but you can also get springs from a hardware store.

Put the catch into the mortise to test the fit. It should be snug but not overly tight. If it fits, place the spring in its hole, put the catch in place and secure the assembly with a small wood screw.

I usually make a shallow notch (1/16 in.) in the bottom of the door to engage the catch. If the door is made of very soft wood, such as redwood or pine, it's not a bad idea to insert a piece of hardwood in the bottom of the door to prevent excessive wear.

To determine the location of the notch, first close the door several times on the catch, which will create a shiny spot where the catch is rubbing. At the end of this shiny spot make the notch for the door to catch. If this shiny spot does not appear, rub the top of the catch with a pencil and then close the door. The pencil mark indicates the location of the notch.

A variation on this catch is to include a positive stop. By shaping a shoulder onto the catch itself, I can control the closed position of the door. I use this variation on inset-door applications or on double doors that can be opened individually.

A little trimming here and filing there, and you'll have a good catch that makes a subtle "click" when the door is closed. □

Doug Noyes is a furniture designer and woodworker in Guilford, Conn.

Cut the ramped mortises. *Use a plunge router to make a sloping mortise for the catch.*

Pare the mortise to the length of the catch using the catch as a guide. *Pare less vigorously as you come close to the desired width.*

Assemble the catch. *The spring sits in a hole bored in the deep end of the mortise.*

Button Catch

Simple, unobtrusive and easy to make

BY MICHAEL PEKOVICH

I had been floundering in art school for a couple of years when I stumbled into a beginning woodworking class. One of my first projects was a simple pencil box with a sliding lid. At wits end for a way to secure the lid short of tying it closed, I approached my instructor, John Snidecore, who showed me a simple spring-loaded wood button catch.

Twenty years later I'm still working wood and still using the button catch on a variety of projects. But I have since modified the design to work as a door catch. The concept is simple: a stepped button slides up into a stepped hole from below. A spring supports the button, and a wooden plate or plug covers the bottom of the hole.

To align the button to the door, I use an approach that's almost foolproof. Hang the door and locate the button about 1 in. from the edge of the door, midpoint in its thickness. Transfer this location to the bottom of the case. From the bottom, drill a ⅜-in.-dia. hole, stopping ⅛ in. shy of the opposite side. With a ¼-in. bit, continue the hole through the case bottom and use a piece of scrap to prevent blowout. Then wedge the door securely in the closed position and drill just into its bottom edge. The drilled indent becomes the cup for the button.

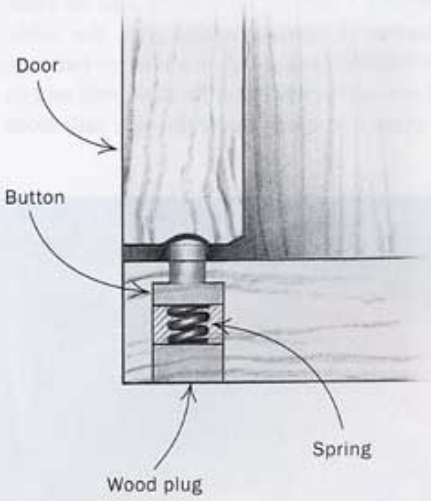
To make the button, simply chuck a short length of hardwood dowel into a drill press. With a file in hand, it's quick work to create the desired profile. After a test fit, cut the button to length. Before doing so, I like to round and polish the top of the button while it's easy to grab. From this point it's just a matter of inserting a spring in the hole and capping it.

For small projects such as my pencil box, I glue a plug into the hole and finish it smooth. For most case pieces, where long-term maintenance is an issue, I prefer a plate screwed to the case bottom, which allows for easier button replacement, if necessary. One final task is to use a gouge or carving knife to cut a shallow notch on the inside edge of the door bottom where it strikes the button. This notch and the rounded button top combine to make for smoother door closing. □

Shape the button on the drill press. *Use a block with a predrilled hole in it to gauge the right size of the button.*

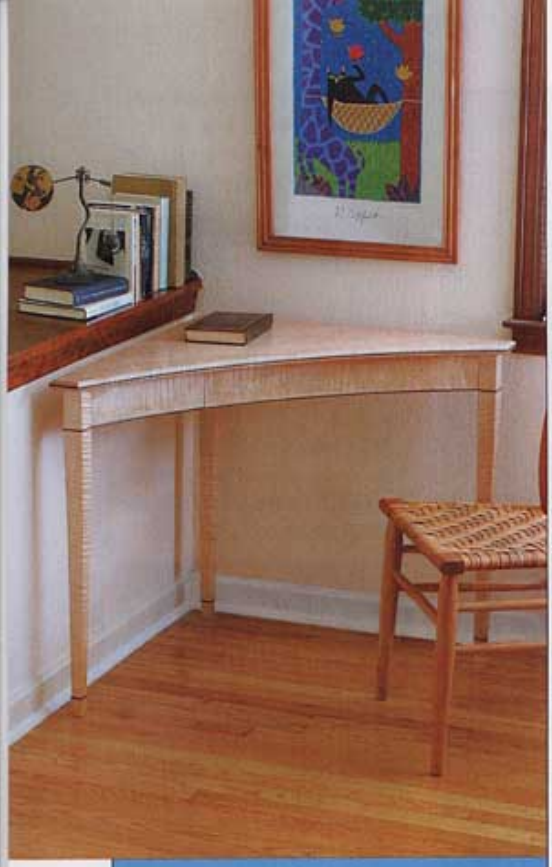
Drill the stepped hole. *Mark the bit with tape to indicate the correct depth.*

Drill the button hole. *Use some scrap stock to prevent tearout.*



Notch the door. *The notch is shallow and angled so that it will depress the button as the door closes.*

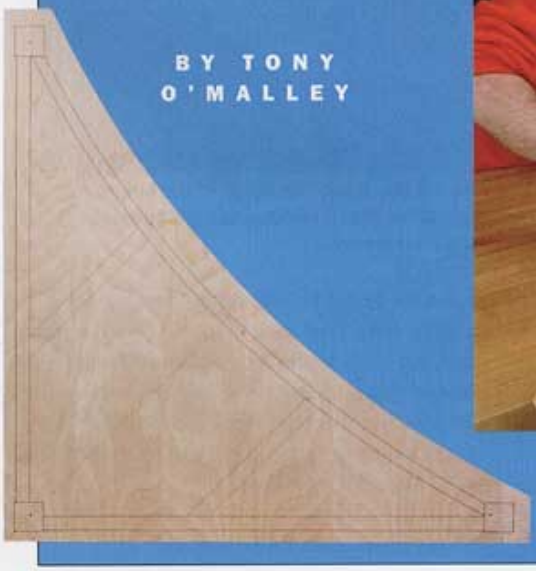
Michael Pekovich is the art director.



A Contemporary Corner Table

One template is the key to shaping and fitting this elegant project

BY TONY O'MALLEY



When rough milling the wood for a table, I typically make an extra leg, in case something goes wrong while cutting the mortises or sawing the tapers. Years ago, after making a pair of Shaker-style desks, I ended up with three extra legs (I was prone to making more mistakes back then). I couldn't just toss them into the firewood pile, and I didn't want to backtrack and make a fourth leg, so I created this three-legged table.

I designed this table to fit into a corner of a dining room, where the recessed front wouldn't impede movement and an extra drawer is always useful. But the table would also work well in a narrow hallway. If you are certain that the table will stay in a corner, you can make the side rails from a secondary wood and not extend the beading beyond the front. However, in a really large room this kind of table can also anchor the corner of an area rug and be visible from all sides.

A template simplifies the process

The first step in the project is to make a full-sized template. Draw the plan view of the table on a piece of ¼-in.- or ½-in.-thick plywood. The template serves several purposes: It shows you the exact size of the parts and how they join together; it can be used as a flush-trimming template for the tabletop; and you can use it when you want to make another table. I lay out the curve of the tabletop using a thin wood batten (⅛ in. thick by 1 in. wide), stringing

Draw the curve on the template. *A thin wood batten and a piece of string yield a curve whose radius is adjustable. It's easy to transfer the curve to the template.*

Rough-cut the tabletop after tracing the template. *Minimize the waste of wood by stepping the glue-up to create a semi-triangular shape.*

Photo, this page (top left): Michael Pekovich

it like a bow to the correct arc (see the bottom left photo on the facing page).

Making the top out of a single board ensures consistent grain and color

Make sure the front piece is at least 6 in. wide to accommodate the curve and still leave a couple of inches of stock at the thinnest point in the middle. Plane the boards to their finished thickness of ⅞ in., joint the edges and then glue them together. Clamp the assembly between battens to keep it flat.

Transfer the shape of the top from the template to the glued-up planks, making sure the sides of the template are 45° to the seams. Cut out the top on the bandsaw or with a sabersaw, then flush-trim the edges using the template. I routed a chamfer on the bottom edge of the top and a stepped roundover on the top edge.

Frame construction is unique

Because the front apron is laminated, its construction is handled separately from the other two aprons. For the two side aprons made of solid wood, be sure to allow for the tenons in their overall length, unless like me, you use loose tenons and cut mortises in both the legs and the rails.

Mill the wood for the legs and cut them to length (see the drawing on p. 52). Then lay out the two mortises in the back leg and one in each of the front legs.

A place for your stuff. *The drawer blends in with the front apron, making it nearly invisible. A fingerhold in the false front is easy to grab.*

Now's the time to cut the kerfs in the legs for the decorative beads—before tapering them (see p. 55). To saw the leg tapers, use a simple taper jig and make the cuts on the tablesaw. Clean up the sawn surfaces with a plane or on the jointer.

Now glue up the three legs and two rails right on the template, which ensures that the rails are square to each other.

To make the front apron, use a simple one-piece bending form made from ¾-in.-thick plywood and faced with bending plywood. To get a ¾-in.-thick lamination for the apron, I cut five plies, each approximately 5/32 in. thick, on the bandsaw. If your bandsaw balks at resawing 4-in.-wide stock, make a 1½-in.-deep cut into each edge of the board on the tablesaw, then finish the resawing on the bandsaw. Then plane them to thickness.

Select and mark the best piece of thin stock for the face. Then do a dry run of the lamination process. Add one or two layers of ¼-in.-thick Masonite or medium-density fiberboard (MDF) to the outer face, to help distribute the clamping pressure. Clamp the laminations into the form without glue. Use blocks across the face of the form. With the dry run you'll find out exactly how many clamps and blocks you'll need.

For the actual glue-up, I use plastic resin (urea formaldehyde) glue because it reduces springback. Glue just one face of each lamination to minimize squeeze-out, using a roller or notched spreader for even coverage. Remember not to apply glue to the outside of the face piece.

Stack the laminations together and secure them to the form with a single clamp in the middle. Then work your way out to the ends. It's better to get all of the clamps on with a moderate amount of pressure before cranking down with full force. Allow

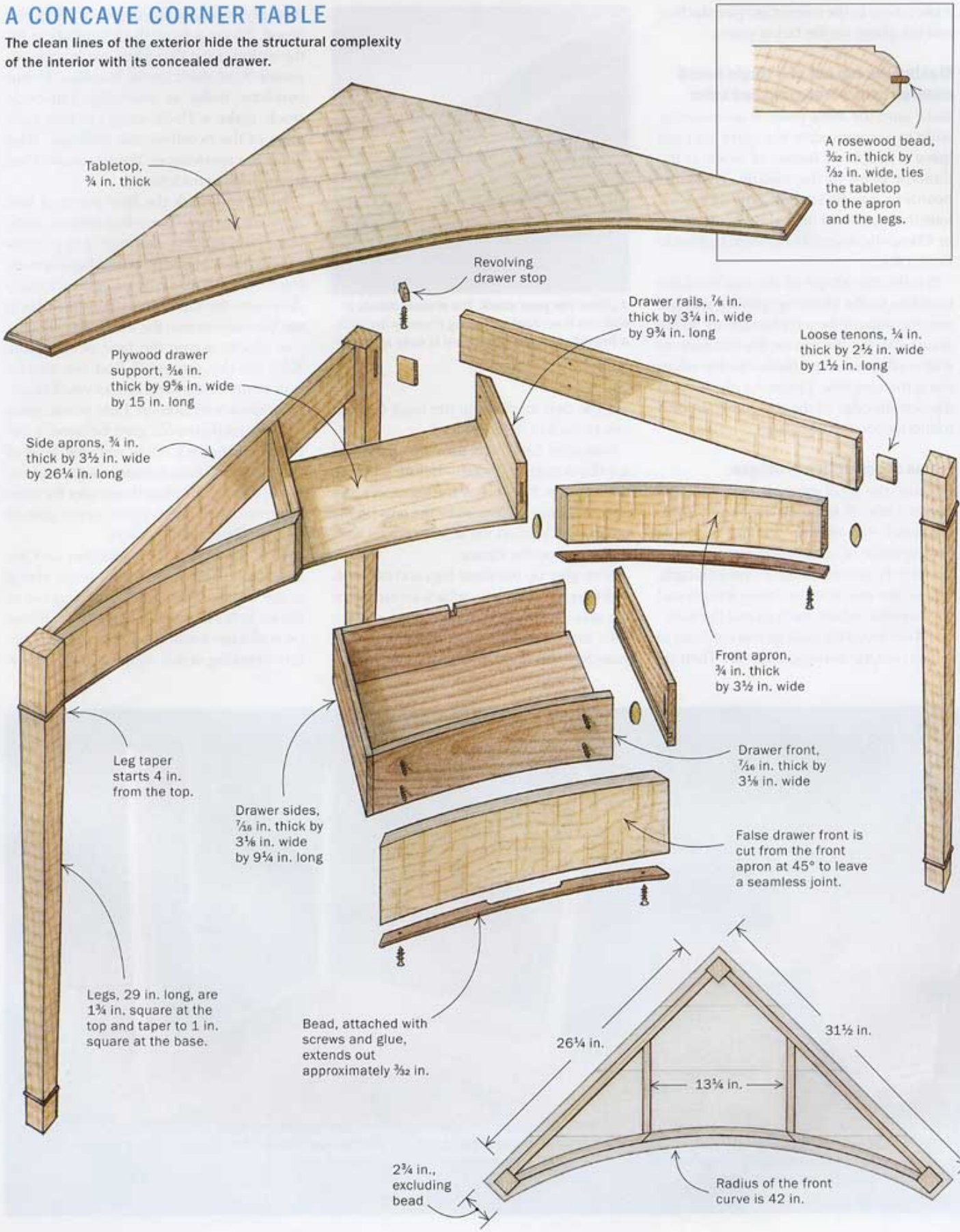
Flush-trim the edges. *Using the template as a guide, flush-trim the edge of the tabletop. The arrows on the template indicate the routing direction to minimize tearout.*

Assemble the rear of the table. *After the legs and the side aprons have been cut, glue them together using the template as a guide to squaring them up.*

Photos, except where noted: Mark Schofield

A CONCAVE CORNER TABLE

The clean lines of the exterior hide the structural complexity of the interior with its concealed drawer.



Drawings: Vince Babak

the bent lamination to dry overnight. Remove the lamination from the form, then scrape as much glue squeeze-out as possible from the edges with a shave hook; any dried glue may chip your plane blade or jointer knives. Next, true one edge on the jointer or with your longest handplane. If you're using the jointer, set the fence for the maximum-width cut to provide the most table support for the workpiece.

Next, saw the apron to width. If you've never cut a curved part like this on the tablesaw, it probably looks a little daunting. It is more dangerous than cutting a flat board, but not unduly so. Practice the cut before actually making it: Set the fence wide of the actual cut, raise the blade, and pass the curved apron over the table. The goal is to keep the contact point of the wood consistent—right at the blade—and not rock the piece. Use a push stick for the last 6 in. or 8 in. of the cut. You may also want to have a second person receive the piece on the outfeed. Once you feel more familiar with how the curved piece will move over the table, set the fence using the kerf already sawn in the upper leg as a guide, and make the cut.

Drawer frame is secured with screws and biscuits

Fitting a drawer in this table is a challenge because of the combination of a curved front apron and side rails that converge toward the back. (If you decide not to add a drawer, simply join the curved apron to the front legs as described and proceed to attaching the tabletop.)

First crosscut the apron into three parts—the false drawer front and two fixed apron pieces. Use the template to transfer the locations of the cuts and the angles onto the apron. The goal is to keep the grain continuous across the apron to conceal the drawer. Try to make each cut a good one so you don't have to recut it and lose some of the grain match. I made the crosscuts on a chopsaw, then cut the two front apron pieces to fit against the front legs. To create a shadow line where they join, I planed a slight bevel onto the ends of the aprons and the top of the legs to form a tiny V-groove when the parts are assembled.

Clamp the front apron pieces to the template. Then cut the two drawer rails to fit, and predrill holes through the back of them into the side rails (see the top left photo on p. 54). Cut biscuit slots to join the

Laminate and trim the front apron

You'll need lots of clamps to laminate the front apron. *The secret to a good lamination is to apply firm but even pressure across the whole piece.*

Cut the front apron to width. *Before making the actual cut, practice sliding the curved apron past the stationary blade. Maintain a steady angle at the cutting point.*

Trim the front apron on a chopsaw. *The false drawer front is cut at an angle to preserve the seamless appearance of the apron.*

Screws and biscuits secure the drawer frame

Install the drawer rails. *Once the rails have been cut to length and aligned with the side rails using the template, secure them with screws.*

Biscuits join the apron to the drawer rails. *The sharp angle at the end of each front rail demands care when using the biscuit joiner.*

Firm yet flexible. *The tabletop is attached with figure-eight fasteners, which allow for seasonal movement.*

front of the drawer rails to the back of the front aprons (see the middle photo above). Last, cut biscuit joints to connect the other ends of the front aprons to the legs.

At this point there's nothing connecting the two apron-rail assemblies on both sides of the drawer opening, with the result that the whole table frame is free to flex quite a bit. That's one reason why I clamp everything down to the template in the previous steps. However, once the top is in place, it will tie the elements together, giving the piece structural integrity.

The top is attached with figure-eight fasteners, which allow for seasonal wood movement (see the right photo above). After screwing the fasteners to the frame, position the frame on the upside-down top. Set the drawer front in place so that it fits perfectly against the ends of the aprons, then clamp the frame to the top and attach it with screws.

The drawer panel serves as a runner for the drawer. *It also adds rigidity to the structure.*

Drawer box has its own bent-laminated front

Made on the same form as the front apron, the front of the drawer box is thinner, with three plies instead of five. After cutting the other drawer parts, saw grooves for the bottom and assemble the parts with biscuits. Try to make the drawer the same size as the opening, then plane the sides until it slides freely. Before fitting the false drawer front, cut a fingerhold in the bottom using a 1-in. cove bit on the router table.

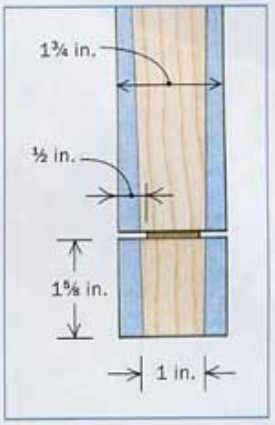
Fit the drawer and false drawer front with the base upside down. Handplane the back face of the false front so that it mates with the curve of the drawer box. Next, shim the drawer rails so that the box slides flush with them. Trim 1/16 in. from the top edge of the false drawer front so that it clears the tabletop. Now clamp and glue the false drawer front onto the drawer box. After the glue dries, remove the drawer and add some screws from inside the drawer box for good measure.

Last, screw a panel of ¼-in.-thick plywood to the drawer rails (see the photo at left), and fit a drawer stop to the bottom of the tabletop. When the stop is aligned with the notch in the back of the drawer, the drawer can be removed. □

Tony O'Malley is a writer and furniture maker.

Decorative beads refine the table

LEG BEADS ADD DEFINITION



Before tapering the legs, cut kerfs for the beads. I cut the kerfs on the tablesaw using a sharp crosscut blade. First cut the kerfs for the top bead that runs around the front two legs and meets the apron bead. The fence should be set at the intended width of the apron (less the bead), and the kerfs are ⅛ in. deep. To cut the kerfs for the bottom beads, set the fence 1⅝ in. from the blade, and raise the blade to cut ½ in. deep (the taper will remove ⅜ in. of material). The bottom beads go around all four sides of each leg.

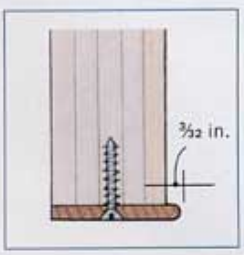
Plane the bead stock (in this case rosewood) so that it fits perfectly into the kerfs. (Plane the stock for the apron at the same time.) Then shape the bead on the edge of the stock. I used a scratch stock, but a block plane or spokeshave will also do the job. After the bead has been sanded, rip it to ¼ in. from the wider stock.

Cut and fit the foot bead pieces before assembling the legs to the rails. The bead is cut in two steps. First miter the end of a long piece on a chopsaw. To cut the second end of the small pieces, make a little miter fence and use a small backsaw. To trim just a little from one of the bead pieces, rub the mitered end against a piece of 120-grit sandpaper. Glue the bead into the kerfs, fitting one piece to the next around each leg. Wait to inlay the beads in the upper part of the leg until they can be aligned with the bead under the front apron.

Hand tools are safer. *Although these small pieces of beading can be mitered on a chopsaw, it is safer to use a backsaw with a shopmade miter box.*

Fit the beads. *The lower beads are best fitted before table assembly. Those near the top must wait until the front apron is attached.*

APRON BEAD ALSO CONCEALS THE LAMINATIONS



Trace the shape of the apron onto the bead stock, allowing about ⅛ in. to protrude along the face. Use three pieces to help avoid steep grain, which is harder to shape. You don't want the seams too close to where the drawer front will be cut, and you don't want screws where the drawer fingerhold will be. Next, screw and glue the bead onto the bottom edge of the apron. Plane the back edge of the bead flush with the apron and use a spokeshave to trim the face edge of the bead to a consistent overhang. I shaped the bead with a simple shopmade scratch stock.

Use the apron as a template. *O'Malley cut the beading material in three sections.*

Screw the bead to the underside of the front apron. *Avoid the area where the drawer will be cut and in the center where the fingerhold is routed.*

A shopmade scratch stock. *O'Malley filed a notch into a scraper to make a scratch stock. Masking tape protects the apron.*

A BEAD IN THE TABLETOP UNIFIES THE PIECE

After putting everything together, the top seemed to need a little something more, so I decided to add a rosewood bead around the edge. To do so, first rout a groove using a template guide in a small trim router. It took two passes with a 3⁄16-in. wing cutter to get the 3⁄32-in.-wide groove. An auxiliary base helps prevent the router from tipping. Using the same bead stock you used for the apron, scrape the bead profile onto both edges of a long strip about 1 in. wide. Then rip the strips to a width of 5⁄16 in., which is narrow enough to bend easily.

More stability. *An auxiliary plywood base makes the router more stable when cutting the groove in the edge of the tabletop.*

Photo, this page (bottom right): Michael Pekovich

Router Lifts

A look at five devices designed to make the router table more user-friendly

BY JOHN WHITE

A LOOK UNDER THE HOOD

All router lifts let you adjust the height of a router bit from above the table by turning a crank. Some even allow you to change bits from above the table.

Mounting a router under a table immediately introduces problems. For starters, to get at the router, you must bend down and reach under the table. Then you have to work with height-adjustment controls and locks that are upside-down and backward. And to change a bit with even a small measure of convenience, you must first remove the motor from the router base so the work can be done on top of the table.

Now, however, those problems just might become things of the past. Several products, generically called router lifts, have entered the market. And although these lifts vary in design, sophistication and cost, all of them promise to make the router table a friendlier place to visit.

I recently tried five router lifts currently on the market: Bench Dog Prolift PL1001 and PL1002, JessEm Rout-R-Lift, Router Technologies Router Raizer and Woodpeckers Precision Router Lift. Each of them allows you to adjust the height of the bit from above the table simply by turning a hand crank. And some of them go a big step further, allowing bit changes with the router in the table.

JessEm Rout-R-Lift

The Rout-R-Lift, made by JessEm, has a carriage that cantilevers out from two ¾-in.-dia. steel guideposts. The carriage flexed a bit under firm hand pressure, but this was not a problem in use, even when I took fairly heavy cuts.

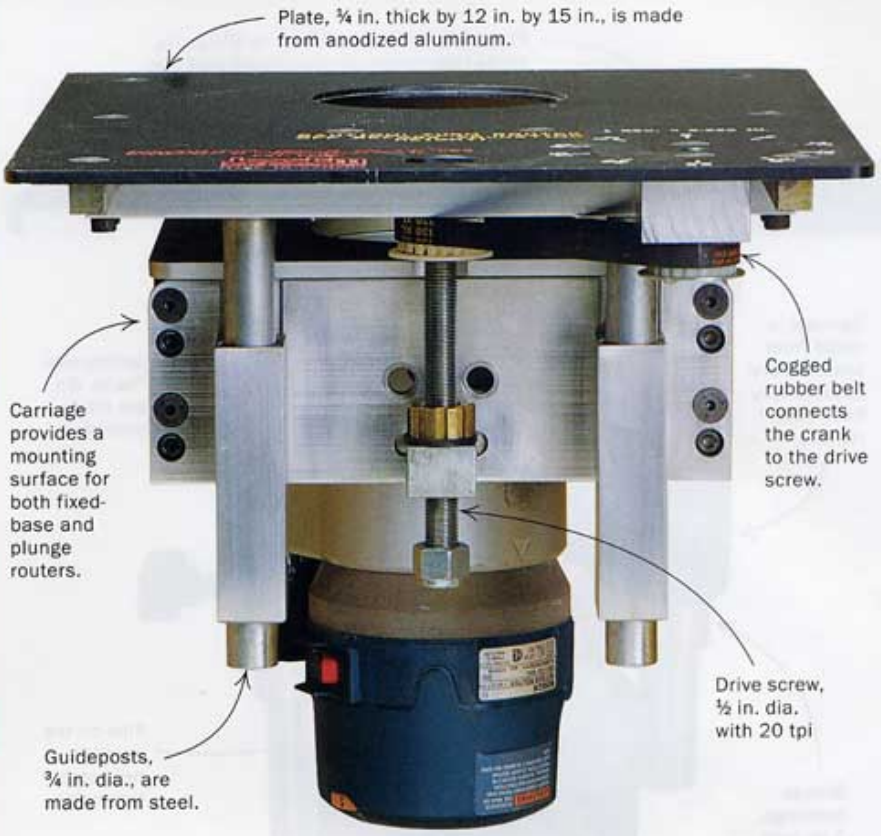
The carriage is raised or lowered by a 20-tpi (threads per inch) drive screw attached to the crank handle by a cogged rubber belt. An adjustable brass nut on the screw eliminated any backlash in the drive.

Because the base of the router mounts to the plate of the carriage, the Rout-R-Lift can accept both fixed-base and plunge routers. But because the router ends up sitting well below the surface of the table, bit changes are awkward. Above-the-table changes are possible with some routers. For example, with a Bosch 1617 fixed-base router in the lift, a wrench can reach the collet nut from above; the second wrench to hold the shaft must be positioned under the table. JessEm plans to release a heavy-duty version of the Rout-R-Lift that allows easier bit changes from above.

The table insert rings, made from phenolic plastic, lock into the top with a quarter turn. Five different inside diameters are

ROUT-R-LIFT

Price: $200 **Contact: JessEm (800) 436-6799**



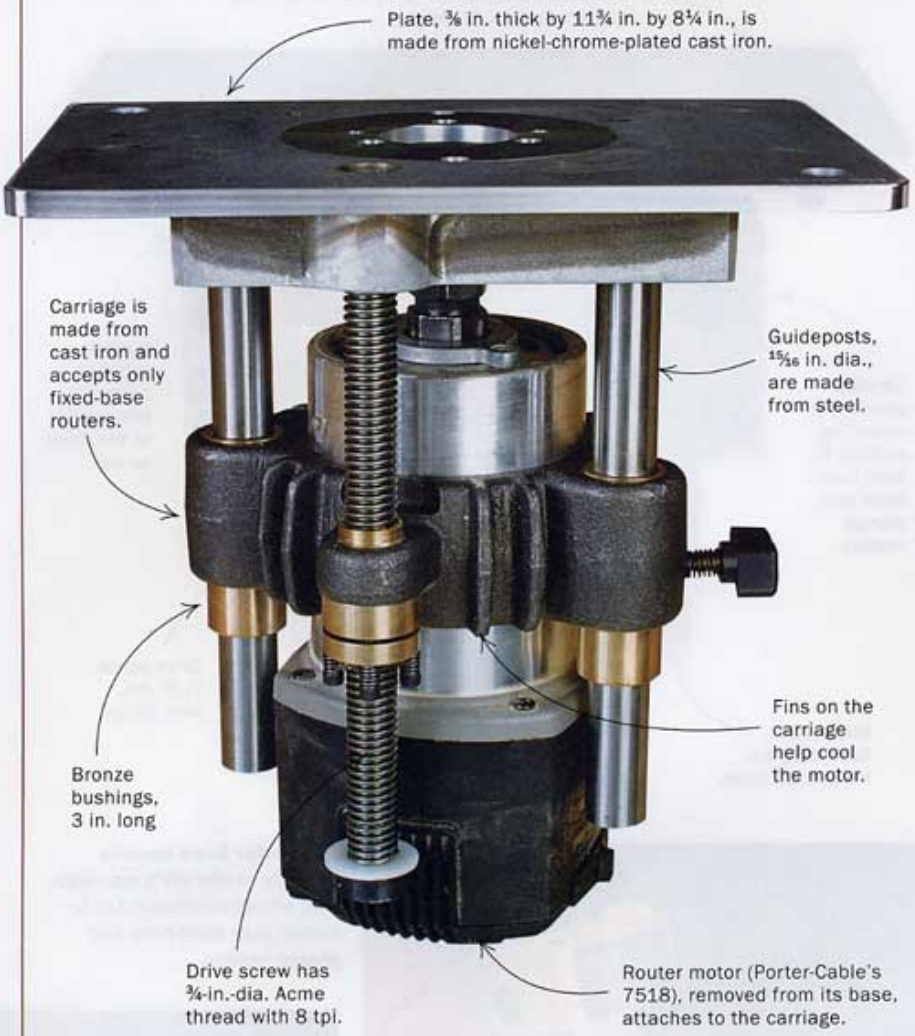
The router base mounts directly to the lift's carriage. *That allows the Rout-R-Lift to accept both fixed-base and plunge routers.*

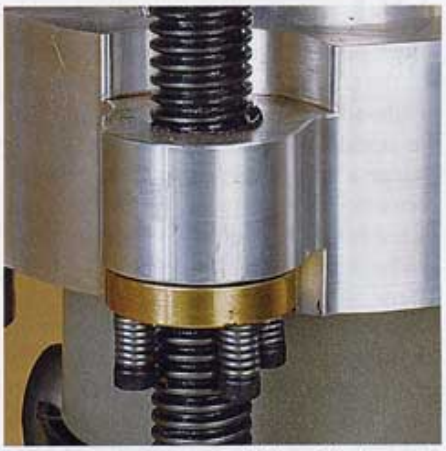
Get cranking. *Each full turn of the Rout-R-Lift crank raises or lowers the bit 0.050 in. With the aid of the index marks, movements in increments as little as 0.002 in. to 0.003 in. are possible.*

Photos, facing page: Michael Pekovich; this page (top, bottom left): Kelly J. Dunton

PROLIFT PL1002

Price: $380 **Contact: Bench Dog (800) 786-8902**





Meaty parts. *The two ProLift models incorporate a heavy drive screw. A spring-loaded nut eliminates backlash.*

Above-the-table bit changes. *Both ProLift models let you raise the router collet above the table, so bits can be changed from on top.*

available, from ¼ in. through 2½ in., including one that accepts Porter-Cable guide bushings. Only one insert ring—the 1½-in. size—is included with the lift.

All things considered, the Rout-R-Lift performed well in service. It's a high-quality tool with a cranking action that was smooth, easy and accurate.

ProLift PL1002 and PL1001

Bench Dog offers the ProLift in two versions. Model PL1002, made almost entirely from cast iron, is an industrial-weight product designed for continuous use in the shop. Model PL1001 is nearly identical, but most of the main components are made from aluminum, making the device more affordable for the occasional user. By the way, neither of the two ProLifts accepts a plunge router.

The ProLifts have lots of parts, but essentially they're just fancy clamps that hold a router upside down. Each mounts to a plate that fits into a cutout in the top of the router table. To add a router to a ProLift, first remove the motor from its base. Then clamp the motor to the carriage of the lift. An adjustment system in each of the ProLifts lets you raise or lower the motor from above the router table. And, of course, when the motor goes up and down, so does the bit that you put in the collet.

The differences between the two ProLifts are related mostly to the router models they each can accept. The cast-iron ProLift (PL1002) accepts Porter-Cable's model 7518, a big 3¼-hp fixed-base router. But with the addition of adapter rings, available as accessories from Bench Dog, the PL1002 also accepts several models of smaller (1½ hp to 2 hp) fixed-base routers. They include Porter-Cable's 690, Bosch's 1617 and 1618, DeWalt's 610 and Makita's RF1100 and 1101.

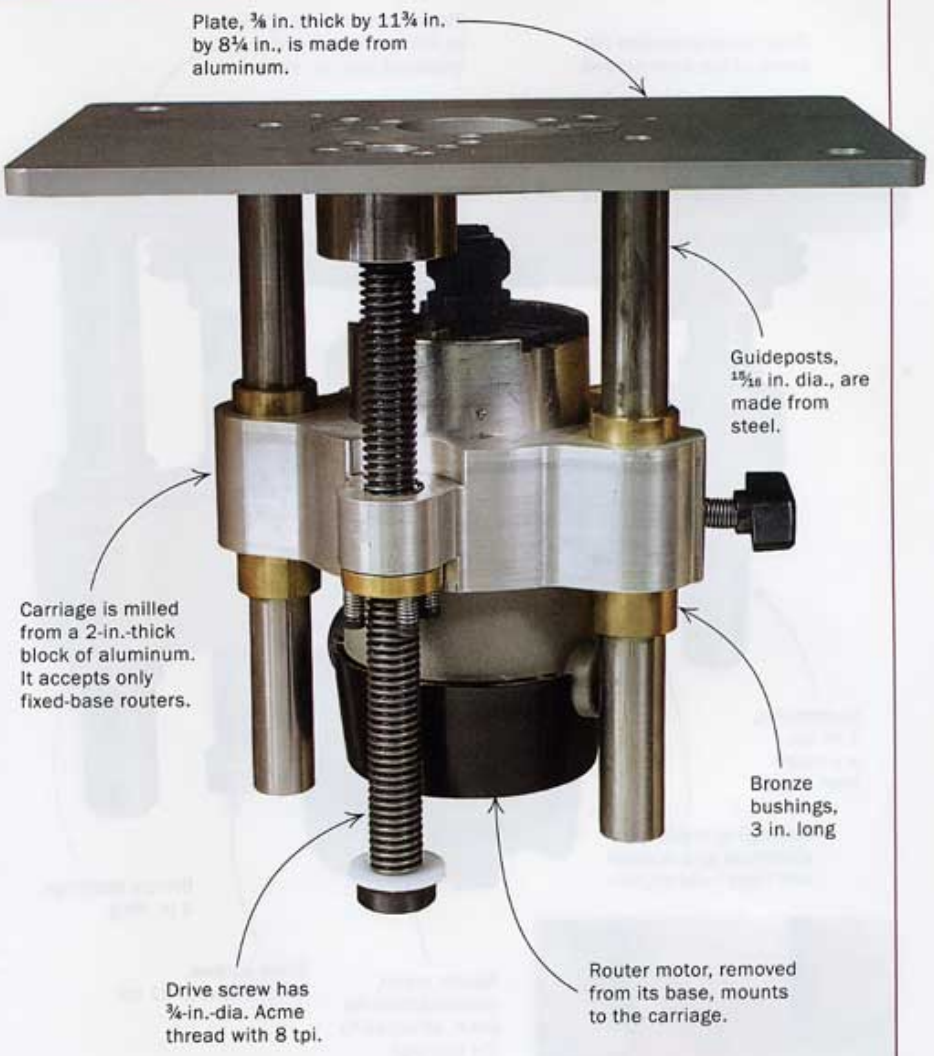
The aluminum ProLift (PL1001) won't accept the Porter-Cable 7518. But it does accept each of the smaller models listed above. The two Makitas require an adapter

Photos, except where noted: Tom Begnal

Ratchet wrench is required. *The ProLifts don't come with a crank; instead, you supply your own. An indexed collar (left), supplied by Bench Dog, fits over a socket, allowing adjustments as small as 1/128 in.*

PROLIFT PL1001

Price: $260 **Contact: Bench Dog (800) 786-8902**



ring to fit the aluminum ProLift. The other small routers don't.

Both Bench Dog models use a pair of meaty 15/16-in.-dia. steel guideposts to support the carriage. And the carriage slides on hefty 3-in.-long bronze bushings. A 3/4-in.-dia. Acme-threaded drive screw is used to raise or lower the carriage, with the upper end of the screw running in a ball bearing. There is no backlash, or play, in the mechanism because the nut is spring-loaded.

Neither ProLift comes with a crank handle to raise or lower the carriage. Instead, all cranking is done with a ratchet wrench and 9/16-in. socket that you supply. At first, I suspected this was a subtle effort at cutting costs. But I soon realized the ratchet system worked especially well. Indeed, it was better than the crank systems on all of the other router lifts I looked at.

By using a tall socket with a 3-in. extension, it was easy to crank the router up or down while keeping my knuckles clear of the bit and fence. And a cleverly designed collar that slips over the socket allows you to read up-and-down movements of the bit in increments as small as 1/128 in.

With the insert rings removed, each ProLift has an opening in the plate large enough to allow the router collet to be raised above the table. That's a big plus when changing bits because there's no more need to hold the collet wrenches at awkward angles.

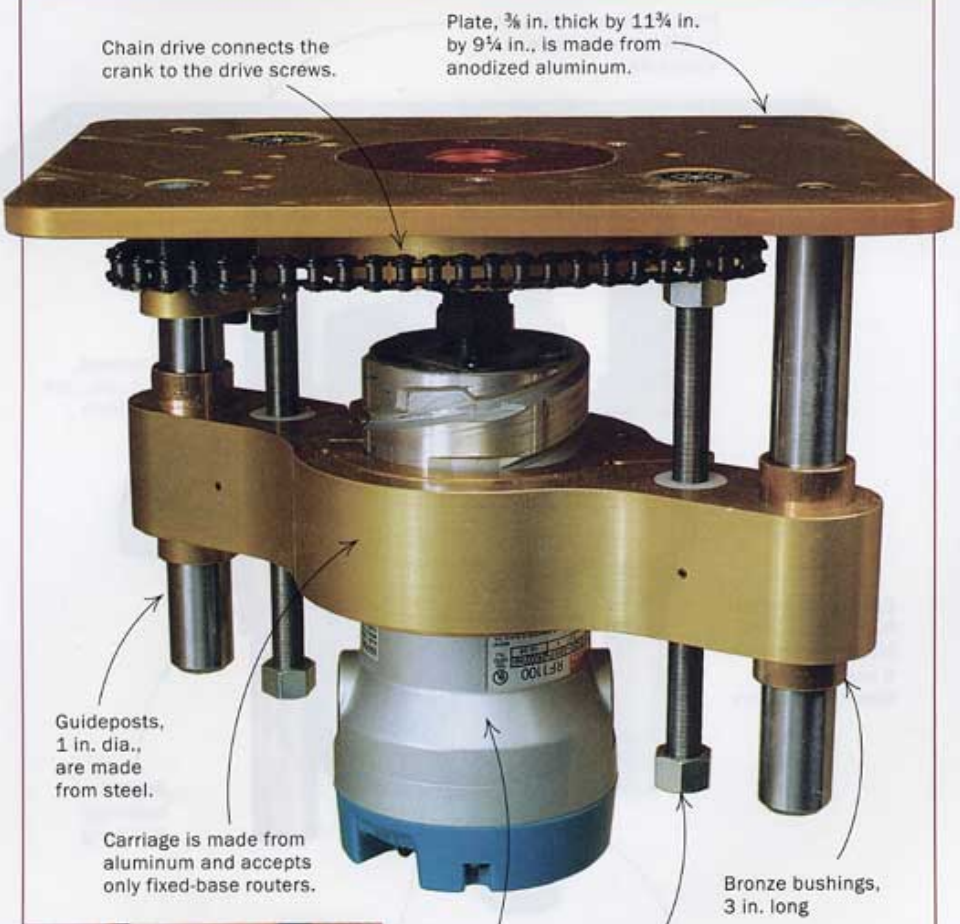
The cast-iron version of the ProLift comes with three chrome-plated steel insert rings with inside diameters of 2 in., 2 5/8 in. and 3 3/4 in. By adding an optional adapter to the 2-in. insert ring, it accepts the Porter-Cable guide bushings.

The aluminum ProLift comes with two insert rings, with inside diameters of 2 in. and 2 5/8 in. Adding an adapter to the smaller insert ring allows it to accept the Porter-Cable guide bushings.

Overall, I found both ProLift models easy and convenient to use. When it came to changing bits, these two got the highest

PRECISION ROUTER LIFT

Price: $270 **Contact: Woodpeckers Inc. (800) 752-0752**



Loosen screw, then adjust. *Once a screw has been loosened half a turn, the Precision Router Lift adjustment disc can be zeroed out and depth adjustments made with the supplied crank.*

Small routers get collared. *With an adapter collar, any number of small routers can be made to fit the Woodpeckers lift.*

marks in the class. And they scored well on adjustment, too. Indeed, I could raise or lower the bit as little as 0.001 in. without any fuss.

I also found both of them to be plenty sturdy. But there's only one option—the Porter-Cable 7518—for those who want to use a large router. And the 7518 works only with the cast-iron ProLift.

If you plan to use one of the smaller routers, and use the router table every day, the cast-iron version would be the one to get. But for occasional users, the less-expensive aluminum model makes more sense to me.

Woodpeckers Precision Router Lift

In general, the design of the Precision Router Lift from Woodpeckers Inc. is similar to Bench Dog's ProLifts. The foundation of the Woodpeckers product is a substantial aluminum carriage with long bronze bushings that ride on large (1-in.-dia.) steel guideposts. Carriage movement is controlled by a pair of fine-threaded drive screws that run in long, threaded nylon bushings. A chain drive synchronizes and connects the screws to the removable crank handle.

The carriage motion was very smooth with no backlash. And the fine threads on the lead screws allowed me to make adjustments of less than 0.001 in.

The Precision Router Lift is designed to be used with Porter-Cable's large fixed-base router, model 7518. But simply by adding adapter collars, the carriage can also accept a wide range of smaller fixed-base routers: Porter-Cable's 690, Bosch's 1617 and 1618, DeWalt's 610 and Makita's RF1100 and RF1101. The Precision Router Lift won't work with a plunge router.

The anodized-aluminum plate has a 3½-in.-dia. opening that accepts insert rings with inside diameters of 1 in., 1¼ in. and 2½ in. And it takes just a quarter turn of an insert ring to lock it in place. The 1¼-in.-dia. insert ring is designed to hold Porter-Cable's guide bushings.

Two discs, each graduated in thousandths of an inch, are recessed into the plate. The discs spin with the drive screws, and in the process they provide a readout of the changes in bit height. The discs can be adjusted with a screwdriver,

ROUTER RAIZER

Price: $90
Router Technologies
(515) 266-1293

Router Raizer is a kit that makes a plunge router adjustable from above a table. You supply the router.

Raising (or lowering) the Raizer. *The Router Raizer, like the other lifts here, uses a simple crank to adjust the bit.*

but I found the process to be fussy. Also, because the drive screws have fine threads, it's a slow process to make major height adjustments. Indeed, it takes 32 turns of the crank handle to move a bit just 1 in. To speed up things, the shaft of the crank can be chucked in a power drill. For me, though, that process was time-consuming and awkward.

Overall, the Woodpeckers Precision Router Lift worked quite well. It's a sturdy and well-built tool. All of the adjustments were precise. And it lets you change router bits from above the table.

Router Raizer

Made by Router Technologies, the Router Raizer is a kit that adds an above-the table height-adjusting crank handle to most plunge-router models. But it won't work with a fixed-base router.

The heart of the Router Raizer kit is a threaded shaft that replaces the original height-adjustment screw on a router. The new adjuster extends through the router's subbase, ending in a hex socket that accepts a removable crank handle.

Aided by some well-written instructions, installing the kit is relatively simple, although a hole does need to be drilled through the router's subbase. An assortment of bushings and adapters fits the kit to a wide range of routers, including those by Bosch, Craftsman, DeWalt, Elu, Fein, Freud, Makita, Porter-Cable and Ryobi.

A Craftsman router with the Router Raizer kit installed worked very smoothly. The 16-tpi drive screw made major height adjustments go quickly, yet it still allowed for precise smaller adjustments.

The crank can still be used when the router is handheld. It's just a matter of slipping the crank into the top of the screw assembly. It worked very well—better than most other add-on cranks I've used.

But the Router Raizer doesn't allow you to crank the collet enough to allow bit changes from above the table. You must remove the router from the table to change the bits.

All things considered, though, if you use a plunge router in a table, the Router Raizer is a relatively inexpensive way to improve performance significantly. □

John White is Fine Woodworking's *shop manager.*

A router with a built-in lift system

Milwaukee's new 1¾-hp router has several interesting features, but one in particular makes it especially suitable for use in a router table (for a review of the router, see *FWW* #153, p. 30). The motor can be raised or lowered with a crank that's supplied with the router. When used in a router table, it's just a matter of drilling a hole in the table to provide access for the crank. Effectively, then, you can adjust the bit height from above the table.

The 5615-20 is a conventional-style router with a 16-tpi Acme-threaded drive screw mounted to one side of the motor to set the depth. When the router is upright, for handheld use, depth adjustments are made by rotating a top-mounted knob. When the router is inverted, a small T-handled socket wrench can be used (right) to turn the screw. To make a coarse adjustment to the height of a bit or to remove the entire motor to change a bit, simply push an easy-to-reach button to release the motor.

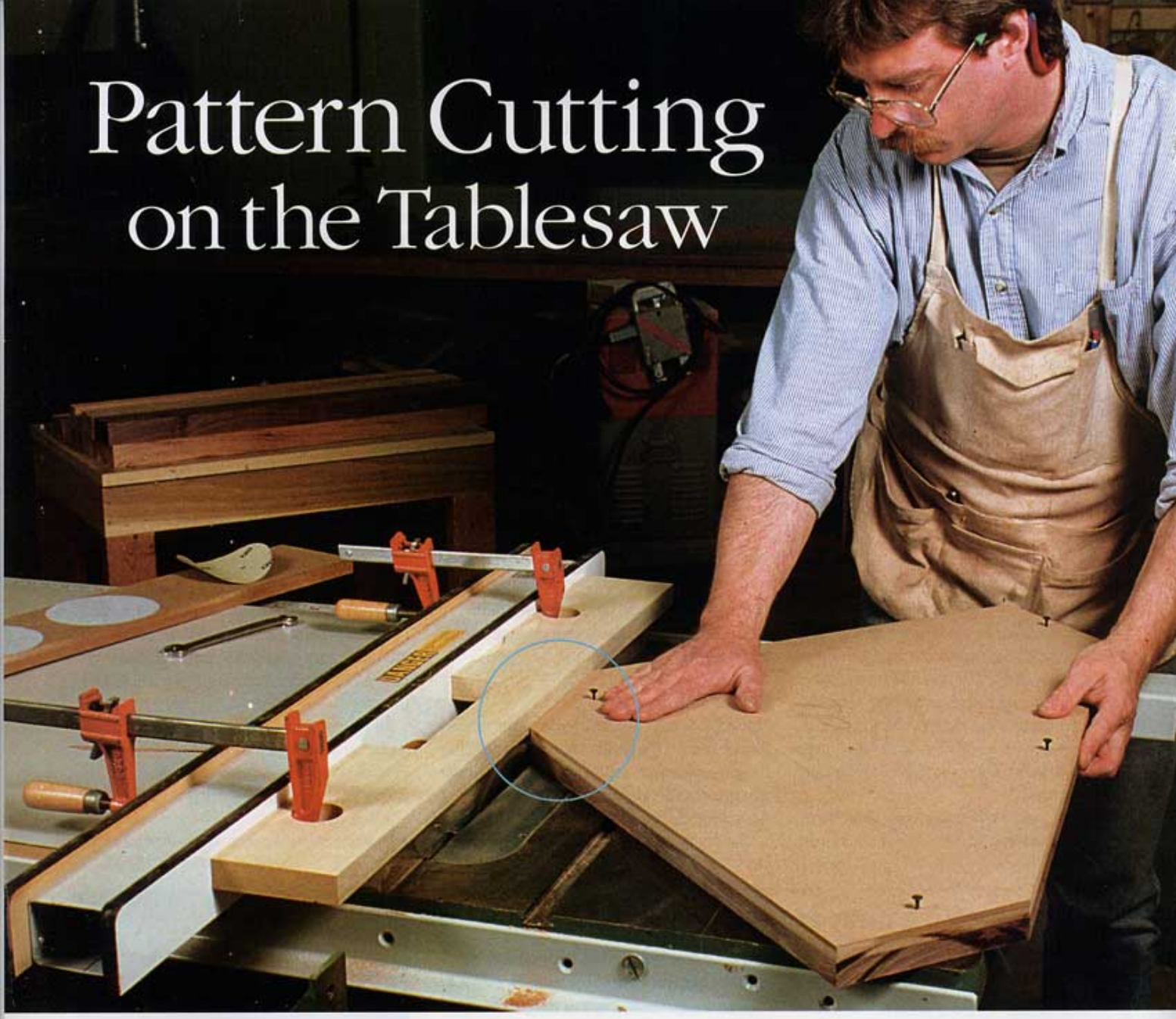
To change bits you'll need to remove the motor from the base, but that's a quick and easy process with this router. Also, the router has a relatively short (1¼ in.) range of depth adjustment. The collet can't be lowered very far into the table. So if you have a long bit, you might not be able to make a shallow cut.

The 5615-20 works well as both a freehand router and in a table. It would be my first choice in its size range if I were picking a single machine for my shop.

Adjustment from above. *Milwaukee's new router allows you to adjust the bit height simply by using a T-wrench (supplied).*

Photo, this page (top): Kelly J. Dunton

Pattern Cutting on the Tablesaw



Duplicate parts quickly and safely using templates

BY STEVE LATTA

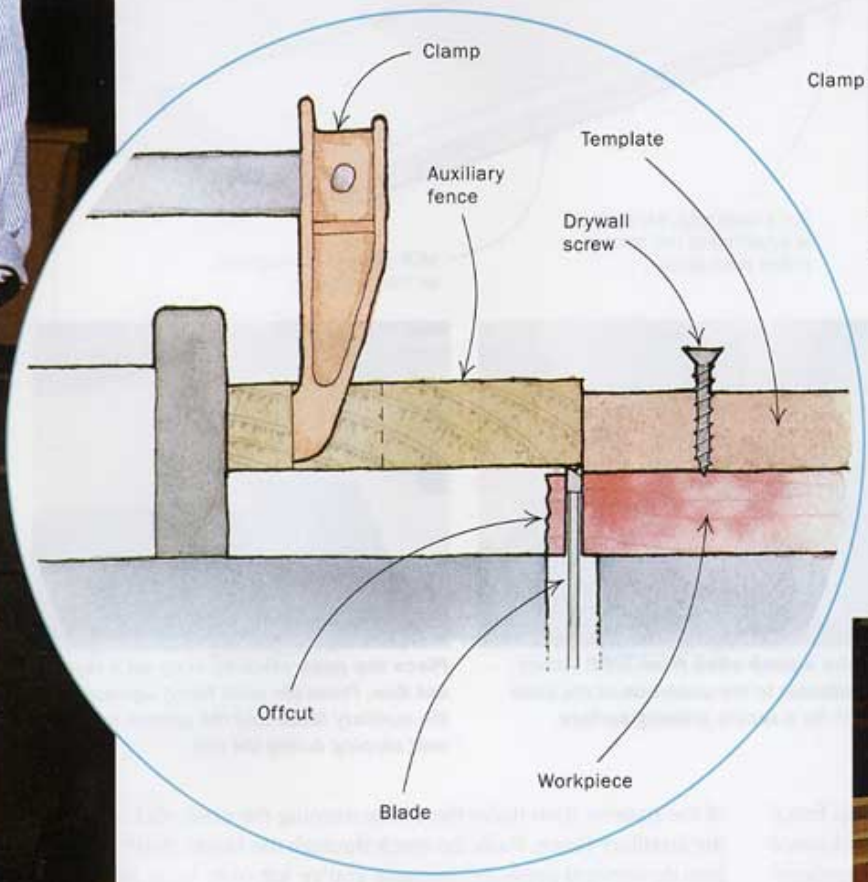
When you mention pattern cutting to most woodworkers, they think of routers or shapers with bearing-guided cutters. But there are times when a tablesaw can be used just as effectively as a pattern-cutting tool, especially when the parts don't involve curves. Tablesaw pattern cutting is a great way to cut oddly shaped pieces or trim a door for an exact fit to a case. I pattern-cut parts large and small, square or with multiple angles, stuff that you just wouldn't normally cut on a tablesaw unless it was outfitted with a good, adjustable sliding table. The six-sided shelves of a corner cabinet are a prime example of what I'm talking about. Pattern cutting makes short work of these oddballs and leaves a cleanly machined and consistent product.

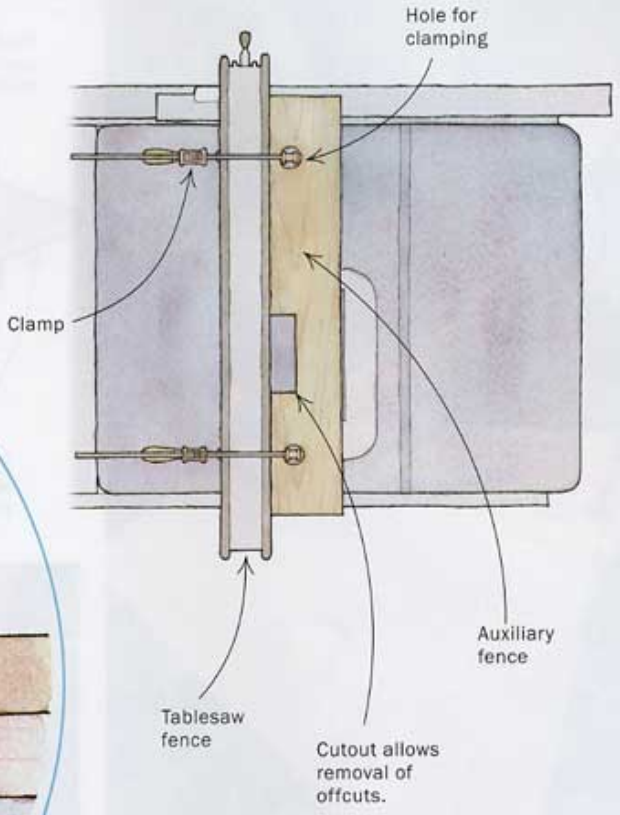
I know what you're thinking: This doesn't sound safe and sane. But because only a minimal amount of material is removed and an auxiliary fence covers the blade, this technique is no more dan-

Photos: Anatole Burkin

AN AUXILIARY FENCE GUIDES THE TEMPLATE

The auxiliary fence is clamped to the saw's rip fence and serves as both a guide and guard. The workpiece, held by a template, slips under the fence and is trimmed by the sawblade. A cutout lets you see whether offcuts are collecting under the fence. Remove them only after the sawblade has stopped spinning.





A piece of scrap is used to set the fence height. *The auxiliary fence should be ⅛ in. above the workpiece.*

Align the fence flush with the sawblade. *Make sure the teeth do not protrude beyond the edge of the fence.*

gerous than many tablesaw procedures. For my buck, I think it is safer than using a router table. A tablesaw is built for supporting large stock. Most router tables tend to scoot around when you lean on them.

The template follows the raised auxiliary fence, which also protects the operator

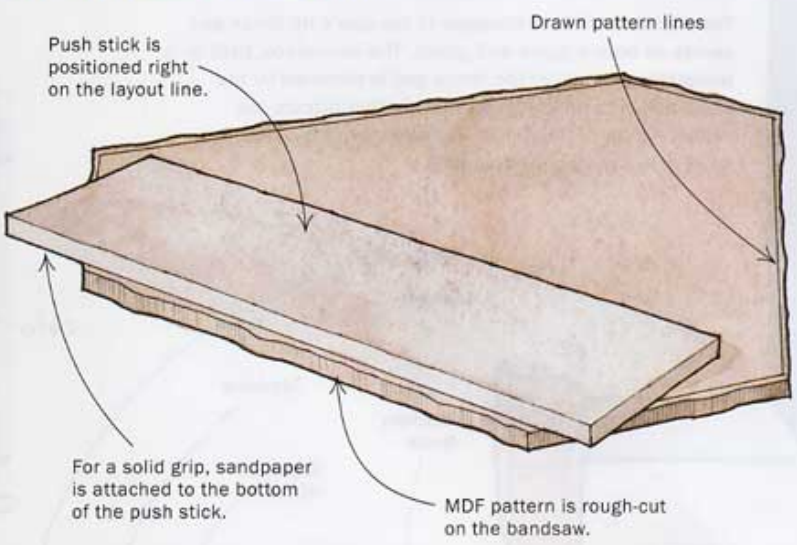
All pattern cutting involves the use of a template and a guide. In this method, a full-sized pattern is used for the template, and a shopmade auxiliary fence acts as the guide. Use ¾-in.-thick stock—medium-density fiberboard (MDF), poplar, whatever's available—for the parts.

The fence consists of a piece of stock roughly ¾ in. thick by 5 in. wide by 24 in. long. Make a cutout so that you can keep an eye out for debris building up under the fence, and drill two large holes for

Drawings: Jim Richey

Odd shapes are no problem. *After drawing a pattern on MDF for a corner-cabinet shelf, Latta rough-cuts the waste on a bandsaw, staying about 1/16 in. off the line.*

CREATING A PATTERN



Make a push stick from MDF. *Attach sandpaper to the underside of the push stick for a secure gripping surface.*

Place the push stick directly on a layout line. *Press the stick firmly against the auxiliary fence and the pattern to prevent slipping during the cut.*

clamping points. Clamp the auxiliary fence to the saw's rip fence about ⅛ in. or so higher than the workpiece. (The workpiece should slide freely beneath it.) Then move the entire fence assembly so that the auxiliary fence is flush with the outside teeth of the blade. Turn on the saw and slowly raise the spinning blade until the teeth are cutting slightly into the underside of the auxiliary fence.

MDF is ideal for pattern stock

For parts like a corner-cabinet shelf, a full-sized fixed pattern makes the most sense. Begin by laying out the dimensions on a piece of ¾-in.-thick MDF. Next, rough-cut the pattern on the bandsaw, staying about 1/16 in. off the line. Then make a long MDF push stick, which will double as a guide for making the tablesaw cut. The push stick is long and wide enough to grip the workpiece safely. Attach sandpaper to the underside to get a good grip on the workpiece. You could also use screws; just keep them away from the cut line.

Place the push stick directly on a layout line of the pattern, then make the cut by running the push stick against the auxiliary fence. Push the stock through the blade, maintaining firm downward pressure. Because you've left only 1/16 in. of material on the pattern, the offcuts will be stringy pieces of stock that won't kick back. Those stringy parts may collect in a mass under the auxiliary fence, so periodically check the cutout for accumulation. If a buildup occurs, turn off the saw and remove the material with a stick or a blast of compressed air. Once the pattern has been cut, check it for accuracy. Fine adjustments can be made with a handplane.

The pattern has two purposes. *Trace the shape onto the workpiece for rough-cutting on the bandsaw. Then use it as a template for final trimming on the tablesaw.*

Use the pattern to trace the shape onto the workpiece. Then rough-cut the workpiece on the bandsaw, staying a heavy 1/16 in. off the line. Before using the pattern, apply some sandpaper to the bottom side or drive some screws through it until the points just protrude and provide a solid grip on the workpiece. Place the pattern on the workpiece and make the final cuts on the tablesaw. If everything has been set up

properly, the pieces should be clean and identical.

Pattern cutting is a great way to trim doors to fit a case

When sizing doors to fit large cases, I make an adjustable jig that allows me to fine-tune individual doors to the case opening. On large cases, openings can shift a tad out of square, and this jig is especially handy if a case opening is slightly off. The jig consists of a piece of MDF with two adjustable pieces of hardwood mounted on each with battens. The combined assembly should be about ¾ in. shorter than the height of the opening. The adjustable hardwood sections should be slightly narrower than the main section so that they won't interfere with the case opening when making adjustments.

FITTING DOORS

Latta uses an adjustable jig to size doors. *Shims above and below determine the gap. Slotted screw holes on the battens of the jig allow it to be adjusted for height and angle if the case is slightly out of square.*

Use the jig as a tracing guide. *Line it up flush with one stile of the door and mark the area to be trimmed.*

Place the jig into the door opening and place shims to account for the door gap above and below the jig. I use a couple of pieces of Formica (you can get free sample squares at most home centers). With the MDF body of the jig held tightly against the case frame member that will receive the hinges, adjust the upper and lower portions of the jig with a screwdriver until you get a snug fit.

Lay the jig atop an assembled door, which you've built slightly larger than the case opening. Place the jig flush with the hinge stile and position it so that the same amount of material will be removed from the top and bottom rails. With a sharp pencil, trace along the outside of the door frame using the jig as a guide. Score the edges and undersides of the stiles with a knife to avoid tearout.

Don't use the jig as a cutting guide. Instead, use an MDF push stick with sandpaper on the underside. Lay the push stick directly on a layout line and make a cut by guiding the push stick along the edge of the auxiliary fence. Cut the door top and bottom this way. With any luck, you should have a great fit. A scraper and a little sandpaper will remove the saw marks on the top and bottom. After hinging the door, plane the far stile until you have a good fit.

Double doors are a little trickier only because the rails of both doors must match in width. After fitting the first door, take care to position the jig on the second door in such a way that you end up with rails of equal width. The eye will easily spot the unbalanced look of adjoining doors with mismatched rails. After hanging both doors, plane the center stiles for a consistent gap (for more on hanging doors, see *FWW* #142, pp. 72-77).

Once you understand this technique, you will find other uses for tablesaw pattern cutting. Just remember to rough-cut the workpiece on the bandsaw first, leaving only a small amount of material to remove on the tablesaw. □

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

Lay a push stick directly on a layout mark. *Cut each side of the door using the same method. Sandpaper on the underside of the push stick provides a secure grip. Do not use the adjustable jig for this process.*

Installing a Desk Gallery

Using dadoes and V-grooves, the parts simply slide into place

BY LONNIE BIRD

To see video clips of the secretary, go to finewoodworking.com

Building a Pennsylvania Secretary: Part II of III

In this article Lonnie Bird installs a gallery in the walnut secretary he built in *FWW* #154. The third and final article will detail building the tombstone doors.

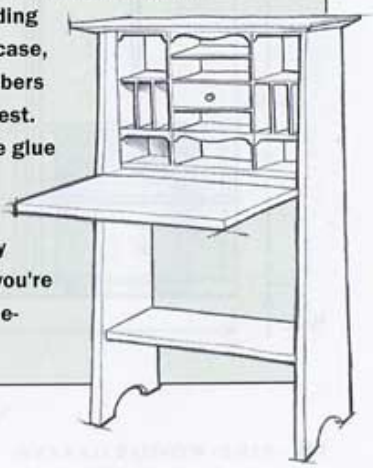
Whether you're building an 18th-century secretary, an Arts and Crafts desk or a wholly new contemporary version, a gallery is an attractive way to use space efficiently. I've developed a method for installing a gallery that relies on dadoes and V-grooves. To explain this process, I'll walk you through the installation of a gallery on the 18th-century secretary featured in the last issue (*FWW* #154, pp. 50-55). This method not only simplifies the construction and installation of any desk gallery, but it also can be used on other types of furniture, including sideboards, chests of drawers and CD racks.

That said, I must admit that I can't resist the allure of furniture from the 18th century. I've always thought the galleries in Pennsylvania secretaries were a perfect balance of function and aesthetics. Judging by the number of surviving examples, it seems evident that the gallery I chose for my secretary was a favorite of the period. The numer-

One simple method fits any furniture style

Until the current age of e-mail and electronic banking, people needed a place to store and organize paperwork, such as bills, letters and stamps. The desk gallery, with its neat arrangement of diminutive drawers, doors and compartments, has traditionally provided for that need. In fact, the popular gallery has spanned several furniture periods and includes styles such as Empire, Shaker and Arts and Crafts. The idea was most exemplified in Wooten desks, which feature dozens of pigeonholes and tiny drawers.

A gallery looks more refined if the framework of partitions and dividers is proportional to the small scale of the drawers and the compartments. Although provincial furniture makers sometimes used thicker stock, a gallery on the finest of desks was constructed from stock 3⁄16 in. to ¼ in. thick. The edges of the stock were typically refined with a bullnose profile that required a miter at the intersections. The miter was most easily created with an interlocking V-joint, just as I've done in this article. For greatest strength, a shallow dado was used to complete the joint behind the V. Once the joints had been cut, the partitions and dividers were slid into their corresponding grooves from the back of the case, starting with the largest members and working toward the smallest. With precise joinery, very little glue was needed to keep the assembly intact, and the completed gallery was surprisingly strong. No matter what style you're building in, this method is time-tested and efficient.



ous drawers and pigeonholes provide a system of organized storage space, and the curves, which are repeated in the seat board, the drawer fronts and the dividers, provide a recurring theme—much like an 18th-century musical canon.

Before beginning, you may want to study related examples and design a gallery that reflects your own personal tastes. Many Pennsylvania secretaries feature carved-shell drawer fronts and elaborate turned-and-carved pilasters, yet others are quite simple, without the curves and other embellishments.

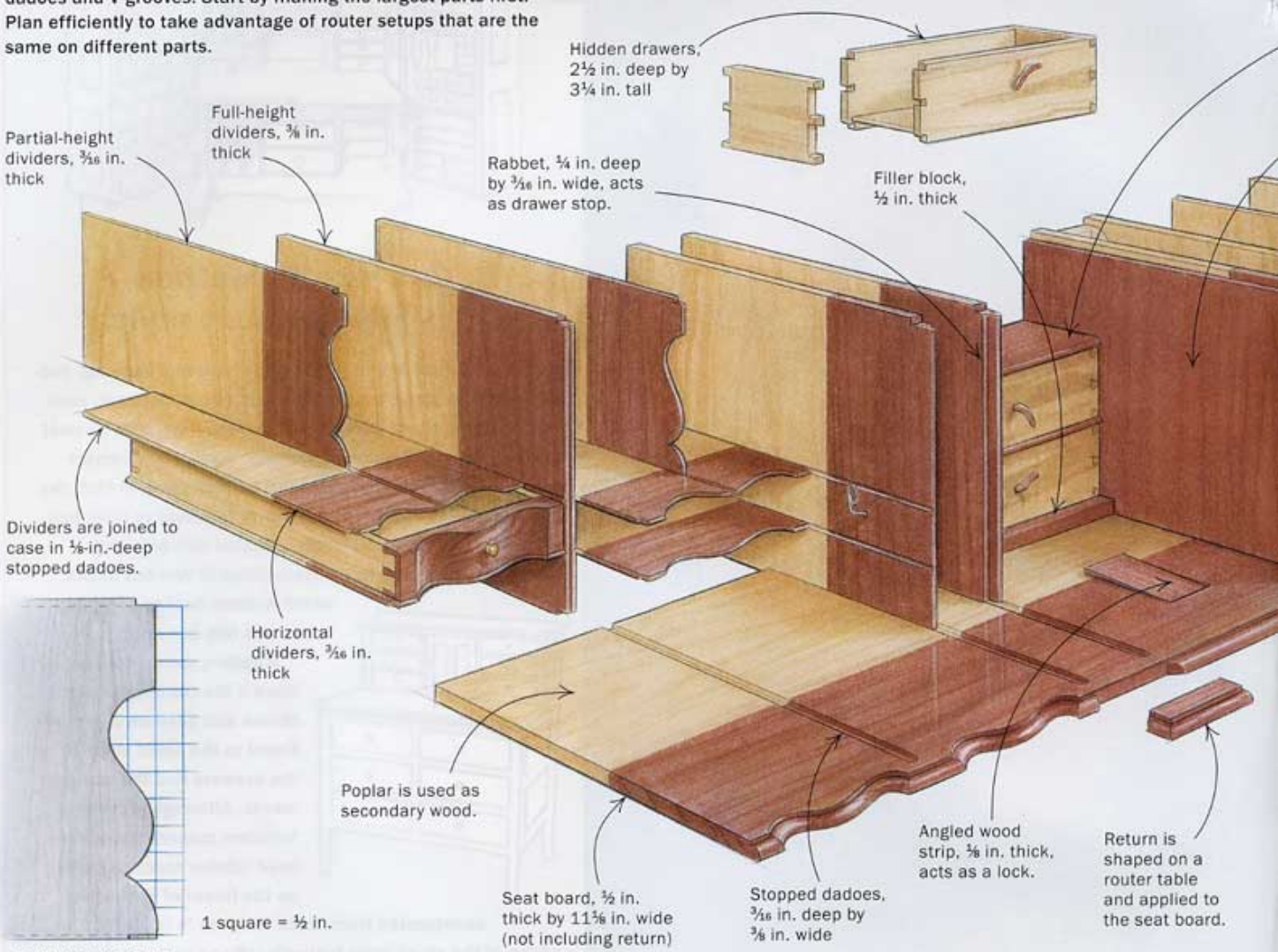
Settle on a design

The gallery portion of the secretary adds tremendous detail and visual appeal to the secretary, with the focal point being the small door in the center. The 18th-century craftsmen used the gallery as a place for creativity—and you can, too. Drawer fronts can be plain, curved or carved. The door can be simply a hinged plank of figured stock, a carved panel or a frame and

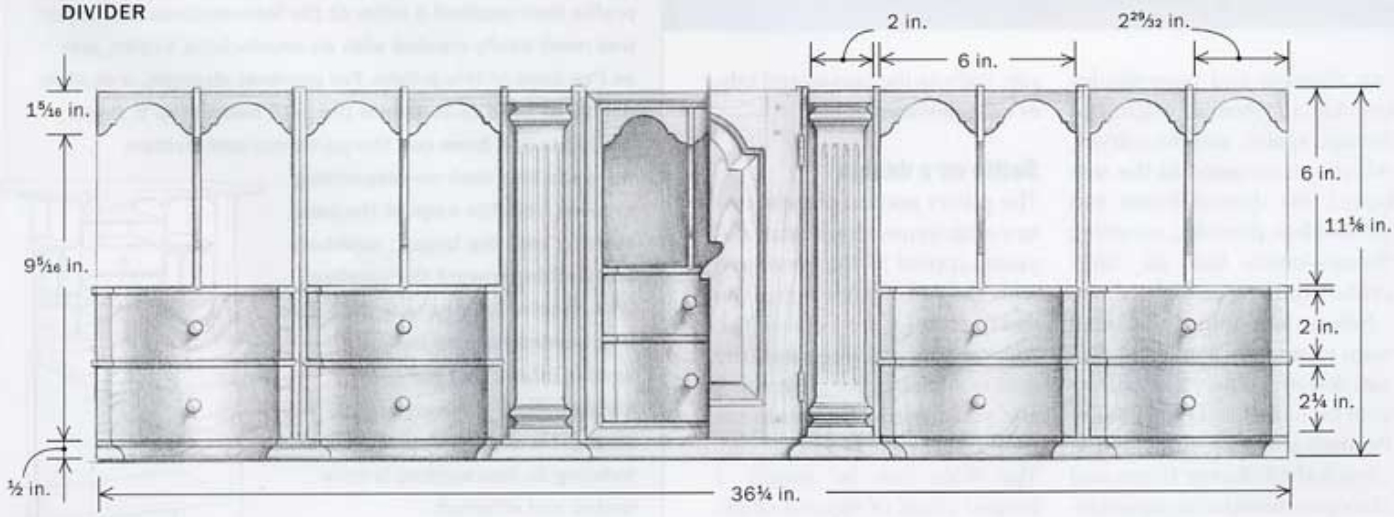
Photos: Matthew Teague

SIMPLE CONSTRUCTION, INTRICATE APPEARANCE

The gallery on this secretary goes together smoothly using dadoes and V-grooves. Start by making the largest parts first. Plan efficiently to take advantage of router setups that are the same on different parts.

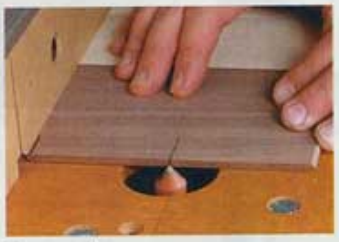


PARTIAL-HEIGHT DIVIDER



DIVIDERS COMBINE DADO AND V-GROOVE JOINERY

Cut joinery on the ends. *Use a V-groove bit to rout stopped grooves on the ends of all the 3/16-in.-thick stock.*



Groove the parts. *Use the same setup on the router, but move the fence to locate the joint.*

panel. Flanking the door are two tall, narrow document drawers. These drawer fronts often are embellished with flat columns, called pilasters, which clearly portray the close ties between 18th-century furniture and architecture.

The gallery also is an ideal place for hidden compartments (see *FWW* #103, pp. 82-85). Many desks of the period feature drawers with false backs or bottoms and hidden boxes for hiding valuables.

The foundation of the gallery is the seat board, which is the platform on which the drawers slide, preventing them from scratching the writing surface. The front edge of the seat board is shaped with a thumbnail or other simple molding profile. The seat board is contoured to match the dividers, the door and the drawers, adding to the visual harmony of the piece.

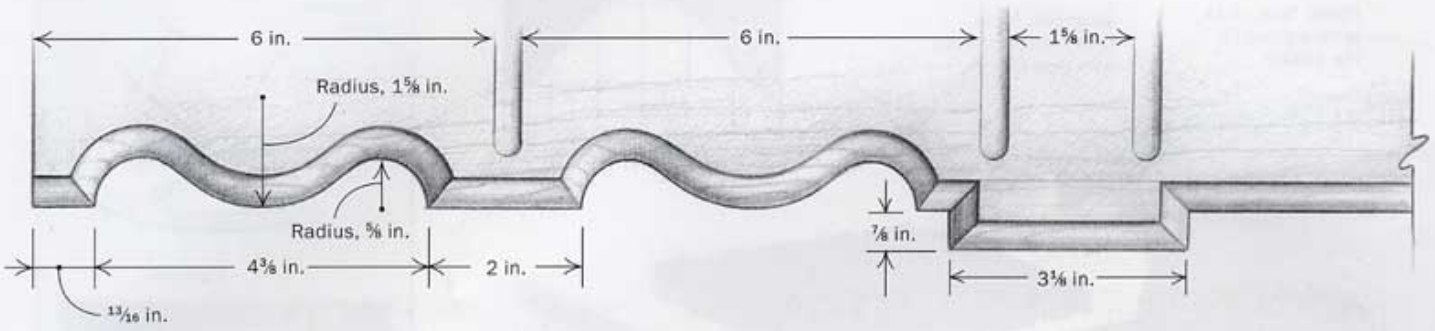
Shape the seat board and install the dividers

Begin construction of the gallery by milling the seat board. Cut the length for a snug fit within the case, then use a router table and a template to shape the front edge. Once shaped, glue the seat board onto the writing surface, positioning the front edge slightly behind the front edge of the top; this ensures that the remaining parts of the gallery are located under the top.

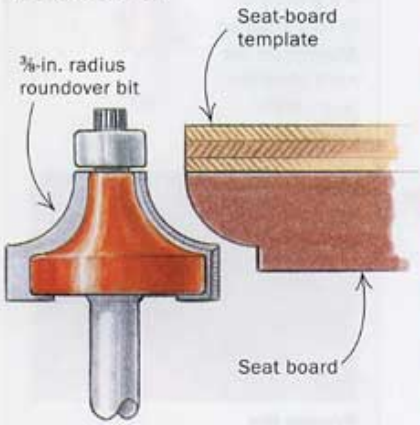
The next step is to rout a se-

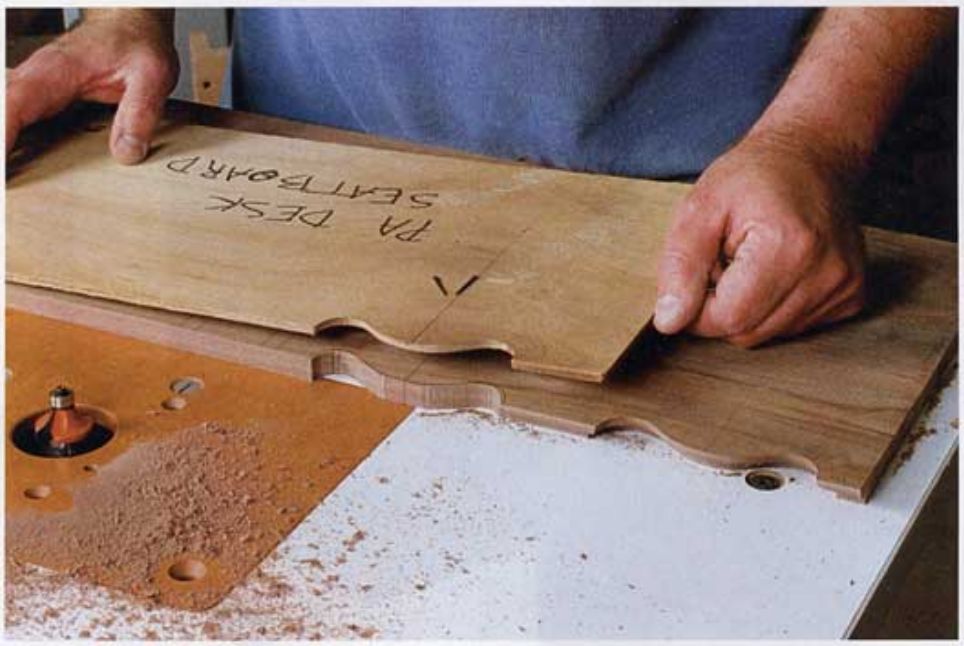
Drawings: Bob La Pointe

MAKING THE SEAT BOARD



Shape the seat board. *After roughing out the front of the seat board on the bandsaw, use a ⅜-in. radius bearing-driven roundover bit to shape the front edge. Once one set of curves has been cut, move the template and cut the next set. Using a single template ensures that the two sides of the seat board are symmetrical.*





Trim for the returns. *Use a tablesaw with the blade angled at 45° to trim back the front of the seat board to accommodate the return.*

Attach the return. *After separating the plywood template stock, simply glue the return into place.*

ries of shallow dadoes into the seat board, into the sides and under the top of the lower case to accept the interior dividers. Avoid the slow, tedious process of measurement and layout by using templates to guide the router. The templates ensure that all corresponding dadoes align perfectly. Dadoes near the case sides are best routed with a laminate trimmer, which has a small base that allows you to get close. Stop each dado approximately ⅜ in. from the front edge of the seat board.

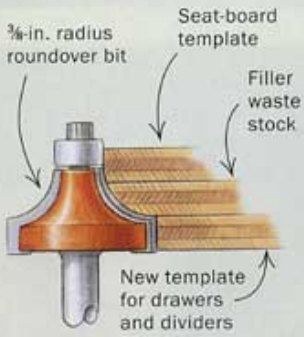
After routing the dadoes, mill the thin stock for the vertical

MAKING A TEMPLATE FROM A TEMPLATE

I enjoy the challenge of duplicating the lines and details of period furniture using today's methods. This secretary's gallery provides a good example. The serpentine curves of the seat board are mirrored in the drawers and the dividers above it. The difference is that the curves in the drawers match the seat-board curve at the top edge, behind the thumbnail profile.

To create a drawer/divider template that's a perfect match to the seat-board curve, begin by stacking two layers of ¼-in.-thick plywood along with the seat-board template. Secure the layers with small nails or double-sided tape.

Now shape the plywood stack with the same bit used for the seat board. After shaping, separate the layers; the bottom layer will now work as a template for shaping the dividers and the drawer fronts.



Avoid the math. *The seat-board template is used to create a template for the drawers and dividers.*

Jig shapes the drawer fronts. *With the drawer fronts held in a jig, a flush-trimming bit cuts the serpentine shape. After the initial cut, the bit is raised to complete the cut.*

and horizontal dividers. I resaw the stock on my bandsaw and plane the stock slightly oversized in thickness. To achieve a snug fit, I carefully handplane each divider to final thickness.

Notice that each divider is shaped along the front edge with a bead. The thicker full-height vertical dividers have a double bead to yield the appearance of two thin dividers that have been sandwiched together. Horizontal and vertical dividers are joined with stopped dadoes and V-grooves. A 90° V-groove bit cuts both the groove and the corresponding point. Remember that the V-groove is added only to the front ½ in. of each dado (see the drawing and photos on p. 69).

The depth of the V-groove is critical for a snug, accurate fit. The V-grooves are cut so that their width equals the thickness of the dividers. The depth of these 90° V-grooves is equal to half the thickness of the divider. Once you've dry-fit the interior framework, glue each divider in place. If the fit is precise, a little glue is all that is needed.

Make the thin decorative valances inside the pigeonholes next. Stack the pieces in layers of four and tape them together. Then bandsaw the decorative outline and—while the pieces are still taped together—smooth the contours. Besides saving time, stacking the parts ensures uniformity. Afterward, apply a thin bead of glue to the top edge of each valance and hold it in position for a minute or two. After the glue sets, reinforce the valances with tiny glue blocks behind each corner.

Build and fit the drawers and the prospect door

With the gallery framework complete, turn your attention to making the drawers and the door. The drawers and the door all fit flush, so a poor fit is easily noticed. Fortunately, because the parts are small, there will be little seasonal movement, allowing for a precise fit in all but the driest of winters. To achieve close tolerances, make each drawer the same size as the opening. Then, after the drawers have been assembled, carefully handplane each one to fit in its opening. A business card works well as a feeler gauge to measure the gap.

The actual drawer construction is straightforward: half-

Dado the seat board and the case. *Once the seat board has been set into place, use a straight bit to rout the dadoes. Templates ensure that all corresponding dadoes align.*

Begin with the vertical dividers. *Once all of the joinery has been cut, the parts simply slide into place from the back of the case.*

Horizontal dividers are next. *To prevent binding during assembly, glue is added only along the front edges of the joints.*

Valances are a nice touch. *Bird glues them to the tops of the pigeonholes. He adds glue blocks later for additional support.*

blind dovetails in the front and through-dovetails in the back. Before the final assembly, embellish the drawer fronts by carving or sawing curves.

The tall, narrow document drawers are simply nailed together. Unlike a conventional drawer, the front of a document drawer typically fits snug within the opening to conceal the fact that it is a drawer. Years ago, the desk's owner hid valuable papers in the document drawers. In fact, a lock was sometimes added for even greater security. This simple device consists of a thin, springy stick of wood that catches in a corresponding notch to prevent the drawer from opening. Although anyone could depress the stick to unlock the drawer, craftsmen often devised ingenious methods for concealing the spring. For added embellishment, a pilaster was often added to the drawer front. The pilaster can be flat and fluted or a split turning with a carved flame. A study of antique desks will reveal enormous variations.

The center (or prospect) door is another feature that invites design variation. One popular version is the arched, or tombstone, panel. You can shape the arches on the top rail and panel with a set of bits from CMT (model 800.524.11). These bits have the correct proportions for the small scale of this door. After shaping, you'll have to complete the bevel on the panel by hand because router bits won't shape inside corners. For more on laying out and completing this bit of handwork, see Part III of this series in the next issue.

All of the old secretaries I've examined feature a prospect box. This small, detailed cabinet fits within the opening behind the prospect door. Because the box fits with a friction fit, the casual observer isn't aware that

the box slides out of the desk to reveal hidden compartments. The design of the front of the box typically reflects the rest of the secretary's interior: A pair of pigeonholes over two drawers is common; another option is a series of four graduated drawers. The sides of the box are joined with dovetails. After assembly, the sides are carefully tapered with a handplane. When properly done the tapered fit of the prospect box within the gallery is quite an achievement. The tapered sides allow the box to slide easily into its opening. However, as the box is slid home, the last ½ in. fits snug within the walls of the

Hidden away. *The gallery features a tombstone prospect door that opens to reveal a prospect box. The box can be removed to reveal three hidden drawers.*

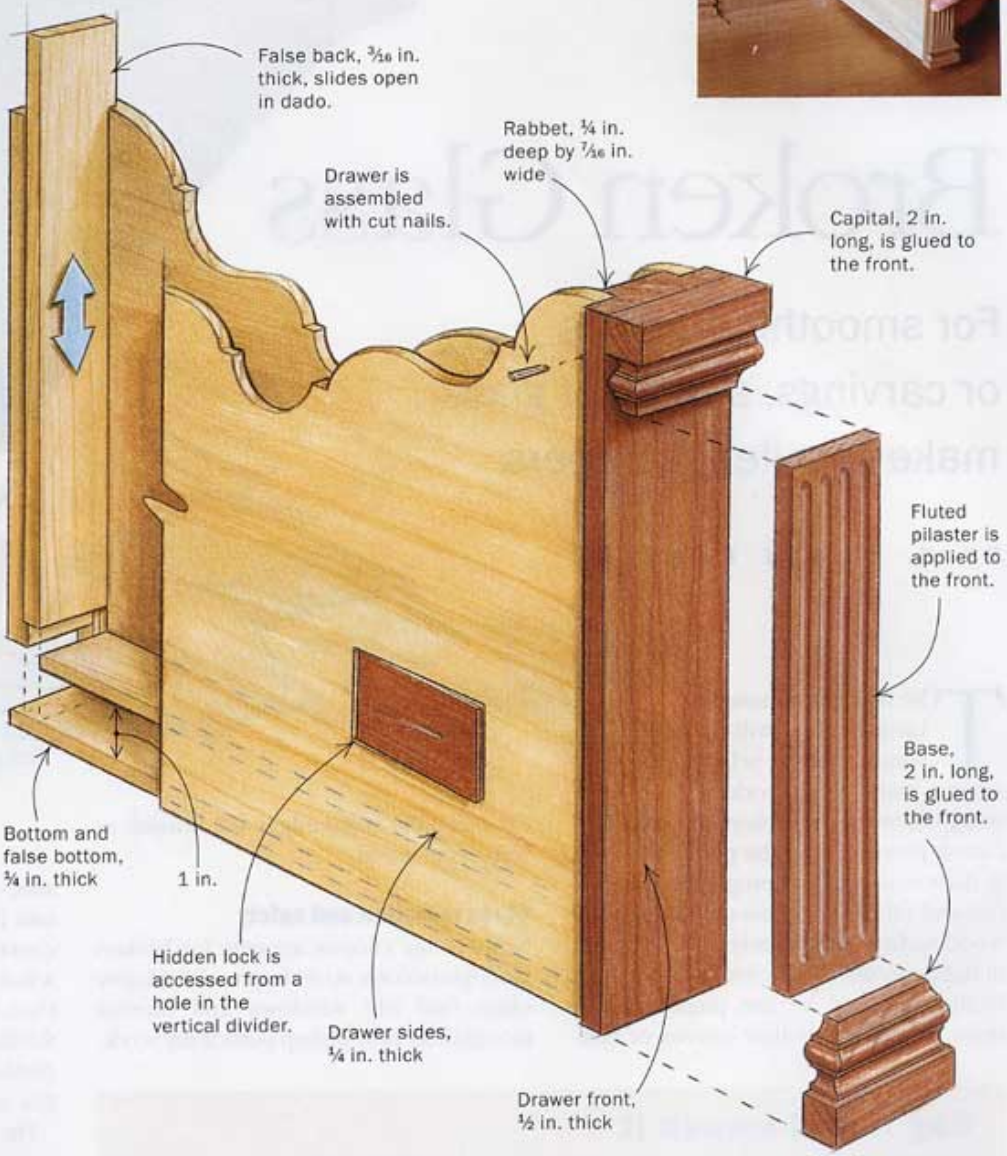
gallery, much like a drive center fits within a lathe. The result is a great example of cleverness and ingenuity on the part of 18th-century furniture makers.

If you're building the secretary seen on these pages, all that remains is to build and install the tombstone doors on the top of the case. If you're installing a gallery on another style desk or a different piece of furniture altogether, these same methods work just as well. Once designed and milled carefully to size, the parts on a gallery simply slide into place. □

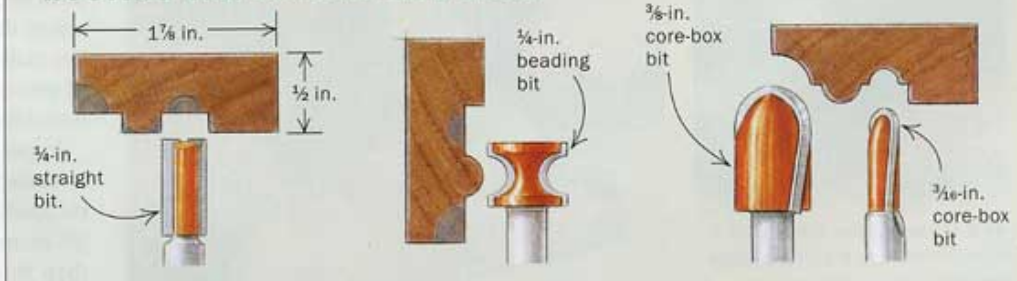
Lonnie Bird conducts seminars from his shop in Dandridge, Tenn. For information on classes, write to him at lonniebird@earthlink.net.

PILASTER CONCEALS A DRAWER

Document drawers of the period were often disguised by applying a decorative pilaster to the drawer fronts. This version also features a false bottom and back, creating a hidden compartment accessible from the rear.



ROUTING THE CAPITAL AND BASE



1. Establish the flats with a ¼-in. straight bit.

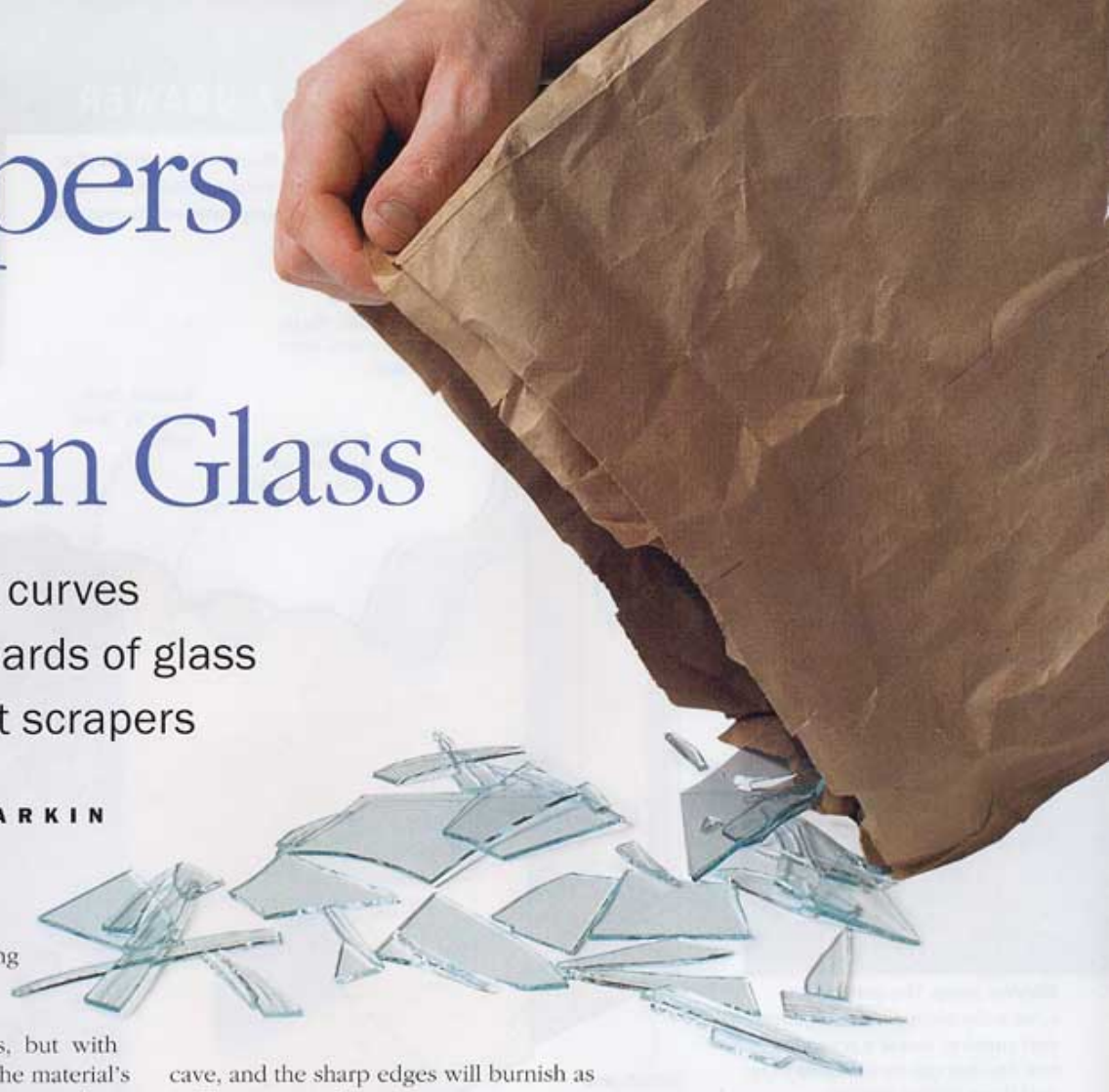
2. Shape the bead with a ¼-in. beading bit.

3. Create the coves with a pair of core-box bits.

Scrapers from Broken Glass

For smoothing curves or carvings, shards of glass make excellent scrapers

BY J. CRATE LARKIN



The thought of handling broken glass will sound alarm bells among many woodworkers, but with straightforward protection, the material's cutting properties can be put to good use in the workshop. Scraping with glass is a fast and effective means of smoothing a wood surface, particularly on curves and in tight corners. Glass breaks into almost limitless shapes, so the pieces can fit many contours, whether convex or concave, and the sharp edges will burnish as well as cut wood.

Glass selection and safety

News of my curious appetite for broken glass has become so widespread that I now often find old windows and mirrors thoughtfully propped up outside my workshop. Those less fortunate can easily obtain their raw materials from glass merchants or wait for errant baseballs to break windows. Untempered double-thickness (⅛ in.) window glass is preferable to single-thickness glass. And for reasons I don't understand, mirror glass often yields scrapers that leave the smoothest surface.

The safest way to break glass is to put it in two paper grocery bags, one inside the other, close up the top and give the contents two or three sharp blows with a blunt object that won't penetrate the bag. A rubber mallet works well. There should be lots of pieces 2 in. to 2½ in. long. If necessary, reseal the bag, and land another blow.

Empty the contents onto a sheet of paper to make it easier to dispose of any unwanted glass. Pick out pieces about 2 in. to 2½ in. in length and width. Pieces smaller than this are too hard to handle; larger pieces tend to break in use. Divide the good pieces into three groups based on

Bag it and smash it

All it takes is a few blows with a rubber mallet to break the glass into scraper-sized pieces.

Photos, this page: Erika Marks

Handholds make the scrapers safe

For safety, wrap the three unused sides of the scraper with electrical cable insulation. Secure it with duct tape.

whether they have convex, concave or straight edges (not the original cut edge, which won't scrape). Dispose of the remaining glass in the paper bags.

Making safe handholds is the most important issue when using glass for scraping. I wrap electrical cable insulation around three sides of the glass and secure it with duct tape (see the photos above).

How and where to scrape

A glass scraper differs from a steel one because it is impossible to modify the cutting edge on the glass—you get what you get when you open the bag. Fortunately, this is not a problem: Each piece of broken glass is slightly different, both in its profile and in the way that it cuts best, so I like to prepare a number of scrapers and see which works best for each piece of wood.

Glass scrapers can be used two different ways. To make scraping cuts, the glass is held like a steel scraper in an upright, slightly forward manner with the thumbs behind the glass. Planing cuts are made by holding the glass at an extreme angle back from the vertical, with the thumbs on top of the glass. Both methods of cutting can be used with either a push or a pull stroke. Experiment to see which direction suits each scraper.

The scraping cut generally removes material faster and works best on surfaces devoid of difficult grain. It can be used on cabriole legs to remove bandsaw, rasp and file marks, to modify a profile, and to smooth the transition to the knee blocks. I have used it on a gooseneck cornice and eliminated hours of tedious sanding. In addition to cutting cleanly, the glass scraper eliminates the unsightly greenish-blue rust "tracks" that break from the burr edge of a steel scraper, allowing you to wet-scrape a surface or to use water-soluble aniline dyes right after scraping.

The planing cut is more effective for awkward or tight areas where greater refinement or burnishing is required and with difficult grain such as curly maple.

You can take advantage of a glass scraper's sharp point and use it as a carving tool. When carving ball-and-claw feet, for example, you'll find numerous areas that benefit from the simultaneous sculpting and burnishing of a glass scraper. □

J. Crate Larkin makes furniture and architectural millwork in Woodsboro, Md.

One scraper can tackle many surfaces

The planing cut. *For a smooth, burnished finish, hold the glass as you would a low-angle plane blade.*

The scraping cut. *Angled slightly forward from the vertical, the scraper removes stock quickly over curved surfaces.*

Clean up carvings. *A piece of glass with a sharp point gets into tight corners, such as those found on carvings.*

Photos, this page: Mark Schofield

Holding Your Work

Simple and efficient solutions for keeping your work steady

BY GARRETT HACK

A good workbench is one of the most important tools in any shop. It doesn't need to be fancy or have vises to be useful, just a nice, flat work surface and a base sturdy and heavy enough to stay put. The challenge then becomes how to hold your work securely and easily, so you can concentrate your energy on controlling your tools, not on work slipping around.

Furniture parts come in a huge variety of sizes and shapes. Take, for example, a chair. To plane the straight seat rails, you must hold them flat on a bench. To shoot their edges you need to support them upright. To shape back legs that are curved, you need a different solution, as you might for carving the crest rail or for holding any of these parts when chopping mortises.

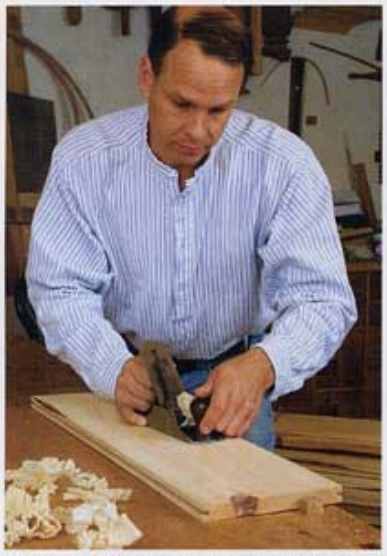
Fortunately, for every kind of holding problem, there are at least a few solutions: stops, holdfasts, bench hooks, miter blocks, clamps and more. The best are quick, positive and easily put to work.

Stops are quick and simple

In an average day, I plane all sorts of parts held flat on my bench. Some are narrow,

BENCH-DOGS

Made of ash, oak or similar hardwood, benchdogs are easy to make and replace, as necessary. A wood spring helps hold it in place.



Planing against a single point. *The easiest way to hold a board when planing is to use a single benchdog.*

Use two points of pressure with wide stock. *Multiple stops help keep wider stock from moving sideways during planing.*

Photos: Michael Pekovich

STOPS FOR THIN WORK

For thin work, a quick, simple jig can hold the stock for planing. Small brass pins (or tacks) can also hold thin stock in place.

Planing thin, straight stock. *This jig is simply a piece of plywood with thin, perpendicular fences. Butt the jig against a benchdog to hold it in place.*

Planing thin, curved stock. *A brass escutcheon pin tacked into a flat board serves as a ministop for smaller workpieces. Because brass is soft, it won't damage your tools if you run into it.*

some wide, some long and some short. By far the simplest way to hold them (and plenty of other pieces that aren't flat) is to use a single, solid stop of some kind.

I use wood stops because they are easy to make and to customize for holding an odd-shaped part, and they won't damage my tools if I run into one. The stop I use most often is a simple hardwood benchdog dropped into one of the holes on my benchtop. While this gives me flexibility in positioning a workpiece anywhere along the bench, a fixed stop either mortised into the benchtop or securely screwed to it can be just as useful in the same situations.

It's ideal to be able to adjust the height of your benchdog just barely above the surface for planing thin drawer sides or sticking out a few inches for larger work. If you mortise a benchdog into your bench, fit it snugly so that it requires only a tap to move it up or down. Because I am often moving my benchdogs (I use them in pairs with my tail vise), I've fitted them with ash springs that keep them in their holes. Lee Valley makes similar brass dogs that drop into round holes easily drilled into a bench.

Three dogs. *Adding pins or V-grooves to your dogs helps them hold thin or mitered stock.*

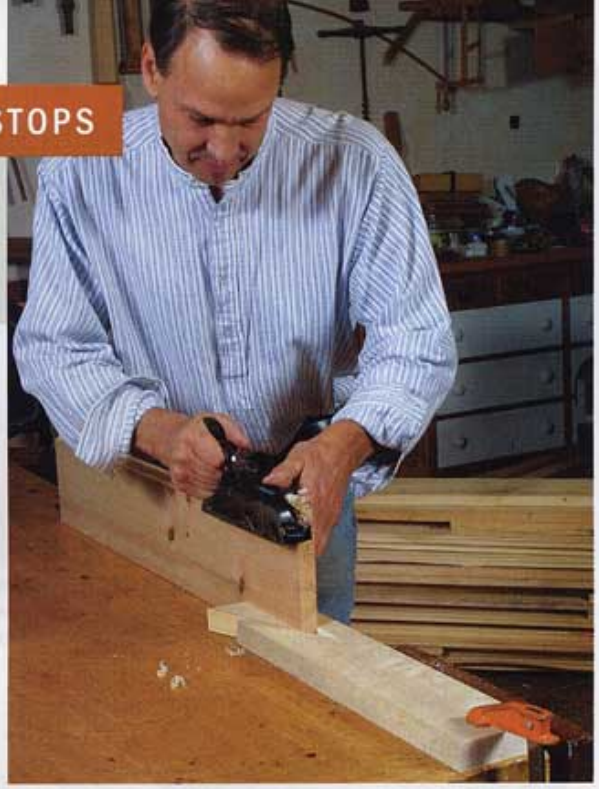
I can make a new wooden stop to fit almost any need, such as cutting a V-groove into the face to hold parts with mitered ends. I have a dog with a brad in the face that pricks

VERSATILE BLOCKS

To chamfer or put a lamb's tongue on a square leg, make two blocks with a deep V-cut and place it against a benchdog. The blocks hold the legs in the best position for working the corners with a chisel.

BIRD'S-MOUTH STOPS

A bird's-mouth stop holds a board on edge and allows you to plane, sand or carve the edge safely without the use of a vise.



Locking the workpiece in the bird's mouth. *A bird's mouth holds stock remarkably steady, but a wedge offers extra stability yet with a quick release.*

Edge-planing curved work. *Butt the end of the stock into a bird's mouth and the middle against a benchdog. Steady the work with your left hand.*

into small pieces to hold them better. But a stop with a nice, square face is still the most useful, and a little planing dresses it up when it gets worn.

There are times when a single stop does not provide enough support, such as when planing wide stock aggressively. In this case I use a benchdog and clamp an additional stop to my bench to prevent sideways movement (see the bottom right photo on p. 76). Or I clamp a board across the entire end to work against.

Stops for thin work—To plane thin stock, I set up a jig that's simply a flat piece of plywood with thin pieces of wood tacked down to it. One piece of wood acts as a stop; the other piece acts as a fence (see the top left photo on p. 77). The whole assembly is butted against a benchdog on my bench.

To plane a piece that is curved and very thin, one of my favorite solutions is to tack a small brass escutcheon pin on a flat board and butt the piece against it. It's best to use brass because it's a soft metal and will cause less damage to your plane blade should you hit the pin.

Bird's-mouth stops—Planing a board on edge is a common-enough task that it's worth making either of two simple wooden jigs to hold the board securely on your benchtop. One is a thick board with a bird's mouth cut into the end that is clamped to the bench. It works easily not only as a stop, but it also offers some vertical support. A slightly more elaborate version has a wedge to lock the part in place (see the top photos at left).

To plane a short apron I butt the piece against a bird's-mouth stop and use a hand alongside the plane to steady both the apron and the plane. This technique is simple, quick and, with practice, not difficult. Where I want a little more support, say, for a thin board, I clamp the end away from the stop in a wood hand screw laid flat on the bench. I've held longer boards in two or three such hand screws. Merely clamping a board upright with bar clamps also works for a task such as cutting a mortise, but when planing they get in the way.

Stops for curved work—Much of the furniture I build has a lot of curved parts. Some of the curves are shallow enough that I can hold the part on the bench as I

would a flat piece. When shooting edges, for example, I butt the workpiece against a stop and work carefully to keep the piece balanced and steady.

For more shapely parts that don't balance easily against a stop—the curved apron of a demilune table, for example—I still use a stop but with one or more support boards clamped to my bench. These outriggers, as I like to call them, are scraps about 2 in. wide clamped in such a way that they provide sideways support at two or more points.

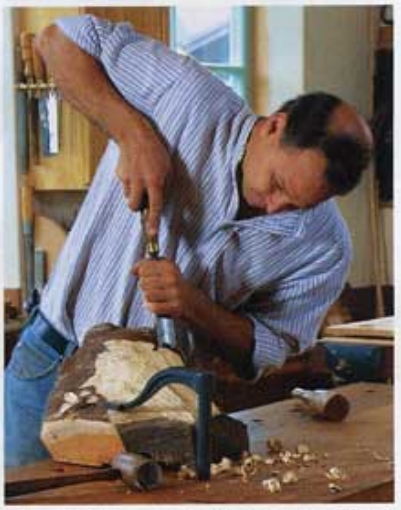
Holdfasts provide a quick, tight hold

Ancient Roman benches had no holding aids besides a simple stop and iron holdfast. A holdfast is simply an upside-down L-shaped bar that wedges into a hole in the bench with a slight rap on the top. Rap a few more times for firmer downward pressure, or from behind to loosen it. Holdfasts are useful for holding work of almost any shape flat on the bench (flattening out any bow as well). They can also be driven into holes in the front of a bench for holding long boards and wide panels upright, as if they were in a vise.

A holdfast offers quick and secure clamping pressure. The more you drive the holdfast into the hole in the bench, the more

HOLDFASTS

One smack, and the work is secured. The shaft of a holdfast wedges into a hole in the workbench. Be sure your benchtop is at least 2 in. thick or the holdfast may split the top.



Odd shapes are no problem. *A holdfast and a stop are all that's needed to hold this burl because it has a flat bottom. If your work doesn't have a flat bottom, use wedges to level the piece.*

Holdfasts—what's out there

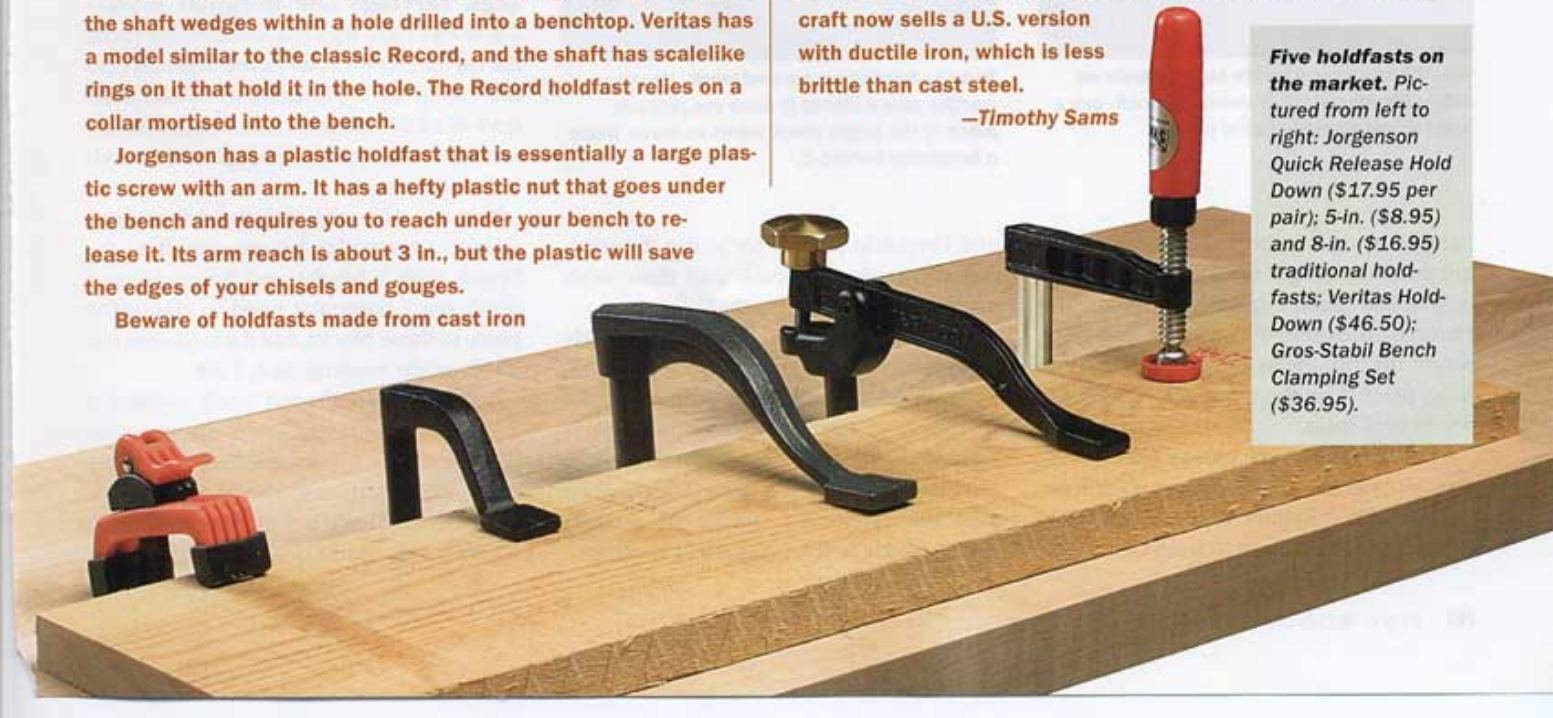
Most of the traditional holdfasts come in two sizes: 5 in. and 8 in. The smaller models can hold stock up to 1 in. thick. Choose a larger model for use with thicker or irregular stock.

Newer holdfasts incorporate a screw at the top of the arm. These holdfasts are not hit with a mallet. By tightening the screw, the shaft wedges within a hole drilled into a benchtop. Veritas has a model similar to the classic Record, and the shaft has scalelike rings on it that hold it in the hole. The Record holdfast relies on a collar mortised into the bench.

Jorgenson has a plastic holdfast that is essentially a large plastic screw with an arm. It has a hefty plastic nut that goes under the bench and requires you to reach under your bench to release it. Its arm reach is about 3 in., but the plastic will save the edges of your chisels and gouges.

Beware of holdfasts made from cast iron because the shafts are brittle and can crack and break when placed under stress. The material of a holdfast should have some flex to it. Some of the cast-iron varieties are being redesigned with a steel shank. Most of these holdfasts are made in Taiwan, and while they're pretty rough looking, they will do the job. Woodcraft now sells a U.S. version with ductile iron, which is less brittle than cast steel.

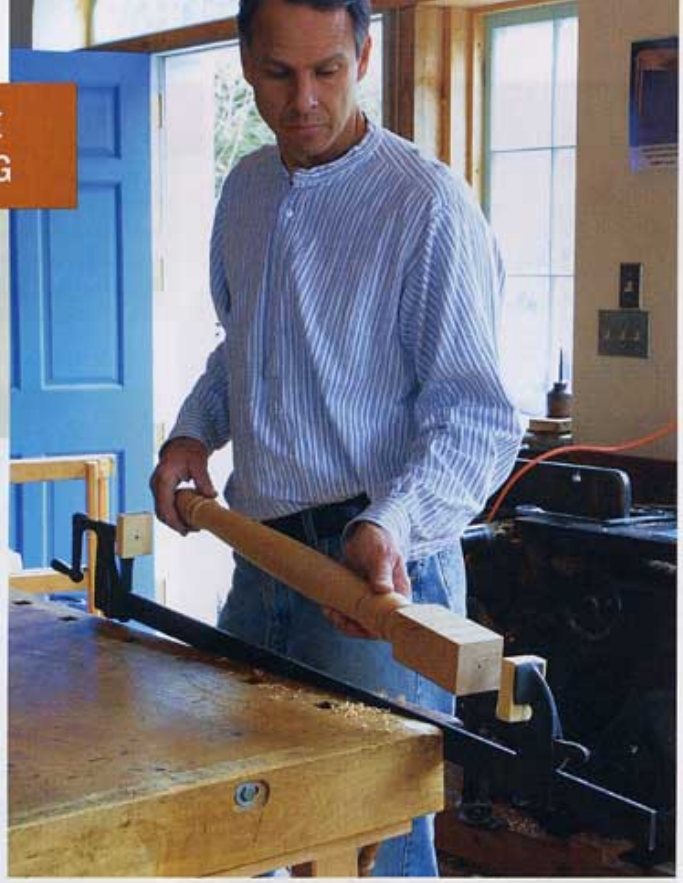
—Timothy Sams



Five holdfasts on the market. *Pictured from left to right: Jorgenson Quick Release Hold Down ($17.95 per pair); 5-in. ($8.95) and 8-in. ($16.95) traditional holdfasts; Veritas Hold-Down ($46.50); Gros-Stabil Bench Clamping Set ($36.95).*

CREATIVE CLAMPING

To secure irregular shapes, use clamps in unconventional ways and combine them with vises, stops or other clamps.



Holding turned legs with a bar clamp. *Glue small blocks with protruding nails onto the jaws of the clamp.*

Wood hand screw holds long boards on edge. *For longer, more unwieldy stock, use a hand screw clamped to the bench.*

Tenon shaping on curved work. *Use two wedges plus a clamp to keep the piece in place. If the larger block wants to move, place a benchdog behind it.*

tightly it wedges in, providing more clamping pressure. A light rap from behind with a wooden mallet quickly releases the clamping pressure. With a model that has a screw on top, insert the holdfast into its hole, place it on the work and tighten the screw until snug.

A holdfast may come loose if lateral pressure is placed on the workpiece. Often, using a holdfast together with a benchdog is one of the fastest ways to hold your work and keep it in place. I try to use the holdfast to steady the work and then work against the dog.

Installing a traditional holdfast is fairly straightforward: It requires one or more holes in your bench 1/16 in. larger than the diameter of the shaft. The problem is where to drill the holes without turning your bench into Swiss cheese—and getting past the emotional hurdle of actually drilling those holes. I suggest at least three evenly spaced holes 14 in. to 18 in. from the front of the bench.

Clamps are versatile mechanisms

I use both light-duty bar clamps and heavier ones with a jaw reach of about 5 in. Unless the piece is small, two clamps always hold more securely than one; both hold the piece in place and work together to prevent slippage from side to side. The problem is that the clamps are typically placed somewhere along the front edge of the bench, where they get in the way.

Nevertheless, clamps can be the best method to hold work on top of the bench: irregular shapes, large work such as big tabletops or jigs for working specially shaped pieces. By placing the clamps along the sides or back of my bench, I get them out of the way of my prime work surface along the front edge. I try to make jigs large enough to get the clamps well out of the way. Clamps also have better holding power if spread far apart. Whenever possible, I try to use a benchdog as a stop somewhere along the bench and eliminate one of the clamps.

For larger pieces that don't fit on top of the bench so comfortably, I regularly clamp these upright along the front edge of my bench, with bar clamps going across the bench, if necessary.

When chopping tenon shoulders on a curved apron, I place a block underneath to add stability under the workpiece and to break up the fibers I am chopping. I butt one end against a stop and use a single clamp to hold everything in place.

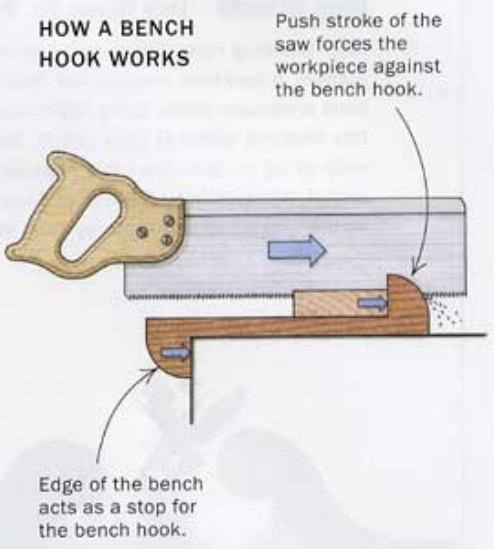
Legs, carvings and irregular work— Table and chair legs can be difficult to hold flat on the bench. A workable method is to first clamp the leg lengthwise between the jaws of a bar clamp and then clamp the assembly to the top of the bench with wooden hand screws.

You can also chamfer the edges on a square, tapered leg by securing it to the bench with V-blocks and a benchdog. I don't see a particular need to clamp the piece to these blocks, but if it becomes unstable while working on it, I do.

Clamping odd-shaped stock requires a good bit of creativity. There are products that may help, but for the most part they work on the principle of wedging the piece between two or three points to keep it stable. I try to use benchdogs and either

BENCH HOOKS AND MITER BLOCKS

A bench hook holds the work steady for both cutting with a push saw and shooting the end of a board with a handplane.



Use a miter block with thin stock. *Held in a vise it allows smaller stock to be held securely for cutting.*

a clamp or a holdfast just because they are the most efficient for me. Don't be afraid to experiment, but there is no reason to make it too complicated.

Bench hooks and miter blocks can secure small stock

I use bench hooks and miter blocks when stock is too small to clamp or hold against a benchdog.

A bench hook is an ancient device—a flat board with blocks on opposite sides. One block locks over the edge of the bench; the other holds the workpiece. The bench hook is good for holding small stock for making repeated sawcuts or for planing the end of a board. Used to shoot end grain, a bench hook not only supports the board but also backs up the fibers at the end of the cut, preventing them from tearing out. Pairs of bench hooks of various sizes are useful for holding long boards or wide panels flat on the bench.

For even smaller stock, I use a small miter block—a 1½-in.-thick block of wood with a rabbet cut into it. Held in the vise, this block can make it easier to cut delicate inlay work, veneer or other small strips of wood. I cut 90° and 45° angles (and other angles) into the block to guide my saw. For a backsaw I place the block in the vise with the rabbet facing me. For a pull saw I orient the rabbet away from me.

A bench, no matter how complex, is only as useful as you make it. I respect my bench, but it's not precious. For common, everyday holding problems drill a few holes in your bench if need be, and set yourself up with a dog, clamps, holdfasts or whatever. A simple, secure hold-down lets you concentrate all of your efforts on controlling your tools, allowing you to do better, safer, more enjoyable work. □

Garrett Hack is a contributing editor.

Drawing: Vince Babak

Current Work

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Greg Bianchi Lock Haven, Pa.

After teaching himself how to do veneer work, Bianchi, a part-time woodworker, then proceeded to build a vacuum press. Using the press, he made this sunburst elliptical table (18 in. deep by 46 in. wide by 36 in. tall). The table is made of maple and walnut, features inlay borders and has a precatalyzed lacquer finish. Photo by Terry Wilde

Keith S. Cornell
Middleborough, Mass.

Cornell built this chest-on-chest (24 in. deep by 48 in. wide by 96 in. tall) based on an image from *American Furniture in the Metropolitan Museum of Art: Late Colonial Period: The Queen Anne and Chippendale Styles* (out of print). The chest took approximately 500 hours to complete and is made of Honduras mahogany with secondary woods of soft maple and tulip poplar and features crotch mahogany veneer drawer fronts with holy inlay. The carved phoenix is taken from a close-up in *American Rococo, 1750-1775: Elegance in ornament* (out of print). The finish is French-polished shellac. Photos by Lance Patterson

Laurie A. Hatfield Keizer, Ore.

Hatfield designed and built this Arts and Crafts bookcase (14 in. deep by 49 in. wide by 59 in. tall) for a course she took at Palomar College in San Diego, Calif. Made of Honduras mahogany, the piece features through-tenons and glass doors. The bookcase is finished with three coats of hand-rubbed oil.

Richard Thorpe
Windham, Maine

While sketching different tribal tattoo designs, Thorpe concluded that some of the sketched angles would be great to apply to a new table-leg form he was working on. This side table (15 in. deep by 15 in. wide by 21 in. tall) is made of walnut and red oak and is finished with oil and wax. Photo by Mark Davis

Michael J. Boillot Tempe, Ariz.

To solve the problem of having limited space in his kitchen/dining area for a large wine rack, Boillot constructed this countertop version. Made of wenge and bird's-eye maple, the rack (13 in. deep by 24 in. wide by 12 in. tall) holds six bottles and 16 glasses. It has a Watco oil and varnish finish.

Roger Alan Skipper Oakland, Md.

Skipper, an instrument maker and *FWW* author, made this mandolin (3 in. deep by 10 in. wide by 27 in. long) after seeing one made by Norman Adams, a luthier and woodworker from Gassaway, W. Va. Made of spruce, maple and ebony, the fingerboard and turned head are inlaid with gold mother-of-pearl and red and paua abalone. The furnishings—tuning keys, tailpiece and thumbscrews on the bridge—are gold. The mandolin is finished with nitrocellulose lacquer.

Jonathan Der St. Ignatius, Mont.

While toying with the idea of multifunctional furniture, Der happily stumbled upon the design for this floor lamp with cabinet (14 in. deep by 20 in. wide by 67 in. tall). Made of cherry, walnut and curly maple, the piece's proportions and shape are based loosely on an Arts and Crafts grandfather clock. "The reverse book-match was an afterthought," said Der, "but the end result is an interesting juxtaposition of a dark void and illumination." The lamp has a hand-rubbed oil and wax finish.

Steve Knowles Puyallup, Wash.

Knowles has always been drawn to the graceful legs of Louis XV furniture, and this hall table (15 in. deep by 42 in. wide by 29 in. tall) "attempts to capture those lines in a more contemporary, less ornate fashion." The table is constructed of mahogany, pommele sapele and ebonized maple. The top's sunburst veneer pattern is outlined with a thin black inlay while the ends and front both curve gently to reflect the leg design. The piece has a catalyzed lacquer finish.

John DeHoog Ypsilanti, Mich. ▲

The geometry of this cabinet with bifold doors (9 in. deep by 32 in. wide by 32 in. tall) is based on a 32-in. square that has been subdivided many times. The case is constructed of white oak, and the doors are made of Douglas fir. "Overall, the piece is creaturelike," said DeHoog, "with curved, aquatic legs, a contrasting rectangular head/body and door pulls that are the creature's eyes." The finish is water-based polyurethane.

John H. Babot ▶
Austin, Texas

This cabinet (16 in. deep by 29 in. wide by 40 in. tall) was Babot's final piece while attending the College of the Redwoods. "My original inspiration came from a Ruhlmann Art Deco Chiffonier," said Babot, "but as the design progressed, the influences of the school, in general, and of Krenov's prodding, in particular, became evident." The exterior of the cabinet is made of curly koa and jarrah, and the interior is constructed of cypress, cedar of Lebanon and maple. The brass pulls and hinges are of his own design. The cabinet is finished with shellac and wax.

◀ **Jamie Buxton** Redwood City, Calif.

Buxton, a computer engineer turned full-time furniture maker and *FWW* author, was inspired to build this tripod dining chair (20 in. deep by 17 in. wide by 41 in. tall) after an evening spent teetering back and forth on a conventional chair. The chair, made of jarrah, has two interesting construction details: The back is a tapered bent lamination, and there is a three-way finger joint connecting the structural members under the seat. It is finished with one coat of boiled linseed oil and several coats of wipe-on varnish.

Photo by Richard Reader

Tips for photographing your furniture

1. *Clean and dust the furniture.*
2. *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.*
3. *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.*
4. *Use 35mm color print (negative) film of moderate speed (ISO 200-400). If you're using a digital camera, shoot at the highest resolution and place the image on a CD.*
5. *Photograph the furniture from several angles. Include some head-on shots, as well as some shots that show both the front and side of a piece.*
6. *Keep the background simple. A cluttered or otherwise distracting background may draw the viewer's attention away from the subject.*

Rules of Thumb

BY MARIO RODRIGUEZ

Accurate joinery starts with a marking knife

One of the secrets to achieving fine, crisp work is to lay out the joints carefully. Whether you're cutting with machines or by hand, working to a single clean line is essential. Instead of a relying on a thick, blurry pencil line, I work to a reliable scribed line cut into the wood surface. Alongside smudged fingerprints, sweat stains and wood dust, it remains unmistakable.

A marking knife cuts a straight, accurate line, highlighting exactly where to stop your cut. Besides offering a clear visual reference, this fine groove also leaves a positive starting point for any wood removal.

On antique furniture the remnants of the craftsman's layout lines are often taken as visible proof that the piece was handmade.

Marking knife has many uses

A marking knife is so versatile that you need at least one in the shop. It can be used for hardware installation, for inlay work, for scoring cutlines to avoid blowout and for laying out dovetails.

When setting hinges, locks and other hardware, not only does the marking knife produce a clear outline for the shallow mortise, but it also provides a fine notch for your chisel tip when you're removing the last of the waste.

A more advanced use of the marking knife is setting inlay and marquetry into a wood surface. Just as when mortising hinges, accurate work becomes as easy as putting the item in place, cutting a fine line around it and removing the waste.

A marking knife can also be used to eliminate blowout on the back of veneered panels or plywood being cut on the tablesaw or bandsaw. For clean crosscuts, cut a layout line across the bottom exactly at the panel's final dimension.

For me, however, the most indispensable use of the marking knife is laying out hand-cut dovetails. One of the keys to a gap-free fit is crisp, careful layout. Once I mark out the joint, the single line left by the marking knife provides the perfect boundary. The waste

Marking knife vs. marking gauge

A marking gauge works well for tenon cheeks. *The cut is clean because it is with the grain and not far from the fence of the tool.*

Shortly after abandoning the pencil, many woodworkers take up the marking gauge. The traditional type of marking gauge scores a line into a board's surface with a stylus-like point that tends to tear wood fibers rather than cut them, often leaving a crude and ragged groove.

The marking gauge works best when used with the grain or on end grain, and when the desired line is close to a parallel edge. A good example is marking the cheeks of a tenon. However, the farther the cutter on a marking gauge is extended from its fence, the greater its tendency to wander. An example of this is marking out tenon shoulders. In this situation, the best tool is the marking knife. Used with a square, the marking knife easily cuts a clean, square shoulder line across the grain.

On the shoulders the marking gauge falls short. *It tears fibers when used cross-grain and far from its reference edge.*

A knife is a better tool for the job. *The marking knife leaves a flawless line, regardless of grain direction.*

Photos: Asa Christiana

USING A MARKING KNIFE

Well-fit dovetails start with accurate layout. *A marking knife allows you to transfer the tail layout precisely onto the pins board. The thin incisions will guide the chisel later during final paring.*

Scribe a line for clean cuts on plywood. *Cut this line into the bottom of the panel, where the sawteeth will exit.*

Marking out a hinge mortise. *The marking knife adds precision to this operation, too. The line will serve as a starting place for final chisel cuts around the perimeter.*

outside that line seems to flake away as I pare at it with a chisel, leaving only a clean dovetail recess or a precise pin.

There are several types of marking knives

The most obvious distinction between marking knives the way in which the blade is sharpened. The most common type used for marking has one side of the blade beveled, so the flat side of the blade can be placed vertically against a straightedge.

Knives also can be sharpened on both sides of the blade. When using a double-beveled knife, you should angle the knife so that the bevel rests flat against the straightedge. Another significant design difference is whether the blade has a single cutting edge or if the knife's tip is spear-shaped with two cutting edges. Generally, the two-edged knife has a sturdier tip and when rotated 180° it can be used to scribe a line down the left or right side of an edge.

In the catalogs you'll find a wide variety of knives for marking. Some feature stout, mirror-polished blades attached to rosewood handles and are made to last a few lifetimes. Others are plastic-handled carving or specialty knives. In the shop, I've used everything from utility knives to X-Acto blades. My favorite is a #1 chip-carving knife with a custom walnut handle shaped to fit my hand.

I use the fixed-blade, chip-carving blade for marking joinery and dovetails, and a #1 X-Acto knife for marquetry and veneer work. Although I could get by with one knife, each type seems to be well suited to a particular type of work.

KNIFE TYPES

DOUBLE BEVEL

Most general-purpose knives have a bevel ground on both faces of the blade.

CHIP-CARVING KNIFE

DISPOSABLE BLADE

Tilt the blade to keep the bevel flush with the straightedge.

SINGLE BEVEL

A blade designed for marking is typically beveled on one face only.

SPEAR-POINT MARKING KNIFE

Keep the flat side flush with the straightedge.

Sharpen on a grinder or a stone

I typically sharpen my fixed-blade knives on the bench grinder. Grinding the blade every time might shorten its life somewhat, but it saves me significant time over honing.

Of course you can hone the blade using flat stones. This method might take a little longer, but it removes less material, leaves a finer edge and eliminates the possibility of damaging the hardness by overheating the metal.

Whether it's single- or double-bevel, handled or handleless, ground or honed, a sharp marking knife will add accuracy to your work. □

Drawings: Michael Pekovich

Q&A

No box spring for a bed?

In the article "Construct a Classic Bed" by Doug Mooberry and Steve Latta (FWW #105, pp. 36-40), the authors state that box springs are not necessary for beds. I am confused, then, about the purpose of the modern box spring. I understand that box springs are historically inaccurate, but will the bed sleep as well? I have also been told that a platform will not allow moisture to pass through the mattress.

—Ramon Sanna, Madison, Wis.

Steve Latta replies: It seems the bed sales force is doing an exceptional job promoting the "evils" of not using a box spring. Customers always get a little squeamish at the suggestion of omitting it. When Elizabeth and I got married years ago, she brought her $650 queen set, and the idea of separating such a perfectly matched (and color-coordinated) pair as her mattress and box spring led to a heated debate. The conflict was resolved only by her box spring's inability to wrap around the staircase to the third floor of our old Victorian. Had that not been the case, the argument, "but the warranty will be voided," might have prevailed.

I have been omitting box springs long enough for many a 15-year warranty to run its course and have never gotten a call concerning any problem with a mattress. On that point I speak from a background of experience—not bedding design. Moisture buildup never has been a problem. We flip our mattress top to bottom periodically, and I've never seen any sign of deterioration. Experience also tells me the performance of the mattress is not impacted at all. If anything, the bed tends to sleep a little firmer, depending on your support system. For our queen set, two pieces of ¾-in.-thick melamine rest on a frame made from 2x4s. The frame is screwed together and then fitted between and screwed to the side rails. This approach makes for a rock-solid bed much stronger than any system with a suspended box and mattress. I would stick to melamine rather than plywood. It is easy to clean and, with edges relieved, is splinter-free.

From a design standpoint, the sizes of modern mattresses often clash with traditional forms. Beds end up too wide and often overpower the room they're placed in. You can shave about 5 in. off the width by eliminating the box and allowing the mattress to rest on top of both rails. I would eliminate the box spring for a bed up to a queen-sized mattress but not for a king-sized one. The combined height of modern mattress sets can be a problem as well. Some sets total 18 in. or more and obscure the headboard, which is typically made from a drop-dead gorgeous piece of wood. Eliminating the box spring solves that problem.

I cannot overemphasize how solid a bed can be with an integrated platform supporting a mattress. There's no shimmy and shake—just the feeling of strength and durability that will last for generations. Throw in a nice, high headboard, a couple of end tables with reading lamps, and life just got better. [Steve Latta is an instructor at the Thaddeus Stevens College of Technology in Lancaster, Pa.]

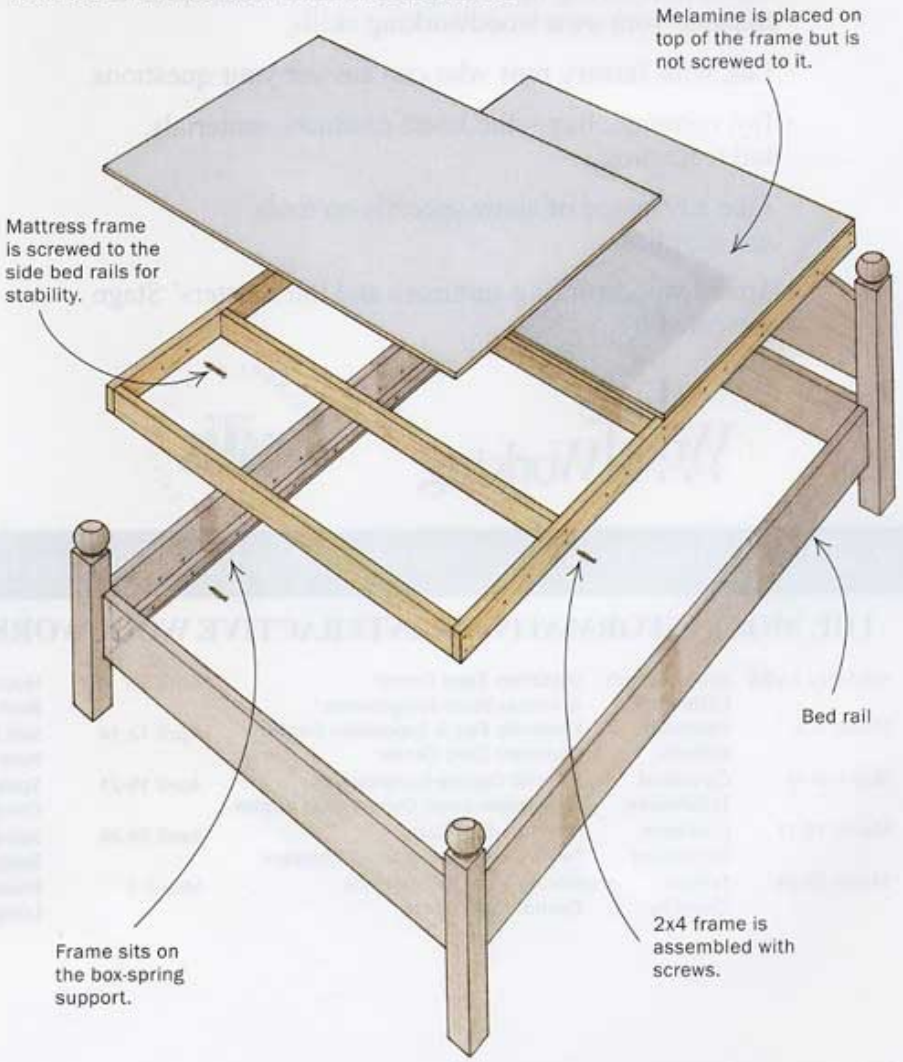
Boiling vs. steam-bending

I am building the Morris chair from issue #101 and am interested in why the author prefers to boil the back slats rather than steam-bend them. I would think that boiling is much simpler from an equipment point of view. I am making the chair out of cherry, and the back slats will be about ⅜ in. thick.

—Phil Capper, via e-mail

Lon Schleining replies: I often wonder why anyone would boil a nice piece of wood just to bend it. Steaming wood does

A STURDY REPLACEMENT FOR A BOX SPRING



Drawings: Vince Babak; photos, p. 98: Timothy Sams

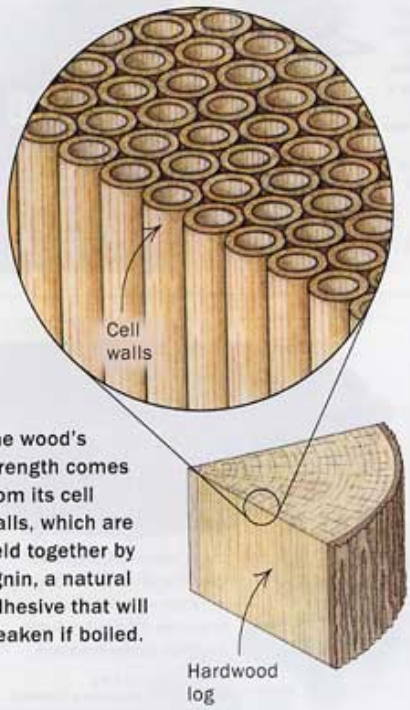
enough damage to the wood fibers. Boiling just makes it worse. Here's why:

When you boil a piece of wood, the lignin or sap holding the wood together is leached out. If you've ever had Thanksgiving turkey that tasted awfully dry, the juice was simply cooked out of it. The same principle applies to wood. Just look at the color of the water when you're finished. It will look like oak tea.

If too much of the lignin is softened, it's likely the piece will crack or check when it cools. Moreover, if the water has any iron particles in it or you boil the piece in an iron pot, the wood will turn black. It isn't all that much trouble to build a steam-bending setup. It's fun, too. You can learn the basics in my article in *FWW* #149 (pp. 78-83).

You mentioned you'll be using cherry instead of oak. To understate the situation a bit, cherry isn't the easiest wood to bend. Try your technique on oak first to see if it will work. Then try the cherry. Your ⅜-in. thickness will need about half an hour in the steam. The same rule of thumb applies; one hour of steaming for each inch of thickness. Just remember, when all else fails, you can always bandsaw those slats out of solid stock. [Lon Schleining is a contributing editor.]

BOILING WEAKENS THE WOOD



The wood's strength comes from its cell walls, which are held together by lignin, a natural adhesive that will weaken if boiled.

Trouble with fine waterstones

With my waterstone in grits of 4,000 and higher, the tool seems to float without cutting, showing signs of polishing only around the edges. Also, I have discovered that a surface polished with higher grits tends to show different high spots if I return to the coarser stones.

–Charles Shafer, Knoxville, Tenn.

William Tandy Young replies: To get tools to glide smoothly on the finer stones, rub their surfaces evenly with a small Nagura stone to create a mud slurry on the surface that polishes the steel and reduces suction. Keep the Nagura dry, and only dip it in water before using. Kerf its face in a cross-hatch pattern with an old hacksaw blade so that it will slide easily on the 4,000-grit stone. With practice,

you'll know how much mud to create. Hone with a light touch, using the whole surface of the stone, as always.

Also, keep your stones in water when they're not in use. If they dry out, then get wet again, they can lose their flatness.

Your waterstones must be consistently flat from stone to stone. Use glass and sandpaper to flatten the 800-grit stone, then use the 800-grit stone to flatten the 1,200-grit stone, and the 1,200-grit stone to flatten the 4,000-grit stone. Japanese waterstones lose their flatness quickly, so you must true them up as you sharpen. Give them a quick flattening every time you use them, and touch them up every few minutes during extended sharpening sessions.

Sometimes, the coarser stones can fool you as you flatten the backs of tools. These stones cut quickly, producing a lot of abrasive mud, and as they wear, they conform to any inaccuracies in the surface of the tool being sharpened. Because of this, they can give the impression that the tool has been honed uniformly flat, even when it hasn't. Any inaccuracies that remain will show up as you change grits. Go back to the coarse stones and rehone the tool until it is truly flat, keeping the stones trued as you work. Then try the 4,000-grit stone again. If the back of a tool is hollow in the middle but honed flat all along the cutting edge, that's fine. Future honing will reduce the hollow.

[William Tandy Young is a woodworker and adhesive supplier in Stow, Mass.]

USING FINE WATERSTONES

Five or six gentle, even strokes on the Nagura stone produce a slurry for faster sharpening on 4,000- or 8,000-grit stones. The slurry creates a fine abrasive that hones and polishes the metal.

Master Class

BY KIM CARLETON GRAVES

Veneer a reverse-diamond pattern

Veneer opens a world of possibilities for the woodworker. Because most of the best wood is made directly into veneer, you'll find more species, colors and patterns in veneer than you'll ever find in the selection at the lumberyard. Veneering also allows you to design the surface of a piece independently of its underlying structure, allowing cross-grain patterns that would be unstable if made of solid wood.

To get the most out of a veneer pattern, you must know how to arrange leaves correctly, not only matching the grain pattern

but also taking pattern jump and light refraction into consideration. The reverse diamond laid up for this round tabletop owes its success to all of these factors.

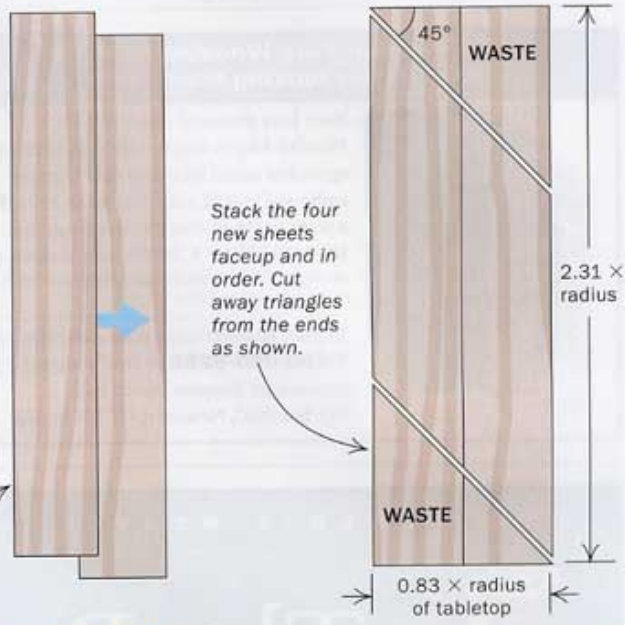
Grain pattern changes subtly with each leaf in a flitch, but there's usually a big difference, or "jump," between the first and last leaves. In a diamond, sunburst or other similar pattern, laying out the leaves sequentially around the outside places the first leaf next to the last. In this reverse-diamond pattern, I stagger the layout to minimize pattern jump.

Refraction is similar to the light-dark pat-

SLIP-MATCH PANELS AND TRIM CORNERS

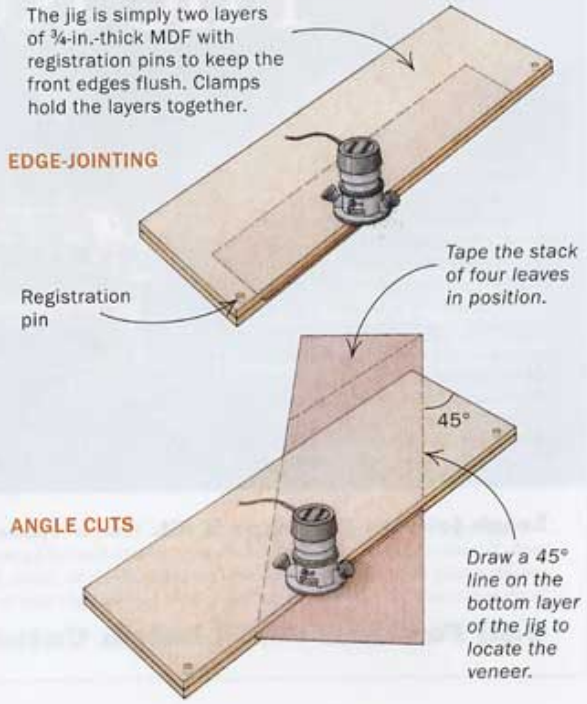
Label the veneer leaves. *It's very important to record their original order and orientation.*

To start you need four identically sized sheets of veneer, their dimensions determined by the radius of your tabletop.



SIMPLE JOINTING JIG DOES DOUBLE-DUTY

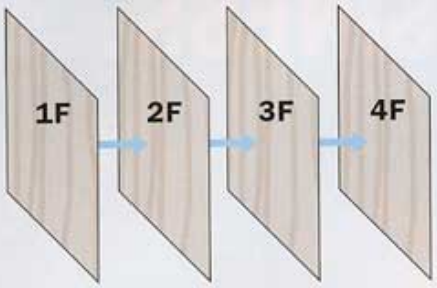
Joint the leaves with a router. *Tape the stack of veneer in position between the two layers of the jig and clamp along the front edge. A ½-in.-dia. bearing-guided straight bit cuts the veneer flush. Use climbing cuts—and multiple passes if there is more than ⅛ in. to be removed.*



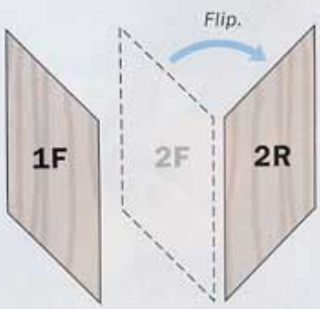
Drawings, except where noted: Michael Pekovich; this page (bottom two): Vince Babak

Book-match the rhomboid shapes into pairs. *Tape these seams temporarily to keep track of the orientation.*

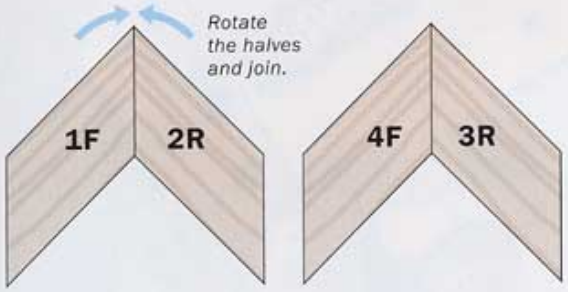
PAIR UP THE PANELS



Relabel the four new sheets, with F and R signifying front and rear. Pair up the first and second pairs for the next step.



Flip over the second sheet next to the first and join the angled ends as shown, taping the seams together temporarily.



For the second pair, flip over the third leaf and join the ends.

terns created by the grounds crew on a baseball field. Veneer makes similar patterns, which can be either dramatic, as on this table, or—if you're not careful—distracting. Because of the way it's sliced, every leaf of veneer has a smooth front and a rougher reverse. Each side also has two directions from which to look across its grain, which I call top and bottom. The front is shinier than the reverse, and the top is shinier than the bottom.

Creating the pattern

The diamond match is made from four sheets of straight-grained veneer. I used quartersawn sapele because it has straight grain lines and even figure, leaving only its rich color and pronounced refraction to catch the eye. However, it doesn't come in leaves wide enough to make up the match needed for this table, so I slip-matched two leaves together for each sheet (see the drawings on p. 102). The number of leaves you'll need to slip-match depends on the size of your sheets and tabletop.

The proportions of these long rectangular sheets are important, because they will determine the dimensions of the final square. Multiply the radius (if the table is round) of the tabletop by 2.31 to get the length of each of these sheets, and by 0.83 to get the width. This will yield a pattern slightly bigger than the tabletop, with room built in for jointing edges as you build the pattern.

When you first get the veneer, number the leaves to maintain their order and orientation. Cut the veneer to length, using a straightedge and a mat knife to score the veneer before snapping it off.

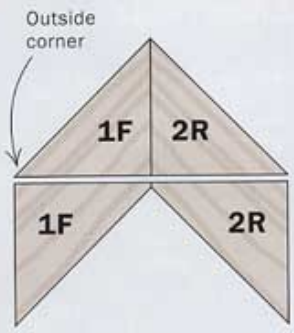
Joint the whole stack of leaves to slightly more than final width. Tape the sheets together, then tape the stack to the lower level of the jointing jig. Put on the top half of the jig and clamp it in place. Use a ½-in.-dia. flush-trimming bit. With your router speed set to maximum, rout from right to left, climb-cutting the stack. If necessary, clean up the last whiskers of waste with a sanding block and 220-grit paper.

When one side has been jointed, mark the finished width of the veneer on the lower level of the jig in two or more places to help align the stack before jointing the other edge.

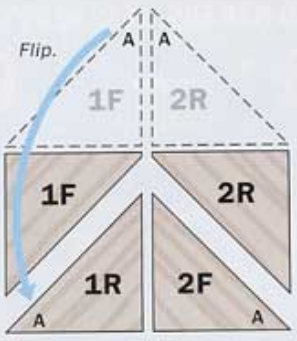
When slip-matching the leaves, keep the

Cut triangles off the top. *Use a straightedge and mat knife for quick, clean cuts.*

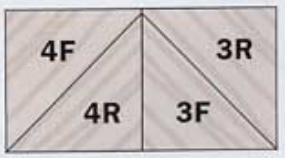
TRIANGLES BECOME RECTANGLES



Cut precisely to the outside corners. These corners will end up at the center of the final pattern.



Take apart the top triangles and rotate and flip the halves, positioning them underneath.

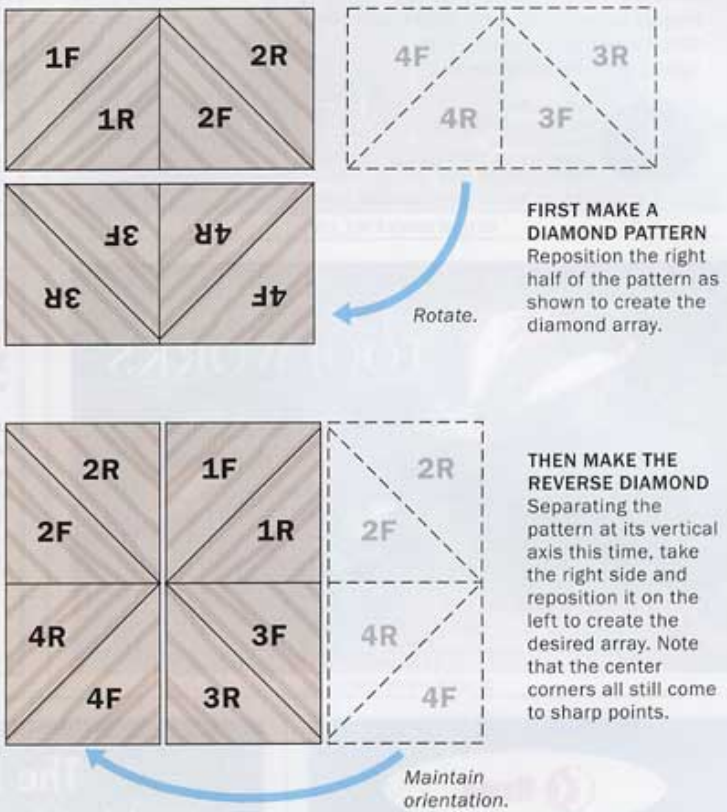


Do the same for the other half of the pattern. You now have two halves of the final pattern.

Photos: Asa Christiana

Join the rectangles to form a diamond pattern. *Tape the new seam temporarily and then create the reverse-diamond pattern as shown at right.*

CREATING A REVERSE-DIAMOND PATTERN



FIRST MAKE A DIAMOND PATTERN Reposition the right half of the pattern as shown to create the diamond array.

THEN MAKE THE REVERSE DIAMOND Separating the pattern at its vertical axis this time, take the right side and reposition it on the left to create the desired array. Note that the center corners all still come to sharp points.

sheets in order and oriented in the same direction. Turn all of the sheets wrong-side up and tape them with masking tape. Stretch the tape as you place it, which will draw the seams together tightly. Turn over the sheets and tape the top side with veneer tape. When the veneer tape is dry, remove the masking tape.

Make the rhomboid shapes

Renumber the sheets on their smooth front sides from 1F to 4F, and on their rough back sides from 1R to 4R. Stack the four sheets, front-sides up, and tape them together. Rejoint them so that they're all identical. Now, use the router jig to cut off triangles from both ends of the stack at 45°, leaving rhomboid shapes.

Pick up sheets 1 and 2. Flip sheet 2 to the right from underneath, so the tops of 1F and 2R abut (see the top drawing on p. 104). Temporarily tape this seam. Repeat with sheets 3 and 4, this time opening sheet 3 to the right from above so that 4F is to the left of 3R.

Cut triangles off the top of both pieces (see the bottom drawings on p. 104) with a straightedge and mat knife. Cut exactly to the outside corners, because these will end up inside the reverse-diamond pattern. The extra material on the bottom triangles will end up on the outside edge of the pattern. Remove the tape holding the top triangle together. Flip over the left half and move it to the bottom, then do the same with the right-hand triangle, creating the arrangements shown on the bottom of p. 104. Flipping the sheets will create a subtle refraction difference within each quadrant of the pattern, adding to the overall visual interest.

To create the diamond pattern, rotate sheets 3 and 4 180° and abut them with sheets 1 and 2 along their horizontal axes (see the top drawings above). This method preserves the grain pattern, the pattern jump and the refraction pattern. Tape the pieces together temporarily for ease of handling.

To transform the diamond pattern to a reverse diamond, you need to break up the pattern along its vertical axis. This will keep the sharp corners of the triangles toward the inside of the pattern and leave the waste areas on the outside. Remove the masking tape, as needed, and slip the right half across to the left. Finally, turn over the pattern and tape all of the seams with veneer tape. Tape the edges of the pattern to protect them.

I use a vacuum bag to press the veneer onto a medium-density fiberboard (MDF) substrate. Adding backer veneer of the same or a similar species to the underside of the panel balances it and keeps it flat. You can press the top and backer veneer at the same time if you use both top and bottom cauls in the bag. To veneer tabletops, I recommend a two-part urea resin that gives a rigid glueline. This tabletop also features a thick, solid-wood edge that frames the veneer pattern as well as protects it from the dings of daily use. □

Masha Zager assisted in writing this article.

BY JEFF JEWITT

Respirators for finishing

Spraying or not, a respirator is a great safety measure for your lungs. *Even when spraying seemingly benign water-based products, Jewitt strongly recommends a respirator and good air circulation.*

When it comes to finishing materials and solvents, the sad truth is that using almost any of these products can be dangerous. The risk ranges from slightly hazardous to extremely toxic, and precautions against them should include skin protection, eye protection and lung protection.

Gloves and goggles aren't all that hard to find or fit properly, but respirators can be a different story. Not all respirators provide adequate protection for woodworking finishes and solvents, and a poor fit may make even a suitable respirator inadequate. Here I'll look at the types of respirators to wear when using finishes and solvents in the average home or small shop. Particulates, such as sawdust, require a different type of respirator. Also, professionals using extremely hazardous materials, or having prolonged exposure to chemicals and solvents, will require more sophisticated respirators.

You may not need a respirator for every type of finishing method or product. Brushing or wiping many finishes with adequate ventilation may be safe when using shellac, oils (linseed and tung) and some water-based finishes. However, once you start getting into acutely toxic solvent-based finishes like lacquers and varnishes, a respirator is a good idea.

When atomizing or spraying *any* finish, including seemingly benign water-based finishes, I strongly advise using a respirator and providing good air circulation.

Most respirators have two layers of protection

Many respirators come with a prefilter in front of the charcoal filter canister. The prefilter captures larger particles, such as pigments and dust, preventing them from clogging up the charcoal filter and reducing its effectiveness. Expect to go through several prefilters before replacing the cartridges. When I order a matched set of cartridges, I order three sets of prefilters.

Most respirators use activated carbon to filter harmful vapors because it has a very large surface area and chemically attracts organic vapor and gas like a sponge.

The charcoal canister eventually becomes saturated and the cartridge needs to be replaced. Knowing when to do this is difficult, because the type of use and conditions affect the service life of the filter. If you can smell the solvent or finish, replace the cartridge. As you get used to the service life of your respirator, you can replace it on a regular basis. The charcoal filter is always working—whether you are wearing it or not. You can extend the life of the filter substantially by storing the cartridge in a sealed plastic bag.

Look for the right kind of cartridge

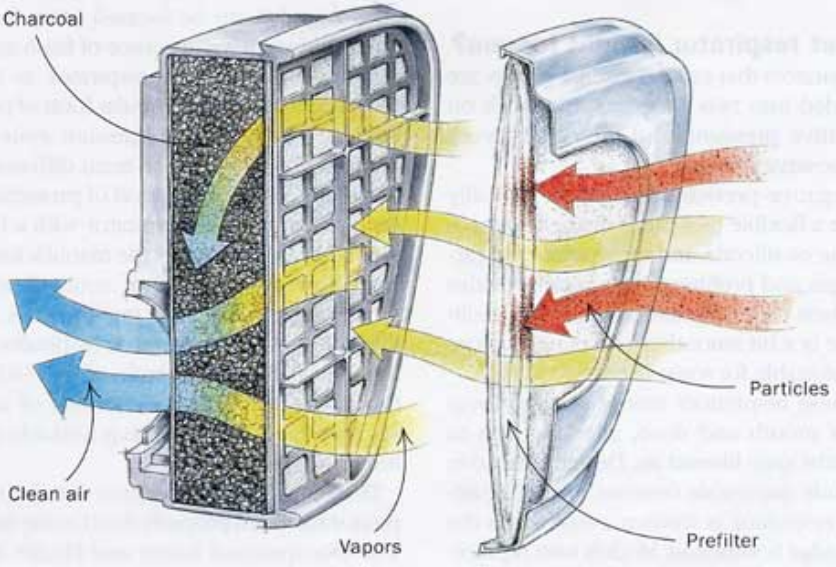
The cartridge for most finishing situations should be rated for organic vapors and gases, paints, lacquers and enamels. Respirators with these cartridges are available at just about all paint stores and large home-improvement stores.

If you have a special requirement or are unsure whether the respirator will work with the finish you're using, get a copy of the material safety data sheet (MSDS) from the manufacturer of the finish and send it to the respirator company, which can match the cartridge to the respirator.

Cartridges rated for organic gas and vapors, paint, lacquer and enamels do not offer suitable protection for the following materials: ammonia, as when fuming wood; methylene chloride found in some furniture strippers; methanol found in

INSIDE A RESPIRATOR'S CARTRIDGE

A prefilter captures large particles, but the core of the cartridge is a canister of activated grains of charcoal, which bond the dangerous vapors to them. The charcoal is held in place between two layers of Tyvek-like material.



Drawing: Don Mannes; photos, except where noted: Mark Schofield

TWO METHODS OF PROTECTION

NEGATIVE-PRESSURE SYSTEM

With this type of system, the user breathes through the filters. The most economical and popular form of protection, it is available with full (right) and half (left) face masks.

POSITIVE-PRESSURE SYSTEM

In this battery-powered unit, air is drawn through the charcoal canisters and pumped through the hose into the hood.

TESTING FOR PROPER FIT

Cover the inlet holes where the cartridges are placed and breathe in (above). The mask should collapse slightly. Then cover the exhalation vent and breathe out (below). If the mask bulges slightly, the fit is good.

some wood stains and finishes; two-part urethane finishes whose odorless compounds cannot be detected if the respirator does not fit properly or if the charcoal cartridge is saturated. For these situations, you should contact a manufacturer to get specific recommendations.

What respirator is right for you?

Respirators that protect against vapors are divided into two classes: some work on negative pressure, and the others work on positive pressure.

Negative-pressure respirators typically have a flexible face piece made from neoprene or silicone and incorporate the cartridges and prefilters. Neoprene provides the best chemical-resistant seal, while silicone is a bit smoother and may be more comfortable for some users.

These respirators mount securely over your mouth and nose, allowing you to breathe only filtered air. Designs available include disposable versions, where the entire respirator is thrown away when the cartridge is saturated. Models with replaceable cartridges and prefilters can be half mask or full mask, the latter providing eye protection as well.

Positive-pressure systems, also known as air-supplied systems, pump clean, breathable air into a mask or hood. The air can either be filtered air (using a filtering system similar to the charcoal cartridge), or the air-hose inlet can be located away from the finishing area in a source of fresh air.

A negative-pressure respirator is the most economical and popular form of protection, while positive-pressure systems are more expensive. The main difference between the two is the level of protection. A negative-pressure respirator with a half face mask, regardless of the manufacturer, can allow around 10% of contaminated air through. A full face mask allows 2% through. A positive-pressure respirator allows less than one tenth of 1% (0.1%) through. Over extended periods of use, say four to eight hours, this is a sizable difference in protection.

These comparisons assume that the respirator has been properly fitted to the user. The Occupational Safety and Health Administration (OSHA), which monitors industrial workplace safety, will not allow masks on individuals who have facial hair or glasses that extend beyond the sealing area of the mask. A hood is the only answer for these individuals.

Even if you are clean-shaven and don't wear glasses, you should still be concerned about the proper fit of a mask-style respirator. Perform a few simple tests (see the right photos above), adjusting the straps as necessary.

For most woodworkers, a negative-pressure respirator is adequate when use is limited to 30 minutes. A half-mask, dual-cartridge style with elastic straps is the most practical. If you want the best protection, or have prolonged exposure to solvents and finishes, take a serious look at a positive-pressure respirator (a battery-operated version is the most cost effective).

In all cases, remember that a respirator is no substitute for doing your finishing in a well-ventilated area. □

Photos, this page (top left, top middle, bottom left): Kelly J. Dunton

The Nature of a Bench

Sculptural furniture maker John Nes
set works hard to do justice to eac
slab of wood he uses. He spend
weeks playing with grain placemen
and stylized joinery until the woo
and the design seem harmonious
While his approach is influenced b
the late George Nakashima, Nesset i
not a purist who believes that th

"soul of a tree" can create a design. H
finds it "more honest to accept hi
role in a piece than to try to obscur
it." After all, he said, "We hack the tre
down and then cut it into pieces tha
we rearrange as it suits us." He call
this bench, "I am Nature," which wa
Jackson Pollock's comeback to a crit
ic who complained that he painte
not from nature but from his ow
imagination. The bench was commis
sioned by the Phipps Center for th
Arts in Hudson, Wis., to serve as seat
ing in its main gallery.

Photos: John Posl