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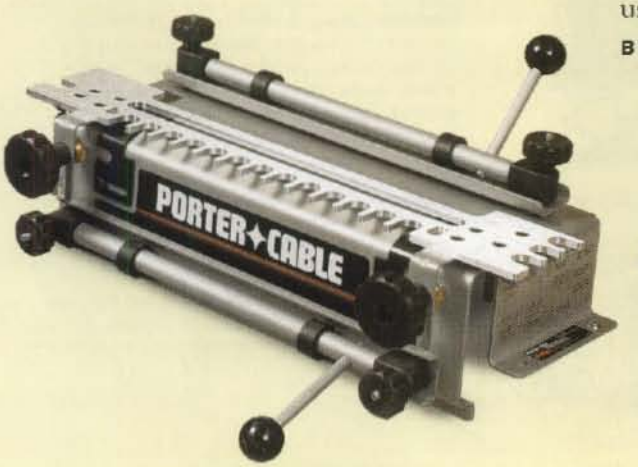

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in the back

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VIDEOS

Letter Carving Basics

T.J. McDermott ("The ABCs of Letter Carving") demonstrates his technique for carving the letter R.

Sharpening a Shoulder Plane

Chris Gochnour ("Nine Reasons to Own a Shoulder Plane") shows how to tune up a shoulder plane before putting it to use.

Details of a Huntboard

Take a guided tour of Garrett Hack's versatile sideboard as it evolves from a work in progress to a finished piece.

TOOL REVIEW

Half-Blind Dovetail Jigs

Woodworker Fred Sotcher reviews five single-use router dovetail jigs and shows how to use one to build a drawer.

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VIDEOS

Veneer Patching and Joining

OCTOBER 23: Mario Rodriguez shares two techniques for seamless veneer patching and joining in this two-part video series.

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contributors

Aaron Radelow *(Master Class)* has dedicated himself to becoming one of the most versatile furniture makers in America. For 15 years, he has been building reproductions as well as original designs in his native San Diego. His diverse portfolio includes everything from a Queen Anne dressing table to Byzantine hand-carved gates and Art Deco desks. Three years ago, Radelow was introduced to the world of French marquetry. He now spends many hours working on the "chevalet," or marquetry sawhorse, that he built. To see more of his work, visit his Web site: www.customwooddesigns.com.

T.J. McDermott *("The ABCs of Letter Carving")* has two long-standing connections with *Fine Woodworking*. He studied boatbuilding with Robert Goodfellow, our art director for many years, and he's a longtime collaborator with contributing editor Christian Becksvoort. Early this year, they teamed up with Jennings Garnett, another Down East artisan, to open the 150 High Gallery in Portland, Maine.

Doug Stowe *("Fresh Take on Tabletops")* has been a professional furniture designer and box-maker for 30 years. When he's not at work in his Eureka Springs, Ark., studio, he can be found at the town's Clear Spring Elementary School, where he oversees a six-year-old program to use the woodshop to augment instruction in math, environmental studies, and history.

FineWoodworking.com

For more information on our contributors, go to www.FineWoodworking.com/authors.

Until recently, **Stewart Crick** *(Fundamentals)* split his time between teaching management/organizational behavior and building furniture. Now he's turning his passion for Shaker and Arts and Crafts furniture into a full-time endeavor. If his shop is empty, you may find Crick at the minor-league ballpark near his Manassas, Va., home, cheering on the Potomac Nationals.

Anyone who has admired the illustrations in *Fine Woodworking* and other Taunton publications is familiar with the work of **Vince Babak** *(Q&A, Master Class, "A User's Guide to Feather-boards")*. Babak, who calls himself an architect with a passion for technical illustrations, migrated east from Akron, Ohio, to attend architecture school at Cornell University. He started doing illustrations for us in 1982 and hasn't stopped since. Babak has an architecture and illustration business in Kensington, Conn.

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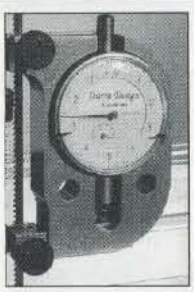

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letters

Spotlight

ISSUE NO. 186
October 2006
p. 16

HYDRAULIC-LIFT CART HAS MORE USES

I'd like to add my experiences to the recent *Methods of Work* tip on using a hydraulic-lift cart in the workshop. As Zolton Cohen says, a hydraulic scissors-lift cart is indispensable for assembly and finishing. But I've found another key use for this tool. I have outfitted my hydraulic-lift cart with a melamine top. I use this level, slick surface as an extension of the existing worksurfaces on my tablesaw, bandsaw, edge sander, disk sander, shaper, drill press, hollow-chisel mortiser, and router table. I simply wheel the cart up to the tool, quickly adjust the height, and lock the wheels. It is particularly handy for safely supporting sheet goods, long stock, and wider stock such as a tabletop glue-up.

When selecting a scissors-lift table, it is important to consider your desired range of worksurface heights. I selected a "high lift" cart with a 770-lb. weight capacity (Harbor Freight Tools, $290). This cart works with all of my machines—plus it is great for lifting heavy tools and furniture in and out of my pickup truck.

—MARK CLAYPOOL, Horseheads, N.Y.

'Woodworking has given me my life back'

In 1994 I injured my back at work, and as a result I acquired a staph infection in the bone. I was left with a lot of metal and a pain pump to live with. At least I am alive and still mobile. At some point, my sister gave me a subscription to this magazine. In a desperate need to work and be needed, I discovered woodworking. It has given me my life back.

I am not an expert or a professional and never will be, but I do love what I do. I have been able to completely rebuild my wife's kitchen, among other projects.

—JACK TANNER, Nashville, Ark.

Manufacturer defends wooden spokeshave

As the manufacturer of the Kansas City Windsor spokeshave, I was surprised by some of Chris Gochnour's comments in his recent article, "Choosing and Using Spokeshaves" (*FWW* #185). For experienced users, the jackscrew adjustment of shaves like ours is not problematic. Once set to the user's liking, typically a fine set, the blade is left where it is. If the user comes to a place where a lot of hogging is needed, he or she can quickly adjust for a deeper cut. Simply loosen one of the thumbnuts a tiny bit, and the blade will pull out into the work. When the temporary need is satisfied, the user can return to the regular position simply by retightening the nut.

Other users like to set one jackscrew a little higher than the other so that the thickness of the cut can be varied, a unique feature of wooden shaves. This means that you can rough out and remove material extremely quickly and then reduce the cut to a final setting without stopping work. This is why some woodworkers prefer wooden shaves to their more modern metal cousins.

Another important advantage to the fixed adjustment of the jackscrew: Whenever the blade must be removed for sharpening and is returned to the stock, it goes right back to the same, favored position without need of readjustment.

—KEVIN T. BRENNAN, Kansas City Windsor Tool Works, Kansas City, Mo.

Chris Gochnour replies: Your suggestions on adjustment are well taken. I agree that a shave of this type, when properly set up, requires infrequent adjustment. That said, when you do need to make a fixed adjustment, the Windsor's concealed jackscrew design was not as convenient as some of the other modern, low-angle spokeshaves I reviewed.

Polyurethane glue dangerous to pets

Keep polyurethane glue, such as Gorilla Glue, well away from dogs. At our animal hospital, we have had three cases in the past year in which dogs have ingested this type of glue. The glue does not adhere to the tissue in the stomach, but it does expand, cure, and become rock hard. We

removed a volleyball-sized ball of polyurethane glue from a Rottweiler. We have never had a case of a dog eating any other type of glue.

—ANDREW TAYLOR, Bolton Veterinary Hospital, Bolton, Conn.

Editor replies: Peter Ragland, president of The Gorilla Glue Company, echoed Mr. Taylor's caution and pointed out that the Gorilla Glue label warns users to keep the stuff away from children and pets for the reasons Mr. Taylor states.

Great job for Woodcraft roller stand

I have had the Woodcraft roller stand for about a year, and I disagree with your recent review (Tools and Materials, *FWW* #186). I use the stand as outfeed support for my tablesaw. Yes, the four legs are adjusted one at a time, but I've only needed to adjust the stand once to saw-table height. After that, the eight rollers are always level. The weight of the stand plus its four locking casters give it better stability than my individual roller stands. And I like the ability to expand the stand when I need it and contract it when I don't.

—STAN LEVINE, Rolling Hills, Calif.

Was Festool sander tested properly?

I read the recent tool test of random-orbit sanders (*FWW* #185). I have some questions about the Festool product test. In the article the author, Andy Engel, says he used Norton 3X abrasives to perform the tests on all of the sanders. To my knowledge, Norton does not make a paper that is compatible with the Festool sanders, which require a center hole in the paper to mate with a hole on the pad. This center hole is critical in the performance of the sander, and in dust extraction. How did the author use Norton 3X paper on the Festool sander? The article also states there is an eight-hole pad available for the Festool sander, and that the test was run using both the Festool nine-hole pad (with center hole) and the eight-hole pad. Festool does not offer an eight-hole pad for their sander. Where did the author obtain that pad? And again, without the center hole, wasn't the performance of the Festool sander seriously impacted?

—DAVID W. FALKENSTEIN, Cave Creek, Ariz.

Andy Engel replies: We wanted to use the same sandpaper for all of the sanders, to level the playing field, so the Festool's nine-hole design definitely complicated the testing. I spoke with Festool regarding the issue, and they sent out an eight-hole pad that I believe was intended for an earlier model. I tested the Festool sander using both the eight-hole pad and Norton 3X disks, and the nine-hole pad fitted with Festool's proprietary disks. The results didn't differ enough to justify separate reporting.

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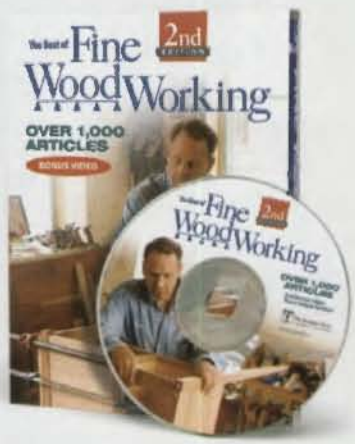

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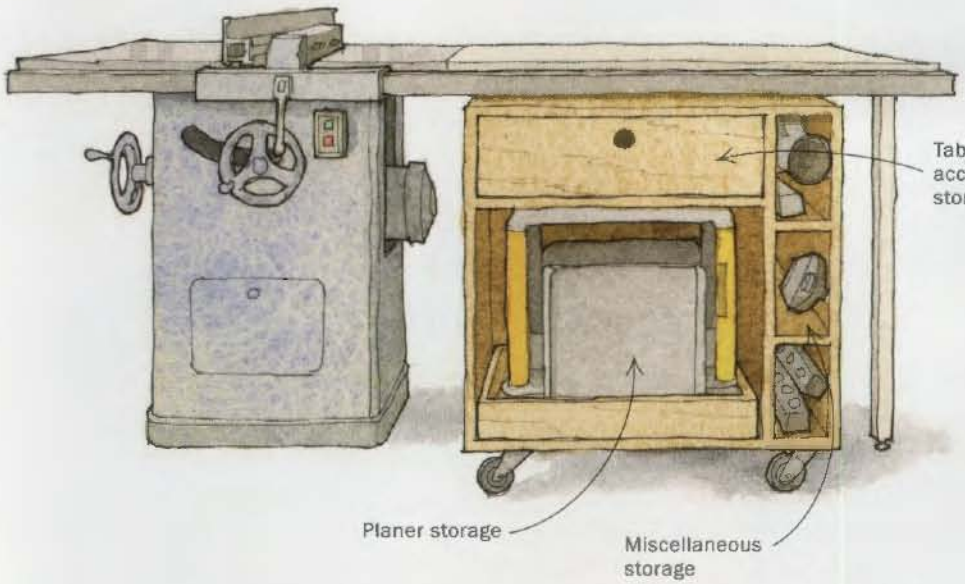
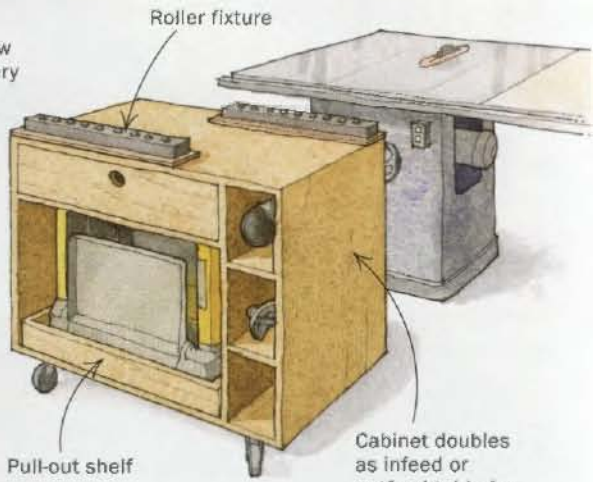
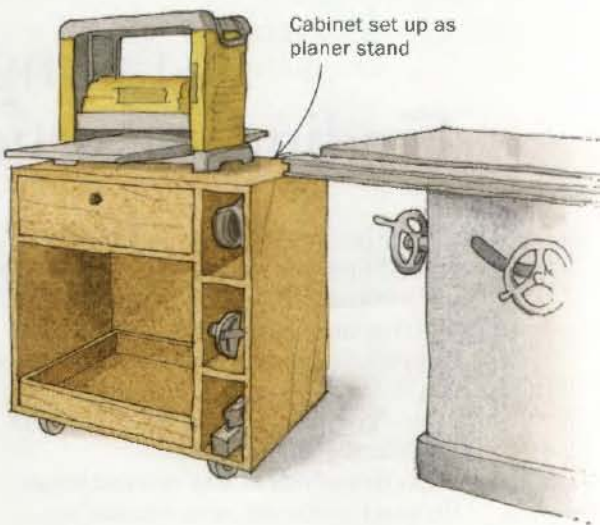




Best Tip

Planer cabinet doubles as outfeed table, stores out of the way

Juris Pukinskis started making sawdust in Mr. Miller's seventh-grade woodshop. Later, he graduated to building houses and furniture in Storrs, Conn. This fall, he's moving his family and shop to Ithaca, N.Y., where new adventures await.



Because space is at a premium in my shop, I built a roll-around cabinet for my benchtop thickness planer. When in use, the planer sits atop the cabinet (right). When not in use, the planer is placed on a shelf under the cabinet, and the cabinet is rolled out of the way under the extension wing of my tablesaw (top left). A pair of removable rollers on the top of the stand allow it to serve double duty as either an infeed or outfeed table for my tablesaw (top right). The cabinet is made from ¾-in.-thick birch plywood, edged with solid birch.

The stand has a drawer on top, a pull-out shelf down below, and three storage bins along one side. Since the stand usually is parked under my tablesaw, I use the upper drawer and the bins to store tablesaw accessories—blades, miter gauge, dado set, inserts, and the like. The bins also serve as a place to store planer accessories.

To use the stand as an infeed or outfeed table, I add two rollers to the top of the stand. Each roller is mounted to a plywood base with dowels on the bottom that fit into holes drilled in the cabinet top.

–JURIS PUKINSKIS, Storrs, Conn.

A Reward for the Best Tip

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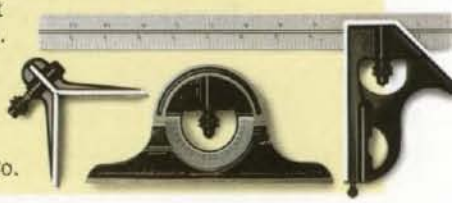


Jig makes it easier to plane sides of drawers

It usually is necessary to plane the sides of an assembled drawer in order to get a perfect fit. But it can be a chore to hold the drawer in place for planing.

The typical routine requires that you clamp the drawer to the side of a bench, take a pass with the plane, unclamp the drawer, check the fit, reclamp, take another pass with the plane, and so on.

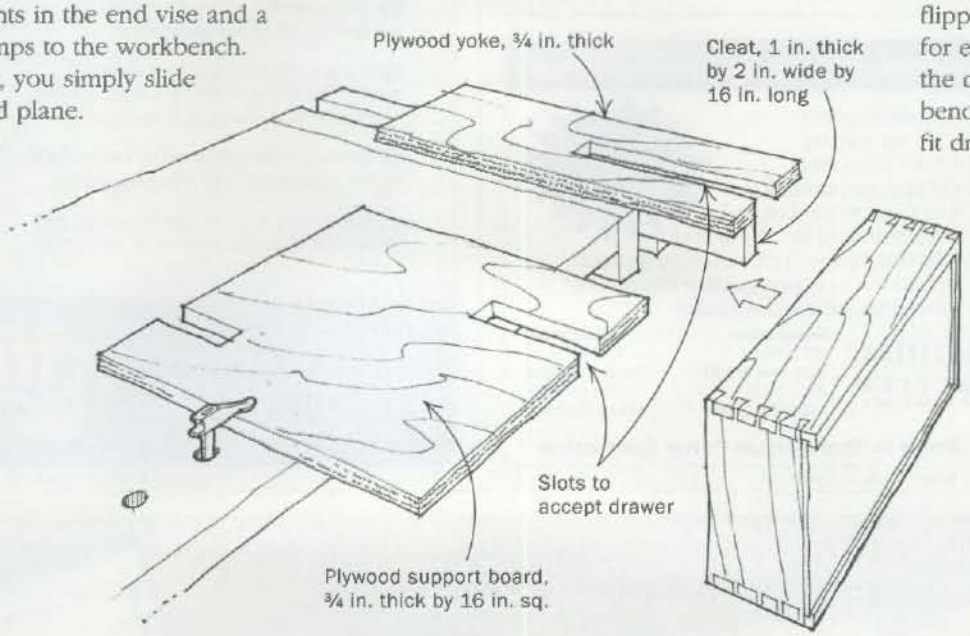
This simple jig saves time and effort. It consists of two main parts: a yoke that mounts in the end vise and a support board that clamps to the workbench.

Once the jig is set up, you simply slide the drawer in place and plane. Slide the drawer out to check the fit. The jig provides support so that the sides stay flat. It also holds the drawer in such a way that I don't feel like I'm stressing the corner joinery.

The yoke is a rectangular piece of ¾-in.-thick plywood. A 1-in.-wide slot cut in the yoke accepts either the drawer front or back. Attaching a hardwood cleat to the underside of the yoke allows it to be clamped in the vise.

The support board has slots on each side to accommodate drawers of different depths. I hold it in place by sliding a clamp through one of the benchdog holes, which keeps the clamp clear of the planing area. A bench hook also would work. By flipping the piece end for end and moving the clamp to different benchdog holes, I can fit drawers of almost any width or length. If I can't, I just cut a new slot in the plywood.

—MARK EDMUNDSON, Sandpoint, Idaho



Quick Tip

Here's a quick-to-make tool for measuring diagonals when checking a box for squareness. Cut a telescoping antenna from an old TV or radio and form each end of the antenna into a point by cutting and hammering it. The antenna is stiff enough to hold its length accurately, even when fully extended. Plus, it telescopes closed for convenient storage.

—KAREN McBRIDE, Dunrobin, Ont., Canada

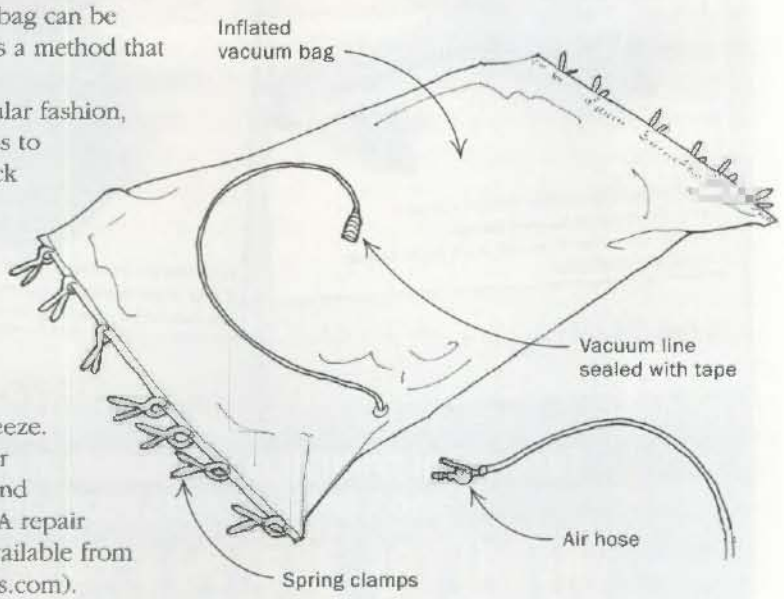
Use air compressor to find leak in vacuum-clamp bag

A leak in a vacuum-clamp bag can be difficult to pinpoint. Here is a method that has worked for me.

Close the bag in the regular fashion, and then use spring clamps to reinforce the tubes that lock the ends of the bag. Inflate the bag using the cleaning gun of an air compressor, then close the bag's input tube with plastic and masking tape.

Give the bag a light squeeze. You should be able to hear and feel the escaping air and mark the holes for repair. A repair kit for patching holes is available from VacuPress (www.vacupress.com).

—JOHN GREW SHERIDAN, San Francisco, Calif.



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Fast-action biscuiting jig

Like many woodworkers, I embraced biscuit joinery years ago. But I never seem to have a nice, flat, usable space to register the base of the joiner while making cuts. This is mainly because my workbench tends to be covered with dried glue drops, shavings, and other whatnots.

I solved the problem with a simple, modified bench hook. It provides a flat, smooth registration surface and has a pair of fences to hold the work. The best one is the split fence, which simplifies cutting biscuit slots in the ends of mitered frames.

The jig is made from ¾-in.-thick melamine. Cut the base to 12 in. wide by 16 in. long and each plywood fence to 2 in. wide by 18 in. long.

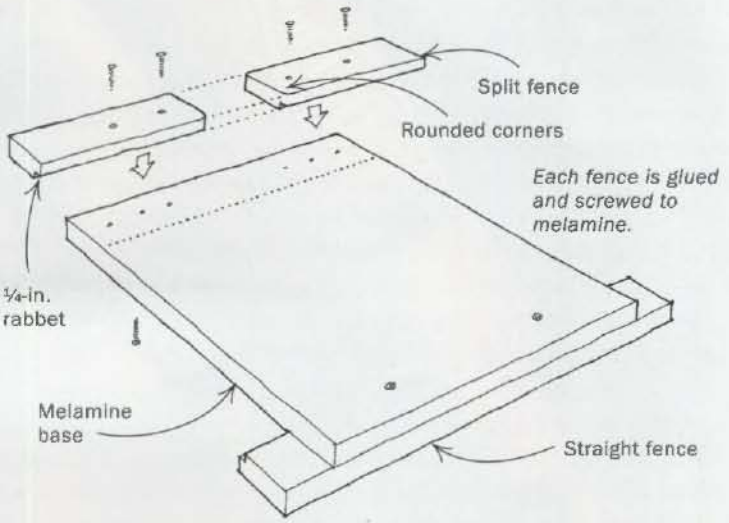
Start by cutting a ¼-in. by ¼-in. rabbet along one edge of both fences. The rabbets provide a place for dust and shavings to collect, so they won't prevent the workpiece from butting tightly against the fence.

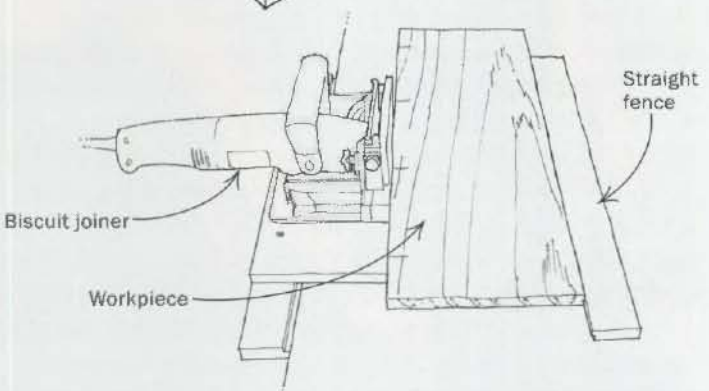
To install the split fence, first mount it in one piece by screwing from the top and bottom. Once it's mounted, mark a 4-in.-long cutout in the center. Remove the fence and cut out the marked section. Then sand a small radius on all four corners of the gap. The radius is important because you're going to be wedging workpieces against these corners and you don't want them so sharp that they mar your material. Install all fences with glue and screws.

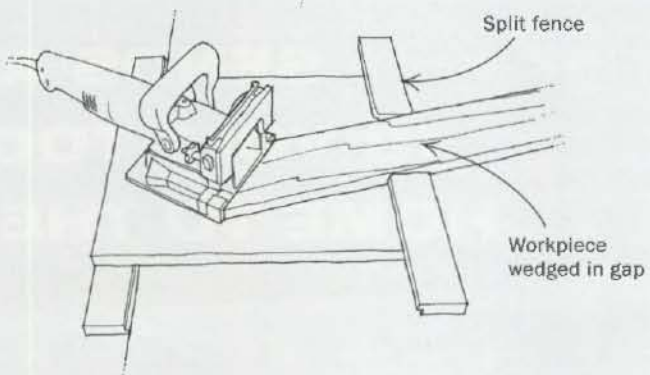
To cut a slot in the edge of a workpiece, simply hook the split fence on the edge of the workbench and place the workpiece against the straight fence. The melamine provides a smooth and true registration surface.

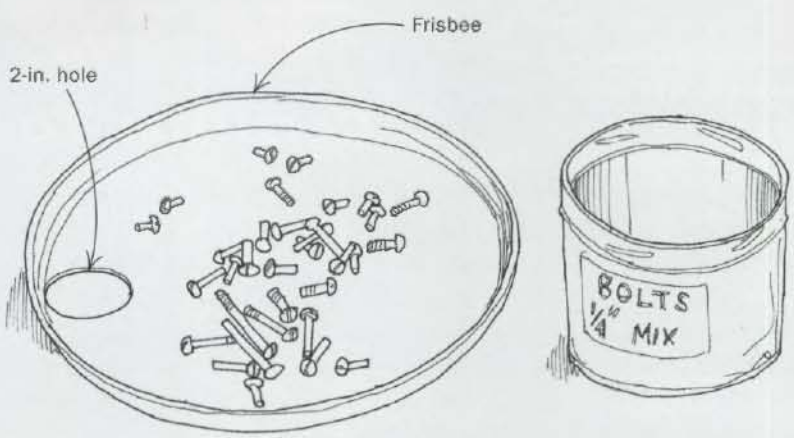
The jig really shines when cutting the end of a mitered joint. No fussy setup here. Simply place the workpiece in the opening of the split fence, then rotate the workpiece until it binds in the gap. As you make the cut, apply continuous sideways pressure to prevent the workpiece from moving.

—GORD GRAFF, Newmarket, Ont., Canada









Empty hardware into can through hole.

Hardware-sorting Frisbee

I have several tin cans filled with mismatched screws, bolts, nuts, wing nuts, and washers. To find a part, I had to dump the contents on my bench and search through the entire collection. Then all the parts had to go back in the can.

To make the job easier, I now use an old Frisbee as a sorting tray. First, though, I used a 2-in.-dia. Forstner bit in a drill press set at a low speed to drill a hole near the edge of the Frisbee.

I just pour the hardware into the Frisbee and search for the part. Then, with the hole held above the can, I push all the loose hardware directly into the can.

—SERGE DUCLOS, Delson, Que., Canada

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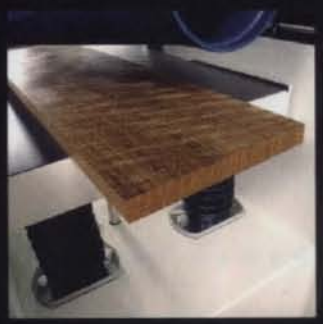

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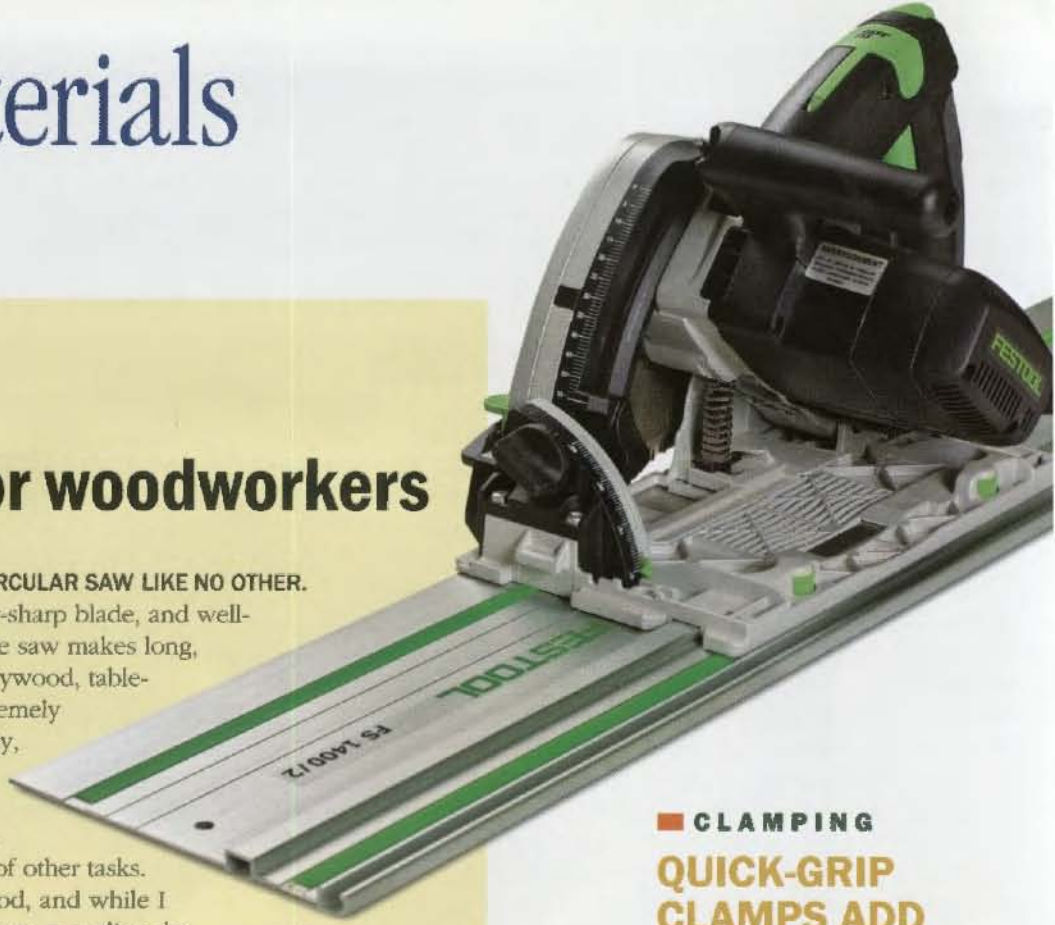

POWER TOOLS

A circular saw for woodworkers

THE FESTOOL TS 55 EQ IS A CIRCULAR SAW LIKE NO OTHER. With its splinter guard, razor-sharp blade, and well-engineered guide system, the saw makes long, straight cuts—whether on plywood, tabletops, or cabinet doors—extremely accurately, cleanly, and easily, virtually eliminating the need for a larger, more expensive panel saw or sliding tablesaw. The Festool adds a unique plunge action, opening up a range of other tasks.

I work with a lot of cabinet-grade plywood, and while I have a panel-saw attachment for my tablesaw, wrestling the 4x8 sheets onto the carriage without scratching the veneers or throwing out my back is a chore. With the TS 55EQ, I can whittle down large sheets to a manageable size quickly and cleanly.

The key to the saw's accuracy is the 55-in. guide rail made from extruded aluminum. The base of the saw mates with and slides effortlessly along tracks in the guide rail. You can correct for any slop in the fit by tightening two small cam screws on the saw's base. Two foam strips under the rail provide a firm footing to hold it in place without clamps, and they protect the wood surface from scratches. Simply align the edge of the rail with the cut line, set the saw on the rail, and make the cut.

The guide rail mates with Festool's OF 1010 EQ router (with guide rail attachment, No. 488752), making the system even more valuable and versatile.

Key features of the saw include a plunge depth stop (metric), a dust port, and a splitter to prevent binding. A splinter guard acts like the zero-clearance insert in a tablesaw to help make splinter-free cuts, even close to the edge of plywood, in stacks of veneer sheets, and on cabinet doors. The controls are easy to reach and the saw is comfortable to use, portable, and stores easily. It retails for $430. For more information and to find out about accessories, go to www.festoolusa.com.

—Mark Edmundson is a custom woodworker in Sandpoint, Idaho.

FESTOOL TS 55 EQ
Motor: 10 amps
Weight: 10 lb.
Blade speed: variable, 2,000-5,200 rpm
Cutting depth: 1 15/16 in. on guide rail; 2 1/8 in. without rail
Dust port: 1 in. and 1 7/16 in. dia.
Kit includes: Carrying case, plastic stop for stopped cuts, and 48-tooth carbide blade

No clamps necessary. *Foam strips on the underside of the guide rail prevent slipping during a cut.*

CLAMPING

QUICK-GRIP CLAMPS ADD MUSCLE

IRWIN'S QUICK-GRIP XP has essentially the same design as the familiar, smaller Quick-Grip clamp, but it's bigger, beefier, and boasts twice the clamping pressure—550 lb. with just one hand and up to 900 lb. with two.

The XP clamps excel on larger projects, such as joining legs to stretchers or assembling carcase sides, and they work well as secondary clamps for leveling tabletop or panel glue-ups. Available in six sizes—from 6 in. capacity up to 50 in.—the clamps range in price from about $25 to $55 (Amazon.com).

—Matthew Teague is a woodworker and writer in Nashville, Tenn.

Photos, this page: Thomas McKenna (left and top); Rodney Diaz (bottom right)

AIR TOOLS

Nailer drives both 23-ga. brads and pins

NIKLE NS2340
Weight: 2.2 lb.
Capacity: 200 fasteners
Air pressure: 60-100 psi
Fasteners: 23 ga., ½ in. to 1⅝ in. long

THE NIKLE NS2340 IS THE LATEST in 23-ga. nailers, offering the ability to drive both pins and brads without having to adjust or modify the gun.

Extrathin, 23-ga. pins are ideal for finish work, providing a nearly invisible fastener. What's more, the thin fasteners virtually eliminate the threat of splits in thin material, and their round shanks drive straighter than thicker-gauge fasteners. The problem with the headless pins is that they offer only minimal holding power. With 23-ga. brads, you get the benefits of headless pins with a significantly increased grip.

The Nikle holds 200 fasteners. *And the carriage automatically adjusts to fit different lengths, from ½ in. to 1⅝ in. long.*

The Nikle performed beautifully. It did not jam during use, and it set even the longest pins accurately. A turret-style air exhaust on top can be adjusted easily to direct the blast away from your face. A very narrow nose places nails accurately, and a double trigger helps prevent accidental firing. The nailer is lightweight and comfortable. For more information, visit www.nikletools.com; to buy it ($220), go to www.floydtool.com (800-882-7060).

—Roland Johnson is a contributing editor.

ACCESSORIES

ADAPTER ALLOWS IMPACT DRIVERS TO ACCEPT BITS WITH ROUND SHANKS

COMPARED WITH A CORDLESS DRILL, an impact driver has a number of advantages. It is lightweight and compact, generates more torque, and offers more driving control. But its quick-change chuck accepts only hex-shanked drill-bits, which means you can't use your drawerful of round-shanked bits. To remedy the problem, DeWalt introduced an all-metal, ⅜-in. keyless chuck adapter (No. DW0521) for impact drivers that accepts round-shanked bits up to ⅜ in. dia. I used it to build a bunch of shop fixtures, and it worked well. It is available from DeWalt (www.dewalt.com) for about $30.

—Tom Begnal is an associate editor.

Now you can use round-shanked bits in your impact driver. *DeWalt's keyless chuck adapter for impact drivers accepts round-shanked bits up to ⅜ in. dia.*

Power is the strong point of the Bosch. *The tiny battery drove an impressive 227, 2-in.-long drywall screws into a three-layer stack of ¾-in.-thick MDF.*

CORDLESS TOOLS

DRILL/DRIVER NOT GREAT AT EITHER TASK

BOSCH'S LATEST LITHIUM-ION CORDLESS TOOL is the 10.8v I-Driver (model PS10-2). The drill-driver has some useful features, such as a pivoting head, plenty of power, and an electronic clutch, but it is heavy and bulky. The tool weighs 2½ lb. and has a 2½-in.-dia. grip, making it awkward to hold, even with large hands. The trigger is comfortable, but the variable speed is hard to control when driving screws. However, the tool has enough power to drive 227, 2-in.-long drywall screws into a stack of MDF. For drilling, the 600-rpm Bosch is too slow to compete well against a cordless drill. That said, the pivoting head and the power offered could make the tool useful for installing hardware inside cabinets. The kit ($150) comes with two batteries, a carrying case, and a 30-minute charger.

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

Photos, this page: Roland Johnson (left center and top); Thomas McKenna (right and bottom)

Forrest Blades

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For almost 60 years, experienced woodworkers have relied on Forrest for the very finest in precision-engineered saw blades.

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"Your blades are without question the best by miles, and I have tried them all."
Bob Jensen–Fridley, MN

"From the first cut on, I realized that this blade was a bargain at any price! Nothing else I have cuts comparably."
Calvin Brodie–Spanaway, WA

Forrest has over 12 blades designed for serious woodworkers. **These blades are especially useful for high-end remodeling:**

Duraline – Available in several tooth count/style combinations for flawless cutting of laminates, acrylics, wood, and more.

Duraline Hi-AT – Best for cutting two-sided veneers and low pressure laminates without chip-outs or splintering.

Solid Surface Planer – For super-smooth cutting of solid surface countertops without scratches or long finishing times.

Woodworker II – *The* best-rated all-purpose blade for excellent rips and crosscuts on all hard and softwoods.

Custom Woodworker II – A specialty blade that's ideal for box joints, dovetails, flat bottom grooves, and high feed rates.

Chop Master – For tight, perfectly cut miter joints and smooth cross cutting at any angle.

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Hartville Tool. *With a large blue decimal scale on the outside and a smaller, black-and-white fractional scale in the center, the dial on this model is a bit hard to read.*

Starrett. *The dial reads fractionally or decimally, but Starrett made the fractional scale the largest and printed it on a bright yellow background that makes it very easy to read.*

Woodcraft. *The dial has one large face, with black-and-white 1/64-in. markings that are extremely easy to read.*

HEAD TO HEAD

Fractional dial calipers

FIVE YEARS AGO, SOME BRILLIANT ENTREPRENEUR came up with the idea of making dial calipers that could be read fractionally in 64ths of an inch (see *FWW* #157, p. 31), with one full revolution of the dial equal to 1 in. That invention provided woodworkers with an accurate measuring tool that didn't require mathematical conversions from decimals to fractions.

Now, several other manufacturers have entered the market fray. I recently took a look at three distinctly different models, from Hartville Tool, Starrett, and Woodcraft, to see what you get at three different price points. All three tools are made in China of satin-finished, hardened stainless steel, and all three tested equally on the accuracy scale. But several of the details are quite different, especially the dial faces.

The Hartville Tool caliper (www.hartvilletool.com) costs about $30. The head moves smoothly along the bar via a serrated thumb tab or a wheel, and it features both a fractional and a decimal scale. The fractional scale is on a white background, but it's a bit awkward to use because the scale is in the center of the dial, and my eye is naturally drawn to the outer ring.

Starrett's model 1202F-6 caliper sells for $70 (www.hartvilletool.com). The dial also reads either fractionally or decimally, but the fractional scale is larger and very easy to read. Head movement is activated with a spring-loaded thumbwheel that has virtually no backlash.

Woodcraft's caliper costs about $50 (www.woodcraft.com). It has one large dial face that's extremely easy to read. The head movement is controlled with a thumb tab only—no wheel—so the travel was not as easy to control as that on the other two calipers that have thumbwheels.

Overall, I favored the Starrett because the dial was so easy to read and the thumbwheel had less backlash.

—William Duckworth is a contributing editor.

CLAMPING

CLAMPING CAUL SAVES ON TIME AND CLAMPS

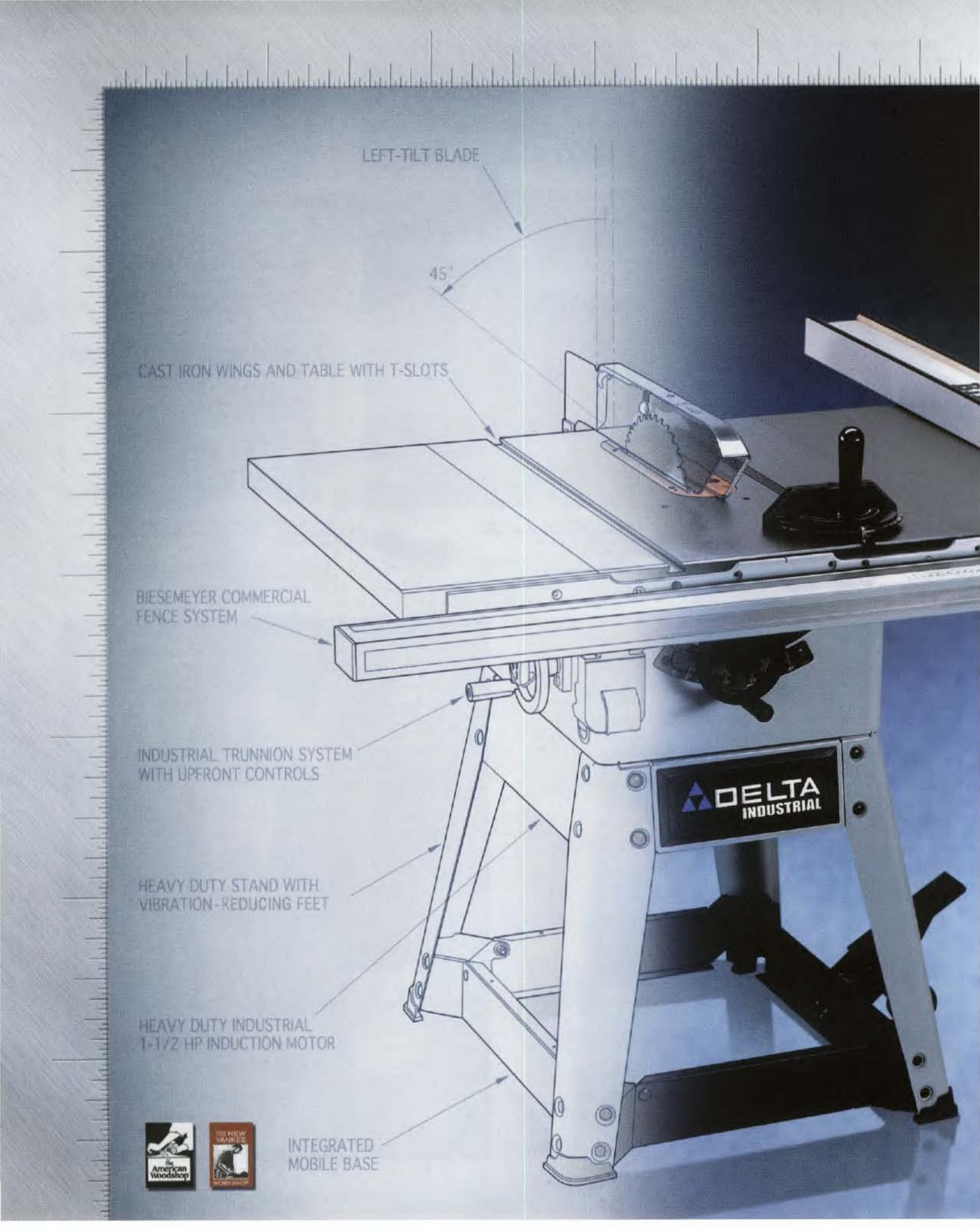
TO ENSURE GOOD CLAMPING PRESSURE when adding solid-wood edging to plywood panels, it's not unreasonable to place a clamp every 8 in. or so. On a 48-in. edge, that means seven clamps. With the new Bowclamp clamping caul, you can do the same job with two clamps.

The Bowclamp is simply a length of hardwood with a precise, gentle curve routed along one edge, and a slot on the opposite edge to accept the jaws of the clamps. As you tighten the clamps, the curved face of the Bowclamp flattens, transferring clamp pressure along the entire length of edging. The Bowclamp can be used for glue-ups as well, such as keeping a panel flat or reaching across a large carcase to put pressure on a middle shelf.

The caul is available in three standard lengths: 2 ft. ($22), 3 ft. ($27), and 4 ft. ($32). Lengths of 6 ft. and 8 ft. are available as special orders. For more information, contact Zig Industries (973-395-1588; www.bowclamp.com).

—T. B.

Photos, this page: Rodney Diaz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LEFT-TILT BLADE

INTEGRATED MOBILE BASE

DUST PORT

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Develop a game plan

MAKE A STEP-BY-STEP PLAN FOR EACH PROJECT TO MAXIMIZE EFFICIENCY AND MINIMIZE MISTAKES

BY STEWART CRICK

Many woodworkers use drawings and cutlists for each project to help them avoid waste and errors and to keep their work organized. I like to go one step further and develop a complete game plan. This plan is basically a series of steps I follow to mill, shape, assemble, and finish the individual parts and components of a project. It's a disciplined and careful way of thinking in advance about the best way to build a project, using the tools in my shop.

I think about these questions in a specific order, starting with the largest task and working down to the smaller details. If a piece is complex enough, I'll write down the plan on paper. For simpler projects, I keep the sequence in my head. In the process, I almost always find ways to save time by combining steps. I also spare myself some aggravation by making sure that I don't work myself into any corners. As a result, my shop sessions are much more efficient and enjoyable. Here are some tips:

1. Find ways to combine milling tasks

When milling, try to avoid the confusion and wasted time that come from repeated machine setups.

A small end table that I built recently, for example, requires ¾-in.-thick stock in each of three major subassemblies. It makes sense to mill all of that stock in one operation—the milling will be more consistent and you will spend less time breaking down and setting up machines.

But don't let the quest for efficiency lead you into other problems. If your stock is not fully acclimated to the shop, or if you know you'll be out of the shop for a couple of weeks between building assemblies, plan to mill up only enough stock to build one assembly at a time.

2. Find the right sequence for fashioning parts

Think about all the steps needed to produce each individual piece, and decide on the best tools and most streamlined sequence for carrying out those steps.

A set of tapered table legs, for example, will require both tapering and mortising. In many cases, you'll want to cut the mortises before tapering the legs because it is difficult to hold a tapered leg secure and level in a router jig, on a drill-press table, or on a workbench. On curved parts, too, it's often easier to cut the joinery before the curves.

Some tasks that take place late in a project can be simplified if you take preparatory steps early on. One

THINK IT THROUGH

My planning process sometimes yields nothing tangible—just a set of mental notes to guide my work. For more complex projects, I'll jot down a few notes or make a full written set of steps to follow in the shop. These notes also make it easy to take a long break from a project and hit the ground running when I return. Here's what such a list might look like for a simple end table with a drawer.

1. Rough-mill all pieces

2. Make legs
- **a. Final-mill leg blanks**
- **b. Lay out and cut mortises**
- **c. Cut tapers**
- **d. Sand legs**

3. Make side rails
- **a. Final-mill stock**
- **b. Lay out and cut tenons**
- **c. Dry-fit side rails to legs**
- **d. Sand rails**

4. Assemble table base sides (side rails to legs)
- **a. Dry-fit parts; dry run of clamping strategy**
- **b. Glue up sides**

(CONTINUED ON PAGE 34)

Photos: Steve Scott

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simple example is remembering to rabbet the back edges of case components before assembling the case (to allow installation of the back).

When building a cabinet with inset doors, for example, make a note to mortise for the hinges before assembling the case. It's easier to do this work before the case is assembled than it is to mount a router on the edge of a cabinet frame. You can mortise the doors later, after fitting them to the case.

3. Decide which components to assemble first, next, and last

It's just easier to fit some assemblies or joints together accurately if you build them in a particular order. You build one part, and then fit the next one to it.

For a small end table, I decided to build the base first so that I could then custom-fit the drawer by transferring dimensions from the opening I had created. In doing so, I spared myself no end of fussing and measuring.

I fit a drawer by transferring dimensions from the opening. In doing so, I spare myself no end of fussing and measuring.

The mortise-and-tenon joinery in the table's base offers another example. One approach would be to cut both portions of the joint to the specified dimensions. But doing this risks wasting a lot of time shimming or trimming tenons to fit. Most teachers will tell you the better way is to cut the mortise first, because the width of the mortise is less variable, as it is determined by the width of the tool used to cut it. Then transfer the dimensions and cut the tenons to fit. For my table, that meant milling up and mortising the legs before I started on the aprons.

Wood movement is another area to consider, particularly if your project will sit idle for long stretches between shop sessions. On my end table, I saved gluing up the top for last. If I had done it earlier, it might have warped before I could build the other components.

4. Plan for the finish before you begin

At some point early in my planning, I decide what type of finish to apply. First, I preview the appearance of my top candidates on sample boards. I also note any surfaces that should be sanded and finished before assembly.

For example, it's best to finish the panel in a raised-panel door before the door goes together. This will take the hassle out of applying finish at the corners, and it will prevent bare spots from showing at the edges when the panel shrinks.

In casework, it also pays to sand and finish any interior surfaces that need it before gluing up. In this way, you don't wind up awkwardly trying to sand the inside of a bookcase. Just be sure to keep finish off any surfaces that will be glued.

5. Glue up in stages

Think ahead about how much of a particular assembly you can glue up successfully at any one time. It might be possible, for instance, to glue up the entire base of a table or an entire frame-and-panel case at once. But you'll make yourself crazy and use all of your clamps trying. How many clamps do you have? And how many arms? You might end up with the glue dry and the assembly out of whack somehow.

Instead, think about breaking the glue-ups into manageable chunks. And plan to spend some time on a dry run of each glue-up. Nothing beats this technique for identifying trouble spots. □

THINK IT THROUGH (CONTINUED)

5. Make back rail and dividers
   - a. Final-mill stock
   - b. Lay out and cut tenons on back rail and lower divider
   - c. Lay out and cut tail on upper divider
   - d. Sand rail and dividers

6. Final table base assembly
   - a. Dry-fit base to lay out legs for upper divider; dry run of clamping strategy
   - b. Mortise legs for upper divider
   - c. Glue up table base

7. Install doublers, runners, and kickers
   - a. Final-mill all parts
   - b. Cut to final dimensions
   - c. Test-fit and dry run of clamping strategy
   - d. Glue in doublers, runners, and kickers

8. Build drawer
   - a. Final-mill all parts
   - b. Cut to final dimensions

9. Build and install top
   - a. Final-mill top pieces and rear cleat
   - b. Dress table pieces for edge gluing
   - c. Dry-fit table pieces; dry run of clamping strategy
   - d. Glue up tabletop
   - e. Cut rear cleat to final dimensions
   - f. Test-fit rear cleat
   - g. Install rear cleat
   - h. Drill holes in rear cleat, kickers, and upper dividers to receive top
   - i. Dry-fit top; mark and drill pilot holes
   - j. Prepare tabletop for finishing
   - k. Finish tabletop
   - l. Install tabletop

10. Finish table

TECHNOLOGICAL

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BOOM SHACKA LACKA LACKA
BOOM SHACKA LACKA LACKA

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READER SERVICE NO. 52

The Versatile Huntboard

This sideboard variation is just as comfortable in a hallway or a living room

BY GARRETT HACK

The huntboard is a wonderful furniture form, a relaxed country cousin to the more formal and high-style sideboard. It's essentially a tall serving table, with drawers and doors for storage of dinnerware. I've long admired the form, so for this year's annual auction of the New Hampshire Furniture Masters, I decided to design and build a cherry huntboard.

Typically, when designing furniture, my first thoughts are about form, proportion, shape, and detail. But versatility also can be an influence, especially for speculative work. I want potential bidders to see what they need—a sideboard in this case—but I also think my work could have many lives beyond the one I design for. This piece would be at home serving as a desk or a display table in a foyer or hallway.

The focus of my design is the three central drawers, with flanking doors adding a sense of balance. The case itself is deep and tall, and is engineered to withstand the weight of a collection of flatware and dinnerware. It's also designed to withstand seasonal wood movement.

Shape the legs and add the banding

In designing the legs of the huntboard, I used a full-size mock-up to help me gauge where they needed refining. After all, visual strength is just as important as actual strength. Once I completed the mock-up, I used it to lay out and cut the real legs, as well as to lay out the cuff banding and mortises. Cut the legs on the bandsaw and refine the shape with handplanes.

After cutting all of the mortises and the primary taper in the legs, install the cuff banding. Although you can make your own custom banding (see *FWW* #166, pp. 116-120), ready-made banding is available (www.vandykes.com, www.woodcraft.com, and www.rockler.com). Cut the

Start with the legs

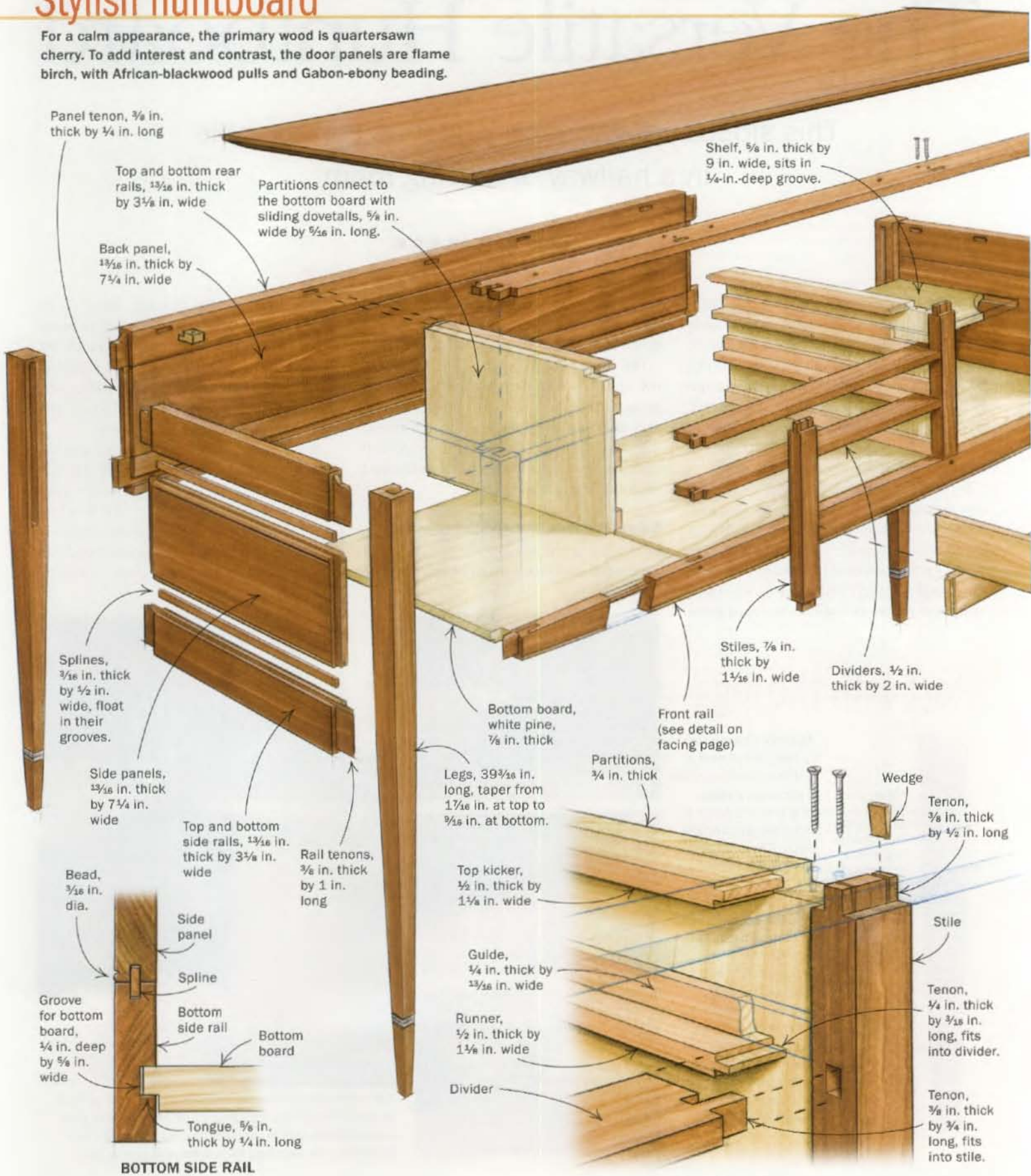
The foot of each leg is highlighted with a cuff-banding inlay and a secondary taper that give the piece a light, elegant appearance. After cutting the primary tapers on the bandsaw, miter and glue in the cuff-banding sections (1). Cut the secondary taper on all four sides, staying well clear of the cuff. Refine the taper with a handplane. Make guide marks just below the cuff (2) and at the toe of the foot, and plane until both marks are gone (3).

ASSEMBLY NOTE

The huntboard glue-up is complex. It's easiest to start by assembling the side aprons and the legs. But glue only the front legs in place at this stage—you'll need to remove the rear legs for a later step (see p. 42).

Stylish huntboard

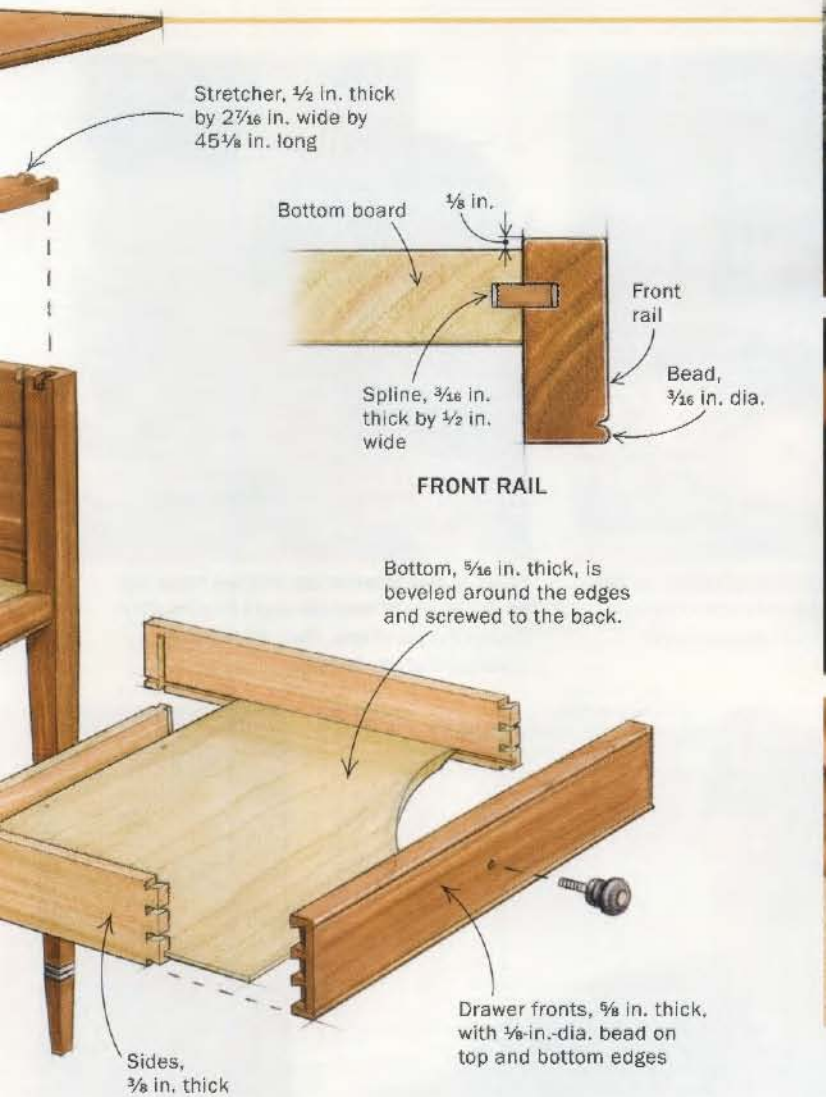
For a calm appearance, the primary wood is quartersawn cherry. To add interest and contrast, the door panels are flame birch, with African-blackwood pulls and Gabon-ebony beading.



BOTTOM SIDE RAIL

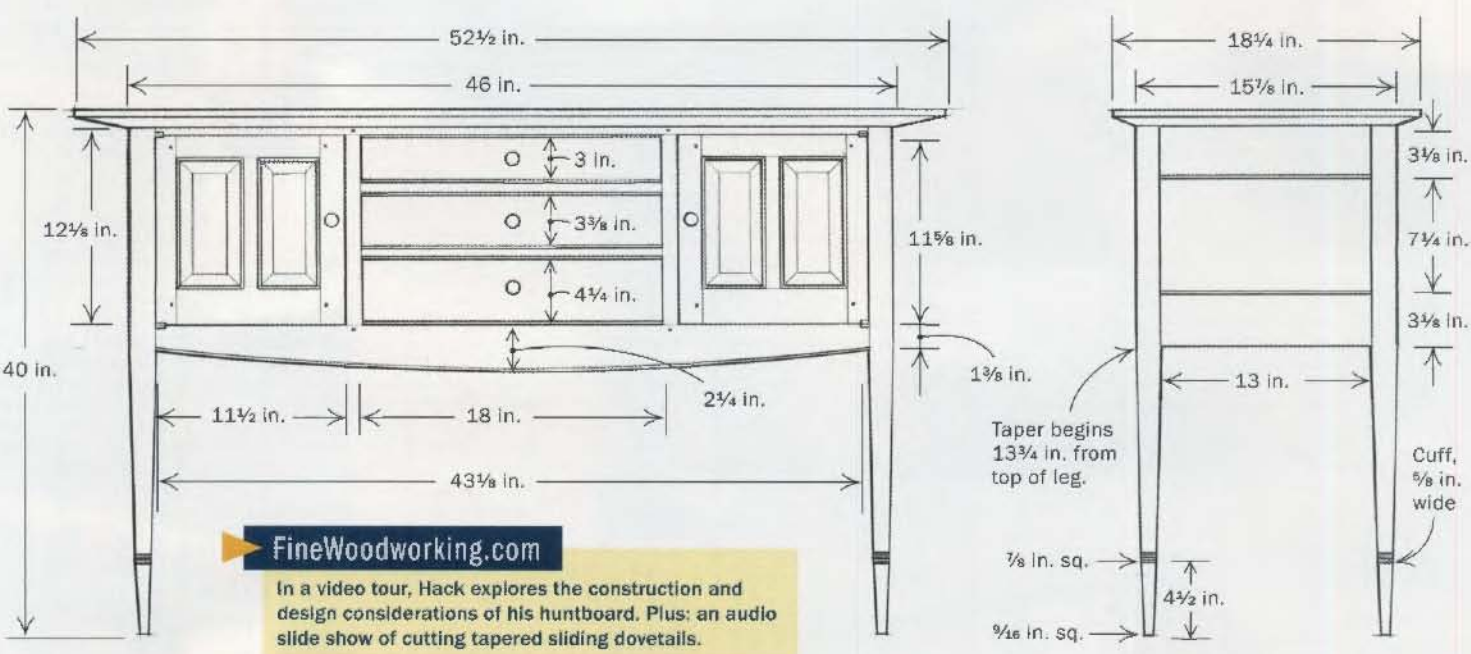
CASE INTERIOR

Photos: Thomas McKenna



FITTING A CRITICAL JOINT

The front stretcher is rabbetted and dovetailed to the legs and side aprons to help stabilize the case against racking forces. Begin by marking the shoulders of the rabbet with the case dry-assembled (top). Cut the stepped rabbet using a backsaw and chisels, then saw the dovetails (center). Set the stretcher in place and scribe for the dovetail housings in the leg and apron (bottom).



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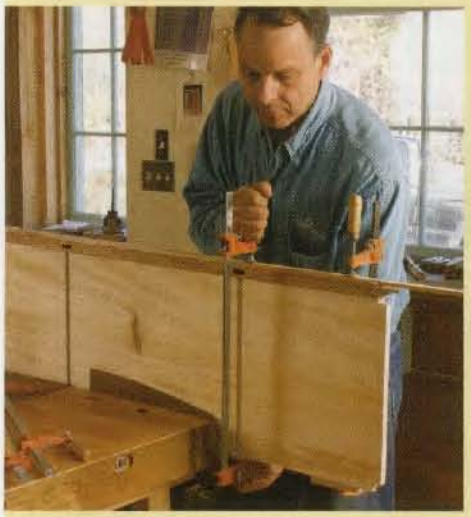
In a video tour, Hack explores the construction and design considerations of his huntboard. Plus: an audio slide show of cutting tapered sliding dovetails.

Drawings: Bob La Pointe

Glue up the case in stages



Attach the front rail to the bottom. *Glue the spline into the bottom board, then add the front rail. Be sure all of the joinery lines up before clamping.*

Glue the drawer stiles and dividers to the front rail. *Assemble the stiles and dividers, then fit them into the front rail as a unit.*

Slide in the interior partitions from the back. *Glue will help the tapered pins slide. Clamp the partitions, then let the glue dry before going any further.*

Attach the case to the rear assembly. *After gluing the front legs and side aprons to the case, slide the shelf into position, and drop the carcase into place.*

dadoes that house the banding using either a router or hand tools (for more on this process, see *FWW* #180, p. 106). Each section of banding is mitered using a 45° guide block and chisel; the block also is used to miter the door beading (see top right photo, p. 45). After the banding is glued in place, level the sections with a block plane, then plane a tapered toe from the cuff to the floor (see photos, p. 39).

Assemble the side and rear aprons

One of the most challenging aspects of this design is planning for the inevitable seasonal movement of the 13½-in.-wide aprons. Cherry boards that wide will move significantly, increasing the potential for cracking the case, opening a gap where they meet the top, and pinching a drawer or a door.

A simple and attractive solution is to make each apron in three parts: a top and bottom rail and a center panel, joined with cherry splines but no glue. The tenons of the rails are glued into the legs, while the stub tenons of the panel float in their mortises. As a decorative element, and to disguise small gaps that will open during the dry winter months, I cut beads in the center panel where it meets the rails (see bottom side rail detail, p. 40).

The most accurate way to cut the tenons and shoulders on the three parts of each apron is to dry-assemble them with the splines and cut them all at once, holding the pieces together with masking tape. Clean up the shoulders with a shoulder plane, then take apart the assembly and trim the center panel tenons down to ¼ in. long. Now, cut the miters and haunches in the longer tenons of the rails. Finally, cut a groove in the bottom rail to accept the tongue of the bottom board.

Fit the front rail and stretcher

When the aprons have been fitted, it's time to cut, shape, and fit the bottom front rail. Also, cut the slot in the rail for the spline that connects it to the bottom board, and scratch the bead along the bottom edge.

The front stretcher is dovetailed into the top of the front legs, and into the top of both side aprons just behind the legs (see photos, p. 41). For accuracy, dry-assemble the case and place the rail in position. Lay out the location of the shoulders and dovetails, and then cut them. Place the rail back in position, mark the dovetail

Add the top stretcher and kickers

With the case upright on the floor, install the stretcher. *This is tricky because you have to glue in the kickers for the top drawer at the same time. The stiles of the drawer frame are tenoned into the stretcher. Drive wedges into the tenons, then screw the stretcher to the interior partitions.*

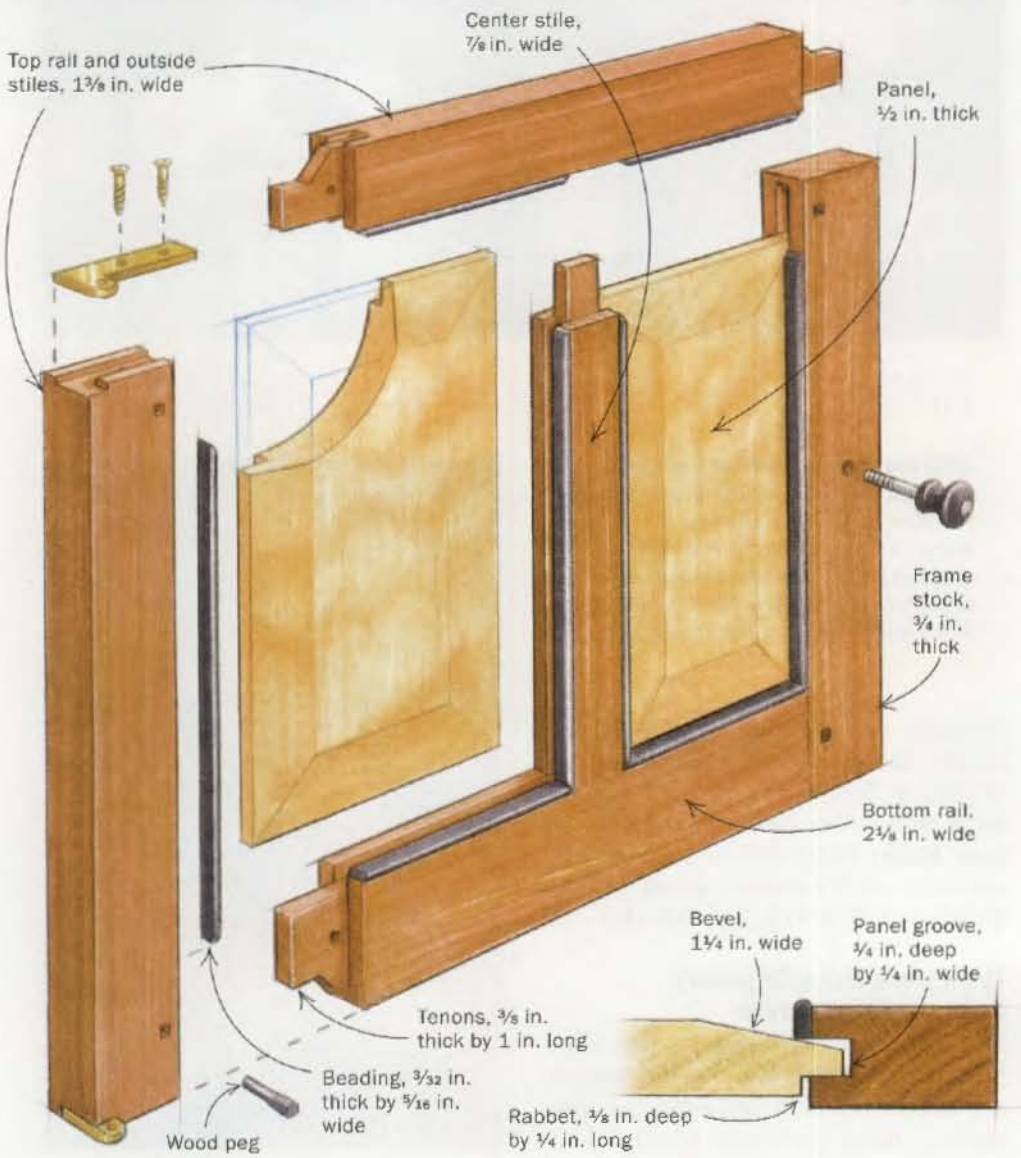
housings, then rout and chop them out. Finally, cut the mortises for the two kickers of the top drawer into the back edge of the stretcher. Also, cut the mortises for the knife hinges in the stretcher and the bottom front rail (for more on installing knife hinges, see *FWW* #152, pp. 108-110).

Thick stock and solid joinery create a stiff structure

With a huntboard, it's possible that many heavy items will be stored in the drawers and compartments. To make the case quite stiff and sturdy, the bottom board and the

Doors feature contrasting beading

Jig creates perfect bead stock. *The jig is a piece of ½-in.-thick plywood with two fences spaced the width of a block plane. The plane rides on identical shims, ensuring uniform thickness. A brad in front of the beading holds it in place.*



top are thick, and strong joinery in the face frame and interior partitions helps tie the top and bottom together.

The face frame and the drawer runners and dividers are joined with mortises and tenons while the interior partitions connect to the bottom board with sliding tapered dovetails (the slots and pins are wider at the back and narrower toward the front). Tapered dovetails ease assembly but still provide a strong mechanical joint.

To cut the dovetail slots in the bottom board, dry-fit the face-frame assembly and the bottom rail. Connect the bottom board with the spline and mark out the dovetail-slot locations. Remove the bottom board and cut the slots. Clamp a fence to the board and remove most of the waste with a straight bit. Then finish with a ⅝-in. dovetail bit. Taper the slot by shifting one end of the fence over by about 1/16 in. and then running the dovetail bit through the cut again.

Use a router table when cutting the dovetail pins in the partitions. Be sure to leave the partitions long for now, as trial and error is the only way to set the pin cut for a perfect sliding fit. I use a side rabbeting plane to taper the pins to fit, though you also could use a paring chisel.

Build doors and drawers after glue-up

When all the partitions have been cut and fitted, dry-assemble the piece, then lay out and cut the slots in the partition and side

Glue the beading to the frame. *The beading should be proud of the outside of the frame. Use plenty of clamps and a caul to ensure a good bond.*

Simple jig for perfect miters. *Clamp a 45° guide block to the frame members and chop the beading to length.*

apron for the shelf that's tucked behind one door. Also, lay out and cut all the mortises for the buttons that secure the top, as well as the mortises in the rear apron for the two top-drawer kickers. Once you're sure everything is fitting nicely, get ready for the glue-up.

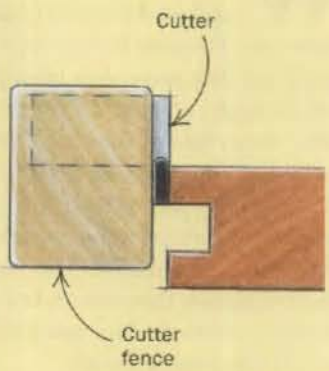
There are a lot of pieces to put together here, so to make the job easier, assemble the case in steps (see photos, pp. 42-43). After the case is glued up, cut the top to final dimensions, shape the underbeveled edge, and secure it in place with buttons and screws.

Finally, after building the doors (see photos and drawings, this spread), assembling the drawers, and turning and installing the knobs, the piece is ready for finishing.

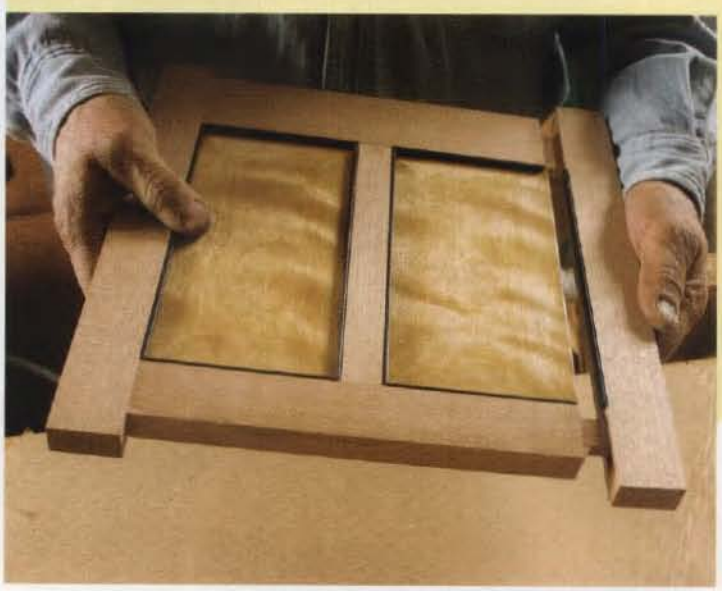
Nothing beats the dazzle of shellac

To bring out the rich color of the cherry, I started with a light coat of oil/varnish. Once dry, I padded on many layers of orange shellac (1-lb. cut) using a clean cotton rubber, rubbing it out between coats with 0000 steel wool. A final "ghosting" with a rag with just vapors of alcohol leaves a beautifully smooth finish. A topcoat of wax is the final and renewable protective finish. □

Garrett Hack is a contributing editor. Past articles and full-size plans are available at FineWoodworking.com.



Scratch the bead. *Run a simple scratch stock along the beading. You're done when the cutter just starts to bite into the frame.*



Cut the panel grooves, then assemble the door. *Cutting the grooves after the beading is applied ensures a flush fit between panel and beading. Trim the horns after the glue dries.*

Waterborne Finishes Come of Age

The best are now as good as or better than solvent finishes; the worst should still be avoided

BY CHRIS A. MINICK

When Congress enacted the Clean Air Act of 1990, doomsayers predicted that oils and waxes would be the only options for wood finishing. Optimists said waterborne finishes would come to the rescue. But at the time, waterborne finishes were little more than latex paint without pigment; they were hard to apply, offered almost no protection, and looked bad.

Five years later I tested 15 waterborne finishes (*FWW* #115, pp. 48-53) and found that while they had improved, they were still far from equal to their solvent-based counterparts. Even so, waterborne finishes offer a package of benefits that no solvent-based finish can match. They have far less odor than lacquers; they dry quicker than oils and oil-based varnishes; they offer more protection than shellac; and they can be sprayed safely without an explosion-proof booth.

So fast-forward another 11 years and it's time to look at waterborne wood finishes again. I purchased 13 readily available, clear waterborne finishes, from the hardware-store variety to those aimed at professionals, and subjected each finish to a battery of tests. What I found surprised me. In the three critical areas of application, protection, and appearance, many of these waterborne finishes are every bit as good (or better, in some situations) as the solvent-based finishes I normally use in my shop. That's a bold statement, but here's how I came to that conclusion.

Whether sprayed or brushed, the finish must be easy to apply

The clarity of a particular waterborne finish or the protection it imparts to the wood matters little if you can't apply it without drips, runs, sags, or brush marks. I used a number of tests to evaluate the application characteristics of each finish. Some tests—viscosity and vertical sag—are industry standards; others—brushability, sandability, sprayability, and grain-raising—are of my own design.

Viscosity: Don't rush to thin a waterborne finish—With solvent finishes, viscosity usually has a direct effect on flow-out and leveling. Waterborne finishes are different. Most are thixotropic; that is, they have a high viscosity in the can but "thin out" when brushed or sprayed. While low-viscosity waterborne finishes will run off a vertical surface, that doesn't mean that ones with high viscosities and great resistance to sag are impossible to apply. Try

AUTHOR'S BEST OVERALL CHOICE

GENERAL FINISHES HIGH PERFORMANCE

Minick's best-overall choice was a pleasure to work with. It brushed and sprayed easily, dried flat, and offered great protection, except from heat.

AUTHOR'S BEST VALUE CHOICE

HYDROCOTE RESISTHANE PLUS

This was Minick's choice as the best value. It brushed and sprayed well, and left a durable, truly clear finish. It's also only $9 a quart.

Photos: Mark Schofield

Testing for ease of application

Testing brushability. *To get an initial feel for how each finish brushed, Minick applied a coat to a plywood panel using a synthetic-bristle brush.*

See how they run. *A notched drawdown bar applied strips of finish ranging from 3 mils to 12 mils in thickness. The test card was then hung up to dry and the thickest line that didn't sag or run was recorded. This gives an indication of how forgiving a finish will be if too thick a coat is applied to a vertical surface.*

to brush or spray your waterborne finish straight from the can before you thin it—you may be surprised.

Vertical sag measures runs and drips—In this test, a notched drawdown bar applied 10 strips of finish that graduated in wet-finish thickness from 3 mils to 12 mils. The card was then hung in a vertical position and allowed to dry. The sag reading is simply the thickest strip that did not run or drip. Except for one, all the waterborne finishes had vertical sag values of 4 mils or greater. A typical brush coat is 3 to 4 mils thick, so runs and drips should not be a problem with most of these finishes.

Brushing and spraying properties varied widely—I brushed a coat of each finish onto a brush-out card, an industry-standard uniform surface used for testing finishes, and inspected it for brush marks and bubbles. A finish was rated excellent if it dried flat with no bubbles; good meant slight brush marks or a few bubbles; fair indicated a noticeable number of bubbles; and poor was an unacceptable amount of bubbles.

For the spraying test, I used a pressure-feed HVLP conversion gun to spray a 2-ft. by 3-ft. test board hung vertically on the back of my spray booth. Finishes were rated excellent if they sprayed like solvent lacquer; good if the dry finish had a few bubbles; fair if trapped micro-bubbles caused a slightly hazy finish; and poor if the dried finish looked like orange peel.

Grain-raising was not a problem—Waterborne finishes have a reputation for raising wood grain, so I took this opportunity to

Did the finish raise the grain? *Each panel was tested with a surface profilometer to measure its smoothness before and after the first coat of finish was applied. With most finishes, the grain-raising was insignificant.*

The finish should sand easily. *Minick sanded the first coat of each finish with P180-grit no-load sandpaper. Good finishes powder with little effort.*

Testing for durability

ADHESION QUALITY

Peel-away finish. *To test how well each finish adhered to the stained section of the panel, Minick cut an X in the finish, applied packing tape, and then ripped it off. Most finishes stuck well; this one didn't.*

SURFACE HARDNESS

Scratching the surface. *A set of pencils graduated from soft to hard were sanded to a flat tip and then pushed across each test panel at a 45° angle. The softest pencil to scratch the finish was recorded.*

find out. I borrowed a surface profilometer and used it to compare the roughness of oak plywood before and after one coat of finish had been applied. Even the worst result was fairly minimal, so it seems that waterborne finishes either have been unfairly stigmatized or have come a long way.

Some finishes sand easily, others clog the paper—No one likes to sand, but if a finish sands easily it makes the job less painful. Sanding the first coat with P180-grit, no-load paper, I rated a finish excellent if the finish powdered easily and the sandpaper didn't drag or clog; a good rating meant the finish still powdered up but sanding took a little more effort; fair finishes required a lot of muscle to sand and quickly caused clogging.

Each finish was cut, scratched, heated, and stained with food to test durability

To ensure an even playing field when testing the durability of each finish, I applied a uniform thickness to a homogeneous surface. I used 10-in. by 16-in. panels from a single sheet of ½-in.-thick oak plywood whose face was made from a single flitch of veneer. I stained half of each panel with a dark walnut, oil-based stain and allowed it to dry for two days before applying any finish.

I used an industry-standard Mayer rod to apply each coat of finish. This is a round stainless-steel bar wound tightly with stainless-steel wire. The diameter of the wire regulates the thickness of the coating; for this test I chose a wet-coating thickness of 3 mils. I applied three coats of finish to each panel and let it cure for three weeks. In addition to the waterborne panels, I prepared two control panels with solvent-based finishes: a professional self-catalyzed lacquer and a conventional brushing varnish. Note that all these tests were done with fresh cans of finish. Many woodworkers don't realize that a waterborne finish has a shelf life of about four years. The chemical additives slowly deactivate over time; warm storage conditions will hasten this deterioration. A sign that a waterborne finish is beyond its useful life is the formation of gelatinous stalactites on the underside of the lid or the rim.

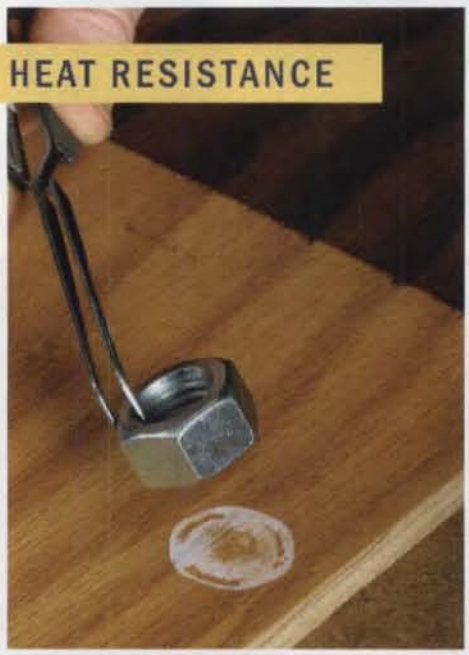
A good finish must stick to the surface—To test each finish's ability to adhere to a surface, I made an X with a razor knife through the coating over the stained section of the panel, burnished a piece of high-tack packaging tape over the X, and then ripped off the tape. An excellent score meant no finish came off; fair meant finish loss of less than 1/16 in. wide at the intersection of the cut, while a loss of more than 1/16 in. rated poor. All the finishes except two had excellent adhesion.

Scratch the surface with a pencil—It may seem counterintuitive, but soft (elastic) finishes are generally more scratch-resistant than hard (brittle) finishes. When an object strikes a soft finish, the finish deforms slightly, then rebounds to its original shape; a brittle finish fractures, causing a scratch. However, a hard finish is a better choice if you want to rub out your finish to a high gloss.

I used a set of pencils ranging from a soft 6B to a hard 6H. I held each pencil at a 45° angle to the surface and pushed it across. Pencils softer than the coating skated along without scratching; pencils harder than the coating dug into it.

Neither heat nor food should mar the finish—I patterned the food-stain test on the one used by the Kitchen Cabinet Manufacturers Association. I placed a dollop of 10 foods on each test

HEAT RESISTANCE

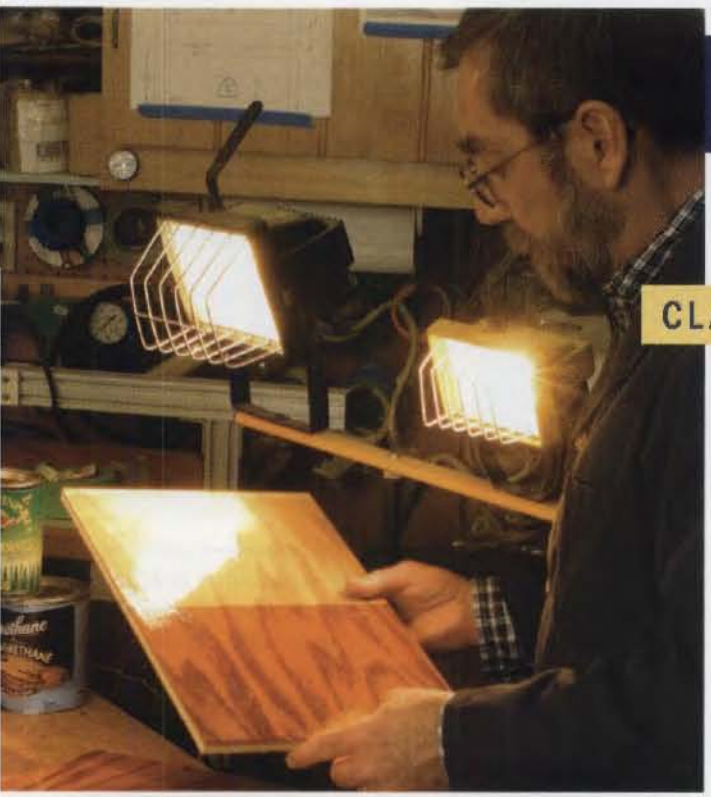


Can't stand the heat. *Minick placed a steel nut, heated in boiling water, on each test panel and evaluated the results after 24 hours. Most finishes survived unscathed; Moser's Simple Success simply failed.*

STAN RESISTANCE

Spilled food, spoiled finishes. *Ten different foods and drinks were applied to each panel to see if they marred the finish. Most finishes coped well, but mustard left a stain on many panels.*

Assessing the appearance



A clear finish. *Each panel was examined under a halogen light for color and clarity. Only a few finishes exhibited the bluish cast that was once the trademark of waterborne finishes.*

CLARITY

COLOR

Waterborne finishes can add color. *Some of the finishes, such as Hydrocote Resisthane Plus, dried clear. Others, such as M.L. Campbell Ultrastar, added a touch of yellow, while J.E. Moser's Marine Shield was dark yellow.*

Comparing the finishes

Every finish was tested first for ease of application, by brush or spray gun. The dried finish was then evaluated for its appearance, and finally subjected to a series of assaults to test its durability.

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Visit our Web site for in-depth results of Minick's finish test.

Finish Brand	Source	$ gallon/ quart
AQUAZAR WATER-BASED POLYURETHANE	Dealer locator: www.ugl.com	53/20
BENWOOD FINISHES STAYS CLEAR	Dealer locator: www.benjaminmoore.com	45/15
CRYSTALAC PREMIUM GLOSS	McFeely's; www.mcfeelys.com	42/17
FUHR 355 ACRYLIC VARNISH	Homestead Finishing; www.homesteadfinishing.com	39/19
BEST OVERALL GENERAL FINISHES HIGH PERFORMANCE	Rockler; www.rockler.com	63/26
BEST VALUE HYDROCOTE RESISTHANE PLUS	Hood Finishing Products; www.hoodfinishing.com	20/9
J.E. MOSER'S MARINE SHIELD	Woodworker's Supply; www.woodworker.com	70/25
J.E. MOSER'S SIMPLE SUCCESS	Woodworker's Supply; www.woodworker.com	45/18
MINWAX POLYCRYLIC	Hardware store or home center	43/15
M.L. CAMPBELL ULTRASTAR	Dealer locator: www.mlcampbell.com	34/8*
OLYMPIC POLYURETHANE	Lowes; www.lowes.com	40/16
OXFORD ULTIMA BRUSHING VARNISH	Homestead Finishing; www.homesteadfinishing.com	58/22
VARATHANE DIAMOND POLYURETHANE	Dealer locator: www.woodanswers.com	48/19
CONTROL GROUP		
MINWAX FAST-DRYING POLYURETHANE	Hardware store or home center	25/9
ML CAMPBELL MAGNAMAX	Dealer locator: www.mlcampbell.com	42/10*

*Available in gallon only. Quart price equals ¼ of gallon price.

panel, then after 24 hours washed the panel clean, dried it, and graded it. I awarded two points if the finish was undamaged, one point if the finish needed buffing to remove the stain, and no points if I observed permanent damage.

The Fuhr 355 and M.L. Campbell's Ultrastar scored a perfect 20 points with the rest of the pack close behind. This is a pretty tough test, so any of these finishes would be fine on a well-cared-for dining table.

For the heat-resistance test I boiled a bunch of ¾-in. galvanized steel nuts in water for five minutes and then immediately placed one on each panel. After 24 hours I inspected the panels and assigned a rating of excellent for no damage, good for slight damage that could be buffed out, and poor for permanent damage.

Clarity and color determine a finish's appearance

The application and protection properties of a finish are meaningless if it looks bad on the wood. Waterborne finishes have a reputation for having a hazy, almost bluish appearance, especially when applied over a dark stain. However, most of the finishes tested were completely transparent. A few were slightly hazy but looked fine under normal lighting conditions, but J.E. Moser's Simple Success had a distinct bluish haze that I found objectionable.

How waterborne finishes color the wood—Conventional wisdom in woodworking circles is that waterborne finishes are completely colorless. While that is true for some brands, it is far from universal. When I measured the color of each finish with a laboratory spectrophotometer, I found that about half had an amber tint reminiscent of nitrocellulose lacquer.

The contrast between the clearest finish (Hydrocote Resisthane Plus, color index 1.35) and the yellowest (J.E. Moser's Marine Shield, color index 27.34) is obvious on maple but barely detectable on dark Peruvian walnut. However, I was shocked when the same two finishes turned cherry a dark gray/green color.

APPLICATION				DURABILITY				APPEARANCE	
Vertical Sag	Brush	Spray	Sand	Adhesion	Hardness	Food Stain Resistance	Heat Resistance	Clarity	Color
Fair	Poor	Poor	Good	Excellent	Very soft	Good	Good	Slightly hazy	Clear
Excellent	Fair	Excellent **	Fair	Excellent	Soft	Good	Good	Slightly hazy	Yellow
Excellent	Good	Good **	Excellent	Excellent	Medium	Good	Good	Transparent	Clear
Excellent	Poor	Excellent	Excellent	Excellent	Medium	Excellent	Excellent	Transparent	Clear
Good	Excellent	Excellent **	Excellent	Excellent	Medium	Good	Poor	Transparent	Light yellow
Excellent	Excellent	Excellent	Good	Excellent	Medium	Good	Good	Transparent	Clear
Good	Excellent	Excellent	Good	Fair	Very soft	Good	Excellent	Transparent	Dark yellow
Poor	Excellent	Fair	Fair	Poor	Soft	Good	Poor	Very hazy	Light yellow
Fair	Fair	Good	Good	Excellent	Very soft	Good	Poor	Transparent	Clear
Fair	Poor	Excellent	Excellent	Excellent	Medium	Excellent	Excellent	Transparent	Yellow
Good	Good	Excellent **	Good	Excellent	Medium	Good	Good	Transparent	Clear
Excellent	Good	Excellent	Good	Excellent	Medium	Good	Good	Slightly hazy	Light yellow
Fair	Poor	Good	Excellent	Excellent	Soft	Good	Good	Transparent	Clear
Poor	Excellent	Excellent	Fair	Excellent	Very soft	Excellent	Excellent	Transparent	Dark yellow
Fair	Excellent	Excellent	Excellent	Excellent	Medium	Excellent	Excellent	Transparent	Yellow

**Thinning of no more than 15% needed to achieve good atomization.

This color change is caused by a waterborne finish's chemical makeup rather than the color of its resin. Waterborne finishes must be alkaline to remain stable in the can, and alkaline materials can change the color of some woods. If you don't like the appearance of a finished sample, wipe the bare wood with a sealer coat of wax-free shellac; it will act as a barrier to the waterborne finish and will prevent chemical discoloration.

Picking the winners

In a strong field, I liked the Oxford Ultima Varnish and J.E. Moser's Marine Shield because both applied clear rather than milky white. But my choice for best-overall finish goes to the General Finishes High Performance product. This finish was a dream to work with: It brushed and sprayed easily, it dried flat, it had great protection except from heat, and it looked good. It has everything you could ask for in a finish except for price. At $26 per quart, the General Finishes product is a bit on the expensive side, so I chose Hydrocote Resisthane Plus as the best value. Not only does Hydrocote offer a truly clear coat, but it's also a steal at $9 a quart. □

Chris A. Minick is a consulting editor.

Fresh Take on Tabletops

With a center gap for expansion, the design options multiply

BY DOUG STOWE

A few years ago, I attended a family reunion at a state park in Tennessee. As a woodworker, I couldn't help noticing that the cabins in the park had solid-oak tables made with breadboard ends. The breadboard ends kept the tabletops flat and covered the end grain, giving a more refined look. I also noticed a common problem: The humidity had caused the top to expand so that it extended ⅜ in. on both sides of the breadboards.

Breadboard ends have an annoying design quirk related to humidity and wood movement. As humidity changes, a board expands and contracts in width. That same humidity, however, has no significant effect on the board's length. And that's the problem. When a table is built, the edges of the top often are made flush with the ends of the breadboards. During summer, when humidity is high, the top absorbs moisture and gets wider, but the breadboard ends stay the same length. As a result, some of the top's end-grain begins to show. In the winter, when humidity is low, especially in heated homes, the top gets narrower as it dries and the breadboard ends stick out.

Center gap solves a problem

At the same reunion, an aunt, wanting to encourage my woodworking career, asked me to design and build her a table. With the cabin tabletop issue fresh in my mind, I began to consider other ways to address the challenges presented by the expansion and contraction of wood.

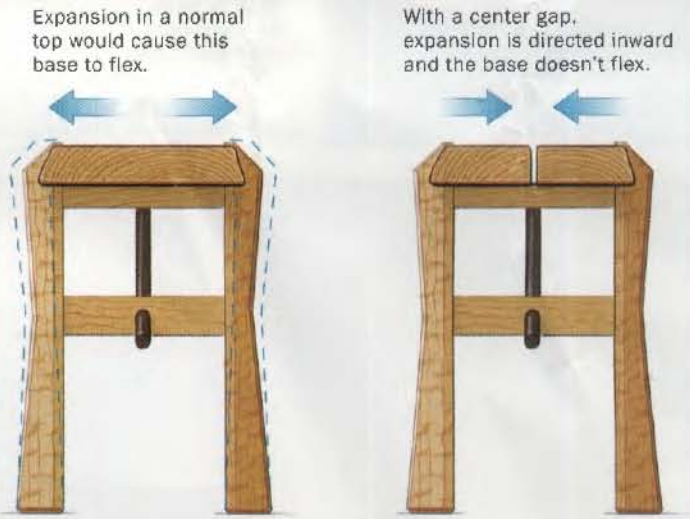
Inspired to think outside the box, I decided to make the top with a narrow center board separated slightly from the other boards to create a pair of end-to-end gaps. With the top attached to the breadboards only at the outside ends, the gaps allow the wood to expand and contract at the center of the table. That means the overall width of the top doesn't change, and the edges of the top and the ends of the breadboards stay perfectly flush. The center board added a unique and interesting look to the table.

Since then, I've used a center-gap concept in several tables and even a bench. In some, I inlaid small, flat stones to add texture and visual interest (see photos, p. 55).

Having a center gap and fixed edges on the tabletop also affects what you can do with the base. For a bench made from curly maple (see photo and drawing, right), the center gap helps in a slightly different way. Without it, the top ends of the legs would

CONNECT A TABLETOP RIGIDLY TO A BASE

Thanks to the center-gap design, Stowe can dovetail the ends of the legs into the benchtop without danger of flexing the base.



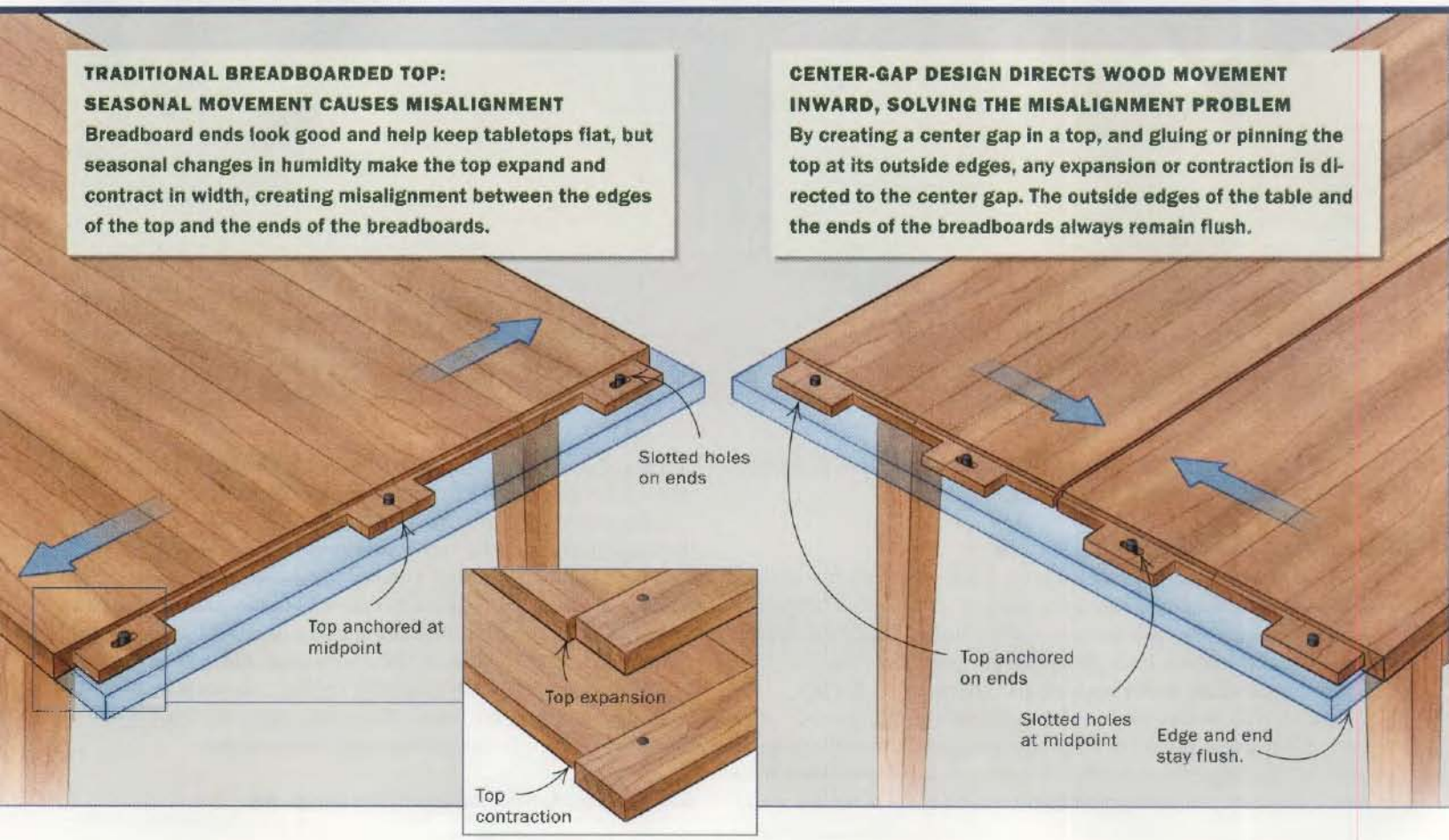
KEEP BREADBOARD ENDS FLUSH

TRADITIONAL BREADBOARDED TOP: SEASONAL MOVEMENT CAUSES MISALIGNMENT

Breadboard ends look good and help keep tabletops flat, but seasonal changes in humidity make the top expand and contract in width, creating misalignment between the edges of the top and the ends of the breadboards.

CENTER-GAP DESIGN DIRECTS WOOD MOVEMENT INWARD, SOLVING THE MISALIGNMENT PROBLEM

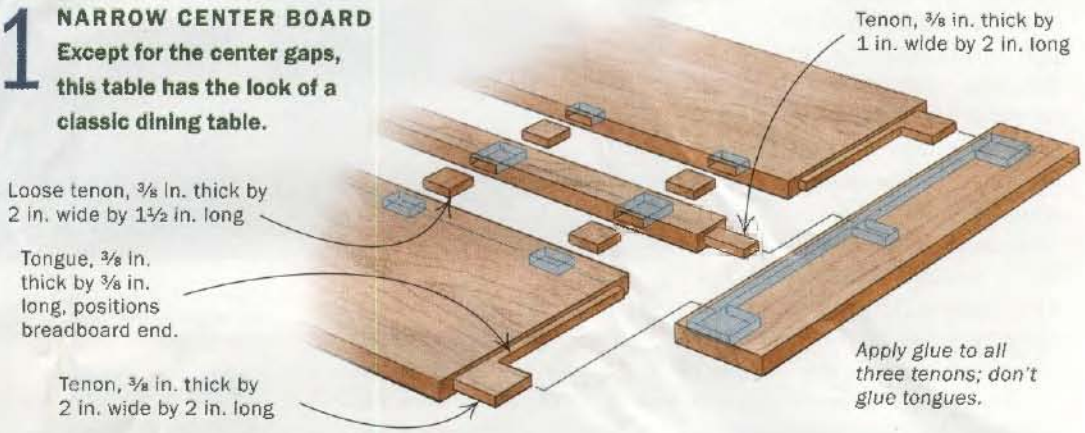
By creating a center gap in a top, and gluing or pinning the top at its outside edges, any expansion or contraction is directed to the center gap. The outside edges of the table and the ends of the breadboards always remain flush.



Photos, except where noted: Doug Stowe; drawings: John Hartman

1 NARROW CENTER BOARD

Except for the center gaps, this table has the look of a classic dining table.



flex. Eventually, such flexing would cause the leg rails to loosen. The center gap eliminates the problem.

Inlaid stones add detail and texture

Natural materials like wood and stone work wonderfully together. That's why I sometimes inlay a few shallow, flat stones in tabletops that incorporate my gap technique. The stones stand just slightly proud of the surface. It's a pretty straightforward technique, yet it adds considerably to the warmth and character of the top.

Arrange the stones on the top in a manner that pleases your eye. Then use a pencil to trace the perimeter of each stone on the top. To help when it's time to relocate the stones later, label each stone and matching perimeter with identical numbers. Use a carving gouge to remove material under each stone. Don't worry much if the match isn't perfect; the glue fills in any gaps.

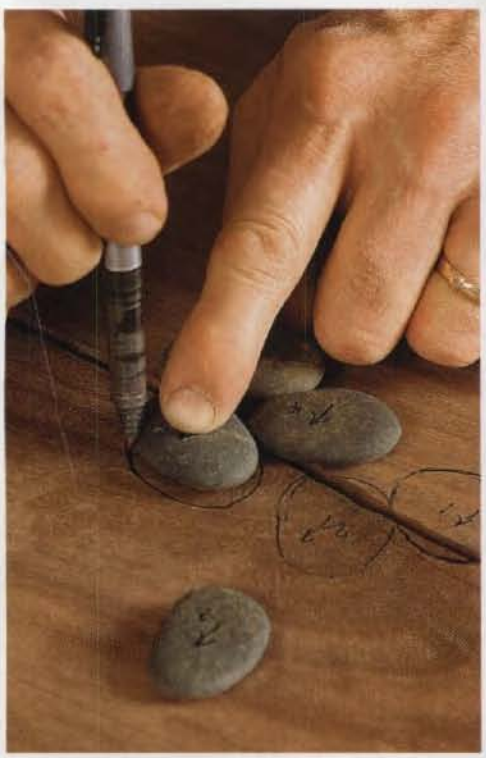
Apply a generous amount of two-party epoxy to a cutout. Place the mating stone in the cutout and press firmly. Repeat for each stone. Sometimes I extend a stone across the gap. In that case, make sure the stone is glued to one side of the gap only. If both sides are glued, the movement at the gap would surely cause something to crack, probably the epoxy joint. Also, when carving, be sure to create a little clearance around the perimeter of the unglued portion of the stone. That way, when the top expands, the stone won't jam against the edge of the recess. □

Doug Stowe is a furniture maker in Eureka Springs, Ark.

Photos, this page and facing page (top four): Tom Begnal

2 INLAID STONES

By adding stones to the center gap, Stowe blends two natural materials to create a whimsical detail.



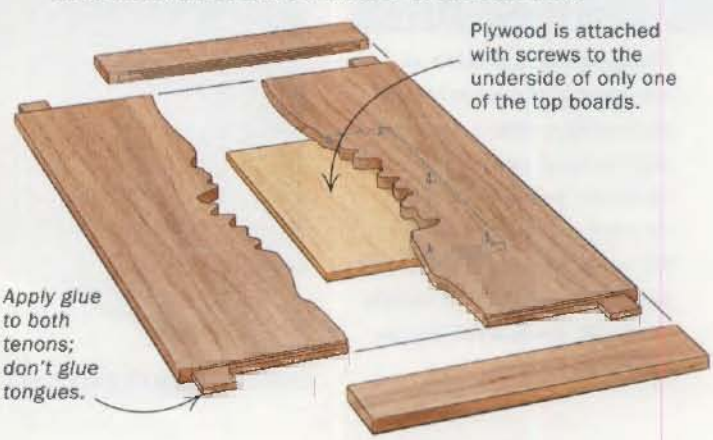
Lay out the stones. *Stowe begins the inlaying process by positioning the stones and then tracing their outline.*

Remove the waste stock. *A carving gouge pares stock as needed so that each stone can be inlaid to about one-half its thickness.*

Glue the stones in place. *A two-part epoxy bonds the stones securely to the top. Stones that span the gap are glued to one side only.*

3 A BED OF STONES

Stowe sometimes opens up a portion of the gap and arranges loose stones to fill the opening. He adds a plywood board with solid-wood edging to the underside of the top to support the stones. To allow for wood movement, the board is attached on one side only.



Many joints are possible

These samples provide an overview of the many joints and configurations possible with dovetail jigs. Other joints are possible, and the spacing options are endless. We used the shorthand listed below each sample to denote the basic joints each jig can produce.

THROUGH DOVETAILS (T)

HALF-BLIND DOVETAILS (HB)

VARIABLY SPACED THROUGH DOVETAILS (VT)

Dovetail Jigs

All can make precise joints—but the best do it easily

BY TIM ALBERS

To many woodworkers, a clean and snug-fitting row of dovetails is the hallmark of craftsmanship (hence the logo of this magazine). This is probably why you'll find more than 20 dovetail jigs on the market, each promising to turn a time-consuming process into a few foolproof passes with a router.

Like politicians, these jigs are either loved or hated and everyone seems to have an opinion about them. To see for myself, I gathered 15 of the most versatile jigs for a thorough test.

The only jigs I didn't test are the most basic models, which cut only half-blind dovetails, on stock 12 in. wide or less, with fixed spacing. These are covered by Fred Sotcher in a Web-only article, available free on FineWoodworking.com.

How they stack up

First, every one of these jigs can produce a snug and accurate dovetail joint. The factors that separate them are the diversity of joints they can create, the width of workpieces they can handle, and the setup and adjustment time they require. The best jigs offer a good balance between versatility and learning curve.

I was impressed with a number of these jigs. Though a router bit can't create the very slender spaces between tails associated with hand-cut joints, a good dovetail jig will turn out a stack of boxes in an hour, and many offer variable spacing for more attractive results.

For the best-overall award, the Leigh D4R comes out on top. It can do it all and do it quickly. The Akeda is another great jig, but not quite as versatile. Even with the D4R, I'd be tempted to add a Keller and/or Gifkins jig: the Keller for larger work and the Gifkins for small boxes. These offer unmatched simplicity and efficiency.

For best value, I recommend the Porter-Cable 4212. While only 12 in. wide, it offers a remarkable combination of price, options, and ease of use.

Tim Albers is a woodworker in Ventura, Calif., and a frequent contributor.

VARIABLY SPACED HALF-BLIND DOVETAILS (VHB)

SLIDING DOVETAILS (S)

BOX JOINTS (B)

ISOLOC (I)

Leigh jigs are fast and versatile

AUTHOR'S BEST OVERALL CHOICE

LEIGH D4R AND D1600

Source: www.leighjigs.com
Street prices: $476 (D4R, shown); $340 (D1600)
Thickness capacity: ⅛ in. to 1½ in.
Width capacity: 24 in. (D4R); 16 in. (D1600)
Variable spacing: Yes
Templates included: VT, VHB, S
Accessories available: I, B, dust port
Instructions: Excellent
Learning curve: Fair
Ease of setup: Very good
Ease of use: Very good

The Leigh jigs are built around a solid aluminum base unit, with quick and solid clamps, and a single ingenious template that produces both through- and half-blind dovetails with variable spacing, as well as sliding dovetails. The jig comes with the cutters and guide bushings for these joints.

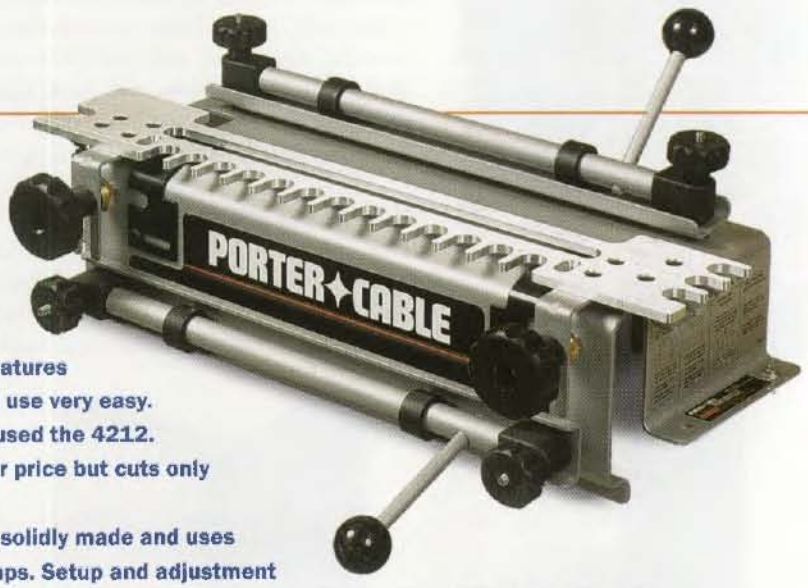
One template does all. *This clever template does both through- and half-blind dovetails, with variable spacing that is easy to set up.*

Complexity is the tradeoff with such a versatile jig. While the manual is the most clear and comprehensive woodworking equipment manual I have seen, it still took me about a half-day to master the basic joints. However, once I understood the basic jig, terminology, and marking system, I was able to cut a variety of joints very quickly. Diagrams on the jig itself act as helpful reminders.

The key to the Leigh design is the sliding template fingers, which allow beautiful dovetail configurations to be arranged by eye, with the fingers always locking down level and straight.

The shorter Leigh D1600 (not shown) is a great value, offering all of the features of the D4R except adjustable pin size, a feature I consider insignificant.

The Porter-Cable is a bargain



AUTHOR'S BEST VALUE CHOICE

PORTER-CABLE 4212

Source: www.portercable.com
Street price: $150
Thickness capacity: ¼ in. to 1⅛ in.
Width capacity: 12 in.
Variable spacing: No
Templates included: HB, T
Accessories available: None
Instructions: Very good
Learning curve: Easy
Ease of setup: Very good
Ease of use: Excellent

Porter-Cable's 4200-series jigs contain some new features that make setup and use very easy. For my evaluation, I used the 4212. The 4210 has a lower price but cuts only half-blind joints.

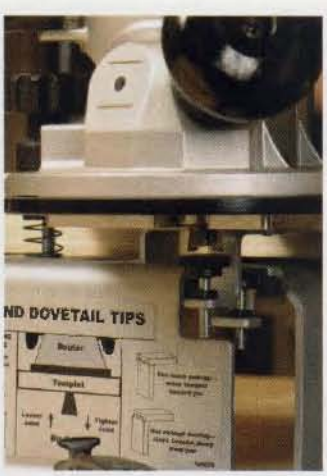
The 4212 base is solidly made and uses fast-acting cam clamps. Setup and adjustment went smoothly, though the instruction manual could be better. Very helpful are the additional setup lines and instructions etched onto the templates themselves. The jig is also the only one to include built-in gauges for setting the router-bit height. The jig comes with ½-in-dia.-shank router bits, which reduce vibration (most others use ¼-in. bits).

After using the jig a few times with the help of the information on the templates, it becomes pretty intuitive, and switching between templates, joints, and different-size boards goes quickly. At an average street price of $150, this jig is a real bargain.

Photos: Asa Christiana

Flip and continue. *For through-dovetails, once the tails are cut the template is simply flipped over to cut perfect pins.*

Helpful guide lines. *The templates have scribe marks that are aligned easily with the back of the tail board, making setup fast.*



Another unique guide. *The Porter-Cable is the only jig with built-in guides for setting bit depth. Instructions on the jig mean fewer trips to the manual.*

AKEDA DC16

Source: www.woodcraft.com

Street price: $350, plus router bits ($450 as tested)

Thickness capacity: ¼ in. to 1 in. (pin board max is ¾ in.)

Width capacity: 16 in.

Variable spacing: Yes

Templates included: VT, VHB, S

Accessories available: Router bits, dust port, various-sized fingers

Instructions: Excellent

Learning curve: Easy

Ease of setup: Very good

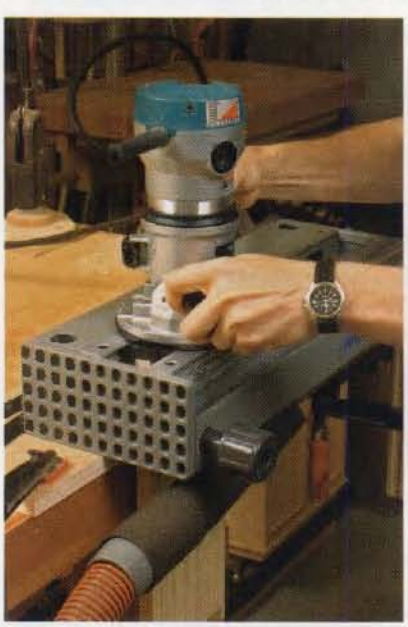
Ease of use: Very good

The Akeda jig truly is a new approach to cutting dovetail joints—and a successful one. If it were 24 in. wide, it would give the Leigh D4R tough competition for the best-overall award.

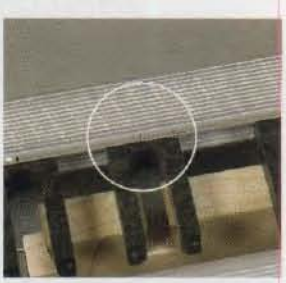
The Akeda comes completely assembled, and setup is a snap. The jig is calibrated at the factory and no adjustments are needed. Within 30 minutes I had read through the excellent instructions and made a precise, finished joint with variable spacing.

The Akeda's uniqueness comes from its boxlike design, which employs movable guide fingers that snap into a guide rail at ⅛-in. increments. The tails are cut first; then the tail fingers are replaced by tapered pin fingers. The clamping bars are simple and fast to adjust—one of the best designs of any jig. They require only one knob, with an internal gear system keeping pressure even.

The Akeda bits are not a standard size, so I'd keep a few extras on hand in case one breaks.



Design advantages. *The Akeda jig's boxlike design offers better router support than other jigs, and with an accessory port, much better dust collection.*



Good old pencil marks. *After cutting the tails, you mark the jig at the centerline of each template finger and then align the pin fingers with those marks.*

FESTOOL VS-600

Source: www.festoolusa.com
Street price: $300, $390 with basic templates
Thickness capacity: ⅝ to 1⅛ in.
Width capacity: 24½ in.
Variable spacing: No
Templates included: None
Accessories available: T, HB, S, B, doweling jig, router bits, dust port
Instructions: Fair
Learning curve: Difficult
Ease of setup: Fair
Ease of use: Good

The Festool is a versatile jig capable of dovetails, box joints, and even shelf-support holes and dowel joints. It also has very solid clamping bars with a third knob in the middle for narrow stock. Adjusted front-to-back, the templates are the only ones that hold their settings when removed from the jig. The jig must be used with a Festool router, but these come with a tapered pin that makes installing the guide bushing a breeze, and the 8-mm-dia. Festool bits are stiffer than the ¼-in. competition.

However, the jig's design is troublesome. Because it uses a special guide bushing with a lipped collar, the stock can't be pushed flush against the template. This makes it harder to align the template with the work or to align two boards when cutting half-blinds. And the long, thin templates tended to flex under the weight of the router, or bow on top of narrow boards. Last, the jig is only the base unit; you must buy bits and at least one template to cut a joint. Add the router and the price approaches $800.

These templates remember. *The Festool templates retain their front-to-back settings when removed from the jig.*

Got three hands? *Because the workpieces don't touch the template, you must go by feel when aligning two boards—tough while holding the workpiece and tightening a clamp.*

HART DESIGN GFK1800

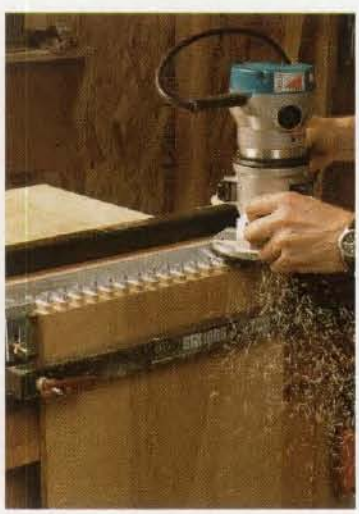
Source: www.hartvilletool.com
Street price: $150
Thickness capacity: 7/16 in. to 1 in.
Width capacity: 18 in.
Variable spacing: No
Templates included: HB
Accessories available: T, small HB
Instructions: Very good
Learning curve: Fair
Ease of setup: Very good
Ease of use: Good

The Hart jig, model GFK1800, is especially large, well-designed, and well-made for a lower-priced, half-blind jig. The initial setup and adjustment took only 30 minutes. I recommend the simple but effective setup gauge ($10), which aligns the side guides and template and sets the bit height. Cam-style clamp levers ($20) are also a helpful upgrade.

As with all half-blind jigs, the template supports only slightly more than half of the router base, so care must be taken to prevent the router from tipping.

The Hart jig also offers templates for through-dovetails—one each for pins and tails. Unfortunately, each time a template is changed, it must be set up and adjusted for accurate results.

The Hart 18-in. jig is a solid performer. A 12-in. model is $100, and includes a free setup gauge.



Good capacity in a basic jig. *The Hart's 18-in. capacity means it will produce deeper boxes and cases than the other low-priced jigs.*

Handy alignment guide. *Like the rest of the jig, the small, optional guide that aligns the side stops is simple but effective.*

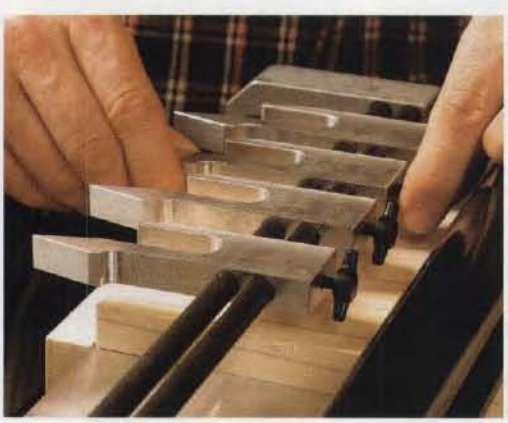
PORTER-CABLE OMNIJIGS

Source: www.portercable.com
Street prices: $400 (7216); $300 (5116)
Thickness capacity: ½ in. to 1 in.
Width capacity: 24 in. (7216); 16 in. (5116)
Variable spacing: Yes
Templates included: HB, VT
Accessories available: Small HB, VT, B
Instructions: Good
Learning curve: Fair
Ease of setup: Fair
Ease of use: Fair

The Omnijig has been Porter-Cable's flagship dovetail machine for many years. In fact, the entire jig is being radically redesigned, with the new version set for a January 2007 release. We'll review it in a future issue. The existing version is the heaviest and most solid of any of the jigs we evaluated (the 7216 weighs in at 60 lb.). Both existing models come with a half-blind template, a router bit, and a template guide bushing. A special offer on the 24-in. model includes a variably spaced through-template.

The Omnijigs arrive assembled with only minor adjustment necessary. The instructions are simple and straightforward, and a good video is included. The solid-steel, cam-action clamping bars have no flex, but to adjust them for different thicknesses you have to reach awkwardly under the jig.

The half-blind templates work well. But on the one for variably spaced through-dovetails, the T-shaped handle on each finger can get in the way of the router above and the workpiece below. Also, it's easy to tighten down the fingers in a slanted position.



Fickle fingers. *The poor design of the T-shaped clamp handles on each finger means that the template must be raised above the workpiece to align the fingers, making layout less accurate. Also the fingers don't stay level when they are adjusted.*

ROCKLER DOVETAIL JIG COMBO 23882

Source: www.rockler.com
Street price: $140
Thickness capacity: ½ in. to 1¼ in. (¾ in. on T)
Width capacity: 11 in.
Variable spacing: No
Templates included: HB, T
Bits included: Yes
Accessories available: None
Instructions: Very good
Learning curve: Fair
Ease of setup: Good
Ease of use: Fair

The Rockler Dovetail Jig Combo is a basic half-blind dovetail fixture with the addition of a through-dovetail template. The jig comes equipped with everything necessary to make either joint. The base unit is made from stamped steel and a fair amount of plastic, including the half-blind template.

The initial setup goes quickly, as the instructions are clear and the jig comes mostly assembled. The clamping bars are solid, and large adjustment knobs make coarse adjustments very quick. The cam-action clamps work very well.

But the jig's overall design is problematic. Unlike the others, the Rockler template is stationary, and a separate fence limits the rearward travel of the router base. This requires too much math and test-fitting to arrive at a snug, flush joint—especially when switching from one type of joint to another.

Adjustments are a chore. *This jig uses a rear fence to stop the back of the router base. This means both template and fence must be adjusted for each new workpiece or joint, and math is necessary.*

Clamp-on jigs are easiest

Three jigs are a different breed: They are portable templates that clamp on to the workpiece. All use bearing-guided router bits, which tend to be more accurate than template guides. Better yet, after initial setup, these jigs handle stock of varying thickness with no

WOODHAVEN 7517K

Source: www.woodhaven.com
Street price: $362
Thickness capacity: ⅜ in. to 1 in.
Width capacity: 12 in.
Variable spacing: No
Templates included: T, HB
Accessories available: B, small HB
Instructions: Good
Learning curve: Fair
Ease of setup: Fair
Ease of use: Good

The standard Woodhaven jig (model 7500; $207) is a half-blind jig with fixed spacing. This review covers more versatile jigs, so I ordered the Woodhaven with its optional through-dovetail template and bits—actually a copy of the Keller Journeyman template.

In its basic configuration, this is a solid half-blind jig that uses bearing-guided bits, an advantage over jigs that use fussier template guide bushings. The clamping bars have slots so that clamps can be moved next to the stock to prevent flex in the bars. The jig can be used upside down on a router table. I also liked the speedier, optional Kamtite clamps (shown).

On the downside, the Woodhaven comes in many parts and takes time to assemble. The side guides are different for various dovetails and must be changed out. The outrigger support arm for the router was more trouble than it was worth. Last, I preferred using the Keller through-dovetail system on its own (see Keller review); its versatility is limited in the Woodhaven jig.

Movable clamps. *These can be snugged up to the sides of the workpiece for even pressure.*

Lots of parts. *The side guides are different for different dovetails, adding a step during changeovers. This jig also requires the most assembly.*

GIFKINS JIG

Sources: www.gifkins.com.au (info); www.japanwoodworker.com (purchase)
Street price: $220
Thickness capacity: ⅛ in. to ⅞ in.
Width capacity: 12 in.
Variable spacing: No
Templates included: T
Accessories available: T, for other spacings
Instructions: Excellent
Learning curve: Easy
Ease of setup: Very good
Ease of use: Excellent

The Gifkins dovetail jig comes standard with a backer-board assembly and one phenolic template of the buyer's choice. The pin and tail boards are mounted at the same time on opposite sides of the fence, and aligned with a very precise and stable stop. A variety of optional templates can be purchased for different dovetail sizes and spacings.

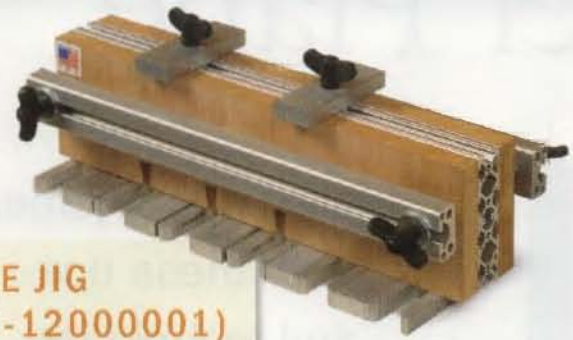
The instruction booklet for this jig is one of the best, though all dimensions are metric. The jig was ready to use right out of the box, aside from a one-time adjustment to the shims used on the pin side of the backer board.

The Gifkins jig is intuitive, remarkably fast to use, and especially suited for the router table.

Shim once; done forever. *The Gifkins jig provides thin shims for fine-tuning the fit of the pins. As with all clamp-on jigs, you'll only have to do this once.*

Router-table technique. *All of the clamp-on jigs will work on the router table, but the Gifkins is especially stable there.*

adjustment. They can't cut half-blind dovetails but are versatile in other ways: Variable spacing and wider workpieces are handled by sliding the template along the workpiece and/or skipping pins. Wedge-shaped shims will allow the jigs to cut dovetails at an angle.



KATIE JIG (KJ1-12000001)

Source: www.katiejig.com
Street price: $270
Thickness capacity: ⅛ in. to ¾ in. (tail board, 1 in.)
Width capacity: 12 in.
Variable spacing: Yes
Templates included: VT
Accessories available: None
Instructions: Good
Learning curve: Fair
Ease of setup: Good
Ease of use: Very good

The Katie is the only clamp-on jig with true variable spacing. However, the movable finger assemblies require a bit more setup than the fixed models, partly because there is play in the finger assemblies when loosened.

I found this jig easier to use upright, with a handheld router. There are optional handles available for controlling the jig on a router table, but they are too close to the clamp handles, and the one interferes with the other. Also, due to the variable spacing, the backer board gets eaten away more quickly than similar models, and tearout becomes a problem.

KELLER PRO SERIES

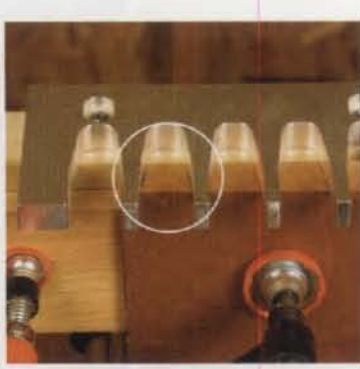
Source: www.kellerdovetail.com
Street prices: $250 (1601); $340 (2401); $440 (3600)
Thickness capacity: ⅛ in. to ¾ in. (tail board, up to 1 in.)
Width capacity: 16 in., 24 in., or 36 in.
Variable spacing: No
Templates included: T
Accessories available: None
Instructions: Very good
Learning curve: Easy
Ease of setup: Very good
Ease of use: Excellent

The Keller Pro Series jigs are simply aluminum templates (with bits included) that come in pairs (for pins and tails) and are supplied in three sizes, all longer and thus more versatile than the other clamp-on jigs. The templates are mounted on shopmade backer boards. There's a less-expensive Journeyman system made from phenolic resin that comes in two sizes, 15 in. ($150) and 22 in. ($220). These combine the tails and pins on one template, requiring the user to make just one backer board.

As with all clamp-on jigs, test cuts are needed at the very beginning to adjust the pins' template on its backer board, but on the Keller a helpful scribe line gets you close. (Quick tip: Before flipping over or replacing a chewed-up backer board, clamp another board to the template to record the correct position.) The system is very easy to use: The tails are cut first, and then the tail board is used to register the pin board. Just clamp on stop blocks for repetitive work.

The 16-in. length might be all you need. It is more affordable, yet because it can be slid along the workpiece, with careful layout it will handle the deepest blanket chest.

Variable spacing, at a price. *While this is the only clamp-on jig with movable template fingers, they have slop in their fit. To align them correctly, push each one against the mounting bar when securing it.*



Low-tech but effective. *After cutting the tails, use that workpiece to lay out the first pin on the mating piece (left). Then you can align the pins' template quickly and accurately (right). Clamp a stop block on each jig to lock in the side-to-side workpiece alignment.*

9 Reasons to Own a Shoulder Plane

Fine-tune your joinery with these tips and techniques

BY CHRIS GOCHNOUR

It's easy to dismiss the shoulder plane as a "specialty" plane, another way of saying it has limited use in most shops. But that has not been my experience. I use this tool almost every day in my furniture-making shop. When I teach woodworking and show students what the shoulder plane can do, it quickly becomes the most borrowed tool from my tool chest.

Early in its history, the shoulder plane was used most often to plane the shoulders of hand-cut tenons, hence its name. The blade is bedded at a low angle, with the bevel facing up, making it well-suited for planing end grain. It can be used one- or two-handed.

What really sets the shoulder plane apart from other handplanes is its narrow body profile, with the sole precisely milled square to its side and a blade that spans ever-so-slightly beyond the full width of the sole (see drawings, facing page). That means the blade is sure to cut fully into a corner without producing an unsightly cut line. Granted, you can use a chisel to get into a corner, but a shoulder plane does it faster with more control. Because the side of the plane and the sole are square to each other, each face of the corner remains square. Also, compared to a chisel, the plane makes it easier to keep the surfaces perfectly flat.

I reach for my shoulder plane all the time. Indeed, when making a wall cabinet recently, I used the plane in nine different places. For many of these tasks, the shoulder plane simply is the best tool for the job. The following pages illustrate some of the more common ways I put a shoulder plane work. No doubt there are other applications as well.

Chris Gochnour builds furniture and teaches furniture making in Murray, Utah.

Photos: Tom Begnal; drawings: Kelly J. Dunton

1 Trim tenon cheeks to fit

Perhaps the task where I use a shoulder plane the most is fine-tuning the fit of tenons to their respective mortises. I use machinery to cut the tenons. But I don't aim for a perfect fit from the machines, mainly because there are enough slight variables in the process to make perfection hit or miss. Instead, I use the machines to produce a very tight fit. Then, when it's time to dry-assemble the parts, I use the shoulder plane to shave each tenon cheek. This gives me complete control, and I end up with a perfect fit every time.

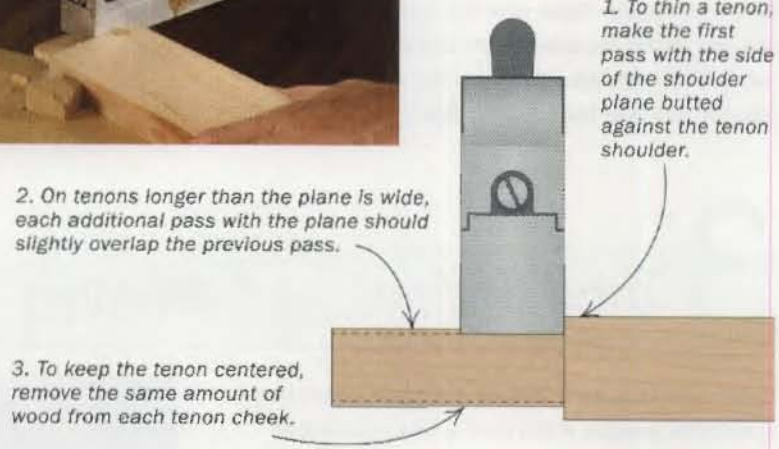
Before starting, set the plane for a very light cut. Check to make sure the blade is parallel with the sole of the plane. Plane across the grain, taking light passes. If the tenon is longer than the plane is wide, use slightly overlapping passes, starting at the shoulder and working toward the tenon end.

Be sure to plane the same amount from both cheeks. If you don't, the position of the tenon relative to the face surfaces of the workpiece will change slightly, and the face surfaces of the mating parts won't be perfectly flush when assembled.

There's another advantage to starting with a tight fit. If, during dry-assembly, I discover any misalignment of the face surfaces of the mating parts, I can make a correction. This is done by identifying where the joint is misaligned and planing one cheek of the tenon until the misalignment is corrected.

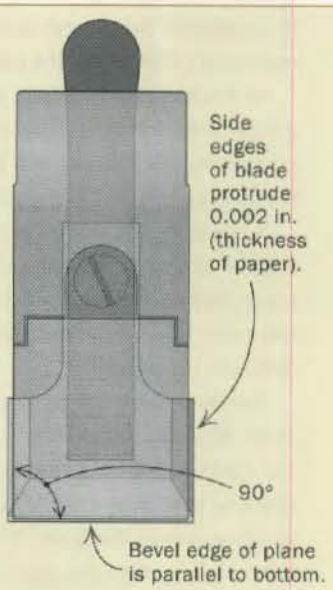
While I'm at it, I use the plane to chamfer the tenon end. This helps reduce the amount of glue that gets scraped to the bottom of the mortise during glue-up.

Trim tenon cheeks. *No matter if the workpiece is narrow or wide, a few light passes with the shoulder plane on each tenon cheek will transform a tight-fitting joint into one that fits perfectly.*



Set the blade extension

A shoulder plane needs to be sharp and well-tuned. The tuning process involves several steps; one of them making sure that the side edges of the blade extend about 0.002 in. beyond the sides of the plane. Gochnour uses two sheets of paper to establish that distance. The paper goes on a flat surface with a narrow piece of 400-grit sandpaper in between. Then, with the edge of the blade on the sandpaper, and the front and back of the plane resting on the paper, he slides the plane back and forth to sand down the edge. When the sandpaper stops cutting, the blade extension will be spot-on.



FineWoodworking.com

Visit our Web site to watch Gochnour tune up a shoulder plane from start to finish.

2 Refine tenon shoulders

Traditionally, tenon shoulders were cut with a backsaw, then cleaned up with a shoulder plane. While today's woodworker probably makes shoulder cuts on a tablesaw, there are occasions where misalignment creeps in. With its low-angle, full-width blade, sole squared to its sides, and solid construction, the shoulder plane excels at working those tough end-grain fibers.

When working shoulders, set the plane for a very light cut and make multiple passes. If planing a narrow shoulder like that of a cabinet door, use a bench hook to support the stock. Lay the board flat on the bench hook and align the shoulder flush with the end of the bench hook's planing stop. This supports the edge of the shoulder and helps prevent splintering. To prevent splintering when working on wide shoulders, clamp the workpiece in a vise with the tenon facing up. Make your first planing cuts from the end of the shoulder to the middle. Then do the same from the opposite end of the shoulder. Work carefully so that the shoulder line remains straight.

Trim tenon shoulders. *When trimming relatively narrow tenons, Gochnour finds a bench-hook jig (above) makes the process easier. The jig's built-in fence helps prevent tearout. Wider workpieces are mounted in a vise and cut without the aid of a bench hook (left).*

3 Tune dadoes and grooves

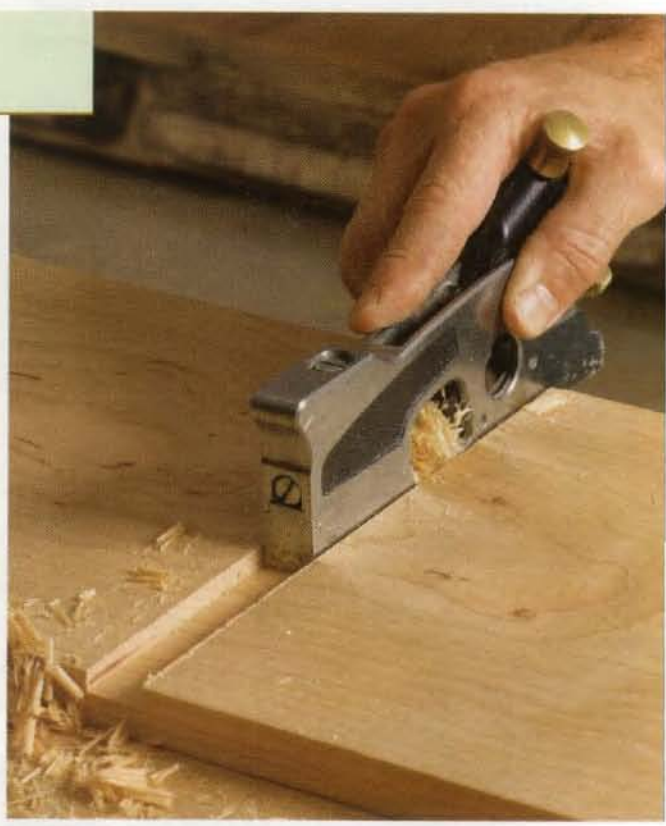
Every now and again, a dado or groove needs to be cut a little deeper. If the joint is wide enough to accept a shoulder plane, I use one to do the job. It's generally faster and easier than resetting the machinery that made the cut initially.

At each end of the dado or groove, use a marking gauge to define the new depth. Adjust the shoulder plane's mouth opening and blade depth for a medium cut so that the work progresses quickly.

To help avoid tearout, start by planing from one edge of the workpiece toward the middle of the piece. You need only plane for a few inches. Then do the same from the other end. Finally, plane the area between the end cuts.

Sometimes I cut a dado entirely with hand tools. To do this, use a backsaw to cut the dado sides to the desired width and depth. The material that remains is removed mostly with a paring chisel working across the grain. Then, the shoulder plane finishes the job in the manner described above.

Deepen a dado or groove. *A dado or groove that's too shallow can be deepened by establishing the new depth on each end with a marking gauge (above). Then the shoulder plane is used to cut to the marked lines (right).*



4 Cut rabbets

A shoulder plane can cut small rabbets. First, define the base and depth lines with a marking gauge. Then, to create a fence, clamp a straightedge board to the workpiece, making sure it is aligned with the baseline.

Open the mouth of the plane to about 1/32 in. to accommodate heavier shavings, and then advance the blade for a medium cut. Hold the plane in both hands with its side firmly against the fence. Make multiple passes as needed. When you reach the depth lines, the rabbet is complete.

Cut a rabbet. *First use a marking gauge to mark the rabbet width and depth (left). After that, clamp a wood straightedge to the workpiece and start cutting (right).*

Fine-tune a rabbet. *A rabbet that's a little too fat can be thinned simply by making a few passes with the plane (above). Rabbeted parts that are slightly misaligned when assembled can be quickly realigned by converting the shoulder plane into a chisel plane (right).*

5 Tweak rabbet joints

Rabbets are mainstays in woodworking joinery and often will benefit from a tweak with a shoulder plane. I periodically use the tool to correct a misshapen opening for a cabinet back, to improve the fit of a rabbeted case joint, or to size the rabbet of a recessed door panel to just the right fit in a door frame.

Many shoulder planes have a unique feature—they convert to a chisel plane in no time. When a corner meets a corner, like when two rabbets meet at right angles, a chisel plane is the perfect tool for getting into that corner.

6 Adjust tongue-and-groove joints

I like the look of tongue-and-groove boards on cabinet backs. I try to fit this joint tight off my machines so that the alignment of the boards is just right. Every now and again, though, a joint is a bit tight and requires the tongue to be slightly thinned. I'll finish it in no time with a few passes of the shoulder plane.

Hold a small board in one hand and plane with the other. On a larger board, plane with both hands, securing the board to the workbench with bench dogs and the tail vise.

Take a shaving or two off each side of the tongue and check the fit. Continue until the fit is perfect.

Tweak a tongue. *A tongue-and-groove joint is a chore to assemble when the tongue is too tight. A few swipes on each side of the tongue solves the problem in short order.*

7 Remove machine marks

On flat surfaces, milling marks are easy to clean up with handplanes, scrapers, or sanders. But a shoulder plane is the best tool for cleaning up inside corners.

On the top and base molding of this cabinet (right), I can plane right up to the raised lip that's machined along the entire length. However, I need to work carefully because I don't want to alter the depth from one piece of molding to the next. I handle this by setting the plane for a very light cut and letting the machine marks serve as a reference to show where and how much material to remove.

On the shallow rabbet that decorates the inside edge of the cabinet door (facing page), I need to remove the router-bit marks before assembly. The shoulder plane is perfectly suited for the task.

A spare plane blade, sharpened to a steeper angle (35° to 40°), can come in handy for long-grain areas with tricky grain. The steeper cutting angle reduces the prospect of unsightly tearout.

Clean up machine marks. *Decorative rabbets on the door fronts (right) and the top and bottom moldings (above) of a case have surfaces that will be exposed when the cabinet is assembled. The shoulder plane is perfect for cleaning up the machine marks left by the tablesaw or router.*

8 Soften sharp edges

I use a shoulder plane to soften sharp edges that are inaccessible with other planes. For example, on a beadboard back, it's easy to soften the sharp edge on the milled bead by reaching in with the edge of a shoulder plane. Because the blade isn't sharpened on its side edge, the plane won't mar the details that are adjacent to the edge being worked.

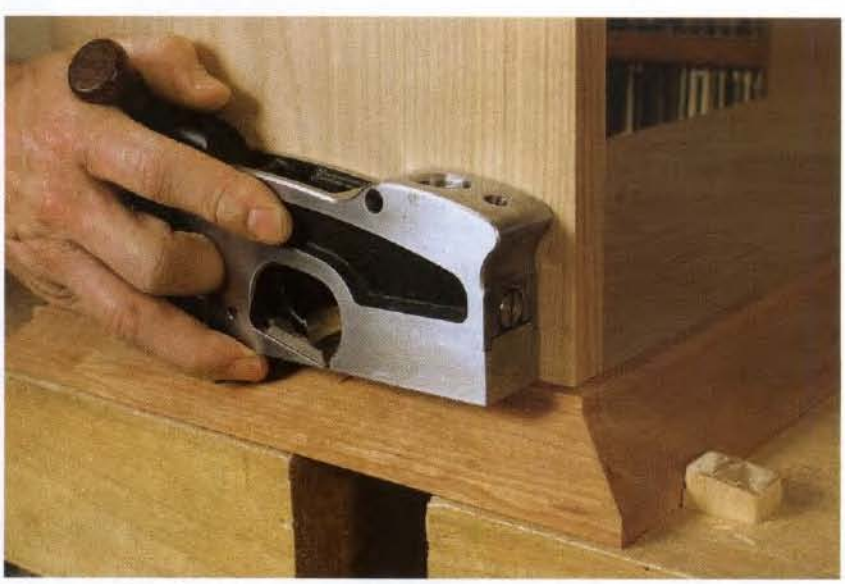
To soften or round the edge, set the blade for a light cut and begin with the plane tipped on its edge at about a 50° angle, with the corner of the blade reaching into the bead. Make a series of passes, rolling the plane more upright with each successive pass.

Go places other planes can't. *The sharp edge adjacent to the beaded edge of the cabinet backboard is easy to soften with a shoulder plane.*

9 Trim mitered molding

The crisp alignment of mitered moldings is a hallmark of fine craftsmanship. Try as I might to get things just right, there are occasions where after the glue is set, slight adjustments must be made to the fit of the molding. These are especially problematic where the molding meets the front or side of a case.

A shoulder plane can be used here as you might a chisel, but with a sole to add control. With a shoulder plane you can carve, shape, and realign moldings for a clean, crisp look.



Plane moldings flush. *The top edges of the front and side base moldings were slightly misaligned. Gochnour uses a shoulder plane to get the parts flush.*

A User's Guide to Featherboards

Extra hands make machine cuts safer, cleaner, and more accurate

BY ROLAND JOHNSON

Keeping my fingers attached to my hands and in good working order is a high priority in my woodworking shop. Featherboards help me do it.

A featherboard is simply a board with a series of slits cut into an angled end, forming a row of flexible fingers that move much like the barbs of a feather. The fingers provide constant pressure to hold stock firmly against tabletops and fences, and the angle allows stock to pass in one direction but resists movement in the opposite direction. They do this especially well at the tablesaw and router table.

But featherboards also increase the quality of router, tablesaw, and even shaper cuts. They maintain pressure exactly where it is needed to keep the workpiece moving in an unwavering, straight line. They are especially helpful for controlling thin stock safely, a particular problem when feeding stock by hand.

This guide will show you how to make a featherboard, and then outline some

Shopmade or store-bought?

I like making featherboards because I can do so quickly and cheaply and I can tailor boards to specific tasks. That said, the manufactured featherboards offered by popular woodworking catalogs offer their own advantages.

Ease of adjustment and setup are the biggest lures. Most models are made of high-grade plastic and lock quickly, anywhere along a standard miter slot. A slot cut into the featherboard allows rapid adjustment for stock width and finger pressure. Some models (left) also offer an optional hold-down attachment, a feature that varies in usefulness depending on the width and thickness of your stock. The Bench Dog Feather-Loc (center) preserves its setting when removed from the miter slot.

Magnetic featherboards offer the added advantage of infinitely adjustable setup without the need for clamps or miter slots, although a metal surface is necessary.

Store-bought models offer ease of use. *Some attach with miter-slot adapters (left) for easily repeatable setups. A magnetic featherboard (right) can be placed anywhere on a metal tabletop.*

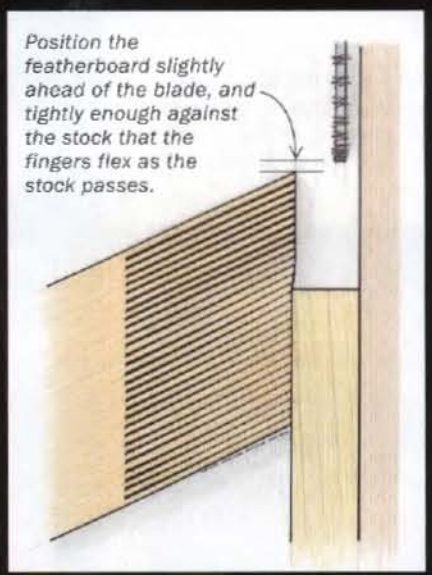
Photos: Steve Scott; drawing: Vince Babak

A simple setup for ripping narrow stock

Start by marking the fence. *Use a pencil line to indicate the front end of the blade. Align the featherboard so that it doesn't reach beyond this line, where it could pinch the blade.*

Clamp the featherboard in place. *Lower the blade and place the stock between the fence and the featherboard. Snug the featherboard against the stock as you tighten the clamp.*

A brace keeps the featherboard from pivoting. *Push this board snugly into position against the featherboard as you tighten the clamp.*



essential featherboard setups on the machines where they are used most often.

Featherboards are easy to make

There are a huge variety of store-bought featherboards, but I like to make my own. It's inexpensive and easy.

Scrap hardwood provides a ready source of material. Flexible woods like ash or hickory make the best featherboards, but any defect-free hardwood will work well. You could use a softwood like pine, but you'd want to make the fingers slightly thicker. Avoid plywood or medium-density fiberboard (MDF); thin fingers of these materials break too easily.

I make most of my featherboards from ¾-in. stock. This is thick enough to support most workpieces that require a featherboard. I sometimes use ½-in. stock for lighter-duty applications. I vary the length and width of the boards according to my specific needs, but I rarely need a board wider than 8 in. Longer boards are good for mounting to a table—you'll want the board to reach to the far side of the table so you'll have access with a standard clamp. Shorter boards work better in applications where they'll be clamped to a fence.

The bandsaw is ideal for making the stopped cuts needed for featherboards, because the user can back work easily out of the cut. A tablesaw blade creates a wider

Holding stock against a fence

Simple side pressure helps keep the workpiece secure against the fence on the router table (below) or the tablesaw. To raise featherboards off the table for panels or other tall stock (right), secure them with wood screws to a long clamping block. Make sure the boards sit no higher than the top of the auxiliary fence.

kerf than I like between the feathers. Of course, you can cut featherboards by hand: Just mount the board in a vise and use a backsaw to cut a series of parallel kerfs.

To make a featherboard, start by crosscutting the business end of the board at an angle. I find that an angle of about 30° offers the best combination of continuous side pressure and kickback resistance. Cutting the feathers into the board's end grain gives them long-grain strength and flexibility so that they don't snap under pressure. Make the feathers no longer than 3 in.

Keep the feathers thin and the spaces between them narrow. Experiment with what works best for you; I find that the thickest practical feather is about ⅛ in. If the feathers are made any thicker, the bending action becomes too stiff, and it is difficult to feed the stock past them. A thinner feather doesn't give you as much pressure, but on most cutting operations the pressure doesn't need to be great. It just needs to be consistent.

Proper setup yields smooth, safe cuts

On any machine, start by placing the stock against the fence or on the tabletop. Position the featherboard firmly against the stock, with the angled end pointing in the feed direction. Secure it to the fence or tabletop with clamps or a miter-slot holddown. The featherboard should be placed firmly enough to keep the stock against the fence or tight to the tabletop, but not so firmly that it makes it difficult to feed the stock into the cutter or blade. Give the stock a test push to be sure.

Position the featherboards as close to the cutter as possible without putting pressure on the cutter itself. In most cases, placing a featherboard directly opposite the blade or cutter can cause the piece to jam dangerously or even kick back, or the cutter to take too deep a cut. Here are some essential featherboard setups.

The tablesaw: Featherboards allow straighter, safer cuts when ripping long, narrow stock, when cutting rabbets or plowing dadoes in narrow stock, or when cutting tall stock like door panels that might rock against the top of the fence.

For ripping, I like to apply side pressure with a long featherboard that I clamp to the tabletop. Downward pressure comes from a push stick. A table-mounted board applies side pressure only on the infeed side—pressure on the outfeed side will cause the stock to pinch the blade.

When cutting rabbets, I clamp two featherboards onto an auxiliary fence to apply downward pressure at the dado cutter (breaking the direct-pressure rule) and on the outfeed side of it. If your saw has a Biesemeyer-style fence, be sure to clamp down its back end, because the fence's tendency to lift slightly will relieve pressure on the featherboards and could result in a cut of uneven depth. For dadoes (across the grain) or grooves (with the grain) in narrow stock, I use a single fence-mounted featherboard to apply downward pressure on the infeed side of the cutter. I also use a table-mounted featherboard to keep the stock tight against the fence.

Stock that is taller than the fence needs side pressure both before and after the cut to prevent it from pivoting away from the blade. But applying that pressure with tabletop featherboards can cause the stock to tip away from the top of the fence. The solution is to lift the featherboards a couple of inches above the table with a clamping block.

Holding stock against a table

Fence-mounted featherboards apply pressure from the top down. This keeps stock firmly against the table for tasks like rabbeting an edge on the tablesaw (right) or cutting a molding profile or edge treatment on the router table (above).

The router table: If the stock is too narrow, wide, or short to work comfortably—in short, if controlling the stock will put fingers close to the cutter—featherboards can make the setup safer. Of course, your best bet for safety and quality of cut is to make router cuts on wide boards, and then rip off the pieces you need. But sometimes narrow or thin stock is unavoidable.

Attach the featherboards to the tabletop and fence to apply downward pressure and side pressure on the infeed side of the cutter. Apply either downward or side pressure after the cutter, depending on how well the stock is supported by the table or fence. Keep the infeed featherboards as close to the cutter as possible. The outfeed pressure can be less than that on the infeed side; the idea is just to keep the stock from vibrating or "fluttering" after the cutterhead. If a second pass is needed on a shaper or router table to cut a molding profile, such as a raised panel, the second pass can't have downward pressure near the cutter. This pressure would tend to tip the work into the cut. □

Roland Johnson is a contributing editor.

Small stock needs both types of support

Top and side featherboards increase safety and accuracy when working with small, narrow stock. The setup ensures a straight, flat-bottomed dado on the tablesaw (right) and a cleanly cut molding or edge detail on the router table (below).

A New Look at Eye Protection

Comfortable glasses, goggles, and face shields leave you no excuse

BY STEVE SCOTT

As beautiful as it might look to you, a woodshop is an unfriendly environment for your eyes. Sanders kick up clouds of irritating dust. The tablesaw throws sharp chips, while small workpieces can burst into flying shards at the miter saw. The lathe peppers its user with wood chips, and grinders throw sparks and abrasive fragments. Hand work also presents dangers: A chisel and mallet can launch chips like little missiles. Less likely perhaps, but just as dangerous, is a caustic splash from a jostled container of solvent or finish.

According to government estimates, hospitals in 2004 treated about 15,000 eye injuries from tools found in most woodshops. Many of these injuries could have been avoided if the victim had worn an inexpensive set of safety glasses or goggles.

"These are not high-ticket items, compared to saving your sight," said Dr. Larry Jackson, an epidemiologist who studies workplace injuries at the National Institute for Occupational Safety and Health.

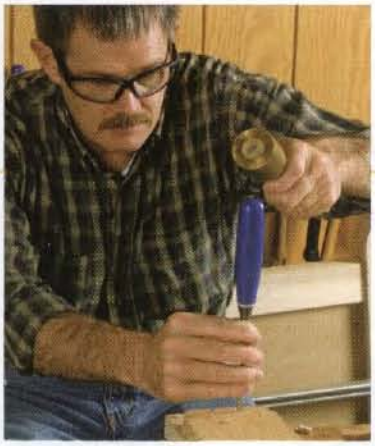
Jackson, who helped develop U.S. industry standards for safety glasses, recommends that every woodshop be equipped with all three basic types of safety eyewear—glasses, goggles, and face shields. Woodworkers should use some type of eye protection at all times in the shop, he says.

No doubt some woodworkers will balk at that suggestion—it's hard to believe that your eyesight is threatened when you're taking shavings with a block plane or laying out dovetails with a marking gauge and a bevel. But it's also hard to argue against a sure way of keeping your eyes safe: making a rigorous habit of wearing the right protective gear. The argu-

Three lines of defense

Safety experts say there's a need in every woodshop for each of these forms of eye protection: safety glasses for jobs that shoot lightweight chips into the air, goggles to keep heavy dust out of your eyes, and face shields (used with glasses or goggles) to protect your face and repel heavier chips or other projectiles.

Photos, except where noted: Rodney Diaz; product shots, Kelly J. Dunton



Safety glasses ward off small chips and dust

With impact-resistant lenses and frames, and wraparound protection, safety glasses shield your eyes from small flying chips, whether they're launched by a mallet and chisel or by a powerful shop machine. There also are great options for woodworkers with corrected vision.

ment tilts further when you consider how easy it is to find comfortable and effective eye protection.

Every woodworker will strike his or her own balance between convenience and eye safety. Three *Fine Woodworking* editors recently sized up a broad selection of glasses and goggles, looking for models that offer both protection and comfort. Here's an informal overview of the eyewear that's available with some tips on what to look for.

Safety glasses are a must

Any protective eyewear—glasses or goggles—should meet the American National Safety Institute standard known as Z87.1-2003. This means that the lenses, typically made of tough polycarbonate, won't shatter and the frames won't break when smacked by a ¼-in. BB moving at 150 ft. per second. They must also offer generous side protection to keep dust and flying objects out of the corners of your eyes. The lenses, frames, and packaging should all be stamped with a Z87+ to indicate that they meet this safety standard.

Don't wear glasses?—For the woodworker who doesn't wear glasses or who wears contact lenses, the selection of safety glasses is wide and varied. Most fit and look like lightweight sport sunglasses.

We liked lightweight models from Elvex (about $5) and Edge Eyewear ($5) that had large, wraparound lenses for good peripheral vision. UVEX, Crews, and AO Safety also make suitable and inexpensive models.

To aid in a snug and comfortable fit, some models come with a padded or flexible nose bridge, padding at the browline, and adjustable earpieces.

Plenty of options for glasses wearers—If you wear glasses, you might think they give you adequate eye protection in the shop. They don't.

Your glasses very likely offer no side protection at all, and they probably leave too much room between your brow or cheekbones and the rims of the glasses. Wood-chip projectiles

GOOD PROTECTION ISN'T COSTLY

For $5, the Elvex Triad offers no-nonsense eye protection in sporty wraparound frames. The glasses feature a flexible nose bridge and earpieces for added comfort.

Elvex Triad

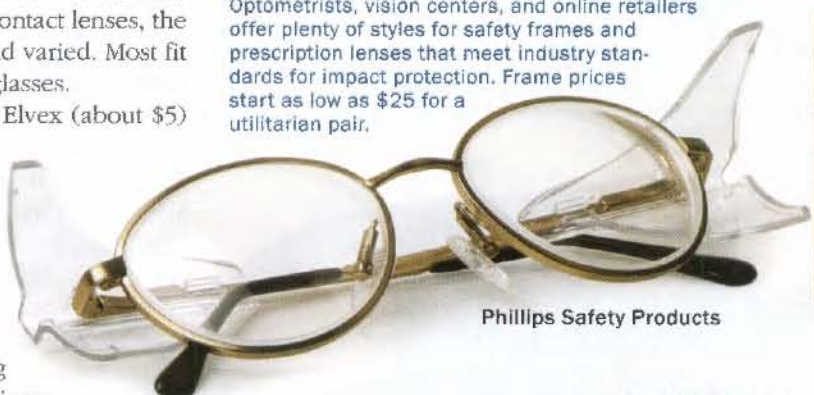
THE CADILLAC

The ESS ICE 2.4 offers military-level impact resistance and greater visibility. The frameless design doesn't interfere with peripheral vision, a common complaint about some protective eyewear. The military cachet comes at a price, though—$42 per pair.

ESS ICE 2.4

PRESCRIPTION SAFETY GLASSES CAN BE STYLISH

Optometrists, vision centers, and online retailers offer plenty of styles for safety frames and prescription lenses that meet industry standards for impact protection. Frame prices start as low as $25 for a utilitarian pair.



Phillips Safety Products

Eye Armor

GLASSES FOR YOUR GLASSES

Safety eyewear designed to fit over street glasses is a relatively inexpensive way for prescription wearers to protect their eyes in the shop. This pair from Eye Armor ($25) offers a snug fit.

Goggles seal out dust

They offer the same impact protection as safety glasses, but safety goggles close all the gaps between your face and the lens with a foam or rubber lining. This full protection is needed when you're filling the air with clouds of fine dust.

LOW PROFILE

For folks who don't wear prescription lenses, many goggles offer a streamlined profile. Uvex Spoggles ($17.50) are one example.

Uvex Spoggles

Crews Verdict Goggles

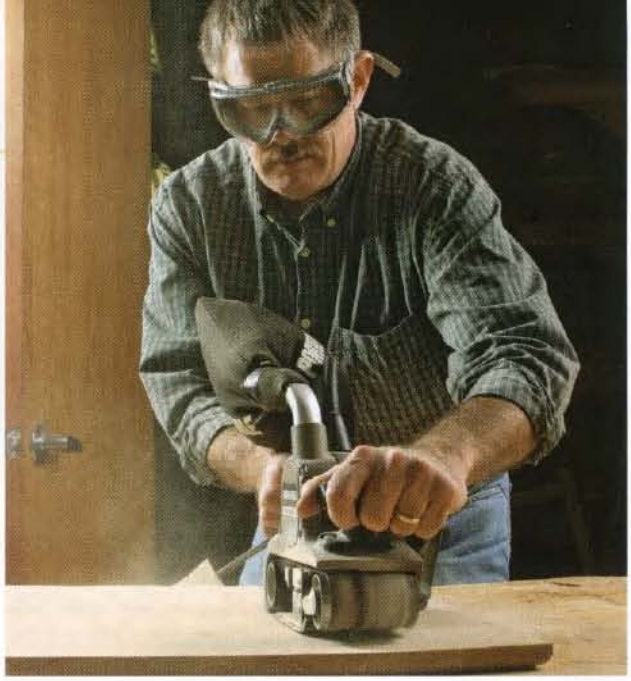
ROOMY ENOUGH TO FIT OVER GLASSES

It's easy to find goggles that fit comfortably over your street glasses. Verdict Goggles by Crews ($9) offer indirect air baffles for fog control and splash protection.

CONVERTIBLE MODELS

Some glasses or goggles can be fitted with inserts that hold prescription optics. Others, like the SG1 from Wiley-X ($90) can be fitted directly with prescription lenses.

Wiley-X SG1



can dart through that gap. Some street glasses also have lenses of glass or acrylic that might not stand up to a direct hit from flying debris.

Safety glasses go a long way toward correcting these flaws. They are designed to fit closely to your brow and cheekbones, and they feature wraparound lenses or side shields to protect the corners of your eyes. The lenses and the frames both are impact resistant.

There are plenty of safety glasses designed to fit over the glasses you already wear. They are sturdy and inexpensive (some cost as little as $4 per pair), but the challenge lies in getting a good fit.

Safety frames for prescription lenses range from bland and square to sleek and stylish. There are a few wraparound models, but lenses of this shape cannot be ground to fit some prescriptions.

If you wear contacts, you still need safety glasses or goggles to keep your eyes safe. Some safety experts go further and advise against wearing contacts in environments with a lot of dust or chemical fumes in the air, because either of these could become trapped behind the lens and damage your eye. Hard lenses are more likely to trap dust; soft lenses are more vulnerable to chemicals, the experts say. Injury statistics typically don't track contact-lens use, so it's hard to gauge the threat. The safest course may be to always use goggles over contacts or to take the contacts out and wear glasses instead when you're in the shop.

Jackson and others recommend wearing safety glasses for any light-duty shop activity that doesn't involve power tools. For power tools that throw dust and chips at high speed, they recommend stepping up to goggles.

Goggles provide more comprehensive coverage

Goggles are the most certain way of protecting your eyes from fast-flying debris and heavy floating dust.

Face shields protect head and neck

A face shield is essential at the lathe, which can spray its user with heavy chips. Flying sparks or disintegrating grinder wheels also are a threat. Be sure to wear safety glasses or goggles underneath; flying debris can ricochet behind the mask.

They're better at this than safety glasses because they completely enclose the eyes, and they're held snug to your face with an elastic head strap. Models with baffled air vents provide the best dust protection and also can protect your eyes against chemical splashes.

For the best field of view, we preferred the full-face models that resemble a diver's mask to the motorcyclist style with separate eyepieces.

Some models, like the goggles you wore in high-school chemistry lab, are designed to fit over glasses. Those very goggles, in fact, or ones much like them (Pyramex, $3), are a great and inexpensive way to protect your eyes in the shop. But with their rubbery, scuba-mask feel, you might not want to wear them for long. A roomy, updated version from Crews has baffled air vents and a foam lining. It's more comfortable but still bulky.

When the heavy chips fly, reach for a face shield

Any task in which the tool forcefully throws large wood chips or other heavy flying particles (wood turning, for instance) calls for a face shield.

A face shield consists of a large, clear visor mounted on a piece of adjustable headgear to flip up and down like a welder's mask. Inexpensive models are available from both Woodcraft and Lee Valley Tools. Just like its name implies, a face shield is designed to prevent flying objects from striking the wearer in the face.

It's easy to feel like your eyes are well protected behind this clear shell, but safety experts say otherwise. Because a face shield is more or less open at the bottom, wood chips or other projectiles could get past it and into your eye. For that reason, the experts say, you should always wear safety glasses or goggles under a face shield. A face shield for your face, glasses or goggles for your eyes. □

Steve Scott is an associate editor.

Jackson 'The Shield'

UPDATED VERSION OF THE BASIC SHIELD

Jackson and Uvex offer two slightly different takes on the familiar face-shield design. Jackson's "The Shield" ($17) mates a set of safety goggles with an impact-resistant shield for the lower face. The Bionic Face Shield by Uvex ($30) provides extended coverage for the chin and the top of the head.

Uvex Bionic Face Shield

SOURCES OF SUPPLY

Safety eyewear is available at home centers and online. Prescription safety glasses can be found at your local optometrist.

Elvex, Edge Eyewear, ESS, U.S. Safety, Wiley-X, Crews, AO Safety
www.safetyglassesusa.com

Uvex Spoggles, Radians AV
www.woodcraft.com

Prescription safety frames and lenses
www.RXSafetywear.com;
www.phillips-safety.com

Face shields
www.discountsafetygear.com;
www.labsafety.com

Stop Guessing at Wood Movement

Figure out exactly how much of a gap to leave in drawers and floating panels, no matter the wood or season

BY CHRISTIAN BECKSVOORT

Seasonal changes in humidity cause wood to expand and contract (shrink) in width. Woodworkers refer to this phenomenon simply as "wood movement." In relatively narrow boards, say, under 5 in., this movement is rarely an issue. But, as boards get wider, wood movement becomes an important consideration. Ignore it, and problems wait in ambush.

If you build a snug-fitting drawer in midwinter, when humidity typically is low and the wood has shrunk to its minimum width, you'll almost certainly have problems come the end of summer, when humidity is high and the wood has expanded to its maximum width. A drawer cut too wide, if it expands, can end up jammed in the drawer opening and stuck fast. It also can push against the drawer opening and stress the joints. By the way, humidity has no measurable effect on the length of wood.

When I teach case construction, the two most frequent questions are "How much gap do I leave over this drawer?" and "How far should my door panel fit into the frame grooves?"

Most woodworkers make such decisions based on little more than a guess. But luck doesn't have to be your best friend here. You can predict pretty accurately how much a board will move simply by knowing: (1) the species, (2) the grain orientation (flatsawn or quartersawn), (3) the width, (4) the current moisture content (MC), and (5) the expected highest and lowest MC.

To collect this data, you'll need a Wood Movement Reference Guide (available from Veritas, www.leevalley.com, for about $6), a moisture meter, a calculator, a ruler, and a dial (or vernier) caliper. Or, you can skip the guide and use a chart and formula (see p. 81). A decent moisture meter can be had for around $100.

Determining the width of a drawer

To determine wood movement for an inset drawer front and sides, I first cut the drawer front and sides for a friction fit.

Sizing a red-oak drawer in winter—To determine the final drawer width, though, I need to collect the pertinent information and use the Wood Movement Reference Guide. As an example, let us assume an 8-in.-wide drawer opening. The wood is flatsawn red oak. Because it's Maine in late winter, the MC is 6%, as low as it will ever get.

I have no way of knowing where in the world my furniture pieces eventually will be shipped, so I assume a potential worst-case scenario of 16% MC—a 10% increase. The guide shows a movement value of 0.0037 for flatsawn red oak. To calculate the worst-case wood expansion, I multiply the movement value (0.0037) by the width

What you need. *The procedure for determining future wood movement requires only a moisture meter, calculator, and Wood Movement Reference Guide.*

Fitting a drawer

A drawer cut and fitted to just the right width offers a smooth, sliding fit even on the most humid of summer days, with as narrow a gap as possible when the drawer shrinks in winter.

1. MEASURE THE OPENING

Measuring the drawer opening, top to bottom, provides the maximum width for the drawer.

2. DETERMINE THE MOISTURE CONTENT OF THE WOOD

Use a moisture meter to measure the moisture content (MC) of the drawer front, back, and sides. By the way, if the parts come from more than one board, make sure the boards have the same moisture content, within plus or minus 2%, or so. If a drawer has parts with radically different MC, the parts won't move the same amount, which could stress joints.

(8 in.), by the worst-case increase in MC (10%). Doing the math I get [0.0037 × 8 × 10] = 0.296 in., or 19⁄64 in., just under 5⁄16 in. Therefore, I cut the drawer front and the two drawer sides to 7 11⁄16 in. (8 in. minus 5⁄16 in.).

If I am making lipped drawers, a standard ¼-in.-wide lip won't fully cover the gap when the board is at 6% MC at the end of winter. So, I'd make a 5⁄16-in. lip.

After assembling the drawers and the case, I use a handplane to trim the ends of the front and the outside faces of the drawer sides to create 1⁄64-in. to 1⁄32-in. clearance on each end.

Sizing a red-oak drawer in summer—Now, let us assume we are building the same drawer in Maine at the end of summer. The MC measures 13%. Again, with 16% MC as a potential maximum, the board would experience an increase of 3% (16% minus 13%). Written out, it looks like this: [0.0037 × 8 × 3] = 0.088 in., or just under 3⁄32 in., meaning an inset drawer would be cut to 7 29⁄32 in. (8 in. minus 3⁄32 in.). The same drawer, at the end of winter, will have an MC of 6%. That's a decrease in MC of 7% (13% minus 6%). Calculating the shrinkage, I get [0.0037 × 7 29⁄32 in. × 7] = 0.205 in., 13⁄64 in.

Keep in mind that these numbers are based on unfinished wood. To a certain extent, applying a finish slows the transfer of moisture to and from the wood, and adds a margin of safety.

Determining the ideal width of a panel

Frame-and-panel construction has lots of eye appeal and is a very stable construction system. That's because it gives solid-wood panels the freedom to expand and contract in width as the humidity changes, without affecting the size of the frame.

For woodworkers, the challenge is to determine the ideal width to cut the panel. If a panel is cut too wide and expands in width, it will bottom out in the grooves, and apply pressure to the frame joints.

But if the panel is cut too narrow, it will shrink so that the side edges are no longer in the grooves. When that happens, you'll see dreaded daylight along each side. You can solve the problem by adding a vertical divider (effectively making two narrow panels rather than one wide one) or by widening the groove cut in the frame parts.

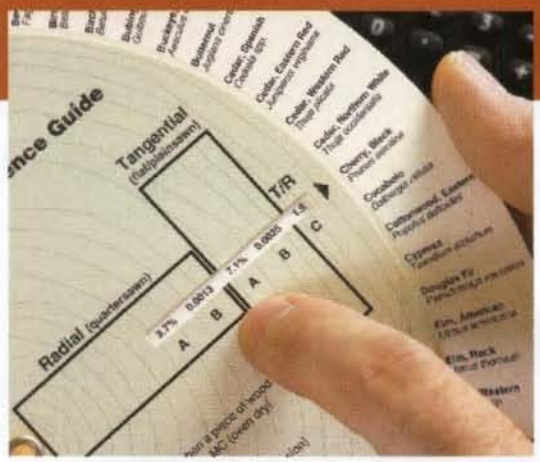
Sizing a cherry panel in winter—Let us say it's the end of February and I've made a cherry door frame. Dry-clamped, the inside edges of the frame measure 10 in. between stiles and 26 in. between upper and lower rails. Centered on the inside edges of all four frame parts is a ¼-in.-wide by ½-in.-deep groove. Therefore, the dimensions, bottom-of-groove to bottom-of-groove, measure 11 in. wide by 27 in. long.

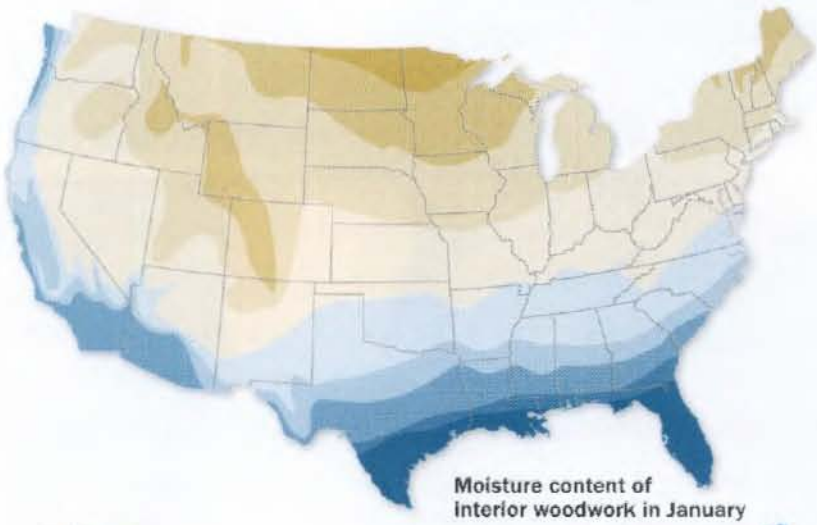
Determining the length to cut the panel is a no-brainer. Because the length changes little as the humidity changes, I simply cut the panel 1⁄16 in. shorter, to

Photos: Tom Begnal; drawings (facing page): Rodney Diaz

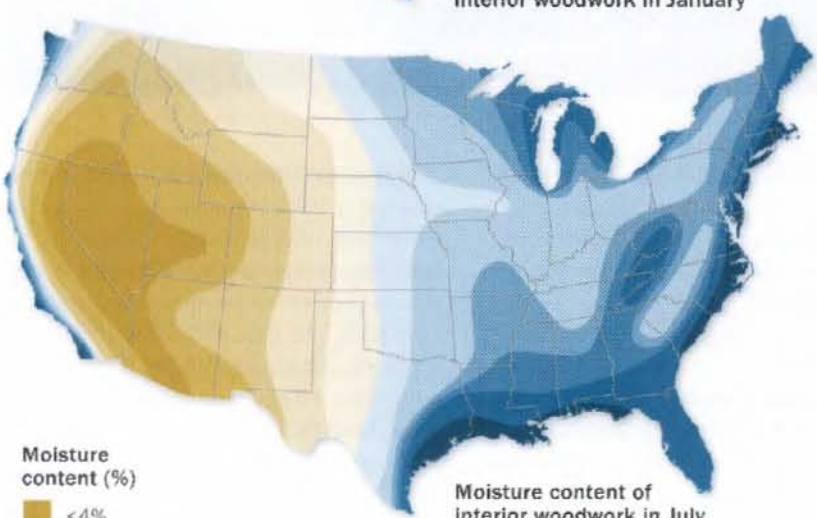
3. CALCULATE THE MOVEMENT

Use the maps below to determine the maximum seasonal change in moisture content (MC). Then use the provided formula to calculate anticipated wood movement.





Moisture content of interior woodwork in January



Moisture content of interior woodwork in July

Moisture content (%)

- <4%
- 4-5
- 5-6
- 6-7
- 7-8
- 8-9
- 9-10
- 10-11
- 11-12
- 12-13
- >13%

SEASONAL MOISTURE CONTENT

In most of the United States, the average MC of interior woodwork varies from winter to summer. It's those seasonal changes that cause wood to shrink in winter and expand in summer. Because Becksvoort does not know where his furniture will be shipped, he always assumes a 10% increase from winter to summer.

USE THIS FORMULA WITH A REFERENCE WHEEL OR A CHART

To determine how much a board will expand or shrink, use this formula. For the movement value (MV), use either a reference wheel or the chart below.

Expected expansion or shrinkage = (MV) x (board width) x (expected change in moisture content)

REFERENCE WHEEL

The Wood Movement Reference Guide isn't a necessity, but it conveniently puts in your hands the quartersawn and flatsawn movement value (MV) for over 70 wood species.

CHART

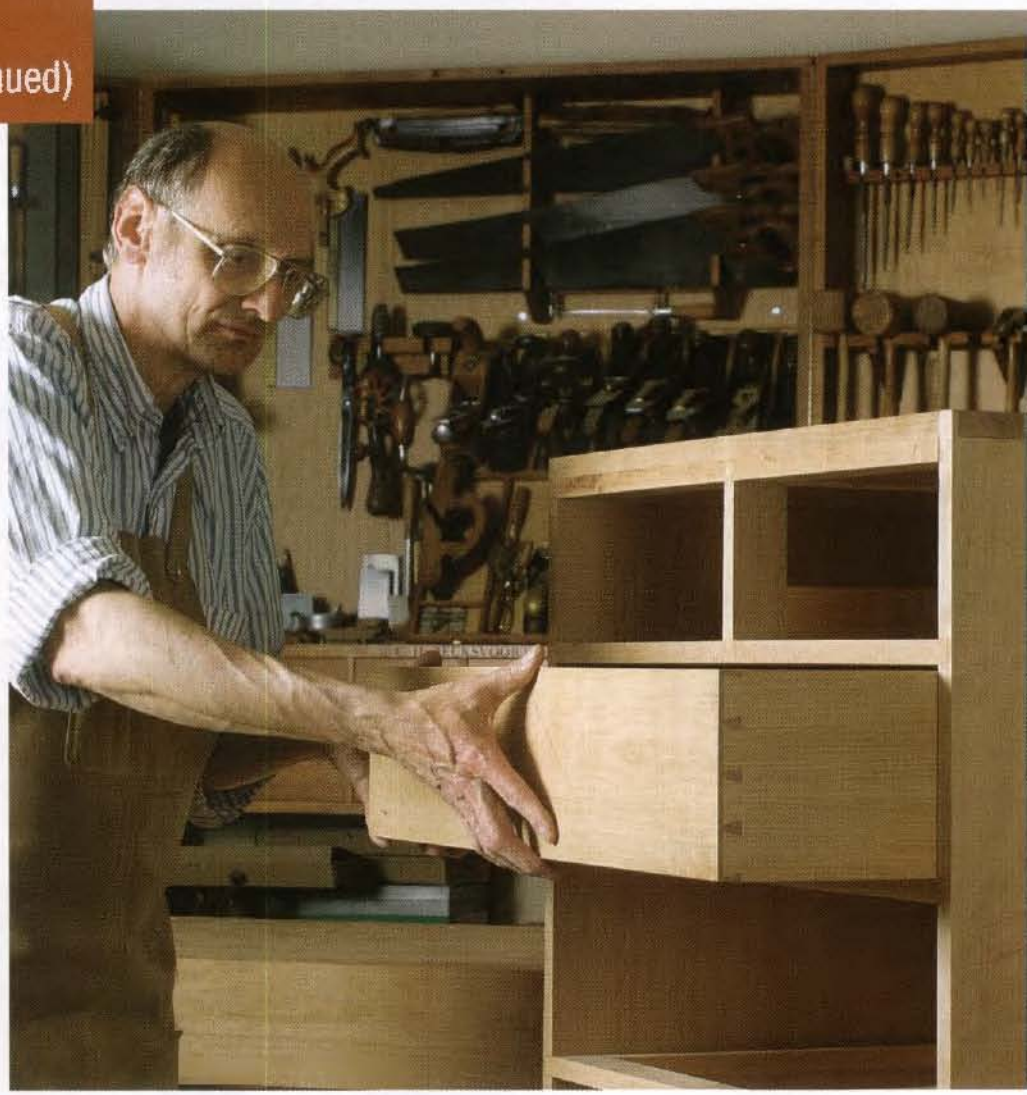
If you'd rather not buy the guide, you can use the chart below to get the movement value (MV). The formula and abbreviated chart are adapted from the *Wood Handbook*, published by the U.S. Department of Agriculture, Forest Products Laboratory. For the complete chart (Table 12-5) listing more than 120 species of wood, go to www.fpl.fs.fed.us.

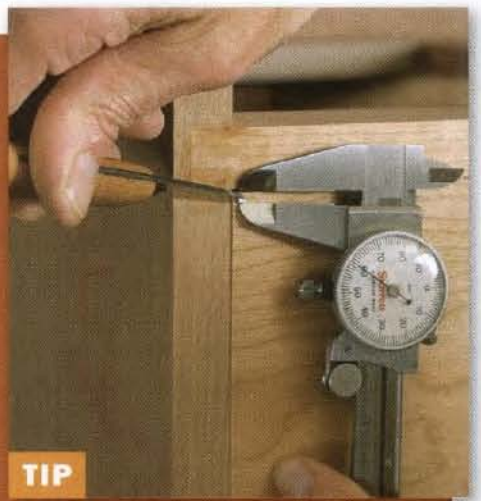
SPECIES	QUARTERSAWN	FLATSAWN
Alder (Red)	.0015	.0026
Ash (White)	.0017	.0027
Aspen (Quaking)	.0012	.0023
Basswood (American)	.0023	.0033
Beech (American)	.0019	.0043
Birch (Yellow)	.0026	.0034
Butternut	.0012	.0022
Cherry (Black)	.0013	.0025
Fir (Balsam)	.0001	.0024
Mahogany	.0017	.0024
Maple (Red)	.0014	.0029
Maple (Sugar)	.0017	.0035
Oak (Red)	.0016	.0037
Oak (White)	.0018	.0037
Pine (Eastern White)	.0007	.0021
Pine (Longleaf)	.0018	.0026
Pine (Ponderosa)	.0013	.0022
Pine (Sugar)	.0010	.0019
Poplar (Yellow)	.0016	.0029
Sweetgum	.0018	.0037
Sycamore (American)	.0017	.0030
Teak	.0010	.0019
Walnut (Black)	.0019	.0027

Fitting a drawer (continued)

4. TRIM THE DRAWER TO FIT

Becksvoort planes the top edge of the drawer front and sides until he hits the trim-point. A quick test shows a perfect gap between the top edges of the drawer and the drawer opening.





TIP

DIAL CALIPER SIMPLIFIES LAYOUT
After determining how much to trim from the drawer front and sides to allow for future expansion, Becksvoort saves layout time by simply setting his dial caliper to the calculated distance and using a knife to mark the trim-point directly on the drawer front.

26 15/16 in. Figuring the panel's width again requires the guide. The panel is cherry and flatsawn. The maximum panel width is 11 in.; the minimum is 10 in. The moisture meter measured the MC at 6%, and considering it's late winter in Maine, that's as low as it will get. So the MC can only increase. Again, I assume a potential worst-case scenario—16% MC—a 10% increase.

Using the above information, and with the guide in hand, I determine that the movement value for flatsawn cherry is 0.0025. To calculate the worst-case wood expansion, I multiply the movement value (0.0025) by the width (11 in.), by the worst-case increase in MC (10%). Written out, it looks like this: [0.0025 × 11 × 10] = 0.275 in.

To be on the ultraconservative side, I add another 1/16 in. and come up with about 11/32 in. That's how much this board could expand. So, to make room for it in the frame, I subtract 11/32 in. from my total available space of 11 in., resulting in a panel width of 10 21/32 in. Rounding it down to an easier number, I cut the panel to 10 5/8 in. wide.

Sizing a cherry panel in summer— Now, let's assume that I'm building that same frame-and-panel in August. Because it's well into a humid Maine summer, the moisture meter reads 12% MC.

Again, I anticipate a potential worst-case maximum MC of 16%. But now the difference between the current MC and the worst-case MC is 4% (16% minus 12%). Multiplying the movement value (0.0025), by the width (11 in.), by the anticipated increase in MC (4%), and you get [0.0025 × 11 × 4] = 0.110 in., which is just under 1/8 in. Adding 1/16 in. as an extra safety factor, I'd cut my panel to a width of 10 13/16 in.

Next, I run the numbers to find out how much that 10 13/16-in.-wide panel will shrink come the end of winter, when the MC could be as low as 6%. With an expected decrease of 6% (12% minus 6%), the numbers look like this: [0.0025 × 10 13/16 × 6 = 0.162 in., or about 11/64 in. So, in winter, when the moisture content of the panel drops back to 6%, the panel cut to 10 13/16 in. wide would shrink to just over 10 5/8 in. (10 13/16 in. minus 11/64 in.). As a result, the side edges of the panel would extend a comfortable 5/16 in. into each stile groove.

At first, this process might seem a bit daunting. After you've done it a few times, though, the entire procedure will take only a few minutes. The payoff is the peace of mind knowing that wood movement won't be a problem. As a professional woodworker, that's important to me. □

Christian Becksvoort is a contributing editor.

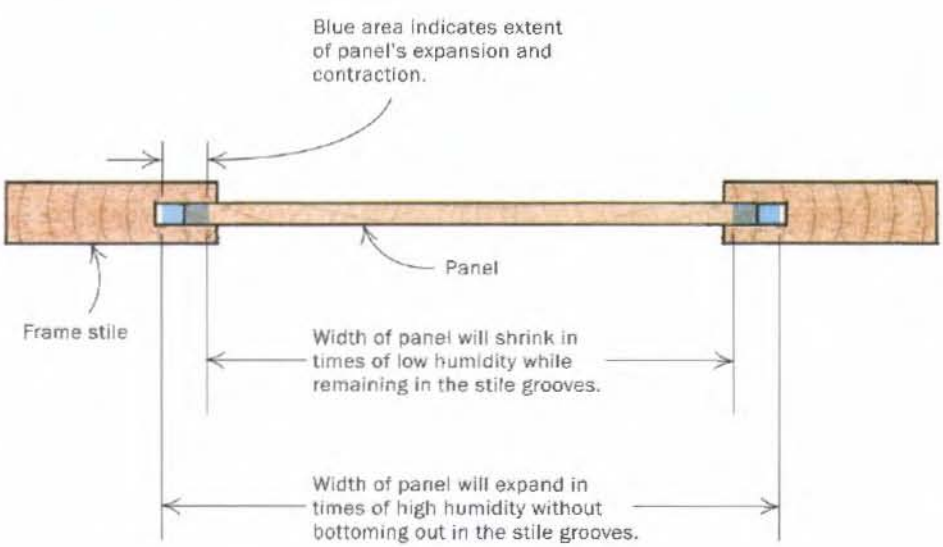
Drawing (facing page): Vince Babak

Fitting a panel

In frame-and-panel construction, a solid-wood panel cut too wide or too narrow will cause problems down the road (see drawing, below). If too wide, an expanding panel will push on the frame stiles, causing stress on the frame joints that could ultimately lead to failure. If cut too narrow, the panel may shrink to the point that it's no longer in the stile grooves, and you'll see a line of daylight along the two side edges. By calculating the future panel movement, you can anticipate a problem, and add a divider or cut a deeper groove to permit additional movement.

Measure for the panel. *To determine the maximum available width for the panel, Becksvoort marks the groove depth all around a dry-fitted frame, then measures from groove-bottom to groove-bottom.*

SIZE SOLID-WOOD PANELS TO COMPENSATE FOR EXPANSION AND CONTRACTION



Cut the panel to size and check the fit. *After measuring the moisture content of the panel and doing the math to determine the appropriate width, the panel is cut to final size and checked against the dry-fitted frame.*

The ABCs of Letter Carving

Create elegant characters using two chisels

BY T.J. McDERMOTT

PALATINO: A SIMPLE BUT STYLISH TYPEFACE

The shapes of the letters make this font a good choice for carving. Chances are, the word-processing program on your home computer includes it. If not, photocopy this font at the size you need, cut the letters apart, and rearrange them.

Letter carving is well worth learning because it transforms and personalizes otherwise ordinary objects. When someone receives a jewelry box or a piece of furniture that you've made and inscribed with their initials, they know they have an heirloom.

I began carving letters more than 30 years ago, while studying to be a boat-builder. An extraordinary craftsman who made bagpipes and did wood carving inspired me. I was awestruck by how quickly and effortlessly he could carve perfect letters. I began to practice sign carving myself, and in 1981, I carved a sign for Cole-Haan shoes when it opened its first store in Freeport, Maine. That led to signs for Polo Ralph Lauren, Tommy Hilfiger, Gant, Calvin Klein, and others.

I've developed a simple and straightforward technique for letter carving that has served me well over the years. You can do most of the carving with a ¾-in. bevel-edge chisel. The only other tool you may need is a #7, 14-mm gouge. Both are shown in the photo above.

Good letter carving depends largely on learning to trust your eye and developing a rhythm in the work with a feel for how the chisels move through the wood. You'll eventually learn the most comfortable

ABCDEFGH

Photos, except where noted: David Heim; this page: Kelly J. Dunton

Cut and paste. *To achieve the best spacing, cut out letters and move them around. Use a straightedge to be sure the letters stay on the same horizontal line.*

way to hold a chisel, which chisels work best for you, and which woods work well for carving.

Good carving starts with good layout

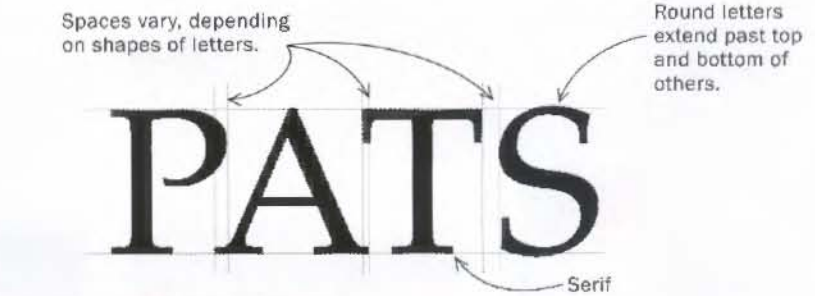
Any large bookstore will have books on letter styles, letter spacing, layout, and the like. For simplicity's sake, you might want to start with a typeface that's available on your home computer. The font shown here, usually called Palatino, adapts well to letter-carving and has some distinctive touches, such as the extralong curve on the letter J. Fonts such as Times Roman and Garamond are also good choices.

On the computer, type the characters you want to carve and enlarge them to the size you want. Take advantage of options that let you modify characters, making them bolder, for example, or stretched out. When you're satisfied, print out the letters.

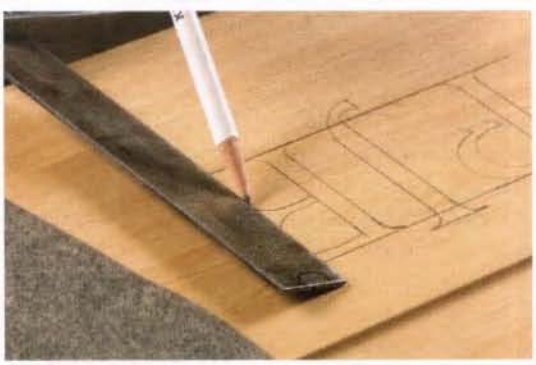
Draw a horizontal guideline across the bottom of the characters to help keep them aligned. Keep in mind

Spend time on the layout

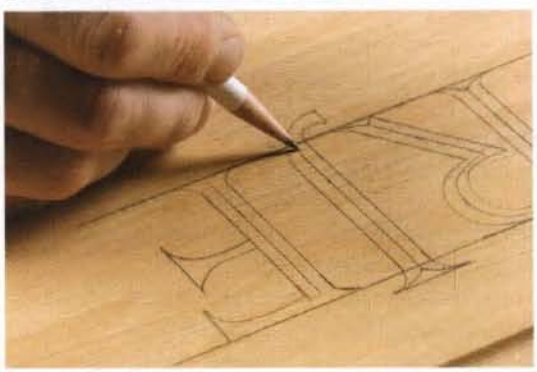
Adjust the letter sizes to fit the space. Take time to arrange the letters so that they look evenly spaced. Try moving letters like A, F, and T closer to their neighbors, and pushing letters like H and M farther away. Trust your eye to tell you when the spacing appears uniform, even if the ruler says otherwise.



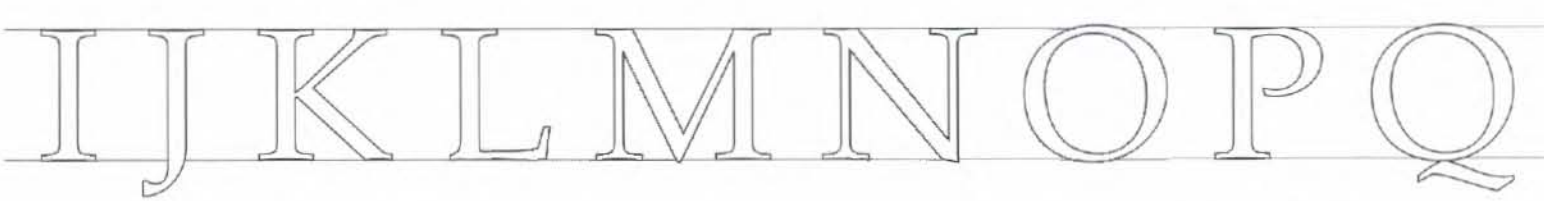
Transfer shapes. *Use carbon paper to transfer the outline of the curved parts of the letters onto the wood. Don't try to trace the straight parts of the letters freehand.*



Finish with a straightedge. *Use a square or bevel gauge to draw straight, parallel lines connecting the curved shapes. If the top of a letter doesn't exactly match up with the bottom, split the difference and blend the lines together freehand.*



Mark the centers. *Measure the exact center of each part of the letters. This line is critical because it marks the first place you'll carve, to set the depth of the letter. Use a straightedge to draw the centerline. Freehand the curves that join the points of the serifs to the centerlines.*



Score the centers. *Hold the chisel in one hand and use the thumb or a couple of fingers on your free hand to help push, pull, and guide it across the wood. Angle the chisel so that one corner does the work. Push down and carefully score the centerline.*

Start in the center

Use clamps or benchdogs to hold the work firmly in place. Push the point of the chisel into the centerline to establish the depth of the carving. You may need three or four passes to achieve the proper depth. Score the narrow parts of a letter only half as deep as the wide parts. You may want to use a mallet to score harder woods, but pounding the chisel into a soft wood will compress the fibers.

Straight chisel for big curves. *It's easier to push the point of a straight chisel around large curves than it is to try to make a curved gouge follow a curved line with a different radius.*

Use a sweep for serifs. *A curved carving gouge makes it easy to connect the point of the serif to the center. Angle the gouge so that the shallowest part of the cut is at the point of the serif.*

that rounded capital letters (C, G, O, Q, S) will extend above and below the guideline. If they actually lined up with the others, they'd look too small.

Try positioning the characters so that they're centered left and right in the space you want to fill. Allow more space below the letters than above. If you don't, the letters will appear too low.

I've seen many signs done by supposedly professional sign shops that suffer from bad letter spacing. You can make adjustments on the computer, but the best approach is to cut the letters apart and move them until the spacing looks right. Be sure to keep them aligned on their guideline, and tape them together.

FineWoodworking.com

Visit our Web site to watch a video of McDermott carving the letter R.

Transfer from paper to wood

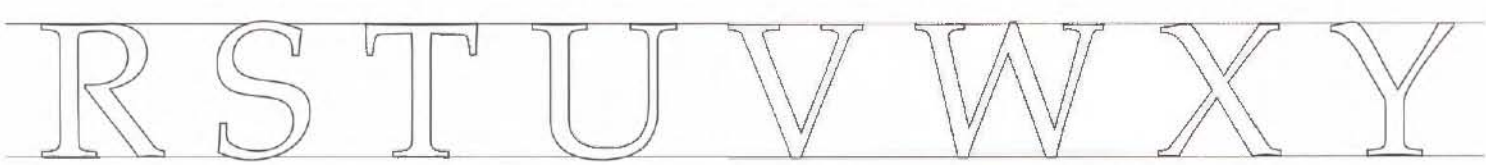
Carbon paper is best for transferring designs onto wood. You also can use graphite paper, available at most craft-supply stores. Begin by tracing all the curved parts of the letters with a pencil. Some typefaces, including Palatino, have serifs that are squared-off (see the sample below). While you can copy that feature, it's simpler to fair the serifs out to a point.

Next, use a square or a bevel gauge to draw in the straight parts of the letters, connecting the curves. Be aware that seemingly straight lines in some typefaces actually have a slight curve in the middle or a slight taper from bottom to top. You'll have to blend the straight lines into the curves by eye. Finally, measure the center of each part of the letters and draw in the centerlines. Freehand a curve from the points of the serifs down to the centerlines.

Get in a rhythm for carving

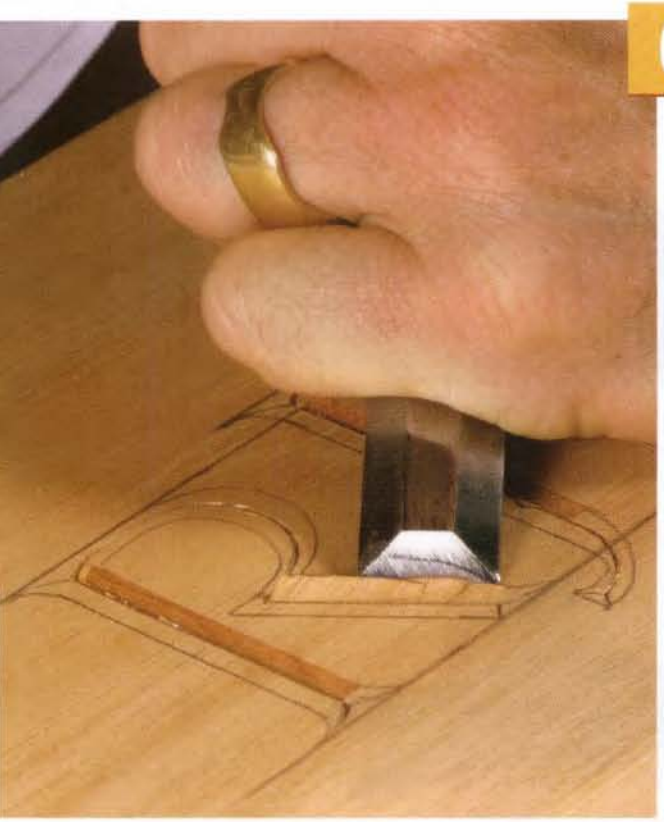
Begin the actual carving by scoring the centerline of each letter with a corner of the chisel. It's better to make multiple passes to score the lines, so you can develop the right feel. These scoring cuts set the depth of the letters, but don't carve very deeply or you can spoil the look. For the letters shown on the opening page, I went only about ¼ in. deep.

Be sure your work area is well-lit. I use a drop light with a 100-watt full-spectrum bulb, positioned about 45° to the left or right of the work and 2 ft. to 3 ft. above the bench.



Carve methodically

Work from one side to the other, cutting the same parts on each letter—all the straight sections, all the curves, all the serifs. That makes it easier to get a feel for how the chisel moves through the wood and sets up a rhythm for the work.



Carve one side. *Hold the chisel bevel-up, place it on a penciled line, and push down and toward the center. Start with a shallow cut, gradually increasing the angle and depth until the side of the letter meets the scored centerline.*

Be careful on the curves. *When carving curves with a straight chisel, keep it bevel-down, and be sure you're aware of the grain direction. You can easily blow out part of the carving by pushing the wrong way. Remove just a little wood with each pass.*

Lighten up on narrow parts. *Try to get a feel for the depth of cut, so you can apply light pressure to the chisel on narrow parts of a letter and gradually increase the pressure for wide parts.*

Rather than completely carve one letter at a time, do the same parts of all the characters. That helps you develop a rhythm and ensures that you'll make consistent cuts from one character to the next. So, score all the right-hand serifs, then all the left-hand serifs, and so on. Carve one side of all the letters, then flip the workpiece and carve the other side.

Keep yourself and your chisels sharp

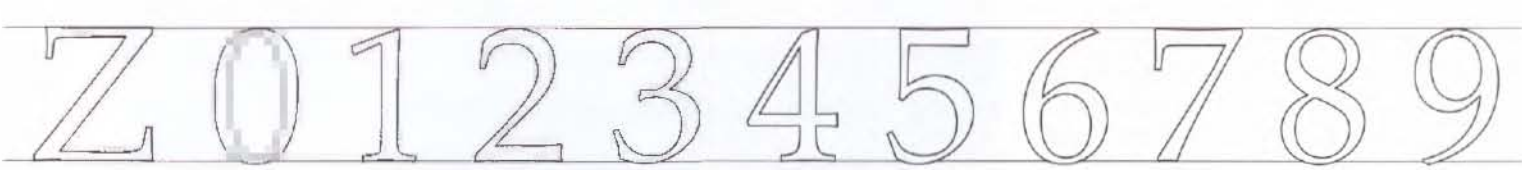
Razor-sharp chisels are a must for good carving. I sharpen mine with a 1x48 Delta narrow-belt sander (a worn 220-grit belt works fine) and a felt buffing wheel. As soon as I feel signs of resistance or sticking from the chisel, I touch it to a soft felt wheel charged with compound.

Carving letters is an intense and deeply focused pursuit. For the best control, stand at the bench and lean over the work. Remember to move around, walk away for a while, or stretch. You'll come back relaxed. □

T.J. McDermott is a sculptor and wood-carver in Freeport, Maine.

Flip the work to finish. *When you've carved one side of all the letters, flip the workpiece and carve the other side. You always carve in the same direction, making it easier to get uniform results.*

Clean up carefully. *Gently erase stray pencil lines, then give the workpiece a light hand-sanding. Use a sanding block to avoid rounding the edges of the letters.*



readers gallery

RANDY LEAVITT
South Royalton, Vt.

Leavitt designed this maple and walnut table (42 in. wide by 84 in. long by 29½ in. tall) to be the centerpiece of his client's great room, which overlooks the Connecticut River. Built in homage to the trees that frame the view outside the client's window, the table has a base that rises from the floor like the roots of a tree and spreads out like branches. The live edges of the planks that frame the tabletop, combined with the shimmer of the inset glass top, mimic the river. The table is finished with an oil-and-varnish mixture.

KENNETH STOVER
Rancho Santa Fe, Calif.

These tea tables (11 in. deep by 16 in. wide by 21½ in. tall) have a dominant Louis XIV lineage, but Stover adapted the inlay in the tops directly from a music stand (circa 1770-75) attributed to noted 18th-century ebeniste Martin Carlin. The stand is on exhibit at the Getty Museum in Los Angeles (www.getty.edu). In keeping with the antique feel of the tables, all of the veneers are more than 100 years old (circa 1880), acquired from a dealer in Paris. The tables are made of poplar and mahogany, veneered with Brazilian rosewood. The inlay in the tops features veneers of boxwood, tulipwood, amaranta, kingwood, and ebony. The finish is French polish.

CELINE SCHMIDT
Saskatoon, Sask., Canada

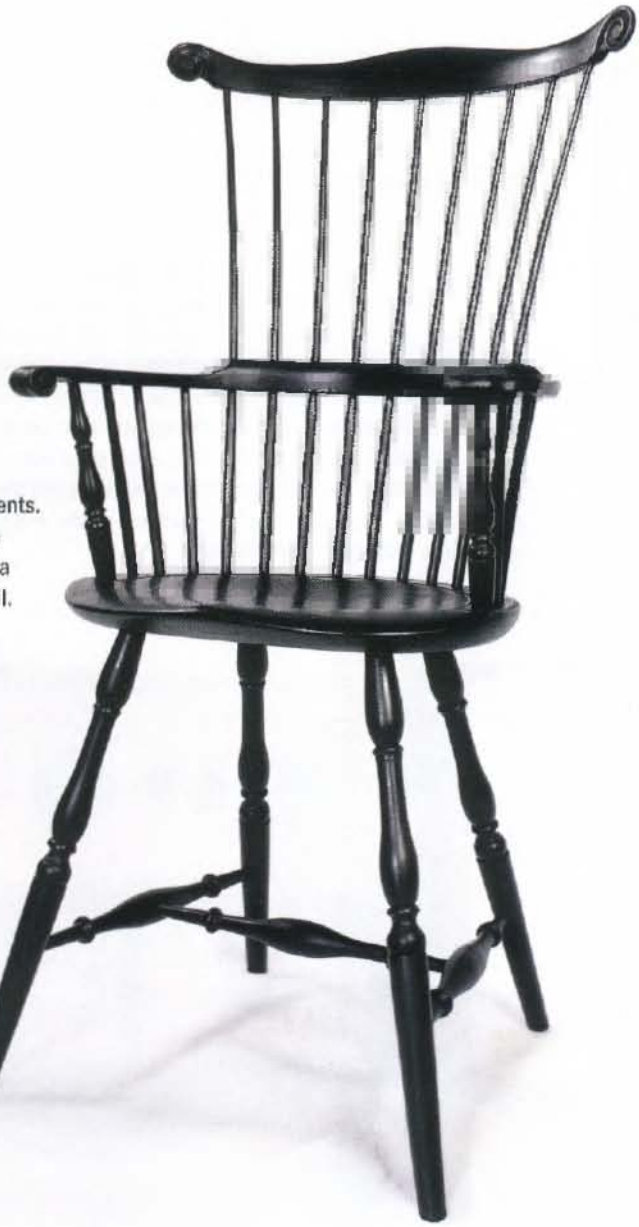
The focal point of this cabinet-on-stand (17 in. deep by 17 in. wide by 70 in. tall) is the inlaid wheat leaves, which are set in the foreground of a repeating prairie sky created with straight-grained tulip poplar veneer. To get the grain of the veneer to wrap seamlessly around the piece, Schmidt laid up the veneer in one large panel, then laid out the marquetry pattern on the sheet using a paper template. She cut up the sheet in different sizes to fit the substrates, added the marquetry leaves, then applied the veneer using a veneer press. The doors run on wood slides, and the finish is a mixture of tung oil and Varathane.

ALAN DANA HALL
San Diego, Calif.

This Mackintosh-inspired Arts and Crafts desk is based on an original built in Scotland by Wylie & Lockhead (ca. 1900). The problem was getting a good-quality photograph of the original—designed by E.A. Taylor (1874-1951)—from which Hall could develop measured drawings. Fortunately, Hall's mailman delivered. While visiting Scotland, the mailman bought a book with a photo of the desk and brought it back. The desk (18½ in. deep by 37 in. wide by 57 in. tall) is made of quartersawn white oak, with poplar as a secondary wood. Hall made all of the hardware and leaded stained-glass inserts. The finish is Watco medium-walnut Danish oil.

Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For consideration, send entry forms (available at www.FineWoodworking.com) and photos (unaltered digital images, prints with negatives, or slides) to Readers Gallery, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwgallery@taunton.com. If you want materials returned, you must include a self-addressed envelope with appropriate postage.



FRED SHINDLE
Collingswood, N.J.

This comb-back Windsor (17½ in. deep by 23 in. wide by 53 in. tall) is based on the speaker's chair built for The Carpenters' Company, a trade guild, and used at the meeting of the First Continental Congress in 1774 at Carpenters' Hall in Philadelphia. Shindle was given access to the original by The Carpenters' Company so that he could take photographs and measurements. His version now resides in the main hall where that first meeting took place. The chair has a poplar seat, maple turnings, hickory spindles, mahogany arms, and a white-oak crest. The finish is two coats of black milk paint followed by linseed oil.
PHOTO: J. ELBERSON PHOTOGRAPHY

ED ZBIK
San Diego, Calif.

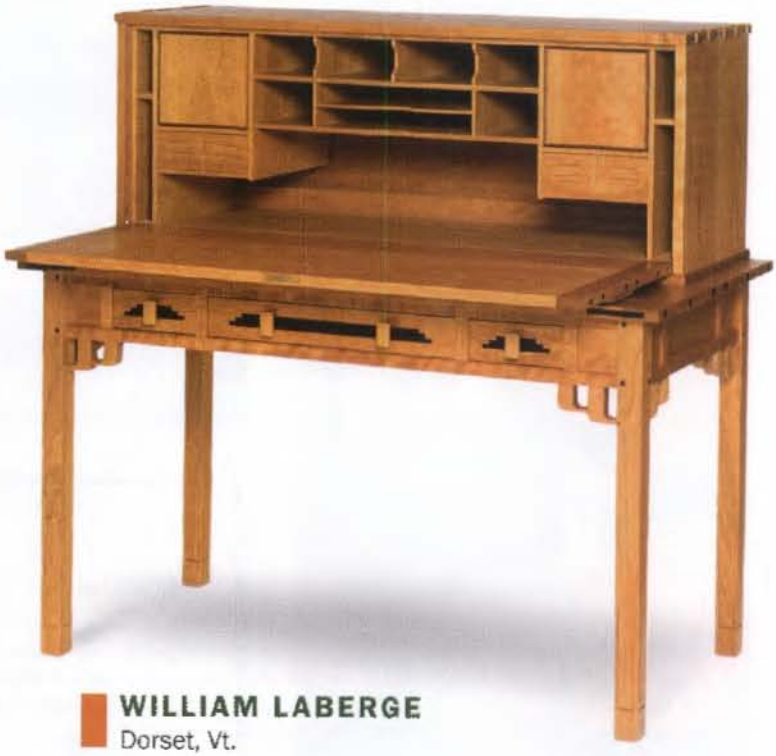
Zbik assembled and turned this segmented vase out of curly maple, bloodwood, zircote, holly, lacewood, satinwood, and ebony. Called "Butterfly Vase," the piece is 9½ in. dia. by 14 in. tall and is finished with Waterlox Original.

MICHAEL PARK
Columbia, Md.

Park built this ash table as a project while a student in the woodworking and furniture program at Rochester Institute of Technology. The graceful curves and airy feel were inspired by Korean furniture. All of the parts are bent-laminated. The table is 16 in. deep by 36 in. long by 17 in. tall and is finished with Bartley clear gel varnish.

RICHARD E. GIES
Kennett Square, Pa.

Gies had been honing his furniture-making skills for 25 years before tackling this tall case clock (11 in. deep by 19 in. wide by 86 in. tall). To make the piece, a classic example of an 18th-century Philadelphia-region clock, Gies took measurements from an original owned by a friend. From those dimensions, he created full-scale working drawings. The clock, made of cherry with poplar as a secondary wood, is right at home in Gies's 1830 Quaker farmhouse. The finish is water-based stain and tung oil.



WILLIAM LABERGE
Dorset, Vt.

This writing desk was inspired by one built by the Greene brothers for the Robert R. Blacker House in Pasadena, Calif. It is made of cherry, with walnut and ebony accents, and is 24 in. wide by 50 in. long by 48 in. tall. When not in use, the writing surface can be folded up and locked. Laberge carved the pulls, corbels, and legs. The finish is hand-rubbed oil.

TRISH NORTON
Newport, Del.

Norton's winged couch (60 in. deep by 72 in. wide by 78 in. tall) reflects her style of sculpture, which often incorporates curves and the winged form. This piece was inspired by the sandhill crane, which has a wide wingspan and a long, thin neck. It is made of maple and features steel legs and aluminum feathers. The crane eyes are ebony. The wood is stained for a frosted appearance, while the steel and aluminum are coated with spray enamel and lacquer, respectively. The upholstery is cotton fabric. PHOTO: BOB MCLAN

Q&A

Cutting mortises for bed-rail hardware

Q: In *FWW* #175, Jeff Miller made it look easy to install bed-rail brackets. I want to know how he gets such clean mortises in the end of 80-in.-long rails. Does he use a router or cut them by hand with a chisel?

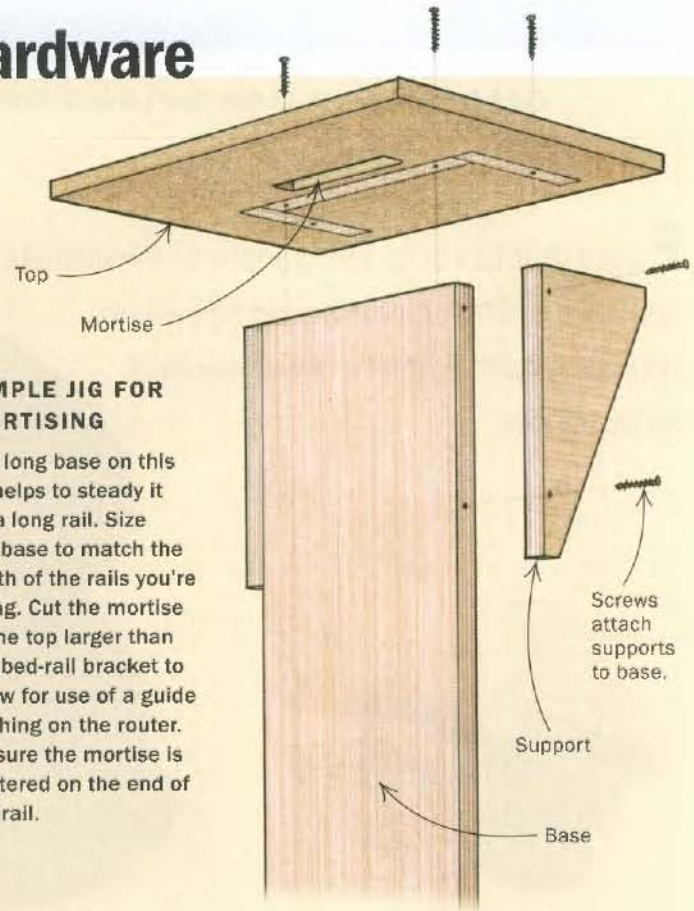
—VINCENT IANNELLI, Portage, Mich.

A: THERE ARE A COUPLE OF TRICKS that help you use a router to cut mortises in the end of a long workpiece.

First, use a jig to support the router. I built the T-shaped jig shown here. The top of the T supports the router, and the base clamps to the workpiece. Second, hold the workpiece at an angle in the workbench vise. I've found that angling the long rail this way is safe and comfortable, although it takes a little work to support the router.

Scribe the exact outline of the bed-rail bracket you want to use. Once you've finished hollowing most of the mortise with the router, clean it up with a chisel. With most of the wood already removed, the chisel should track the scribed lines cleanly.

—Jeff Miller, a furniture maker in Chicago, is the author of Beds *(The Taunton Press, 1999).*



SIMPLE JIG FOR MORTISING

The long base on this jig helps to steady it on a long rail. Size the base to match the width of the rails you're using. Cut the mortise in the top larger than the bed-rail bracket to allow for use of a guide bushing on the router. Be sure the mortise is centered on the end of the rail.

Hold the work at an angle. *Use a bench vise to steady the bed rail at a good working height. Clamp the jig to the end of the bed rail. With a plunge router, straight bit, and router template guide bushing, cut the mortises into the ends of the bed rails.*

Clean up the mortise. *Pare away the remaining waste with a chisel to make a snug housing for the bracket.*

Ask a question

Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

Photos: Kelly J. Dunton; drawing (this page): Vince Babak

Will green wood soak my shop?

Q: How do I keep my expensive lathe and bandsaw from damage and rust caused by cutting and turning green wood? Will the wood raise the humidity level in the shop and cause other tools to rust?

—RICH LEHMANN, Glendale, Calif.

A: GREEN WOOD CAN RUST unpainted cast-iron surfaces very quickly. So sweep up chips at the end of every turning session—even if you're only going to lunch.

I usually end any green-wood turning session by vacuuming the machines and the shop, then giving bare metal surfaces a coating of WD-40. That will take care of humidity problems that the shavings may create. Green shavings dry quickly, so it's a good idea to remove them at the end of the day to minimize a fire hazard.

—Ernie Conover, a regular contributor, teaches woodworking in Parkman, Ohio.

A breeze. *Turning green wood is a joy, quickly producing mountains of long shavings. But they hold enough moisture to rust bare metal in short order. To keep rust from developing, remove the shavings and clean the shop.*

Can one tablesaw blade do it all?

Q: I use a combination blade in my tablesaw for rips and crosscuts in boards as well as plywood and MDF. The results are good enough, but would I get better results if I used an assortment of blades?

—CHESTER HAGEN, Wheat Ridge, Colo.

A: IN MY EXPERIENCE, a sharp combination blade with a low tooth count makes the best overall choice. A combination blade has two types of teeth: Rip-cutting teeth are square to the blade and chisel small chips out of the wood; crosscutting teeth have alternate pointed edges and slice across the grain like knives. A combination blade isn't perfect for either ripping or crosscutting, but we don't tend to notice as long as the blade is sharp.

A low-tooth-count combination blade lets you use a fast feed rate for thick hardwoods; the blade removes chips quickly while reducing friction and heat buildup. As the tooth count increases, the maximum feed rate drops. That may yield a smoother cut surface because each tooth takes a smaller bite, but it also increases friction and heat. Cutting cherry with a high-tooth-count blade may produce enough heat to discolor the wood.

With a low tooth count, you can slow the feed rate when cutting thin hardwood, most softwoods, and material such as MDF. That increases the effective cuts per inch for a smoother surface.

—Steve A. Olesin, Acton, Mass., was a member of the Guild of New Hampshire Woodworkers and author of Tool-Making Projects for Joinery and Woodworking. *He died unexpectedly in April 2006.*

Less is more. *A combination blade with a low tooth count (front) can yield good rips and crosscuts in a variety of woods. The typical 40-tooth blade (rear) is a workhorse but produces more wood-scorching friction.*

Wrenches and router collets

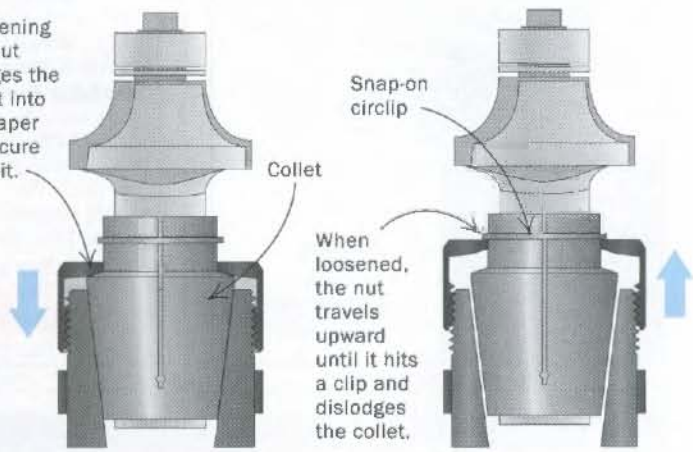
Q: Why do I have to use a wrench twice when I want to remove a router bit? The wrench seems to loosen the nut on the collet, but after a couple of turns by hand, I have to use the wrench again to release the bit.

–DAVID CREITZ, Kennesaw, Ga.

A: MOST ROUTER COLLETS are designed with a slight taper that won't self-release. Once tightened, the collet won't come loose without being pulled. When you loosen the collet nut and continue to turn it, you bring the nut up against a rim or a snap-on circlip on the top of the collet. You have to use the wrench a second time so that the nut applies enough force to lift the collet out of its socket.

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

Friendly persuasion. *Most router collets have a slight taper and require some leverage to undo. That's why you have to use wrenches after the collet nut loosens.*



Is MDF hazardous?

Q: What is the toxicity of MDF dust, and what hazards do we face by being exposed to this material?

–PETER LUNDQUIST, Calumet City, Ill.

A: MOST MDF, or medium-density fiberboard, is held together with urea-formaldehyde resins. This type of adhesive lends strength and stability to the panels, but also emits small amounts of formaldehyde. This can irritate eyes and respiratory systems and cause more severe health problems in people with an extreme sensitivity. Two alternatives are Medex and Medite II from Medite Corp. (www.sierrapine.com). These products emit extremely low levels of formaldehyde.

—William Duckworth, a contributing editor, wrote about MDF in FWW *#170.*

Side effects. *MDF is a versatile material, but the urea formaldehyde that holds panels together can be a health hazard to some sensitive individuals.*

Finish inside a blanket chest?

Q: I finished the outside of a blanket chest with Tried & True Varnish Oil. Do I need to finish the inside to keep the wood from splitting and warping? If so, is there a finish that will be odorless after a couple of weeks?

–MICHAEL WOLLOWSKI, Terre Haute, Ind.

A: YOU CAN LEAVE THE INSIDE carcase of the chest unfinished if you like, but I would play it safe and seal it.

Avoid oil-based finishes because their odor will linger and permeate the contents of the chest. That won't happen with shellac, because most of its alcohol solvent evaporates very quickly. I'd apply two coats, followed by a coat of wax after the shellac has dried for 24 hours.

—Jeff Jewitt, a wood finishing expert, is a frequent contributor.

Drawing (this page): Kelly J. Dunton

Sharpening gouges: the 40° solution

BY MIKE MAHONEY

What a keen edge does. *A properly sharpened gouge cuts efficiently and doesn't need a lot of muscle to do its work.*

In my years of teaching wood turning, I've noticed that many students have trouble learning how to grind gouges correctly. That's understandable. Unlike most other turning tools, a bowl or spindle gouge must be moved in two directions simultaneously—rolled against the grinding wheel while being swept from side to side. That's the only good way to keep the gouge's distinctive fingernail profile and a cutting edge beveled at a consistent angle along the curved end of the tool.

The proper bevel is crucial for cutting wood efficiently. As a rule, the more acute the bevel, the cleaner the gouge will cut and the less force you'll have to use. For most turnings, a 50° bevel is better than one of 70°, and 40° is better still.

The sharpening jigs I've seen produce an uneven bevel, invariably 16° to 20° more acute on the sides than at the tip. That's because they aren't designed to swing the gouge from side to side. As a result, the gouge will vibrate when used and will dull quickly.

I believe it's better to grind gouges freehand. The technique described here, which I adopted after watching my friend and master turner Stuart Batty, is simple, effective, and easy to learn.

Set your grinder for the proper angles

Handbooks and experts give different recommendations for optimum bevel angles, but Batty and I have found through experience that spindle and bowl gouges work best with a bevel of about 40°. As it happens, that magic number represents the bevel angle, the amount of side-to-side movement you make when grinding, and the amount of bevel on the top side. Here's how to set up your grinder to get a consistent 40° bevel.

First, mark guidelines on the grinder platform 40° left and right of the center of the grinding surface. They

1. Set up the grinder to get a consistent 40° bevel

Make a template. *Cut one corner of a piece of scrap at a 40° angle and use it to mark the grinder platform.*

Angle the grinder platform. *Use trial and error to set the platform at a 40° angle (or close to it), which will be the bevel angle on the gouge.*

Grind the nose to check the angle. *Test the platform angle by lightly grinding the nose of the gouge, then checking the result with a protractor or angle gauge.*

Photos, except where noted: Matthew Gardner; this page (top): Rodney Diaz

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READER SERVICE NO. 120

READER SERVICE NO. 64

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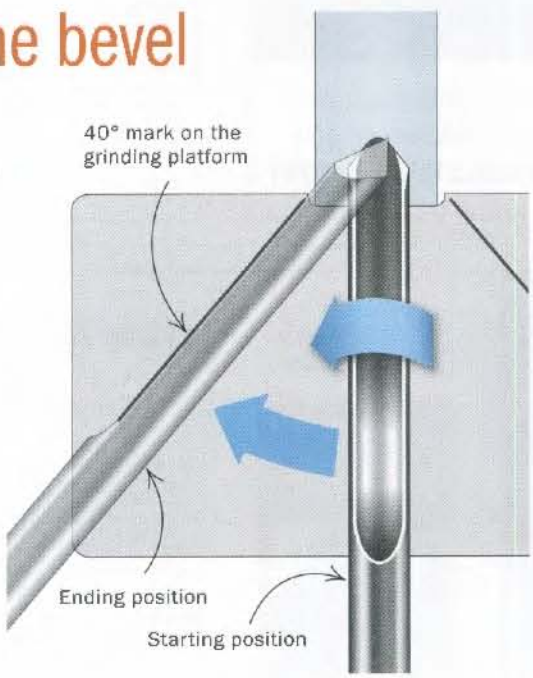
READER SERVICE NO. 16

2. Flatten the cutting edge

Start a new cutting edge. *With the gouge's flute facing down, grind away the cutting edge. The resulting thin face creates a guide for the last stage of sharpening.*

3. Grind the bevel

To sharpen the edge, start with the gouge centered on the grinder platform in line with the grinding wheel. Roll the gouge while simultaneously swinging it to the side to the 40° mark on the grinder platform. Keep the gouge flat on the grinder platform to maintain a consistent grinding angle. Sharpen one side at a time. Finish by blending in the bevel.



will help you get a consistent side-to-side sweep. Make a template from scrapwood cut to the same size as the platform. Mark the guidelines with an indelible marker.

Next, adjust the angle of the platform. Set it by eye to an angle that looks close to 40°, then test it by grinding the bevel on the nose of the gouge. Check the result with an angle gauge or protractor, and tweak the platform angle as needed. Don't worry if the angle isn't exact; a couple of degrees either side of 40 won't matter. Once you have the platform at the correct angle, grind the bevel on the nose again and recheck it.

Grind a fresh cutting surface

The next stage of grinding deliberately flattens the cutting edge so you will have a fresh surface to grind back to. Hold the tool in line with the grinding wheel with the flute face down on the platform. Lift the gouge from the platform slightly as you pass it over the wheel a couple of times; that will create a slight convex surface overall. If you hold the gouge against the platform the whole time, the wheel will leave a concave surface, which gives the gouge a tendency to catch in the work.

To sharpen the edge, roll and swing

Begin with the gouge in line with the grinding wheel and the flute facing up. Keep the gouge flat on the grinder platform, holding it by the metal just above the ferrule to keep the grinding angle consistent. If you hold the tool by the handle, you may be inclined to lift it off the platform, thus changing the angle.

Roll the gouge counterclockwise while moving it to the left. You want to end with the flute facing to the left and the gouge lined up with your 40° line on the left side of the grinder platform. As you bring the gouge up to the line, be careful not to roll it too far; if you do, you'll make the end of the bevel convex.

Repeat the maneuver, rolling the gouge clockwise while moving it toward the other 40° mark. □

Start with the flute facing up and the tool centered on the grinder platform. *Sweep the gouge in an arc to the left, simultaneously rolling the tool so that the gouge faces left. End at the 40° guideline on the grinder platform. Then sweep and roll the gouge to the right.*

Drawing: Rodney Diaz

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A faceted Ruhlmann leg

BY AARON RADELOW

In Paris during the early years of the last century, Emile-Jacques Ruhlmann was "it" when it came to Art Deco design. One of his signature designs was a torpedo-shaped, multisided leg that attached to the corners of tables or cabinets. While looking through a book on Ruhlmann furniture, one of these *fuseaux à facets,* or spindle legs with facets, caught my attention. I was lured by the simplicity of their graceful curves, but I was shocked to learn that it took Ruhlmann's top craftsman needed a week to create each leg.

Intrigued to discover their hidden complexity, I decided to take the plunge and to build a cabinet incorporating four of these legs. With the aid of various jigs, I broke down construction into manageable sections that, while still time-consuming, are not that difficult.

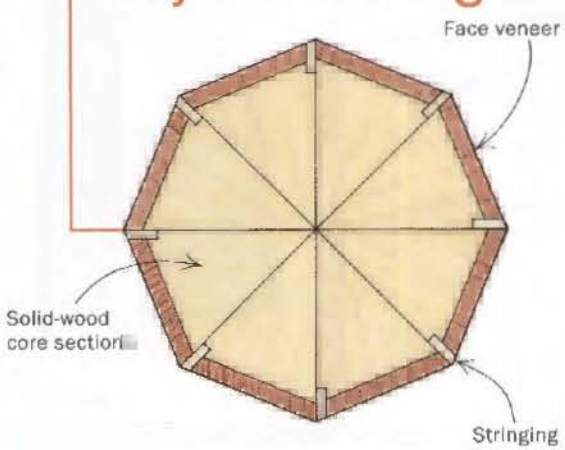
The leg's core consists of eight pieces

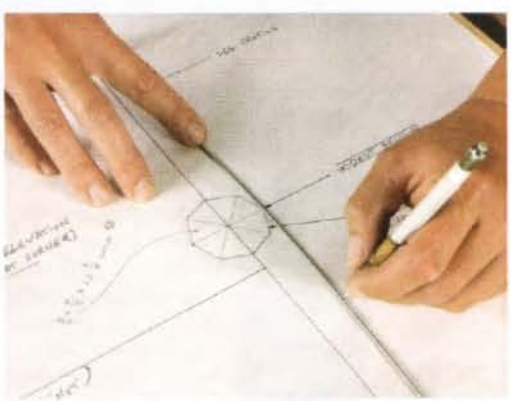
You'll need to create a full-scale drawing of the whole piece first. Use a thin strip of wood or metal to lay out the fair curve of the leg's profile. At the leg's widest point, draw a line perpendicular from the outside edge to the midpoint of the leg. Draw seven other lines of equal length radiating out from this midpoint and connect them at the ends to form an octagon. This will be your guide for making the eight sections of the leg.

Cut the leg components—Traditional Ruhlmann legs were veneered, so the core should be made from strips of stable and well-seasoned rift-sawn white oak or poplar. If you prefer a more contemporary look, use cherry or maple for the legs and skip the veneering. In either case, start by milling rectangular strips that are the same width as each segment in the octagon, slightly thicker than the outside edge of one facet, and about ¼ in. longer than the leg. Make parts for two extra legs to allow for testing and waste.

I make a jig or sled to run these strips through my planer to create isosceles triangles with two base angles of 67.5° and a top angle of 45° (see drawing, facing page). All eight triangles must be identical so that when dry-fitted together they create a solid leg that matches the cross-section drawing.

Lay out the leg





A full-size drawing. *Use a flexible guide to fair the leg's curve. Then draw the octagonal cross-section at the leg's widest point. This view is used to size the eight sections that form the core.*

Sources of Supply

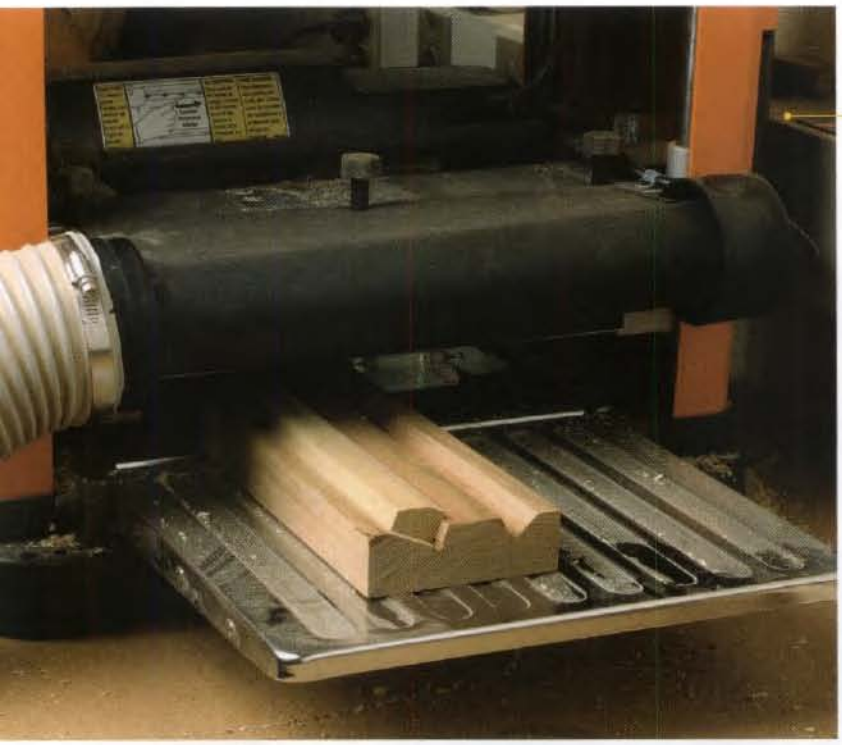
VINYL AND HOLLY STRINGING
www.doverinlay.com
301-223-8620

VENEER
www.certainlywood.com
716-655-0206

OLD BROWN GLUE
home.pacbell.net/ebeniste/gluepage.htm
619-298-0864

HIDE GLUE
Gram strength 192 for hammer veneering
www.milligan1868.com
518-762-4638

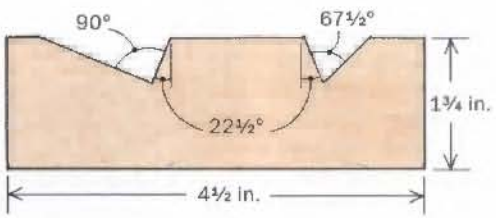
Photos: Mark Schofield; drawings: Vince Babak

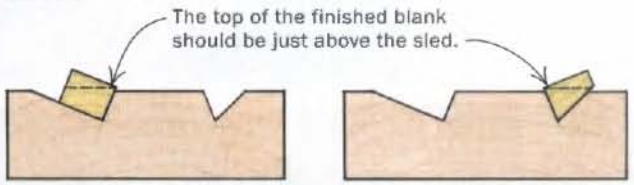


Make the leg segments

STEP 1: USE A SLED TO ANGLE THE SEGMENTS

To create the eight triangles that form an octagonal leg, place each rectangular blank on a sled and run it through the planer in two positions.

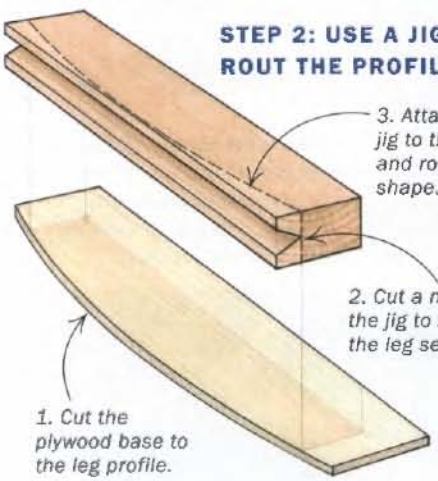




Place a rectangular blank in the first channel and run it through the planer until you create a single flat surface across the top of the blank.

Place the just-planed surface face down in the second channel and run it through the planer until you have created an isosceles triangle.

STEP 2: USE A JIG TO ROUT THE PROFILE



Into the router jig. *Use a pin nailer to secure each leg section. To make the pins easier to pull out, Radelow attached a binder clip as a pivot point for angling the gun away from the work.*

Work outward to the ends. *To avoid tearout on the top of the leg, begin in the middle and rout the bottom of the leg conventionally. Then profile the top of the leg, working away from the center, using a climb-cut and keeping a firm grasp on the jig.*

Form the leg's profile—To cut the curved profile of the leg on each triangle, you'll need a jig for the router table or shaper. The base of the jig can be made from ¼-in. or ⅜-in. plywood. It should be about 5 in. wide and 4 in. longer than the leg. Cut the leg's profile on the base's front edge; the bearing on the pattern-cutting bit will run against this edge. The jig's top section should be about 1 in. thick by 3 in. wide, slightly longer than the leg component, made from pine or some other softwood.

On the tablesaw, cut a 45° wedge into the edge of the jig so that a triangular leg section will fit snugly and will be flush with the outside edge of the jig. Glue the

Roll up the leg. *After shaping the eight sections for each leg, dry-fit them with masking tape to check for symmetry.*

Add veneer and stringing

Apply the veneer. *Because clamping the veneer to the triangular leg section would be very difficult, the easiest way to apply the veneer is with hide glue and hammer veneering.*

Trim the veneer. *Use a laminate trimmer with an adjustable base to remove most of the overhanging veneer.*

two parts of the jig together so that the top part is flush with the widest part of the base. On the bandsaw, cut the leg profile onto the top part of the jig, staying just outside the base line.

When you place the leg blank back into the jig, it should be flush only at the widest section of the jig. Secure the blank temporarily in the jig using a pin nailer. To make it easier to remove the pins later, the pins should only just penetrate the workpiece, and the front of the pin nailer should be propped to keep the heads of the pins exposed.

Remove the bulk of the wood on the bandsaw, and starting in the middle of the leg, run the right-hand or lower end of the leg past the router bit from right to left. If you try to run the top end of the leg into the bit in this direction, you will be going against the grain and almost certainly will get tearout. Instead, do a climb-cut on the top half, moving the jig from left to right. When done, remove the pins with pliers to release the shaped component and test it against your full-scale drawing.

Veneer and inlay one section at a time

With the core components shaped, it's time to veneer them. Because you'll be gluing eight pieces together, there probably will be misalignment that must be corrected by sanding. Most burl veneers, such as this amboyna burl, are thick enough to allow for sanding, but standard veneers are too thin; use special 1/16-in.-thick veneer (see Sources of Supply, p. 106).

Make a pattern of the outside face of a leg section and cut out the veneer using either a veneer saw or a scrollsaw. The veneer should overhang the section about 1/8 in. all the way around.

I build a cradle with a 45° groove to hold each piece while I hammer-veneer it using hot hide glue. Once the veneer has dried, trim the overhanging edges flush. I use a laminate trimmer with a tilting base and a new flush-trimming bit. The tapered ends won't guide the bit's bearing, so I sand these sections and clean up the whole piece on P150-grit sandpaper glued to a flat surface. Don't sand too much or you'll spoil the alignment with the other pieces.

One side of each section gets stringing—To emphasize the octagonal shape, eight lines of stringing run down each leg. The

A groove for stringing. *Use a rabbeting bit in a router or laminate trimmer to create a small rabbet on one side of each leg section for the stringing.*

Apply the stringing. *A thin bead of glue and plenty of masking tape secures the ivory or holly stringing in each leg section (above). The rabbet should be very slightly shallower and narrower than the stringing so that the latter can be sanded to final size (left).*

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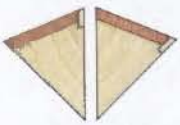
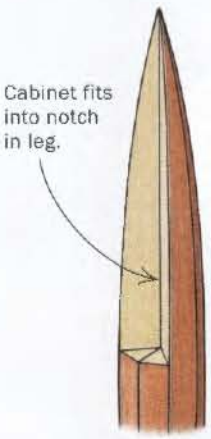
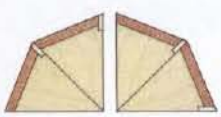
Assemble the leg



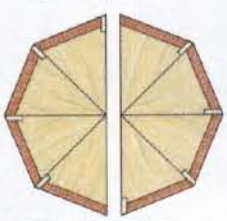
Assemble in pairs. *Glue two leg sections at a time into quarters.*



Each leg has a notch. *Cut off the top of one of the quarter sections to create the notch that receives the corner of the cabinet.*

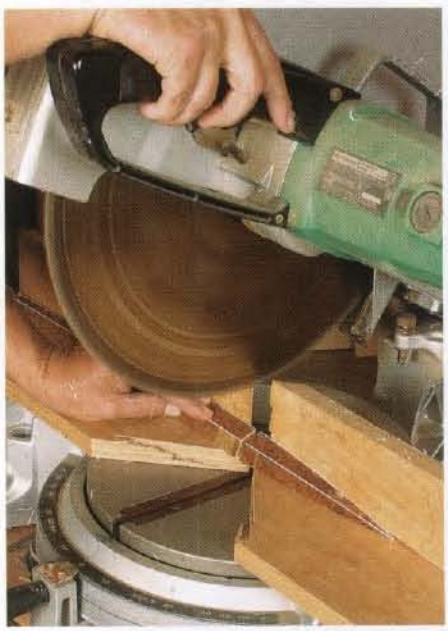


Glue the quarters into halves.



Glue the halves together.

Assemble the sections. *Glue the quarter sections in pairs to form halves of the leg. When dry, glue the halves together to complete the leg.*



traditional material is ivory (you can buy certified legal ivory online at eBay), but holly or vinyl are acceptable and are easier to use because they typically come in longer lengths.

Run a rabbet slightly less than the thickness and width of the stringing into one outer corner of each leg section (see drawing, p. 108). To cement the stringing into the rabbets, I use Old Brown Glue, a liquid hide glue with extended work time. The next day, sand the inlay flush with the leg segment.

Assemble the legs and add the shoes

Gluing eight sections at once would be messy so I take two sections, apply hide glue sparingly to both joining faces, and tape them together with masking tape, making sure they are as flush as possible. Allow the quarters to dry overnight.

Take one quarter and cut away the top to form the notch for the cabinet's corner. Now glue the four sections into halves, and then the halves to form a whole. Cut the leg to length on the tablesaw, propping up the foot so the cut will be square.

To make the foot, take a ¾-in.-sq. by 2-in.-long piece of the material you used for the stringing. Turn it on the lathe to create a taper that will follow the shape of the leg, with the connecting end 1/64 in. larger in diameter than end of the leg. While at the lathe, drill a small hole in the foot for a dowel or a piece of threaded rod, and a matching hole in the end of the leg. Glue the foot in place.

Now extend the leg's octagonal flats onto the foot using a small sanding block. After everything is faired to your liking, sand the whole leg, one facet at a time, using P150-grit paper. This will also transfer the corners to the center of each inlay. With the cabinet upside down, attach the legs using Old Brown Glue and strap clamps.

The last step is to add the small ivory bead at the top of each leg. I use a ball burr bit in a handheld drill, but you could use a gouge to create a small crater that will enclose about a third of the bead. Apply a high-gloss traditional finish, and admire the results. □

A turned foot. *Turn the tapered foot until it is just larger than the bottom of the leg. Join the two with either a dowel or a threaded rod (above). Use a sanding block to extend the leg facets onto the foot (right).*

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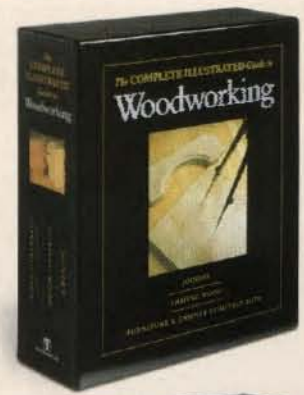

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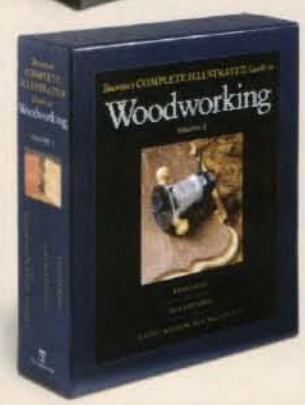

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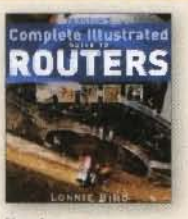

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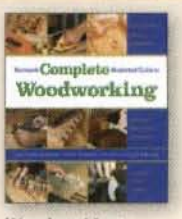

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The impact of light on dyes and stains

BY TERI MASASCHI

Hidden color. *The candlestick protected the tabletop from sun damage, preserving the original darker color.*

Whatever dye or pigment stain you use, it will fade or change color with exposure to bright light. The solution is not to swear you'll never stain wood again (after all, natural colors in wood are affected by light too), but rather to learn which coloring agents to use, how to use them, and what else you can do to preserve the intended color.

The degree of lightfastness varies enormously between different dye stains and pigmented stains. The problem is that many products contain both dyes and pigments, and the dyes fade faster. With time, the effect can be disappointing. With the right technique, you can stop dye-and-stain combinations from fading at different rates, and take advantage of the ultraviolet protection offered by some clear coats.

NGR dyes are more lightfast

When measuring lightfastness, many variables come into play, such as what substrate the dye is on, the concentration of the mix, and of course the type of light exposure. To give a rough indication of the relative lightfastness of different dyes and stains, manufacturers use a scale from 1 to 8, with 8 being the most lightfast.

Dyes come in both powders and liquids, with the former divided by the solvent in which they dissolve: water, alcohol, or oil. As a group, powdered dyes have lower fade resistance; water-based dyes fall into the 2 to 5 range while alcohol and oil-soluble dyes range from 2 to 3. In general, powdered dyes in darker tones containing a lot of black are more lightfast than the medium to light tones of reds and blues.

The modern metallized dyes are even more lightfast. Better known as non-grain raising (NGR) dyes, they come either in ready-to-use strength (such as Solarlux) or 2-oz. liquid dye concentrates (such as TransTint or WizardTint). This group falls from 4 to 7 on the scale, with the very darkest approaching 8.

The older NGR stains did not have the lightfastness of today's products, hence the continuing belief that these alcohol-based stains are not very light resistant.

Pigments are fade resistant

As a group, pigment stains resist fading better than dyes. The actual pigments can be natural or man-made, with many of the former recognizable by earthy names such as raw umber or burnt sienna. The bright primaries such as blue or red are now mostly man-made. The two groups

SUNLIGHT FADES DYES

Red and yellow dyes were applied to birch plywood. The bottom half of each board was exposed to full sun for six weeks.

Water-based powder dyes faded fast. *After only five weeks, the extent of the sun damage, particularly to the red-dyed areas, is obvious.*

More lightfast. *Alcohol-based, non-grain-raising dyes suffered some damage from the sunlight but not as much as the water-based dyes.*

Photos: Mark Schofield

don't differ markedly in their lightfastness. New on the market are micronized pigments whose particles are so small that they mimic the transparency of a dye but offer the benefit of superior lightfastness. These "super" pigments are mostly confined to commercial systems and are very expensive, but they are finding their way into consumer exterior stains. Check the ingredients label for "transparent" red, yellow, or brown.

How to combine dye and pigment stains

When you open a can of Minwax Golden Oak, you'll notice that both the liquid in the top two-thirds of the can (the dye) and the thick sediment at the bottom (the pigment) are the same color. This dye and pigment stain combination, with its one-step ease of application, is common among mass-market stains. However, with prolonged exposure to bright light, the dye in the product will fade faster than the pigment, altering the original effect.

To offset this, select a separate NGR dye and a pigment stain of the same color. Apply the dye and let it dry. Then go over it with a thick pigment stain such as a gel stain that will act as a shield.

Further ways to protect the colors

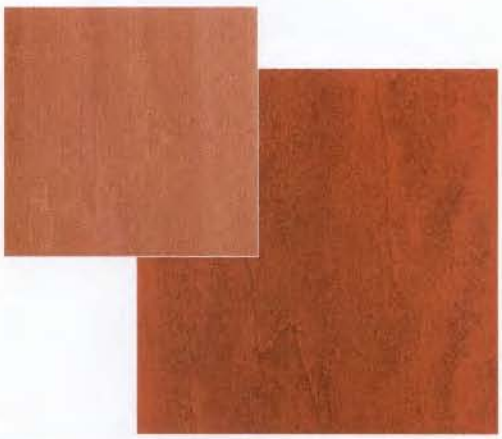
Manufacturers of clear coatings use additives to slow down the degradation of a color. The best finishes for sun protection contain both ultraviolet absorbers (UVAs) and hindered amine light stabilizers (HALS). UVAs absorb the damaging rays and protect the underlying surface color, whether stained or natural; HALS protect the clear coat itself.

Because both types of additive are expensive, finish manufacturers use them sparingly unless the product is designed for a sun-exposed location and can command a premium. In general, marine finishes contain large amounts of UV protection, mass-market exterior finishes have smaller amounts, and most interior finishes contain little if any. The can probably will mention if the contents include UV inhibitors, but to be safe, contact the manufacturer.

Even in a good exterior finish, the additives eventually will break down from exposure to light. □

USE A CLEAR COAT TO PROTECT THE COLOR

Clear finishes designed for exterior use should contain ingredients to block and/or absorb ultraviolet light.



The benefits of UV protection. *Compared to the severe fading of the water-based dyes with no clear topcoat (top), those sealed with three coats of an exterior finish containing ultraviolet absorbers showed only a slight change in color.*

APPLY STAIN AND DYE SEPARATELY

Two-step process adds depth to a workpiece. *The best way to combine dyes and stains is to apply the dye first (left), in this case an oil-based dye dissolved in mineral spirits, and to let it dry. Then wipe on a heavy pigment stain with a similar color (below). This will add depth to the look and will give the dye underneath some protection.*

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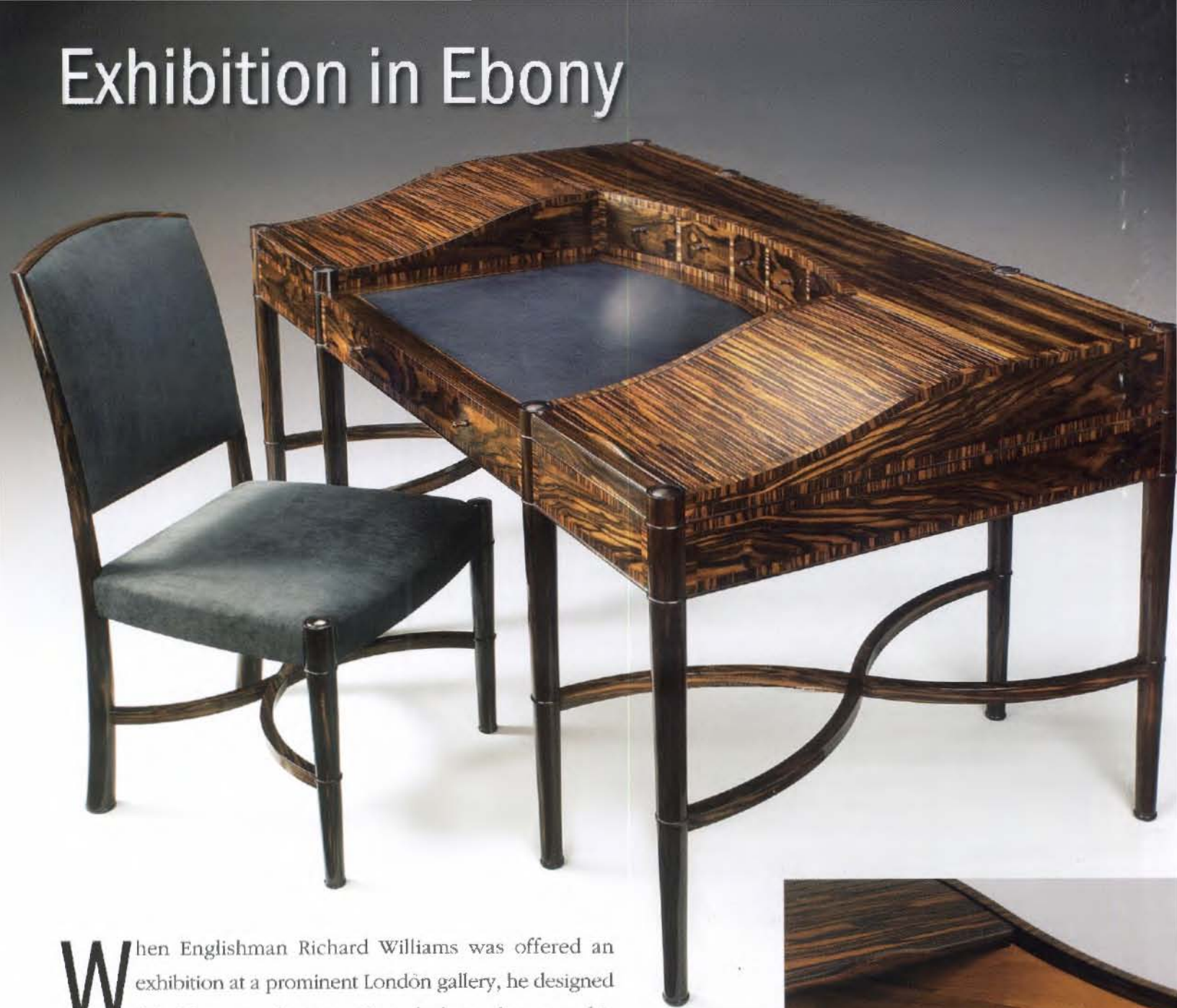

Photos: Ian Gibbs

When Englishman Richard Williams was offered an exhibition at a prominent London gallery, he designed this Macassar-ebony writing desk to showcase his shop's virtuoso craftsmanship. Williams calls the desk "a bit of a nod to British furniture history" but says it isn't modeled directly after a particular period or piece. In form, however, with its covered compartments and gallery of drawers, it is a Carlton House desk, with a lineage leading back to a desk George Hepplewhite designed for the Prince of Wales.

Williams's desk had its own generous patron—a longtime client who offered to foot the cost of building it and wait until it sold to be repaid. That was fortunate, because the desk and chair required 930 hours to build. Williams, who employs five cabinetmakers and can spare only a day a week at the workbench, built the chair but entrusted the desk to Stuart Webster. The trickiest technical issue was getting the tambours to slide without sticking or racing. A full-scale mock-up solved that riddle.

—Jonathan Binzen

Pro Portfolio Visit FineWoodworking.com to watch an audio slide show of work by Williams.