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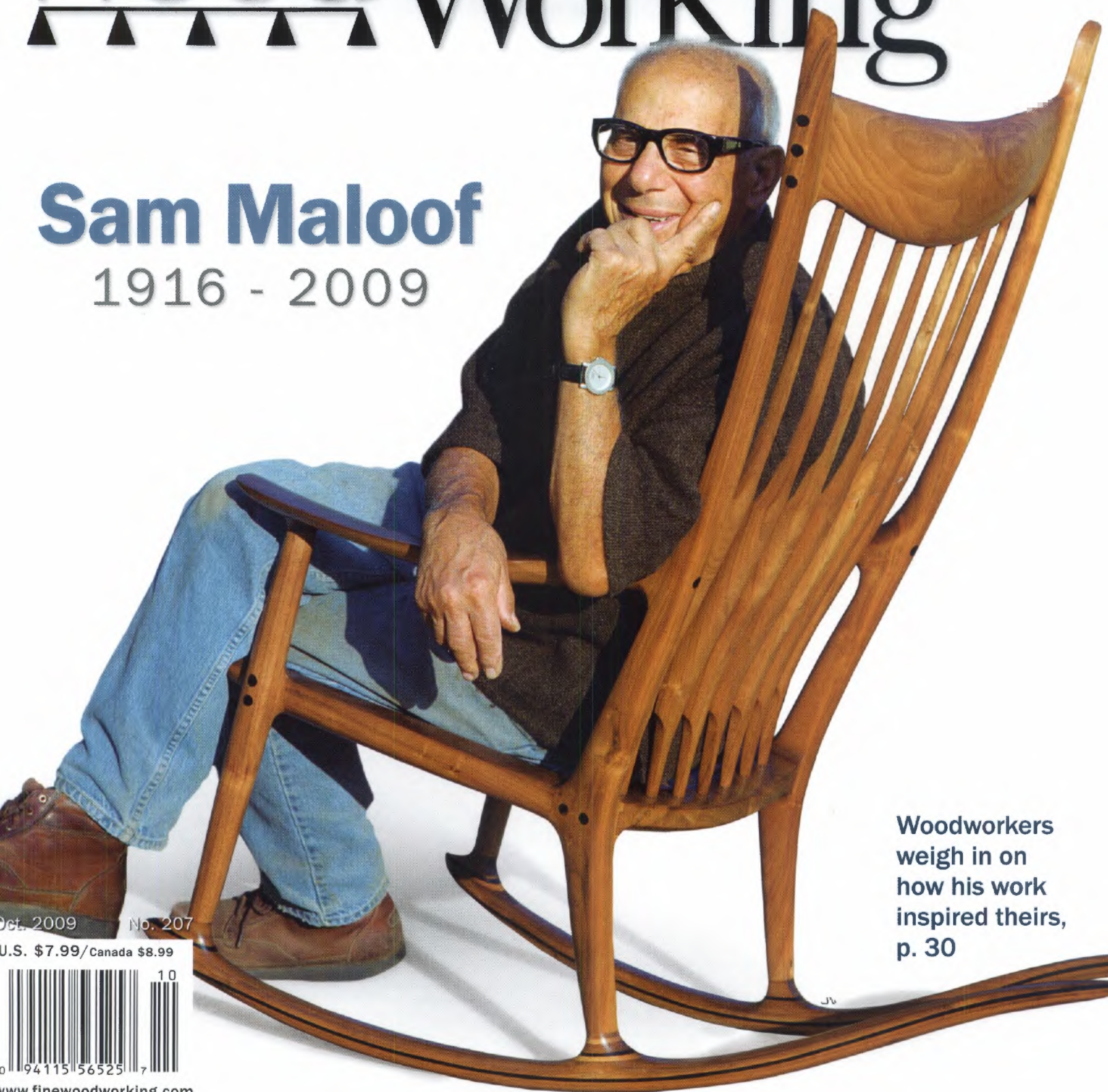
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Sam Maloof

1916 - 2009



Woodworkers
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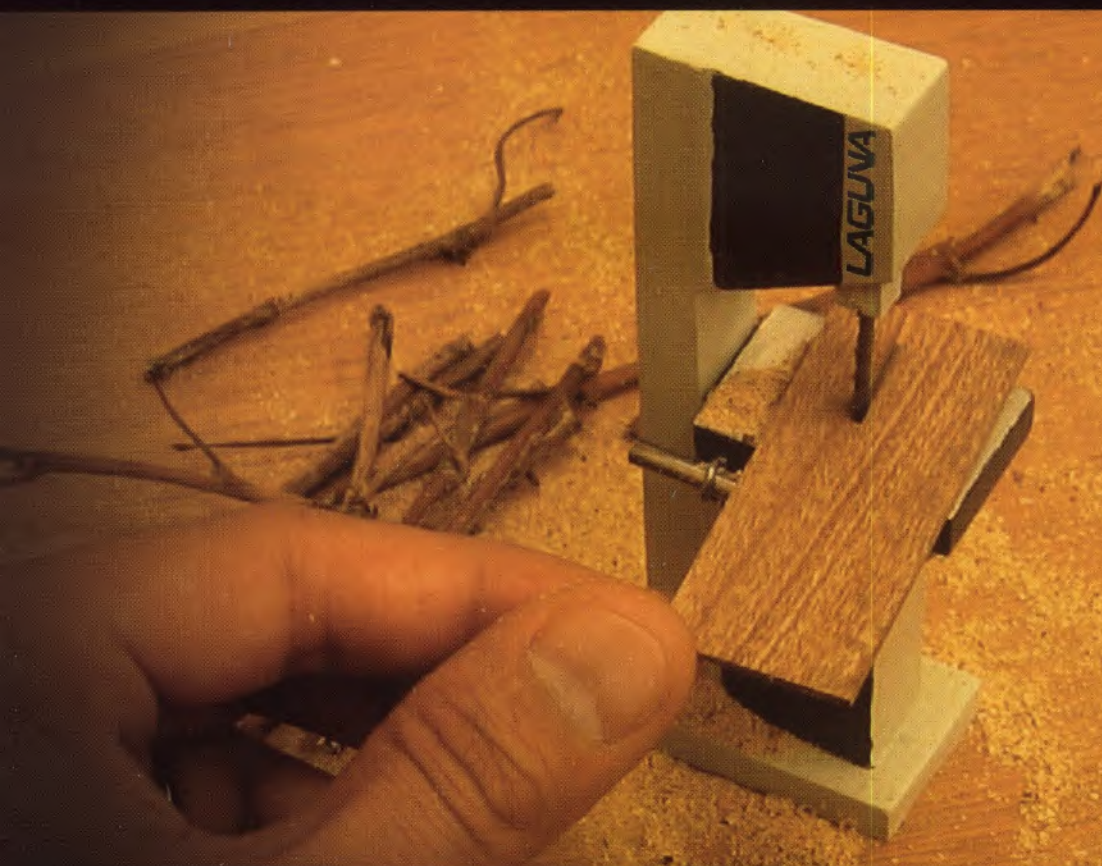
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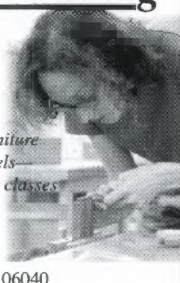
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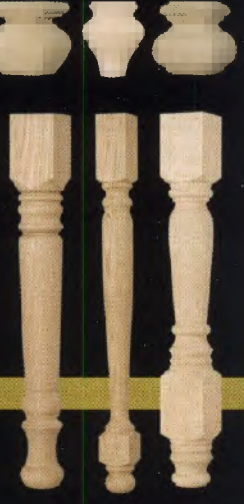
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Woodworkers reflect on how Maloof influenced their craft. Plus, a narrated tour of more Maloof furniture.



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See how associate editor Tom Begnal put 18-volt cordless drills through a real-world torture test.

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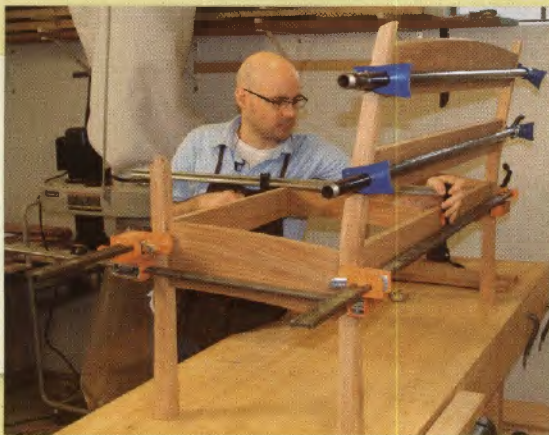
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contributors

Daniel Chaffin (*"A Bench That Fits Every Room"*) is a self-taught professional furniture designer and craftsman in Louisville, Ky. After renovating a downtown building, he moved his shop from a tiny basement with just over 6-ft. ceilings to the new space, with ceilings over 12 ft. He's still astounded every time he flips a long board end for end without denting the ductwork. His two business partners keep him from dovetailing everything, which helps make their small business successful. Chaffin lives above the shop with his wife and two children.



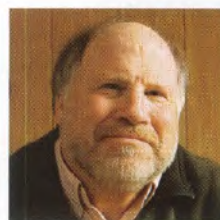
Tony O'Malley (*"Best Hinge for Built-Ins"*) has installed hinges on everything from custom entry doors to fine furniture. He operates a small woodworking business in Emmaus, Pa. (www.tonycustomwood.com), where he focuses on built-in cabinetry for home libraries, offices, and media. When he's not building furniture or writing about it, O'Malley likes to play tennis and ride his mountain bike.

Hendrik Varju (*"The Confusion Over Wipe-On Finishes"*) operates his studio, Passion for Wood, in the hills of Erin, Ont., Canada, where he builds custom designs, repairs and restores antiques, teaches courses, and holds seminars. Varju also produces detailed step-by-step woodworking videos (see www.passionforwood.com) and is set to release another title this year.



Bob Van Dyke (*Fundamentals: "Creating a Tabletop"*) came to woodworking via the kitchen, or more accurately by refurbishing a restaurant he once owned. Trained at the Culinary Institute of America on the Hudson River, he worked in a premier French restaurant in London. He now runs the Connecticut Valley School of Woodworking (www.schoolofwoodworking.com), but perhaps missing the heat of the kitchen, he blows glass in his spare time.

We feel sorry for anyone who hasn't had a chance to work with associate editor **Tom Begnal** (*"Compact 18-volt Cordless Drills"*). He retired at the end of June to live the life of a country gentleman and hobbyist woodworker. From now on, his contributions to the magazine will be as an author. He's been with the staff since 2000, and we'll miss his expertise, his penchant for life's little quirks, and his great sense of humor.



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SEPTEMBER/OCTOBER 2009

From the Editor

TWO DAYS WITH SAM MALOOF

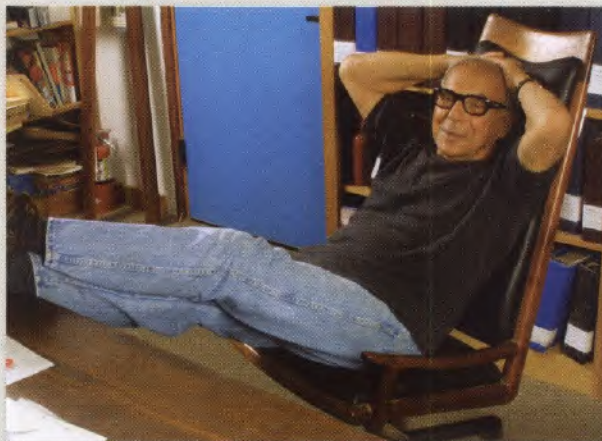
I dialed Sam Maloof's number timidly in 2005, just another writer calling for a piece of the icon. My idea was to do a twist on the typical Maloof homage, asking him instead to offer advice to aspiring designer/makers. His longtime assistant, Roz Bock, put my call through and suddenly I was talking to the man. He was friendly and open right away, even though I was a stranger. He said he wasn't sure if he had much to say to guide others, but he was game to try.

When I turned into the driveway of Maloof's famed compound a few months later and found his office, he was just as down-to-earth and accommodating in person. During the two days I spent with him, we were interrupted regularly by visitors. All were welcomed, given a tour, and given plenty of his time. I know this drove his staff nuts, because it left his daily schedule in tatters and did nothing to shorten his multiyear backlist, but it made him universally loved. I am just one of hundreds who visited with Maloof and came away changed.

STRONG IN HIS 80s

At 89, Maloof still insisted on doing at least the rough shaping on all of his chair parts, muscling them sure-handedly across the bandsaw table. And he moved with the grace of a much younger man through the various construction projects on his sloped property, where ground was being cleared for a public gallery. He drove me to lunch the first day in a brand-new Porsche convertible. He did about 85 mph, chatted constantly, and ran over a few road cones while he reached for his cell phone. It was a slightly surreal ride in the California sun.

I was humbled when he left me alone in his old house for a day of uninterrupted shooting. I gingerly moved my umbrella lights through his handmade doors, around the artwork of his famous friends, between iconic pieces of his furniture, through the life he and Alfreda had shared. Friends say Sam was never the same after she died in 1998. He moved out of the house, had it declared a historic landmark, and built a new one nearby.



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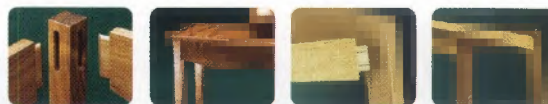
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In the weeks since Maloof passed, I've realized that he was the first real national treasure I've known. "National" is the right word because his was a uniquely American story. The son of Lebanese immigrants, he served in the Army, trusted his intuition always, became a unique entrepreneur, and made furniture for two U.S. presidents.

HE MADE HIS OWN RULES

Even if he wasn't such a charming man, his furniture would have made him famous. Being self-taught and one of the first of his kind, Maloof was free to make his own rules. When he found flush drawers tedious to fit, he recessed them in a rounded frame. When he needed curved parts, he balanced them on the bandsaw table, making free-form cuts that would torture the most lenient shop teacher. He put screws in his joints, used sapwood, and sanded through laminations, but he built his pieces one at a time, letting each develop a life of its own. And they've proven almost impossible to copy. I've never seen an accurate reproduction of his rocker. Try matching the sinuous crest rail, with its complex interplay of hard lines and soft surfaces, draped curves, and tight arcs—his three staff craftsmen can do it, but they've been with him for decades. Maloof repeated a handful of pieces again and again, but was always making improvements, so every new version contained all of his skill and experience.

After spending a couple of days with the man and his furniture, I started to realize that one resembled the other: walnut-colored skin, a slightly bunched musculature, even the desire to please. Maloof wanted clients to love their pieces. He put function above all else. He guaranteed all of his work and would take pieces back at any time for repairs.

BOUNDLESS CREATIVITY

It is an understatement to say the trip was inspiring. Like my other two favorite woodworkers—Wharton Esherick and George Nakashima—Maloof's creativity didn't stop at furniture. He created his world, surrounding himself with beauty and grace. His life, houses, art collection, techniques, furniture—everything from carved door handles to custom window frames to beautiful rooflines—all emanated from that same generous, inquisitive soul.

On the last day I was there, I worked briefly in Maloof's new home, shooting a few rare pieces. When he came in for a midday nap, I tried to leave. But he insisted I stay and get what I needed. He was content to go to sleep as I moved around just outside his open door.

—Asa Christiana



The new house gave Maloof a chance to design and build a second spiral staircase. He kept a mallet and gouge at the bottom so he could work on the carving from time to time.

Router Boss punches back

In "Mortisers for All Budgets" (*FWW* #206), Tim Albers states that Router Boss doesn't excel at mortises. The opposite is true. The Router Boss gives you the freedom to cut any size mortise or tenon, including many of them in a row; to cut mortises and tenons using the same setup; to use stops, rules, cursors, or a digital readout to control the cut; and to see the cut as it is being made and cut to a mark or scribed line. None of the other machines reviewed offers all of these capabilities.

Admittedly, Albers's oversights weren't all his fault. The instructions were still being updated when his machine shipped, and he did not receive our plunge-assist kit, which would have made it easy for him to plunge the router with one hand while cranking the workpiece sideways with the other (one of his key criticisms was that he needed both hands to plunge). Also, we've improved our current production model to make it much quicker to attach the mortising table.

—LEWIS STEPP, The Craftsman Gallery;
www.chipsfly.com

200 hours designing?

I've been a professional furniture maker for nearly 15 years now. I can't believe that architect Mark Bellonby (*Readers Gallery*, *FWW* #206) spent more than 200 hours designing his cabinet and more than 300 building it. Architects design entire homes with everything in them, in less time. And in *FWW* #205, John Olenik says he spent 600 hours on his Greene and Greene sideboard. I consider myself an expert in estimating labor, and I can't see how these projects could take so much time.

—MATT STARK, Santa Cruz, Calif.

Anissa Kapsales replies: As the editor of the *Readers Gallery*, I confirm the time spent whenever it is noted by the maker. I also know from their write-ups that not everyone comes from the same woodworking background with the same work habits or shop setup (all of these play into overall speed). And if you are a hobbyist, one of the great things is that you can take all the time you want.

Bellonby, who was making the display cabinet for himself, said he doesn't always

spend such a long time in the design phase, but he designed this piece (right) from the ground up, and it is a complex one. The initial design took only about 30 hours, which included research on bridge structures, pencil sketches, and an early SketchUp model. Then he used a detailed SketchUp model to work out the precise proportions, from cabinet to stand to muntins, and used AutoCAD to create construction drawings. Last, he used Photoshop to mock up different veneers. "No doubt design time could have been compressed," he said, "but thoroughness was good for my peace of mind."



Olenik is a part-time professional woodworker who readily admits that he tends to work slowly, often agonizing over details that probably only the connoisseur will notice. Since his Greene and Greene sideboard was a gift for his daughter, not a commission, he had the luxury of taking his time and indulging his urge to perfect every aspect. When working on a commission, he records his design and construction hours and is much more conscious of time.

Clarifications

After several readers wrote in to complain about author Steve Latta striking one hammer against another to peen the bar of a miter gauge (Fundamentals, *FWW*

#205), we heard from several more who urged us to check out a recent episode of "Mythbusters," a popular show on The Discovery Channel. The hosts tested the claim that striking two hardened hammers together would cause them to break. The results suggest that the old adage doesn't hold water. The Mythbusters found there is no way a person could shatter a hardened steel hammer by striking another hardened steel tool—not even by swinging as hard as possible. So, the gentle taps Latta was giving were safe. The tests are online at www.mythbustersresults.com.

In Mark Arnold's recent article and Master Class on veneering sunburst patterns (*FWW* #206), we failed to give credit to Chauncey Montgomery for the wonderful photographs of Arnold's finished tabletops.

About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't perform operations you learn about here

(or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, find another way. We want you to enjoy the craft, so please keep safety foremost in your mind.

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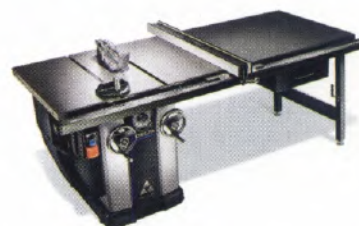
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READER SERVICE NO. 91

Best Tip



Daniel Thomas is the founder and CEO of Thomas Tool Company. Whenever he can escape the office, he heads for the workshop, tending to the craft he learned from his father when he was young. Lately he's been trying to use renewable and salvaged lumber products for his projects.

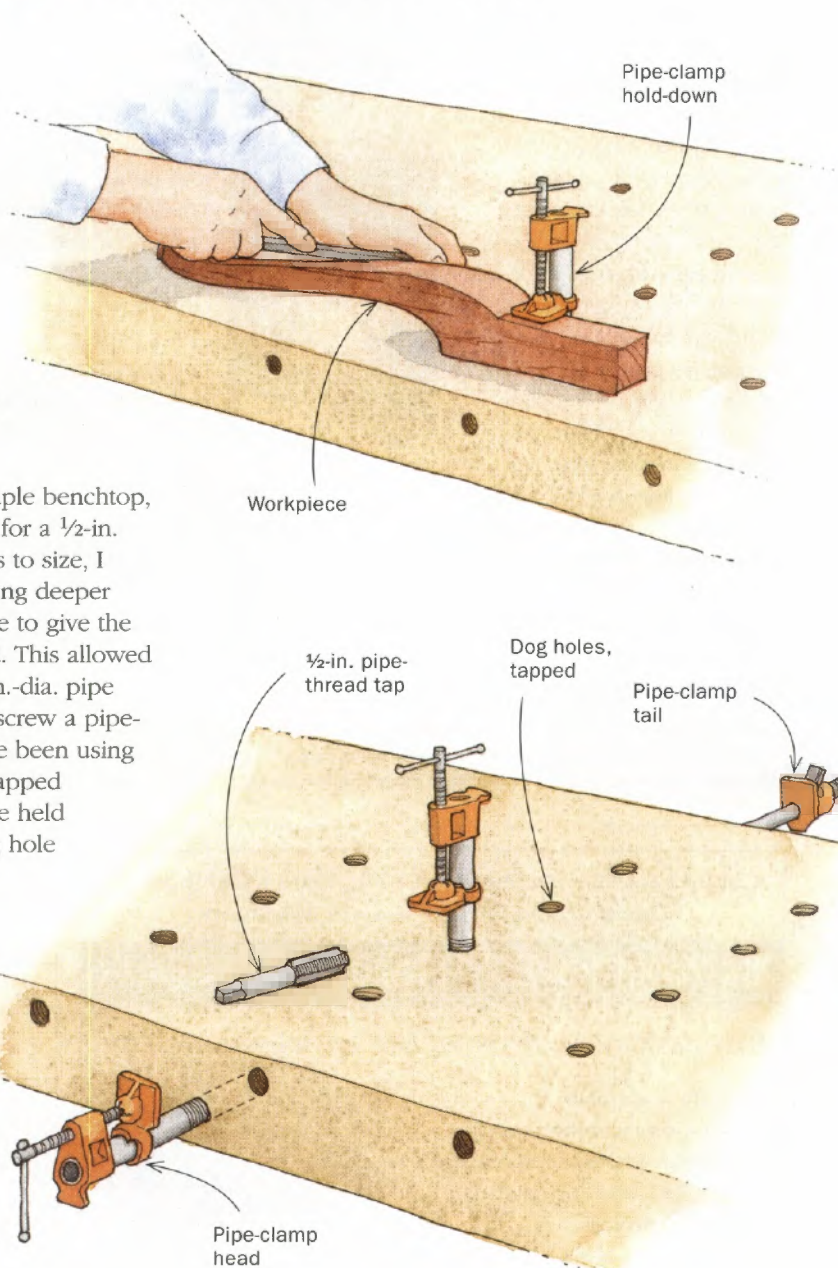
Pipe-clamp parts make workbench more versatile

While drilling dog holes in my new maple benchtop, I realized that $\frac{3}{4}$ in. is the tap drill size for a $\frac{1}{2}$ -in. pipe thread. After drilling the dog holes to size, I tapped them with a $\frac{1}{2}$ -in. pipe tap, going deeper than the normal thread depth for a pipe to give the threads more holding strength in wood. This allowed me to screw a threaded section of $\frac{1}{2}$ -in.-dia. pipe into the tapped dog hole and, in turn, screw a pipe-clamp head to the pipe's other end. I've been using this setup for two years now, and the tapped wooden threads in the hard maple have held up just fine in their double duty as dog hole and threaded insert.

I use the threaded dog holes in three ways: First, I can install a clamp perpendicular to the benchtop in any dog hole to use as a hold-down. Second, after drilling and tapping holes in the apron of the bench, I can use a clamp as a side vise against a dog. Finally, utilizing drilled and tapped holes on the opposite side of the apron, I can attach the quick-release end of the pipe clamp. This lets me hold items that are wider than the benchtop.

The tapped holes on the side of my bench are really neat—it is like having an extra vise. You can screw a short or long pipe into the hole. The arrangement gives a lot of latitude for clamping. When locating the side holes, it is important to put them at the correct height below the top of the bench—too low and the clamp head will not be above the top of the bench.

—DANIEL THOMAS, Franklin Park, Ill.



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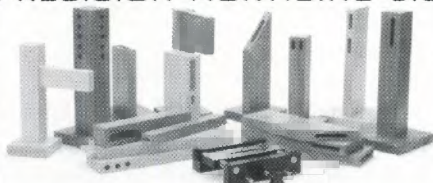
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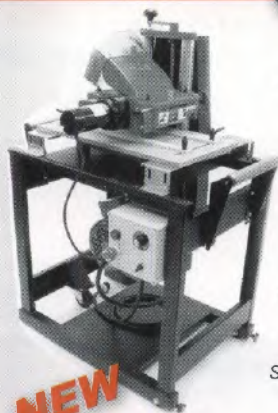


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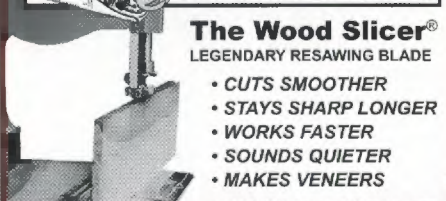


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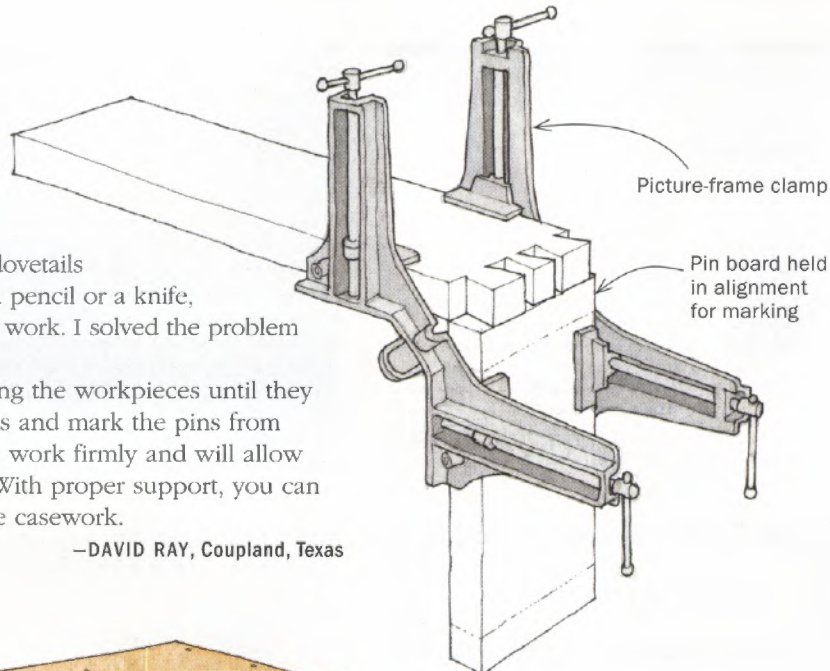
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Picture-frame clamps hold dovetail parts for marking

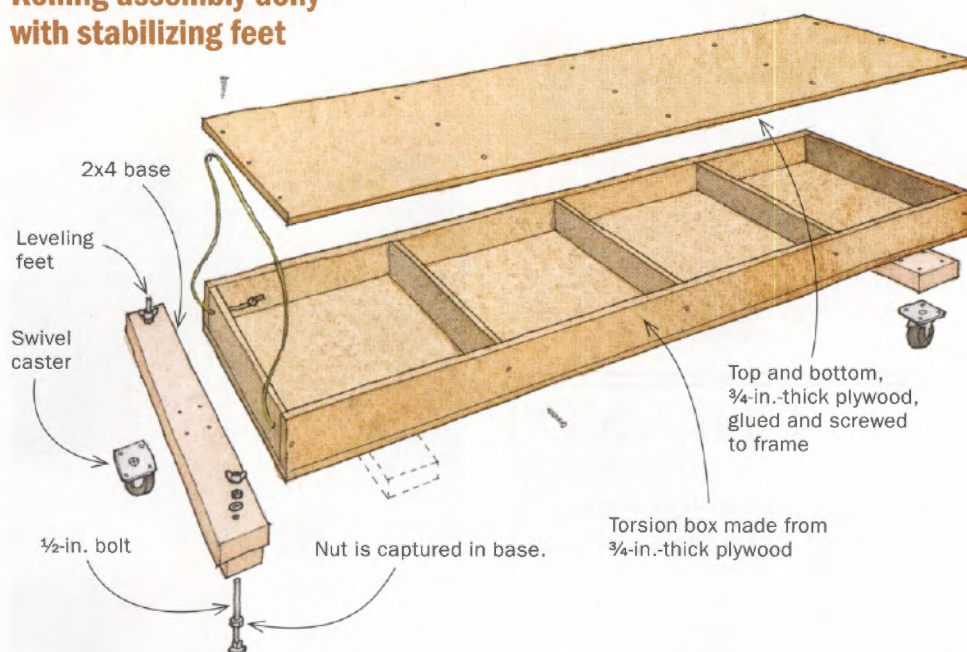
Holding boards in alignment while marking dovetails can be a challenge. Whether you mark with a pencil or a knife, any movement during marking will ruin your work. I solved the problem by using two 90° picture-frame clamps.

Place one on each side of the joint, adjusting the workpieces until they are in perfect registration. Tighten the clamps and mark the pins from the tails (or vice versa). The clamps hold the work firmly and will allow precise adjustments for perfect registration. With proper support, you can even use this method to hold and mark large casework.

—DAVID RAY, Coupland, Texas



Rolling assembly dolly with stabilizing feet

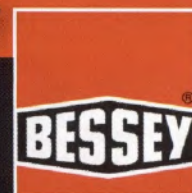


It is important to have a flat, stable surface to assemble and finish projects. This is problematic if your shop floor is uneven. To overcome this obstacle, I built this rolling assembly dolly. It features torsion-box construction, three casters, and adjustable leveling feet, which ensure stability. To lock down the feet, unthread each bolt until it touches the floor, then tighten down the wing nut on top; loosen the wing nut and raise the bolts to free the dolly for movement. When not in use, you can stand the dolly against a wall out of the way.

—T.O. REEDS, Hayden, Idaho

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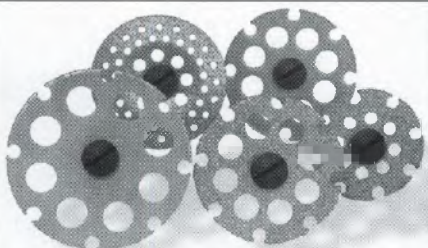
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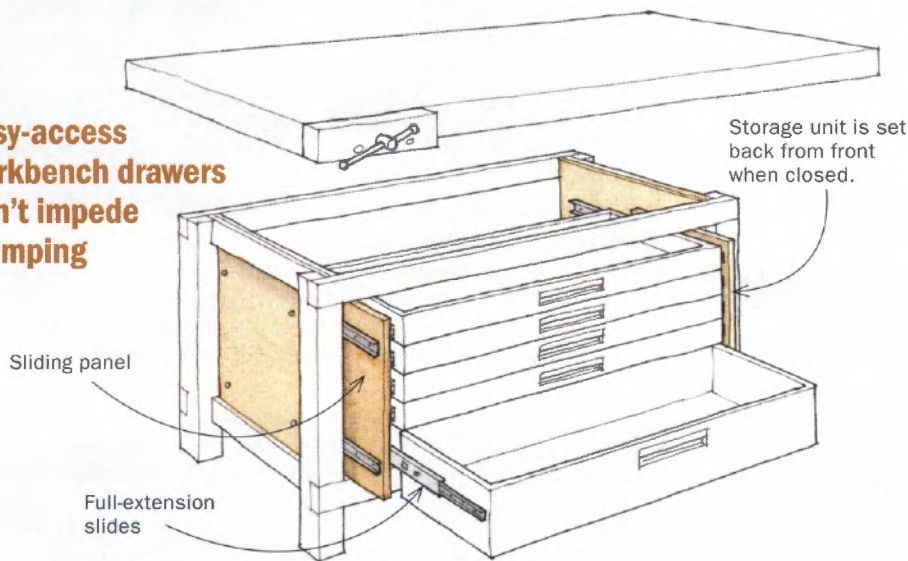
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methods of work continued

Easy-access workbench drawers don't impede clamping



I've fitted my workbench with a drawer stack that extends on a double set of runners. This design allows the contents of each drawer to be fully exposed, even the stuff at the back. But when closed, the entire unit is set back from the front of the bench, so the drawer stack won't interfere with clamping operations.

Each drawer is fitted with a pair of 14-in., 100-lb., full-extension ball-bearing runners. These runners are screwed to sliding $\frac{5}{8}$ -in.-thick plywood panels, which in turn are screwed to two 14-in., 350-lb. runners attached to the sides of the bench.

This robust system allows a fully laden drawer to travel smoothly twice its depth. I screwed a stop to the bottom of each sliding panel to prevent the drawer units from opening farther than necessary and possibly tipping the bench.

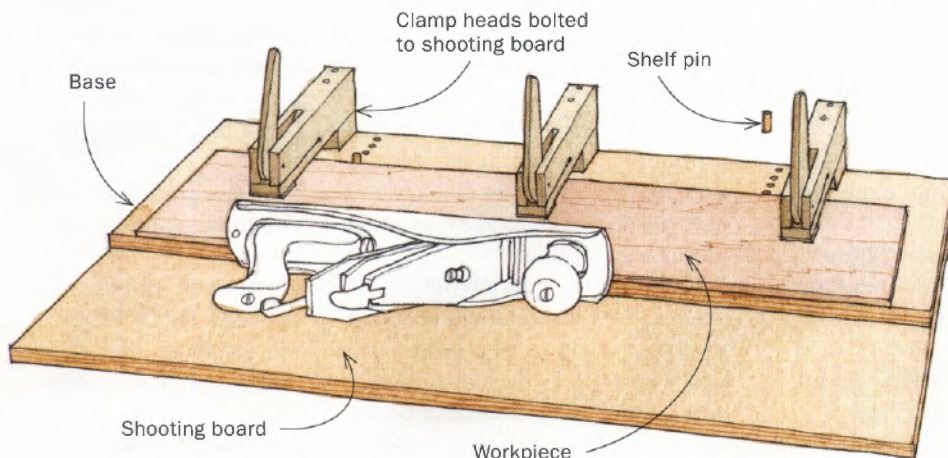
—GRAHAM SANDS, Waitakere, New Zealand

Versatile shooting board

I developed this shooting board a few years ago. It uses the same basic principle as any shooting board in that you lay your plane on its side, ensuring the iron is cutting at 90°. You could make this jig as long as you need, and it does not require a lot of materials.

The cam clamps provide a great deal of hold-down with little effort. Shelf pins act as a fence, making it easy to align a workpiece so that it overhangs the base. The pins also help keep a stack of veneer sheets in alignment. You can remove the pieces, inspect the edges, and then slide the pieces back against the pins if they need more work. You can also offset the shelf pins if you want to create tapered pieces.

—JIM DABAL, Norwood, Colo.



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■ MACHINES

Delta hits home run with redesigned Unisaw



World class riving knife. Delta has created an extremely convenient riving-knife system. To raise, lower, or remove the riving knife, you simply release a front lever with one hand and position the riving knife with the other (left). With the riving knife in the raised (high-profile) position, it's easy to snap on the anti-kickback pawls and blade cover (right).



THE DELTA UNISAW, a 10-in. cabinet saw, was introduced about 40 years ago. Many woodworkers would argue that for most of those four decades, it was the gold standard against which all other cabinet saws were judged.

Over that time, the Unisaw remained essentially the same. Now, perhaps prompted by a 2008 regulation from Underwriters Laboratories (UL) that requires manufacturers to include a riving knife on all new saws by 2014, Delta has introduced a completely new model. I recently had a chance to use the new saw in the *Fine Woodworking* workshop. It became immediately clear that this is not your father's Unisaw.

For starters, Delta made things more convenient by putting the blade-tilt crank on the front, alongside the blade-elevation crank. You no longer have to reach around to the side of the machine to tilt the blade. They also made the tilt scale easy to read. In addition, the two crank systems moved with a smoothness that reminded me of a good metalworking machine.

The new Unisaw also has a wonderful riving-knife system that

uses just one knife to do the job of two. That's possible because the knife can be locked in either of two positions. In the low position, it works as a low-profile (shark fin) knife, allowing you to make non-through cuts, like slots or grooves. In the high position, it's a high-profile knife that accepts a blade cover and anti-kickback pawls. Delta made it especially easy to lock or unlock the knife. One hand pulls a lever at the front of the cabinet while the other hand raises or lowers the knife. There is no need to remove the throat plate.

Using a testing-quality straightedge and feeler gauges, I checked the table for flatness. On average it was under 0.001 in., an excellent number. The cast-iron extension tables were almost as flat. Measured with a dial indicator, the arbor-flange runout was 0.0005 in. With the blade at 90° to the table, the blade-to-miter-gauge runout was 0.004 in. across a 7½-in. length. When the blade was tilted to 45°, the blade-to-miter-gauge runout measured 0.003 in. across 6½ in. All are very good numbers.

A standard Biesemeyer rip fence is sturdy, slides easily, and locks with little effort. The saw has a decent miter gauge that repeatedly returned to 90°. Also standard is a storage drawer that mounts under the side table. The 3-hp, 230-volt motor had no trouble ripping and crosscutting 1¾-in.-thick maple. A 5-hp motor is an option.

It was hard to find anything wrong with the new Unisaw. OK, dust collection was only average. Expect to pay about \$2,900 for the saw with a 3-hp motor and a 36-in. rip fence. The same saw with a 52-in. rip fence costs about \$3,000. For information, go to www.deltaportercable.com.

—Tom Begnal is an associate editor.

■ HAND TOOLS

New chisels approach perfection

BLUE SPRUCE TOOLWORKS, the hand-tool maker in Oregon City, Ore., has added a set of bench chisels to its line. All the chisels are 10³/₈ in. long with 5-in.-long blades made from A2 steel (to hold an edge longer) tempered to Rc60. At the socket, the blades are 1/4 in. thick, tapering to about 1¹/₆₄ in. at the end, making them great for getting into dovetail corners. The bevels are ground and honed to 30°. The handles are gracefully turned from highly figured, curly maple. Acrylic resin is fused into the maple, making the handles extra durable with a brilliant sheen that pops the grain.

The blades had dead-flat faces, so I didn't have to do any lapping. All the bevels were accurately ground and honed. And the side bevels were perfectly tapered along their length. Added

You get what you pay for. Blue Spruce's bench chisels are pricey, but they are unrivaled.

to all that, the edges were slightly softened, so they felt good in the hand. These chisels are rugged enough to withstand heavy mallet blows, yet refined enough to provide the agility and control needed to make a light paring cut. I enjoyed the fine balance of the tools. Held near the bevel or by the handle, the chisel felt light and easy to control.

In short, these bench chisels are as good as any on the market, but you'll pay for perfection. Blue Spruce makes them in five sizes, ranging from 1/4 in. to 3/4 in. A set of five sells for \$435. For more information, go to www.thebestthings.com.

—Chris Gochmour builds furniture in Murray, Utah.

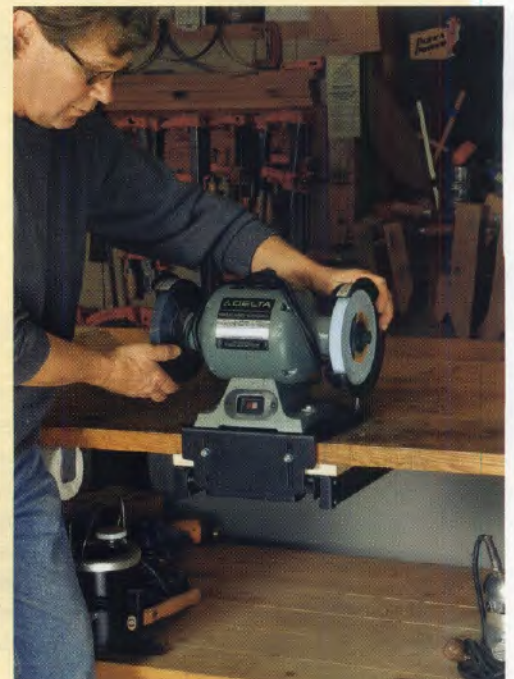


■ ACCESSORIES

Flip your benchtop tools down and out of the way

THE BENCHTOP SLIDE MOUNT is a heavy-duty pivoting bracket that attaches to just about any bench. A stout one-piece rail system attaches to the bottom of the bench, providing tracks for a roller assembly and swivel plate. It took less than an hour to install the bracket and bolt my bench grinder to the plate. Then I simply slid the tool forward and up on the bench, where it stayed firmly in place. The Benchtop Slide Mount works on benchtop thicknesses ranging from 1³/₄ in. to 4¹/₂ in. and accepts tools weighing up to 75 lb., such as benchtop bandsaws, miter saws, and scrollsaws. It sells for \$98; go to www.commercejwelding.com/bench.htm or call 800-527-5798.

—Roland Johnson is a contributing editor.



Easy as one, two, three. With a tool mounted to the Benchtop Slide Mount, you can store the tool below your workbench (left), then raise it (center) and put it to use on top of your bench (right).



Joined at the hip. The Dust Deputy can be bolted to the canister of almost any shop vacuum.

■ ACCESSORIES

Hot-rod your shop vacuum

CYCLONIC DUST COLLECTORS are elegantly simple. Create the right cone shape, suck dust in at the correct angle, and the heavy stuff settles at the bottom while cleaner air goes out the top. Oneida's new Dust Deputy proves this theory at the low end of the size and price scale.

I used the \$99 Dust Deputy Kit, which comes with two 5-gal. buckets, one for the dust and another that bolts to your vacuum canister to hold the first pail. When I snapped the tiny plastic cyclone onto a bucket, connected it to my shop vacuum, and added a little wooden leg so the whole thing didn't tip over, the cyclone turned my poor-performing vacuum into a powerful machine.

To torture-test the unit, I replaced the dust-caked HEPA filter in my vacuum with a new one, and spent an hour vacuuming several months worth of dust from every surface in the shop. The cyclone bucket filled up three times, but the vacuum canister remained empty, and the filter had only the finest layer of dust. As a result, the suction was at least twice as powerful as before, and it never let up.

The significant downside is that the buckets/cyclone must stay tethered to your vacuum by a short hose, leaving you to drag everything around. Also, the multiple hoses and cyclone lid kept popping off. A few sheet-metal screws would secure the hoses. I recommend the Dust Deputy for folks who don't have to move their shop vacuums much. I'll use it for my router table, chopsaw, and sander, which are within 10 ft. of each other, but I'll stick to my broom and dustpan for shop cleanup. For more information, go to www.dustdeputy.com.

—Asa Christiana is the editor.



Clean filter means full power. With the Dust Deputy attached, the filter stays surprisingly clean.



Not very portable. The Dust Deputy and shop vacuum in tandem result in a rig that's awkward and tippy. A short wood leg added to the Deputy bucket helps keep everything upright.

■ BENCHTOP TOOLS

Craftsman spindle sander works well

THIS NEW CRAFTSMAN SPINDLE SANDER was able to easily sand any curve I threw at it. A 1-in.-travel, 30-strokes-per-minute, vertical spindle oscillation keeps the coated abrasive from loading up with sawdust, resulting in reduced heat and longer abrasive life. The 18-in.-dia. cast-iron tabletop provides adequate support and the round shape provides a consistent space from the drum to the edge of the table at any angle, eliminating the variable distance of a square table and the resulting inconsistent support. However, the table doesn't tilt, useful when sanding beveled edges. I still consider the Ridgid EB4424 to be the best of the small spindle sanders (for my review, see *FWW* #188). The list price for the Craftsman 351.215000 is \$280 (www.sears.com).

—Roland Johnson is a contributing editor.



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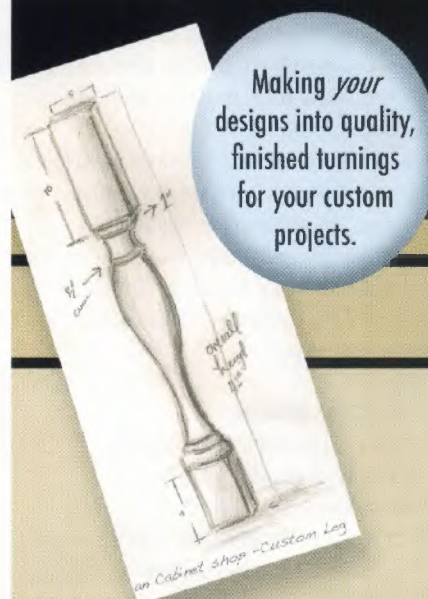


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Creating an attractive tabletop

Part 1

Lumber selection and rough milling

BY BOB VAN DYKE

The top is the most visible part of the table, so you need to get it right. This sounds easy on the surface, but the process is loaded with pitfalls. In this three-part series, I'll describe my method for producing a tabletop you can be proud of. In this issue, you'll learn how to choose the best boards, mill them, and arrange them for the best-looking sequence. In part two, I'll show you how three glue-ups are less traumatic than one. In part three, I'll show you how to achieve a perfectly flat and smooth tabletop.

Remember, someone (probably you) is going to be living with this table for many years. And as a furniture maker, one of the advantages you have over the factory is that you can hand-pick beautiful boards. Those early decisions make or break a tabletop.

Pick the right boards

The best design option is to make the top from a single wide board. Realistically, though, that is limited to small tabletops. Most often you'll need to glue up boards, and the lumber selection will be critical.

Start thick—You'll be removing a lot of material during flattening and planing, so start with lumber that is considerably thicker than the final thickness. For a top that will be $\frac{3}{4}$ in. to $\frac{7}{8}$ in. thick, plan on using roughsawn $\frac{4}{4}$ lumber, typically 1 in. to $1\frac{1}{16}$ in. thick. The best-looking tops are usually made from a number of planks cut from the same board. You can cut successive sections from a long board, or resaw boards from a thicker plank. Not only will the color match perfectly when using resawn boards,



ANATOMY OF A PERFECT PANEL

A well-made tabletop begins with the lumber: Look for boards with consistent color, straight grain along the edges to disguise the glue lines, and boards that can be milled flat and straight so that you don't build stresses into the finished top. It is worth spending extra time and even extra money to find the right sequence of boards. Just milling the first boards that come to hand will create a top where the boards clash and the glue lines are obvious.

What to look for at the yard



Sneak preview. At the lumberyard, if the boards are roughsawn, ask permission to block-plane a small section to get a better view of the wood's color and grain.



Riftsawn edges add stability. Try to find boards where the growth rings run at about 45° to the face where the finished edges will be. This ensures that the sections of the top will stay flat.

but you can create symmetrical patterns such as book-matching and slip-matching. However, when resawing you will need stock at least 10/4 (2½ in.) or even 12/4 (3 in.) thick because the resawn parts will move a lot after they are cut and may become severely cupped, twisted, or bowed.

Select as many boards as you will need and try to match the color as best you can. You may have to spend a considerable amount of time sorting through the lumber stack.

Watch the grain—Don't be afraid to buy lumber that is wider than you think you will need. Frequently you will bandsaw a few inches off one or both edges to yield a board with straight grain and no sapwood along the edge. If you look at the end grain of any flatsawn board with straight-grain edges, you'll see that the growth rings near those edges are approximately 45° to the face. That part of the board is rift-sawn. By joining together the riftsawn to riftsawn parts of the boards, you are ensuring that the top will stay flat. And because the face grain of any rift-sawn section is mostly straight, you have the advantage of hiding the glueline.

After bringing the boards home, stack them horizontally for a week or more so that they can acclimate to the humidity in your shop. This is particularly important for air-dried lumber.

Rough-cut the boards to length and width

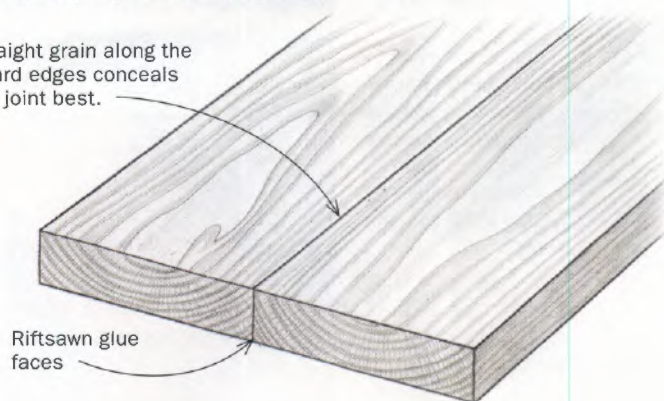
Begin rough milling by deciding where you will chop each individual board that will make up the top. Are there knots, sapwood, or other obvious defects you need to cut out or hide?

All planers and jointers leave some snipe—the tendency of the tools to take a deeper bite at the end of a cut. Make the sections at least 5 in. longer than final length, so you can cut away areas of

STRAIGHT GRAIN HIDES JOINTS

It is much easier to conceal the joint between two boards if the grain on both runs parallel to the edge. Another advantage to selecting boards with riftsawn edges is greater stability across the tabletop.

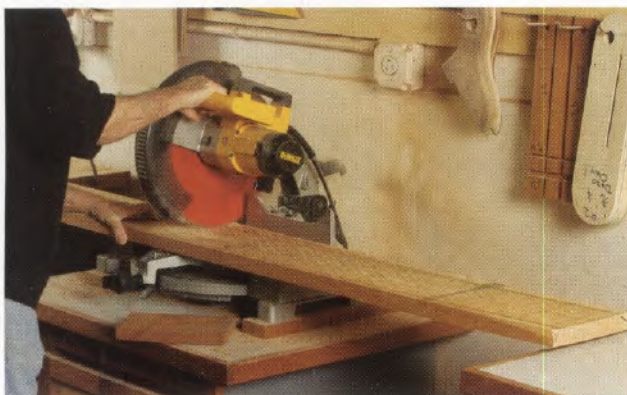
Straight grain along the board edges conceals the joint best.



Rough-milling reveals true character

Start extra long.

After laying out the parts of the tabletop on the rough boards, cut them 4 in. or 5 in. overlong to allow for snipe from the jointer and planer.



Bandsawing is safer. Ripping the unjointed boards on the tablesaw might cause kickback. So cut them $\frac{3}{4}$ in. over final width on the bandsaw.

FOLLOW THE GRAIN

One advantage of using rough boards a few inches wider than finished width is that if the grain runs at a slight angle, you can saw the finished board so that its edges are parallel to the grain.



Location of desired board

snipe. Now lay out the width of the board you will need on the roughsawn plank (typically about $\frac{3}{4}$ in. wider than the final width). Note which edges have straight grain that you can use for the glue joint. If the boards are wide enough, you can angle the sections so that the edges are parallel to the grain (see drawing, below left). Crosscut the boards on the chopsaw and rip them on the bandsaw (or with a circular saw) and not the tablesaw.

Surface the boards and lay them out

Once your boards are sawn to rough width and length, you're ready to joint and plane them. At this point, you only want the boards roughly flat and planed so that the faces are just parallel. If you take too many passes on the jointer and planer, you may not have enough material left to plane after the glue-up. Joint one edge straight and rip the opposite edge parallel, leaving it about $\frac{1}{4}$ in. to $\frac{3}{8}$ in. over final width. Each pair of boards combined should be narrow enough to fit through your planer. Pass the ripped edge over the jointer to remove the sawmarks.

With the boards planed enough to reveal the grain and the color, you're ready to make the final decision on how they will go together. Shuffle them to find the most pleasing combination. Don't try to arrange boards so that the grain lines run from one board into the next. More often than not, the match will get thrown off as soon as you plane the boards to final thickness.

As you try different combinations, step back and look at them from a few angles. The color and

Joint a face. With the boards cut slightly wide and long, joint a face of each board. If the board is warped, joint the concave side. At this stage there is no need to completely smooth the board. Just remove enough to stop it from rocking.



Plane the other face parallel. Run the boards through the planer until the face opposite the jointed one is just smooth. Don't aim for final thickness yet.

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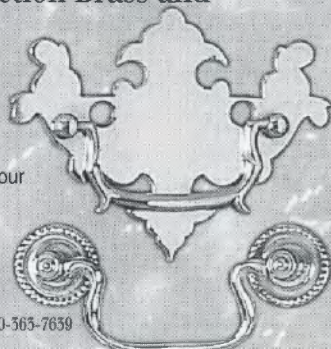
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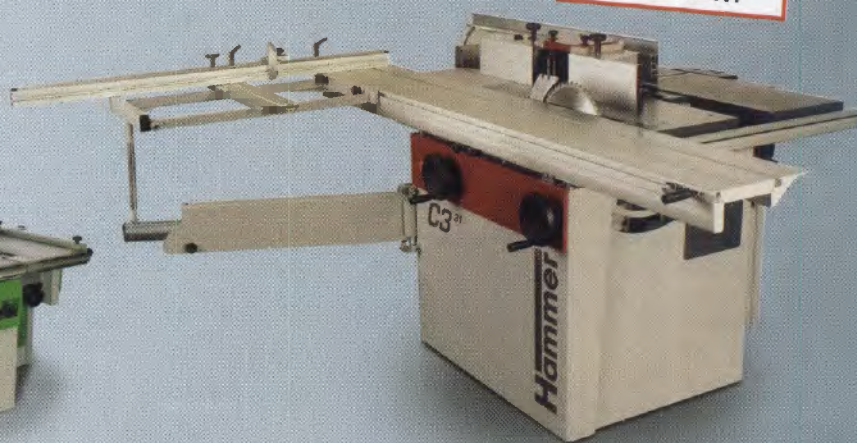
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Select the final sequence



Joint one edge, then rip to width. Run one edge over the jointer until it is flat and at 90° to the face that is against the fence (left). With the jointed edge against the fence of the tablesaw (right), rip each board slightly over final width.

The right combination. With the faces and edges flat and square, you can place the boards next to each other and look for the best sequence.



figure of many boards will change dramatically depending on the direction from which you view them because light is being reflected differently from the wood cells within the board. This effect is known as chatoyance.

Try to align boards so the grain is going the same way. Doing so will make it easier to plane the top smooth later. But don't sacrifice aesthetics for practicality. Appearance is the number one priority.

Many woodworkers make a big deal over alternating the direction of the end grain because they think it will help to keep the top flat over time. However, I give priority to a board's best appearance on the top face and pay little attention to the end-grain orientation because I am milling the boards carefully before glue-up.

As you shuffle the boards, keep track of the different combinations by drawing small triangles with a number inside them across the gluelines. Most of the time, the best combination will hit you as soon as you see it. When you've made the final decision, put a large triangle across all the boards to show clearly how they go together.

In part two, I'll show you how to prep the boards for glue-up. □

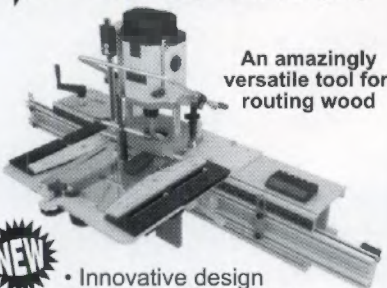


Record good matches and make the final choice. When you find two boards that go well together, draw a small triangle across the joint and number both sides (above). This will make it easier to come back to this pairing after you've tried other combinations. After you have found the best sequence of boards, draw a large triangle across the whole top (right).



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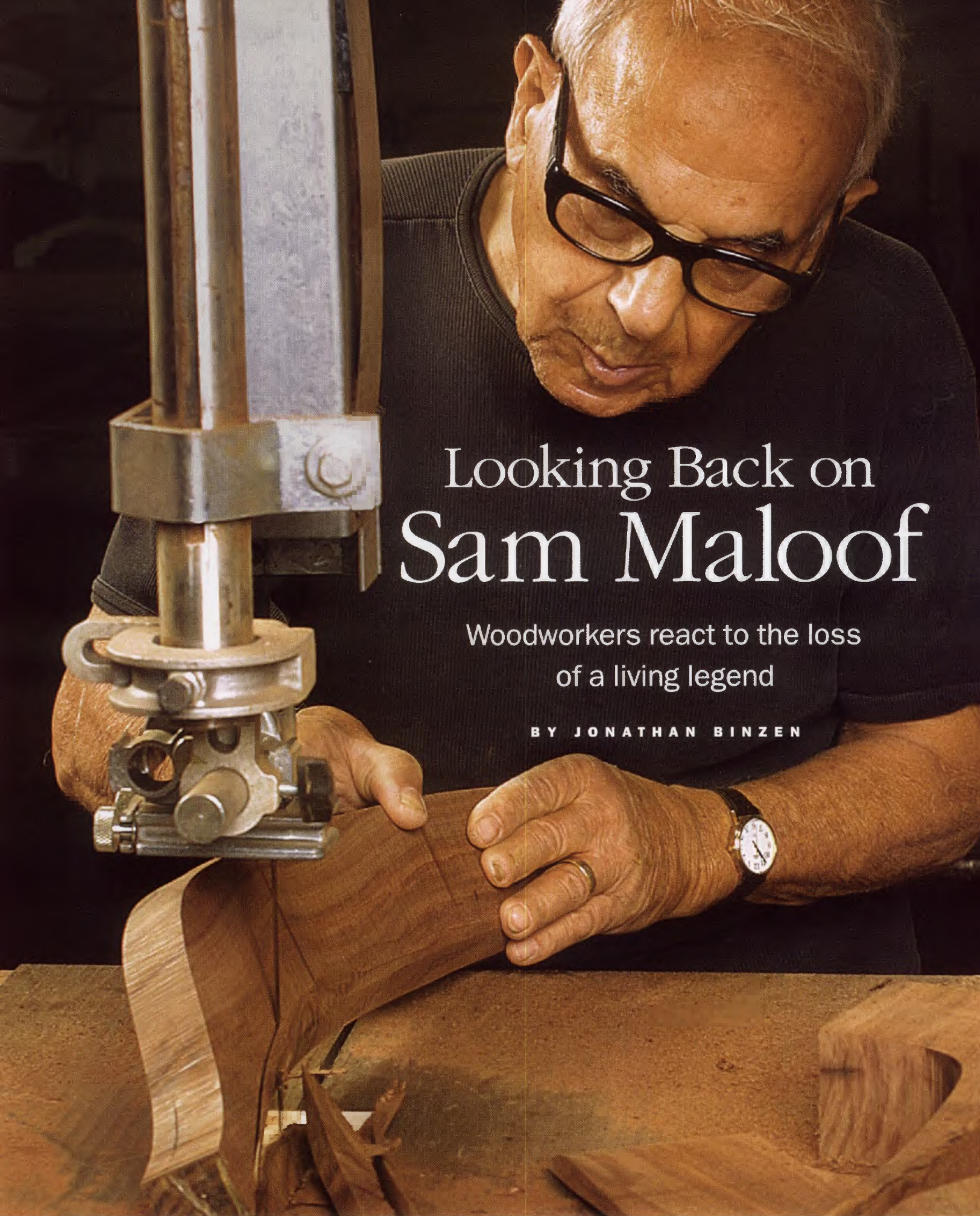
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A close-up photograph of Sam Maloof, an elderly man with glasses, focused on his craft. He is using a band saw to cut a piece of wood. The image is the cover of a magazine or book, with the title and subtitle overlaid on the right side. The background is dark, making the wood and the man's face stand out.

Looking Back on Sam Maloof

Woodworkers react to the loss
of a living legend

BY JONATHAN BINZEN

The news of Sam Maloof's death in May did not come as a complete shock—after all, he was 93 and had been making furniture for 61 years. Yet, for many in the woodworking community, accepting it has been difficult. For more than half a century, Maloof has been a touchstone for the field, providing a powerful example for amateurs and professionals alike. He inspired generations of makers not just with his furniture, but with his lifestyle—the hand-built house and shop in a lemon grove in Alta Loma, Calif., where all were welcomed—and with his extraordinary generosity as a teacher, mentor, and friend.

Philadelphia furniture maker Michael Hurwitz, who was a teenager when he first saw Maloof's furniture in a 1972 exhibition, spoke for many others when he said, "We were in denial about the fact that at some point Sam wasn't going to be making furniture—you

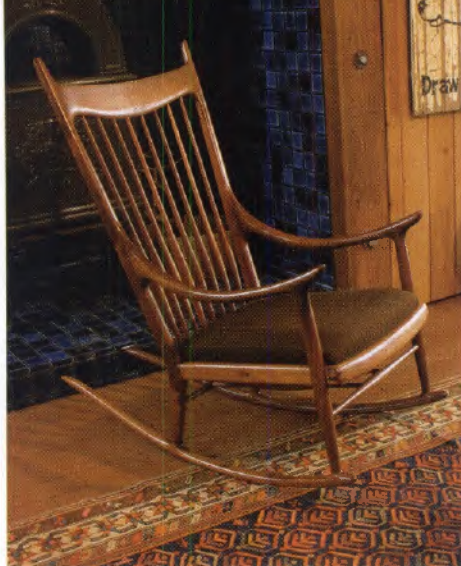
just thought he was always going to be there."

Maloof himself evidently had a similar feeling. According to Larry White, one of his three assistants, Maloof had continued buying whole slabbed logs of claro walnut right up to the end—despite having four woodsheds brimming with some 100,000 board feet of lumber. "I actually think," White said, "that Sam thought buying these beautiful trees was going to keep him going forever; that he was never going to leave us."

Maloof continued to work in his shop until six weeks before he died. In February, after several months' work with the help of Mike Johnson, another longtime employee, Maloof completed three distinctly new designs—a rocking chaise and two chairs. "I don't think I've seen him as happy in years



Forces of nature. Maloof loved this enormous avocado tree. When he saw it in the early 1950s, Maloof bought the property and built his house and shop beneath its branches.



He developed his designs gradually

Rather than jumping from one thing to the next, Maloof stuck with a handful of furniture forms and made them repeatedly. The evolution of his rocking chairs is evident in these three versions. The rocker from the late '60s (top) has turned back spindles, rounded arms, an upholstered seat, and stretchers beneath the seat. By the late 1970s, Maloof was making chairs like the one at center. It is the iconic version he is sitting in on the cover of this magazine. The frame is similar to the '60's version, but the spindles are sawn to shape, the arms have widened into paddles, the seat is solid wood, the stretchers are gone, and the rockers are longer and more dramatic. In the 2000s, when he made the rocker at bottom, he was experimenting with an outcurving arm and a narrower crest rail with back posts that no longer protrude past it.

Online Extra

Go to FineWoodworking.com/extras for a retrospective on Maloof's legendary career:

- An audio slide show of Maloof's furniture, home, and studio, with reflections from fellow woodworkers
- Memories from our online community
- A never-before-published Q&A with Maloof
- An archive of interviews with and stories about Maloof

Not just a chairmaker. Maloof produced a wide range of tables, desks, and case pieces in a rectilinear style softened by rounded edges and turned pulls.



as he was working on those pieces," White said. "He was totally absorbed, and it was a wonderful thing to watch. They were his last push, and he was obsessed to get them done.

"Production in the shop went to hell," White added with a laugh, "but he was having a great time."

Production slipped, White explained, because right up until this year, Maloof had personally taken virtually all of the chairs produced in his shop from plank to assembled piece—doing almost all of the bandsawing, shaper work, joinery, rough shaping, and glue-up before passing them to his three assistants for final shaping, extensive sanding, and finishing.

Both White and Johnson are accomplished furniture makers well capable of constructing the chairs; letting them do so would have freed Maloof to spend time designing new pieces. But he wouldn't hear of it. "He was so strongly committed to his clients and to having his hands on the pieces that went out the door," White said, "he just couldn't turn loose of that."



A booming business. Success prompted Maloof to hire his first employee, Larry White (left), in 1962. White left to run his own shop in the '70s and '80s, but returned in 1992. He and Maloof's other two assistants, Mike Johnson and David Wade—who total 74 years' experience with Maloof—will continue making Maloof's furniture.



Creativity unbound. The handbuilt house and shop Maloof created in a lemon grove west of Los Angeles were designed on the fly, built without permits, and expanded and altered year by year. In 2000, the whole compound, listed on the National Register of Historic Places, was relocated to make way for a highway. Maloof's touches are everywhere in the house. Along with the furniture that fills the rooms, there are unique pieces on every side, from whimsical door latches to this spiral staircase (right).



Maloof's customers were just as committed to him, and they, too, have acted as though he would go on making furniture forever. At his death, the shop, which makes 40 to 50 pieces per year (most of them chairs), had a six-year waiting list, which included orders for some 100 of his classic rocking chairs. And though many customers no doubt were well aware that Maloof had celebrated his 93rd birthday in January, the orders kept rolling in.

Exactly how the Maloof shop will operate without Sam is unclear. He talked for years about planning for the day when his assistants would take over the business, and in the 1990s he incorporated to facilitate the transition, but the details of ownership and leadership in the shop are not yet known. Maloof's assistants clearly are all dedicated to carrying on his designs and his philosophy. "We're in a transitional state right now," White said, "but I can guarantee that Mike Johnson and David Wade and I will be here making his work."

The legal and logistical changes will no doubt soon be resolved, but for Maloof's three assistants, who together represent more than 70 years' experience in his shop, the emotional changes may come more slowly. "Looking out the shop window in the afternoon," Larry White said two weeks after Maloof's death, "we expect to see Sam come walking up with his stick and with the sun in his hair. Then realizing today that's not going to happen anymore, that was a tough moment." □

Jonathan Binzen, a woodworker and freelance writer in New Milford, Conn., is a consulting editor for Fine Woodworking.



An eye for art and craft is indispensable to the furniture designer, Maloof often said. His house brims with collections of Native American pottery and rugs and crafts by his many friends.

Personal reflections on **Sam Maloof**

To take stock of Maloof's influence as a man and as a woodworker, we interviewed a range of furniture makers and a furniture scholar.

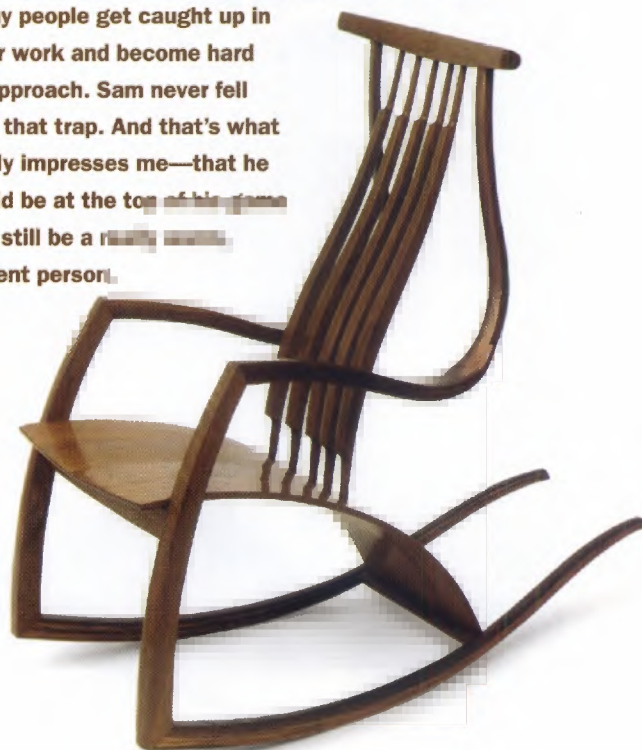
THE WARMTH OF THE MAN



Tom Hucker, who took a memorable class with Sam Maloof at the Penland School in 1973, was teaching there himself in June when this photo was taken. Hucker makes custom furniture in Hoboken, N.J.

I first met Sam when he was teaching a two-week class at Penland [in North Carolina] in the summer of '73. I was 17 and just beginning as a woodworker. Afterward I wrote letters to him and he would always write back, handwritten letters that were very supportive and sweet. Ever since then he's been a design influence for me, but he's also somebody in some ways that you have to fight against. My new rocker [below] is heavily influenced by Sam in the spindles and the basic proportions, so he keeps coming back. But for me, the underlying thing about Sam

is just how genuine and warm a person he was. So many people get caught up in their work and become hard to approach. Sam never fell into that trap. And that's what really impresses me—that he could be at the top of his game and still be a really, really decent person.



CREATING A NICHE FOR CHAIRMAKERS



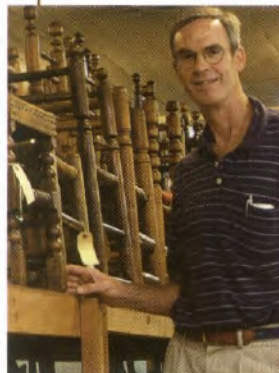
Robert Erickson, of Nevada City, Calif., who was encouraged early on by Maloof's example, has been making chairs and rockers for 40 years.

Sam Maloof developed a chairmaking style based on hand shaping, an approach that the big furniture companies couldn't follow, and that created a niche for me and for many other chairmakers. When people had seen Maloof's work, a handmade rocker made sense to them. They saw that a rocker could be a very personal piece—both for the maker and the customer—and they saw it as a chair they would spend a lot of time in. Those two things made them willing to spend more for it. And with Maloof's prices establishing the high end of the range, there was room for other makers to charge enough to make a profit but still give their customers the feeling they were getting a good deal. He showed me it was possible to be a chairmaker in a world of furniture makers.



Erickson's Anderson Ranch rocker, made recently while he was at the Colorado arts center, was built in the Sam and Alfreda Maloof Woodworking Barn there, which was funded by the Maloof Foundation.

HIS PRACTICAL SIDE



Edward S. Cooke Jr., a professor of decorative arts at Yale University and a former curator at the Museum of Fine Arts, Boston, has written extensively on contemporary and period furniture.

Sam Maloof always had his feet squarely on the ground as a businessman. He stayed focused on a range of forms that he could expand slowly, incrementally, rather than trying to reinvent himself constantly. He figured out a way to take a version of soft Modernism—whether the source is Hans Wegner or Finn Juhl or some other Scandinavian—and do a particular American twist on it, which located that same sensibility in a small shop. He used walnut instead of teak, and then he started to really accentuate the shaping.

Sam wasn't an instant success. Even his rocker didn't catch on right away. He decided to make one in '62 after seeing JFK in a rocker. But he couldn't sell them at first. Then in 1976 the Museum of Fine Arts in Boston asked a number of people to make gallery seating. They gave each maker a few thousand dollars. Most of them made one or two objects. Sam delivered around 12. His instinct was, I'll take a loss on this, but it's ultimately worth it. And that's when the rocking chair took off. To me, that's the pragmatics of it. He was quite astute at marketing his stuff.



Maloof had his influences, too. This chair from 1949 by Danish designer Hans Wegner represents the Scandinavian style that influenced Maloof's own soft Modernism.

FURNITURE THAT FEELS FAMILIAR



Michael Hurwitz makes furniture in Philadelphia, where he formerly taught furniture design at the University of the Arts.

The first Sam Maloof piece I ever saw was in a show I went to in high school. Wendell Castle also had work in that show, and there was a period after that when I was watching both Sam and Wendell—two titans—having very different careers.

I loved the fact that Wendell's work kept changing and I loved that Sam kept doing what he always did. They were both inspirations. I never felt like Sam was making a similar chair because he was out of ideas; I just thought that's the way his mind worked. His chairs are something you can count on. They feel like home. Just today I sat in one of his rockers, and they're as wonderful to sit in as they are to look at. Part of the experience is stroking the armrests and the seat as you're sitting there. I like going home for Thanksgiving, and Sam's work feels like that.



Full circle. Decades after his own work inspired Hurwitz, Maloof saw the younger man's striking rocker (shown) on the cover of a book, and was inspired to design a rocking chaise of his own. Maloof finished it earlier this year.

SAM'S LOVE OF LIFE



Brian Boggs, who made chairs for 25 years in Berea, Ky., now lives and works in Asheville, N.C.

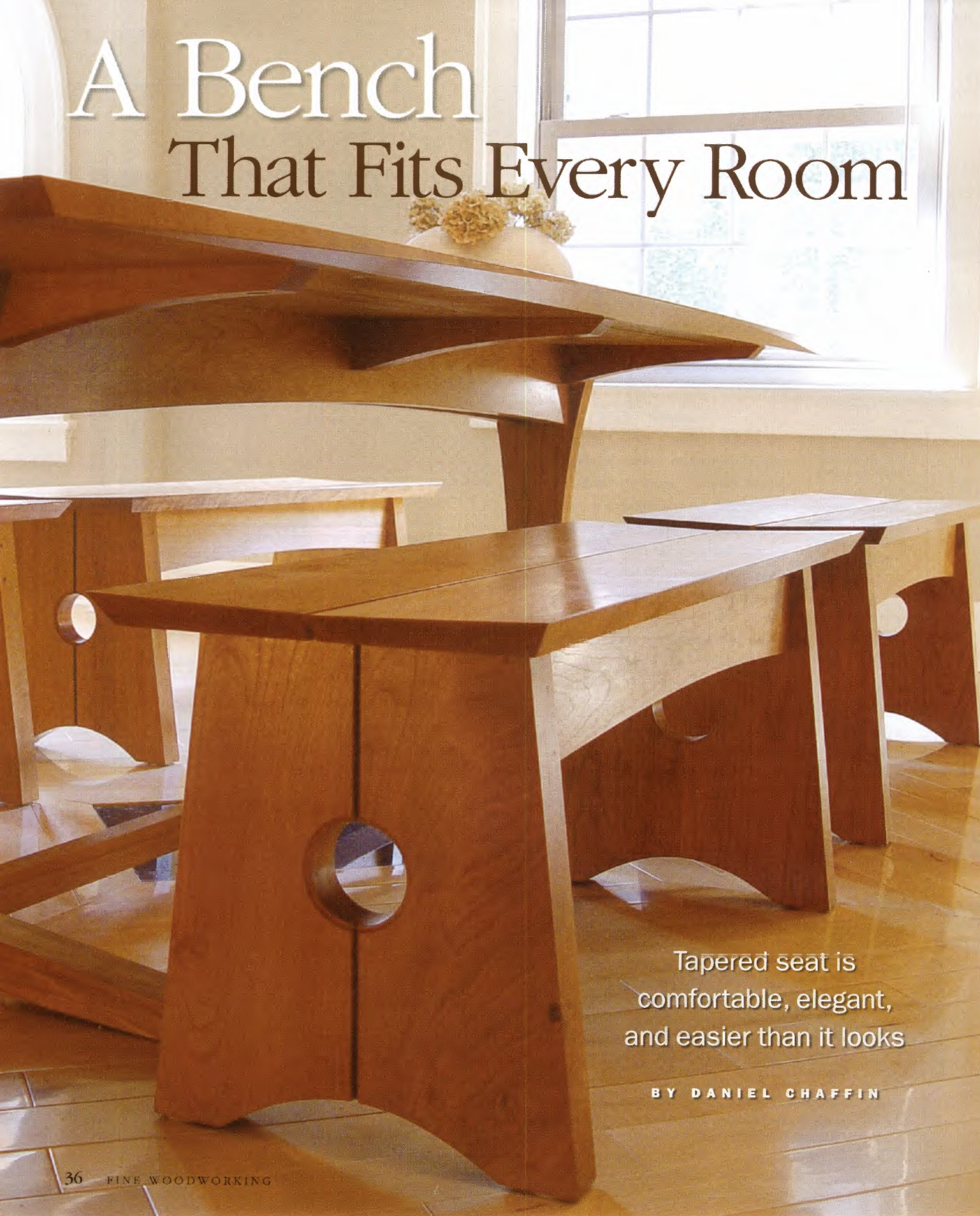
Sam connected so well with virtually everybody he encountered because he loved people and loved life. And that bubbled up in whatever he did, whether it was speaking at a conference or talking

to an individual or working with wood or collecting art and craft. And it was infectious. It was hard not to be impacted by that and inspired by that. As much as I admire his chairs and other furniture from a design standpoint, I really think that it's just the love of life that's infused in everything he did that made him and his work so magnetically attractive.



Similar evolution. With their roots in Appalachia, Brian Boggs's chairs look quite different from a Maloof rocker. But Boggs's slow evolution of a single form is parallel to Maloof's approach.

A Bench That Fits Every Room

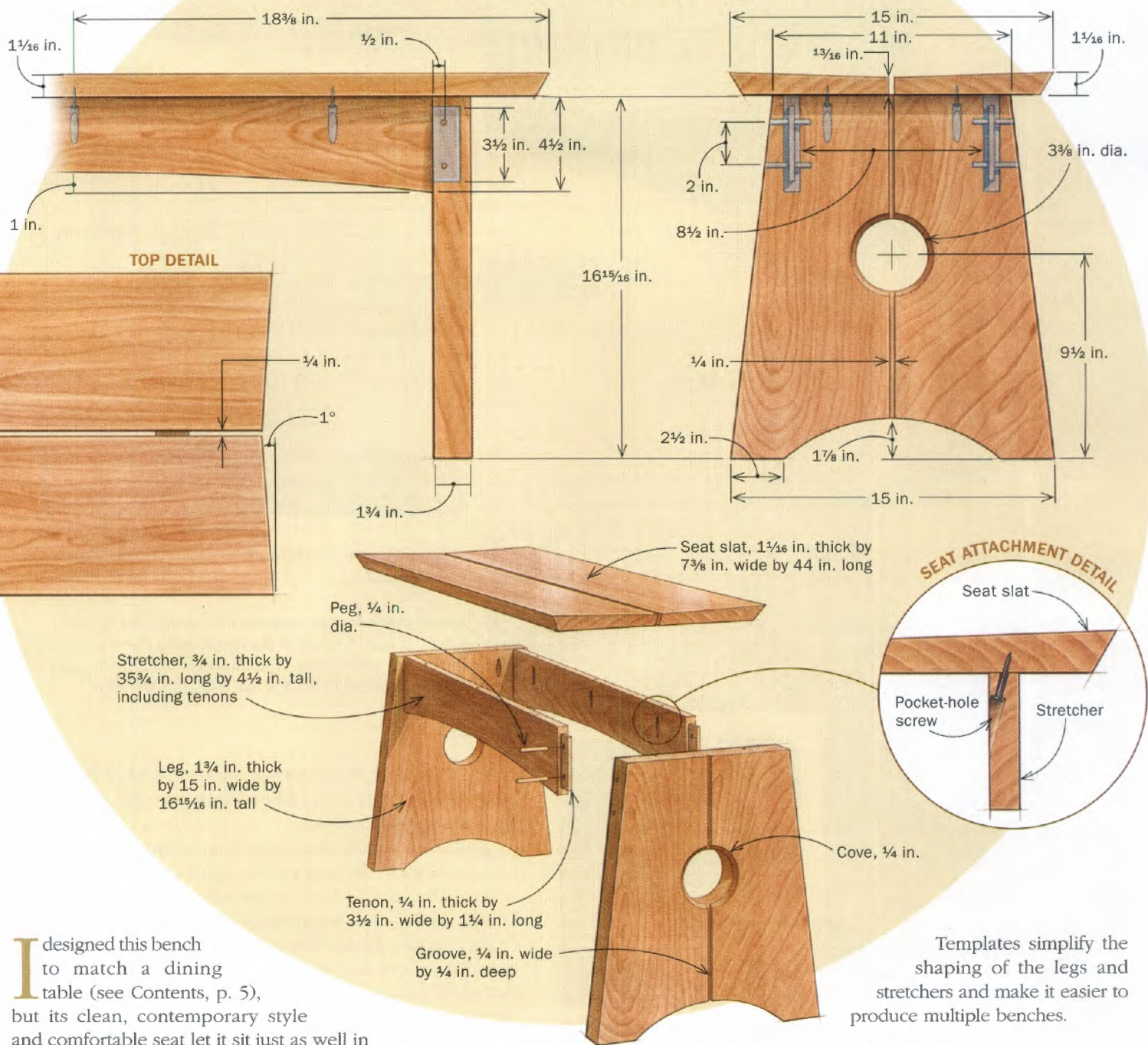
A modern wooden bench with a curved, tapered seat and a circular cutout in the base, set in a bright room with a large window. The bench is made of light-colored wood and has a sleek, minimalist design. The background shows a large window with a view of greenery outside, and a small vase with dried flowers sits on a surface behind the bench.

Tapered seat is
comfortable, elegant,
and easier than it looks

BY DANIEL CHAFFIN

BUILD IT IN A WEEKEND

Aside from the mortise-and-tenon joints, everything else—from tapers, grooves, and bevels to pocket screws—is simple to execute.



I designed this bench to match a dining table (see Contents, p. 5), but its clean, contemporary style and comfortable seat let it sit just as well in the foyer, bedroom, mudroom, or on the front porch. It even works under a tree in the backyard, if made with exterior woods and finishes.

The slight taper on the tops of the seat slats complements their beveled edges. The legs, which are glued up from two boards, have a routed groove that both hides the glueline and ties the legs to the spaced seat slats. The legs also are arched along the bottom, a detail repeated on the stretchers.

These design details seem difficult, but they are surprisingly straightforward. Tapering the seat slats would be tough by hand, but I'll show you how a simple stick turns a planer into a tapering machine.

Templates simplify the shaping of the legs and stretchers and make it easier to produce multiple benches.

Make a template for the legs

You could make the legs from a single 15-in.-wide board, but few people have a jointer and planer wide enough to handle it. I recommend using two narrower boards for each leg.

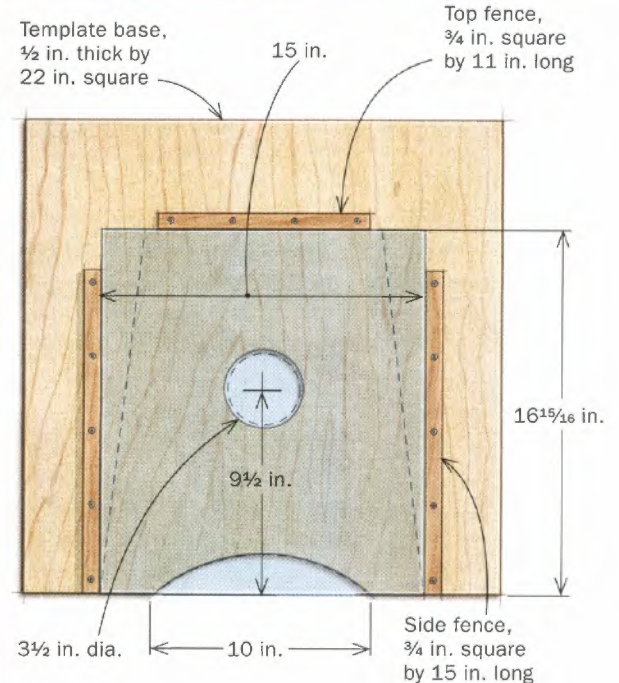
Leave some extra width on the boards. That will help keep the glueline centered so it will be hidden by the routed groove. Keep the boards a bit long as well, so there's room to adjust them for the best grain match. After gluing the boards together, joint one edge and rip the leg to width, keeping the glueline centered.

Making a template for the legs is time well spent. A Forstner bit large enough to cut the hole in the leg will leave tearout on the

A template makes quick work of the legs

This template not only helps lay out the arc and hole before roughing them out, but it also works as a guide for your router, ensuring that both legs are the same and that the hole and arc are accurate and clean.

1 MAKE THE TEMPLATE



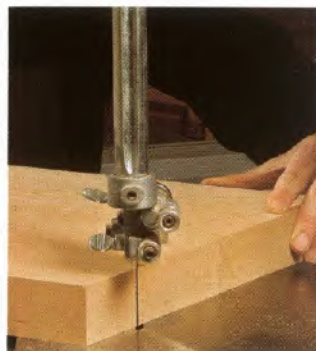
Attach three fences—one for the top and two for the sides—to align the legs in the template so that they're marked and routed consistently. After attaching the first two, place the leg blank against them, and use it to align the third.



2

REMOVE THE WASTE BEFORE ROUTING

Place the leg blank in the template, and trace the arc and circle onto its inside face. Cut the waste from the arc, leaving about $\frac{1}{16}$ in. to be routed away. For the hole, Chaffin uses a 3 $\frac{3}{4}$ -in. Forstner bit, which leaves about $\frac{1}{8}$ in. of waste. Any tearout on the outside is removed by the router.



walls of the hole. The template allows you to drill the hole undersize and rout it to finished diameter with a spiral bit, leaving a smooth surface.

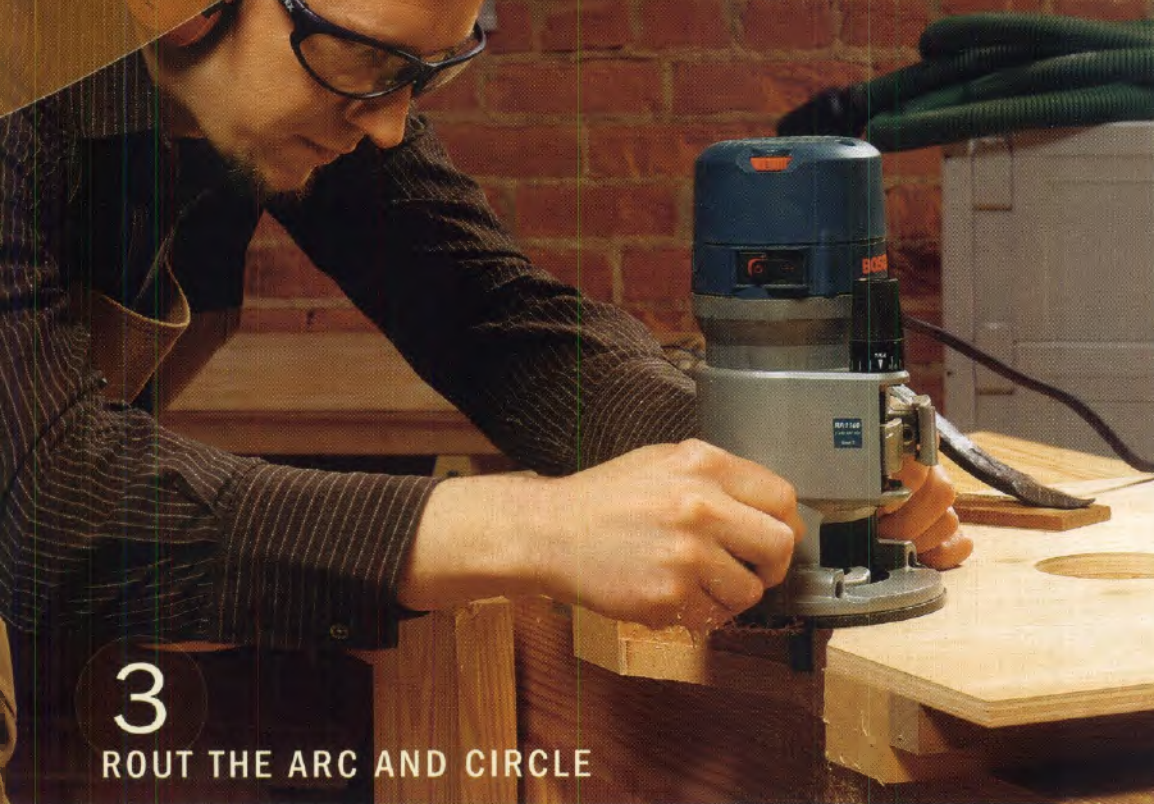
I guide the spiral bit with a bushing, so the hole in the template needs to be 3 $\frac{1}{2}$ in. dia. to account for the offset and create a 3 $\frac{3}{8}$ -in.-dia. hole. The arc, on the other hand, is made with a bearing-guided, flush-trimming bit, so it should be actual size on the template. To draw the arc, use a $\frac{1}{8}$ -in.-thick batten made from quartersawn lumber. Register the ends of the batten against two small clamps, push it to its apex, and trace the arc.

Remove the waste at the bandsaw. Smooth the cut by sanding to the line. Bore the hole at the drill press and attach the fences.

Put that template to work

Use the template to mark the arc and hole on your leg stock. Then bandsaw and drill out the waste. Put the leg back in the template and secure it to the bench—I use holdfasts. There's no need for double-faced tape, because the three fences and clamping pressure hold the leg in place. Rout the arc and hole to final size.

I clean up the routed surfaces with a card scraper—using a narrow one for the hole—and sandpaper. While you have

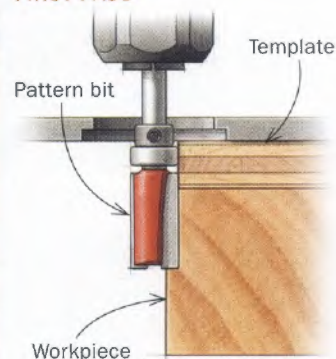


3

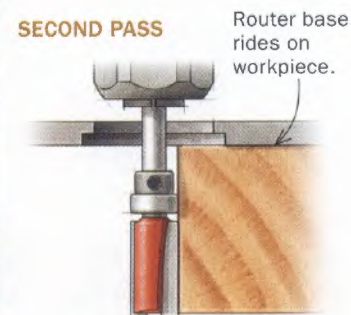
ROUT THE ARC AND CIRCLE

Route the arc. Because the legs are 1 3/4 in. thick, it takes two passes with a pattern bit to rout the arc flush. On the first pass, the bearing rides against the template. For the second pass, remove the template and register the bearing against the routed surface (see drawings above).

FIRST PASS



SECOND PASS



the router out, rout the cove detail on the show sides of the holes and then groove the center of the legs. Now mortise the legs. I do this before tapering them because I use a hollow-chisel mortiser to cut them, and I want square edges to register against its fence. A router and edge guide would also work.

After all the mortises are cut, lay out the leg tapers with a straightedge and cut close to the lines at the bandsaw. Clean up the cuts with a smoothing plane. Mark the arc on the stretchers. I make a plywood template, using a batten to lay out the arc, so that they're the same. Cut the tenons and trim them to fit. Then cut the arc at the bandsaw and clean it up with a spokeshave.

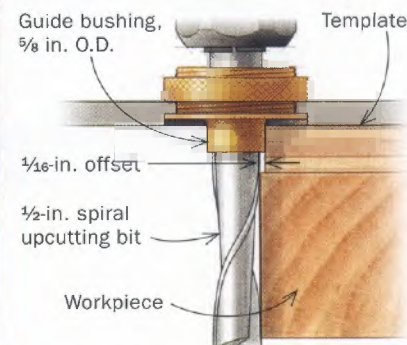
Simple stick tapers seat

Nearly every surface on the seat slats is beveled or tapered, and it's important to cut them in the right order. First, taper the slats' thickness. Then cut the compound angles on the ends. Finally, bevel the outside edges.

I've tapered the seat slats across their width with a hand-plane, but it took forever. I've also used an elaborate sled for my planer. Every taper I cut with it had to be fixed with a handplane, so I rethought my approach and came up with a simple solution—so simple, I wonder how I could have missed it earlier.

All you need so that your planer will make this cut time after time is a stick that lifts the inside edge of the slat higher than the outside edge. Ironically, the stick I use is an offcut from the elaborate sled. Attach the stick to the bottom of the slat on the inside edge with double-faced tape, and use a

ROUT THE HOLE WITH A SINGLE PASS



Route the hole. A 2-in.-long spiral bit cuts end grain and long grain cleanly, and is long enough to trim the walls in one pass.

Finishing touches



Cove the edge. A 1/4-in. bearing-guided cove bit routs a nice detail on the outside edge of the hole.



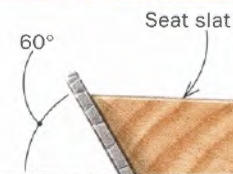
Groove the glue line. Use a 1/4-in. straight bit to rout a 1/4-in.-deep groove over the glue line.

Taper and bevel the seat

A flat seat isn't comfortable. Taper the slats across their widths so that they are thinner on the inside edge than the outside.

Taper first

Bevel second



Ends get a compound angle. With the blade tilted to 60° and the miter gauge set at 89°, cross-cut the slat to length. The outside edge should be against the fence. For the second cut, move the miter gauge to the other side of the table and turn the board over.



Edges last. Leave the blade at 60° and bevel the outside edge of the seat slat.

TIP

A SIMPLE TRICK FOR BIG TAPERS
All you need to taper the seat slats is a 1/4-in.-square stick. Attach it to the inside edge of the slat with double-faced tape (below). Chaffin puts cross-hatching on the board to gauge his progress (above).



pencil to mark lines over its entire face. When the last bit of pencil has been removed, you're done. It's that simple.

With the ends still square, clamp the slat between benchdogs and plane all the surfaces smooth.

Tilt the tablesaw blade to 60°, adjust the miter-gauge fence to 89°, and crosscut the slats. Move the gauge to the other side of the table and flip the board onto its other face to cut the second end. With the blade still at 60°, bevel the outside of each slat.

Prep all the surfaces for finishing now. If you wait until after assembly, you'll find places that you can't get at well enough to do a good job, like between the stretchers. I use a smoothing plane and break the edges with a block plane. Because cherry is prone to blotching, I lightly sand all the parts

Assembly is straightforward

With only four joints, assembly isn't tough. Glue the base together, then peg the joints.



Glue the stretchers to the legs. Spread glue on the tenons and tap them home. Scrape away the squeeze-out when the glue starts to gel, but leave the clamps on for a few hours.



Peg the joints. Saw off the waste, and use a sharp block plane to bring them flush.



Add the seat. Secure the top with pocket-hole screws. Note the 1/4-in.-thick spacer on the bench keeping the tapered slats flat against the legs.

with P320- or P400-grit sandpaper so that it absorbs the oil finish more evenly.

Assemble and finish the bench

I use pocket screws—located on the inside of the stretchers and legs—to attach the seat slats. Cut the pocket holes before assembling the bench.

Begin the assembly by gluing and clamping the stretchers and legs together, making sure that their top edges stay aligned. Let the glue set for a few hours and then drill holes for the pegs that pin the tenons. I make cherry pegs with a dowel plate, but you also can buy them. Don't use much glue on the pegs. They're a tight fit in the holes, and the pressure created when you drive them in could force glue out through the faces of the legs. Cut the pegs close and plane them flush. Now place the slats on top of the legs, aligning their inside edges with the groove cut into the legs. Drive in the pocket screws and you're ready to finish the bench.

You can build this bench in a weekend, but the finishing might take longer. I applied three thin coats of Tried and True varnish oil, wiping away excess oil after an hour. Allow plenty of time for each coat to dry before applying the next. In Kentucky, that can mean four days between coats in the summer, less in the winter. Buff the first coat with 0000 steel wool, and the last two with a soft cloth. Top it off with a coat of paste wax. □

Daniel Chaffin is a professional furniture designer and maker in Louisville, Ky.



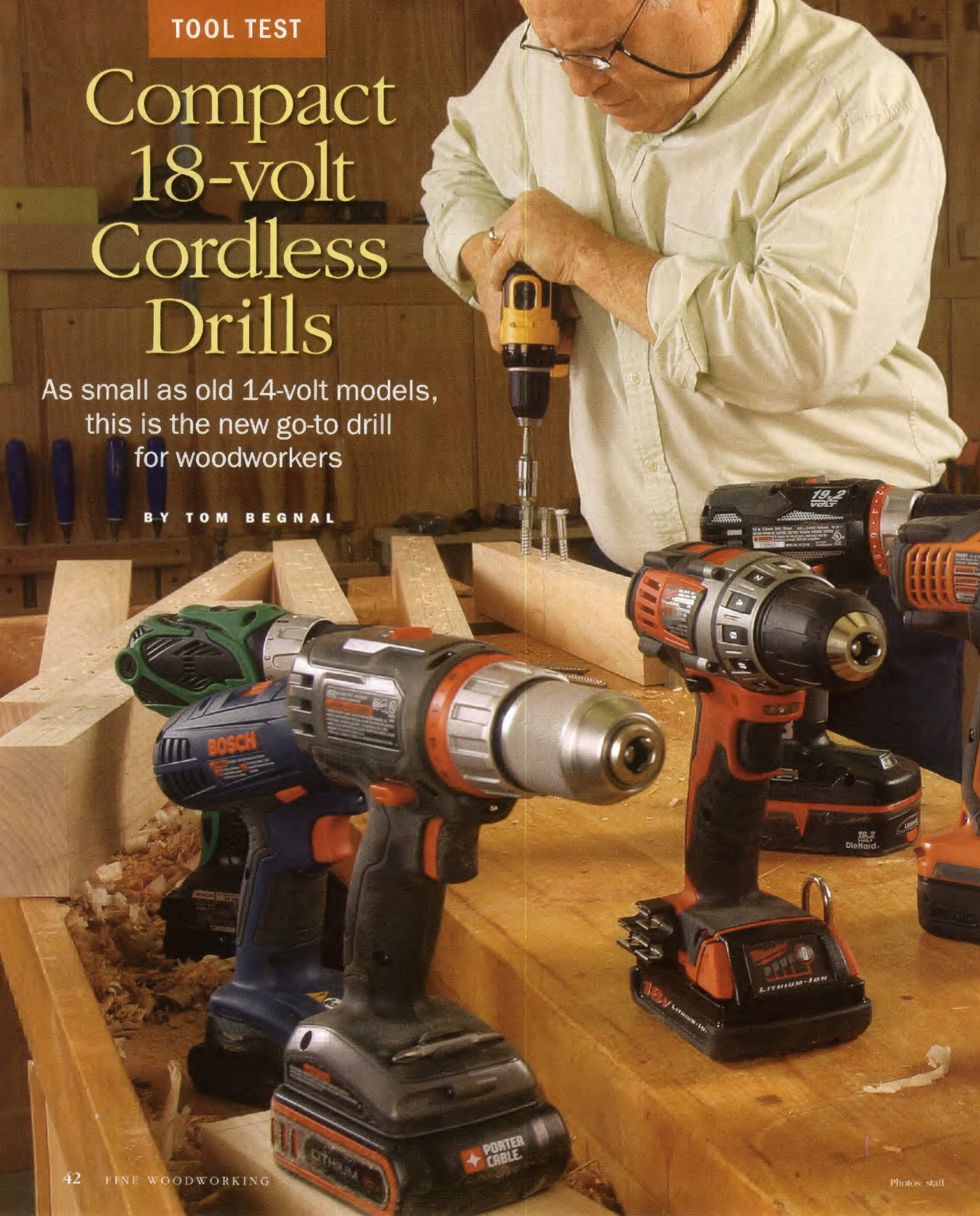
Oil finish for warmth. Three coats of a linseed oil/varnish finish brings out the natural color of cherry, and protects the seat.

TOOL TEST

Compact 18-volt Cordless Drills

As small as old 14-volt models,
this is the new go-to drill
for woodworkers

BY TOM BEGNAL



Cordless drills and salad dressing have something in common. When you go shopping for them, the choices seem endless. Indeed, you can find more than 100 cordless-drill models on the market, and while some are me-too products, many have a unique place in the food chain.

With a host of features and power levels to consider, it's challenging to find the single category of drill best suited not only for your workshop/furniture-making needs, but also for the many other miscellaneous home-improvement projects that every woodworker does. The ideal do-it-all drill would be compact, so it's easier to get inside small cabinets and other tight spots. It would be relatively lightweight, to be easy on the hands and arms, while allowing the control you need to drive the smallest of screws. But it would also have the power for all those odd jobs that require more muscle, such as building a shed, deck, or picket fence.

Compact 18-volt drills do it all

So I set about looking for cordless drills that were compact, light, and powerful. I hit that trifecta with a relatively new class of drills—compact 18-volt models powered by lithium-ion batteries. These are lighter and smaller than other 18-volt drills past and present, even lighter and smaller than the 14.4-volt models *Fine Woodworking* has favored in the past. And they have power for almost any big task.

I now consider 18-volt lithium-ion cordless drills to be the new go-to drill for woodworkers.

I ended up with 10 of these new drills in the shop. The Craftsman has a

19.2-volt battery; the others are 18-volt.

Except for the Skil, which had a $\frac{3}{8}$ -in. chuck and one battery, the drills had

$\frac{1}{2}$ -in. chucks and came with two lithium-ion batteries. All included a battery charger. Extra batteries for all the drills are available separately.

Choosing a champ

I tested the drills for power, battery life, and control. The Makita had strong scores across the board, making it my best overall. It's reasonably priced, so I also consider it a best value.

Tom Begnal is an associate editor.



Old 18-volt drill

New batteries are the key

Thanks to lithium-ion batteries and smaller bodies, this new class of 18-volt drills is easier to handle yet has almost as much power as its larger 18-volt ancestors.

New 18-volt drill



Less is more. These new drills can get into places other 18-volt drills can't.



Plenty of power. These compact drills send lag screws home without any fuss.

Real-world tests

Begnal used real drilling and driving tasks to reveal the top performers.

TORQUE

Begnal used each drill to drive six 3/8-in.-dia. by 3-in.-long lag bolts into hard maple. A well-undersize (3/16-in.-dia.) pilot hole ensured that all the drills would stall at some point before being able to fully drive the bolts. Then he measured the exposed length of the six bolts to see how far they had been driven. After recharging the batteries, he repeated the test. The rating in the chart is based on the average of 12 bolts.



RUN TIME

To compare the battery life, Begnal used a 1 1/2-in.-dia. spade bit to bore as many holes as he could through 1-in.-thick red oak on a single battery charge. Then he compared the hole counts. The test was repeated twice.



CLUTCH

When using the clutch to drive a bunch of same-size screws, it's annoying when some screw heads end up deep while others are shallow. So, Begnal drove ten 1 1/2-in.-long sheetrock screws into 2-in.-thick MDF and adjusted the clutch to see how consistently each drill could drive screws flush with the surface. All did a good job, so he left this factor out of the chart.



BOSCH
36618-02



CRAFTSMAN
11910

MODEL/SOURCE	STREET PRICE	WEIGHT
Bosch 36618-02 www.boschtools.com	\$205	3 lb. 9 oz.
Craftsman 11910 www.craftsman.com	\$180	3 lb. 11 oz.
DeWalt DCD760KL* www.dewalt.com	\$230	3 lb. 10 oz.
Hitachi DS18DSAL www.hitachi.com	\$180	3 lb. 4 oz.
Makita BDF452HW www.makita.com	\$200	3 lb. 6 oz.
Milwaukee 2601-22 www.milwaukeetool.com	\$190	3 lb. 15 oz.
Porter-Cable PCL180DK-2 www.deltaportercable.com	\$180	3 lb. 12 oz.
Ridgid R86007 www.ridgid.com	\$190	4 lb. 4 oz.
Ryobi P815 www.ryobitools.com	\$170	3 lb. 12 oz.
Skil 2895LI-02 www.skiltools.com	\$110	3 lb. 12 oz.



*available in October 2009

Online Extra

To watch a video of our battery-life test and torque test, go to FineWoodworking.com/extras.





DEWALT
DCD760KL*



HITACHI
DS18DSAL



MAKITA
BDF452HW



MILWAUKEE
2601-22

LENGTH	CHARGE TIME (MINUTES)	TORQUE	BATTERY LIFE	COMFORT	COMMENTS
9¼ in.	21	Fair	Good	Very good	Fastest charge time. Clutch is a bit weak at its highest setting.
9 in.	47	Fair	Excellent	Good	Best battery life—makes up for long charge time.
8½ in.	35	Excellent	Good	Very good	Second-best torque.
8¾ in.	36	Very good	Good	Excellent	Lightest. Most comfortable. Clutch is a bit weak at its highest setting.
8½ in.	25	Excellent	Very good	Very good	Best torque. Second lightest. Third-best charge time. Second-best battery life.
8¾ in.	40	Fair	Fair	Very good	Second heaviest, but very compact. Worst battery life.
9¼ in.	23	Good	Good	Very good	Not as compact as others. Second-fastest charge time.
8 in.	28	Very good	Very good	Very good	Shortest length, but heaviest. Third-best torque.
8¾ in.	49	Very good	Good	Good	Second-longest charge time.
9¾ in.	80	Fair	Good	Very good	Best price by far, but smallest (¾-in.) chuck. Short battery life and long charge time.



PORTER-CABLE
PCL180DK-2



RIDGID
R86007



RYOBI
P815

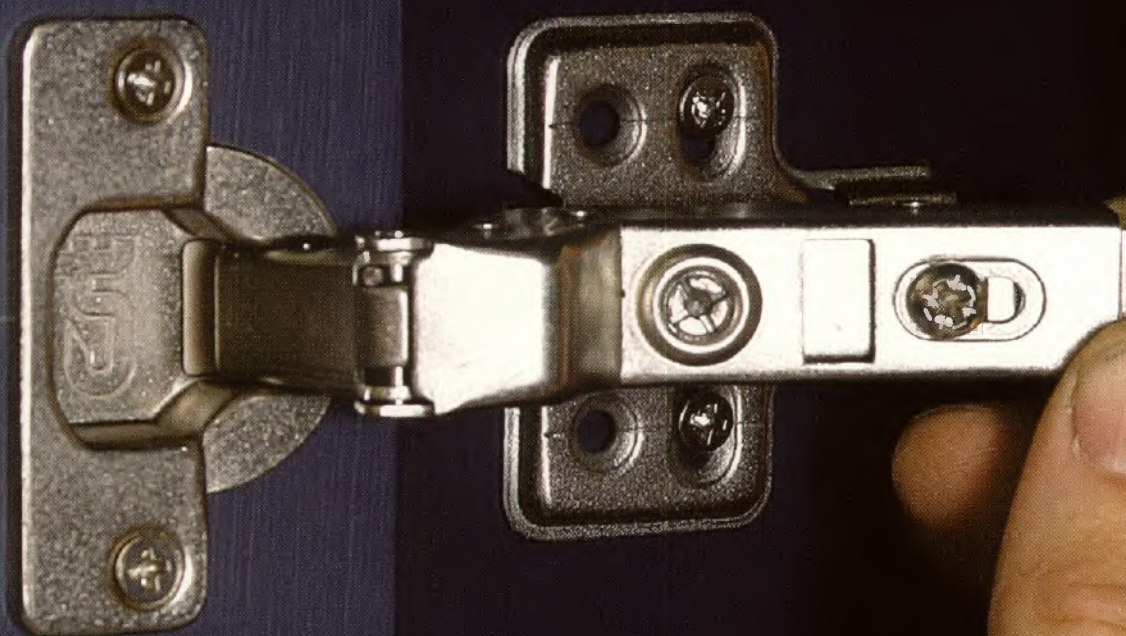


SKIL
2895LI-02

Best Hinge for Built-Ins

Easy to install and adjust, cup hinges speed up cabinetmaking

BY TONY O'MALLEY



Adding a set of built-ins is a good way to increase your home's value. And in today's economy, expending a bit of sweat equity is smarter than spending your savings.

Making beautiful built-ins isn't usually as hard as making fine furniture, partly because cleverly engineered hardware for cabinet doors and drawers has sped up the process tremendously. European cup hinges make it simple to hang and fit doors of all types, from inset to overlay.

With traditional hinges, hanging a door requires careful layout and precise mortising. Achieving even gaps involves trimming with a handplane—taking a bit off one edge, then some off the others. But you only get one shot. Take off too much

and the gap is large and unattractive.

Cup hinges are easier to install, because the only mortise needed is drilled with a 35 mm Forstner bit. A simple turn of a screw adjusts the fit in any of three directions. There are self-closing models available and some are soft-closing, so you never have to hear a slamming door again. And after the door has been hung, you can unclip it from the cabinet in seconds for finishing, transport, or to install large items like stereo equipment, and return it just as quickly without the fit being changed.

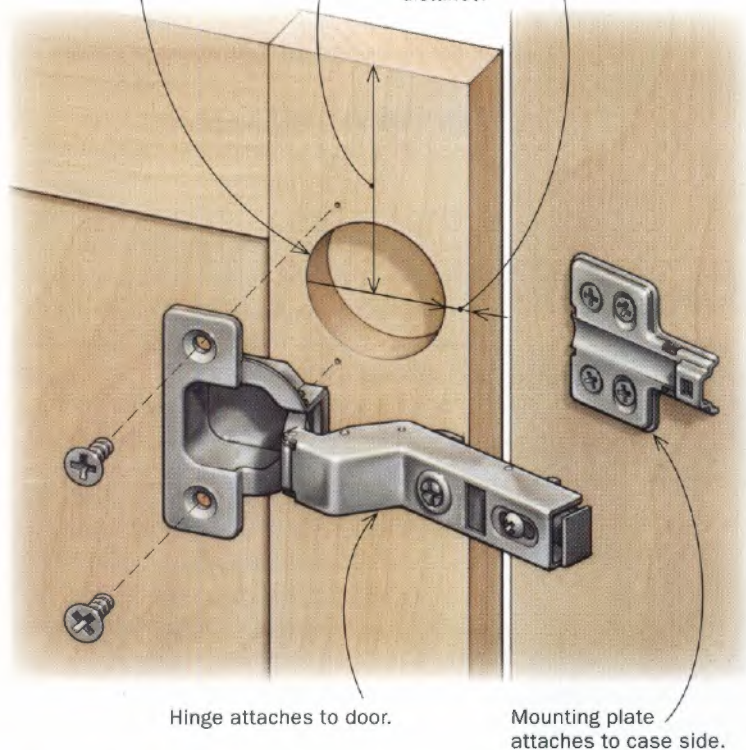
The only downside to cup hinges

CUP-HINGE BASICS

Choose an even distance from the top and bottom to the centerline: For example, 3 in. is easier to remember and measure than $3\frac{5}{16}$ in.

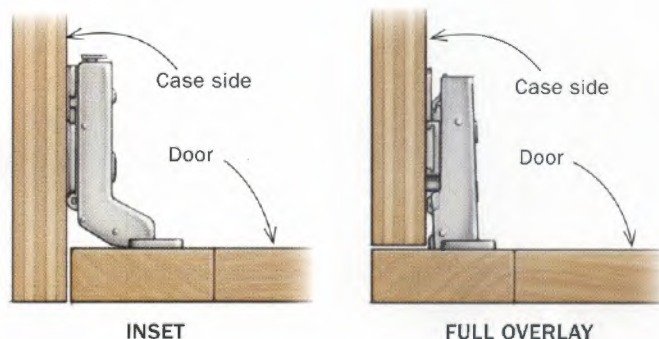
35-mm-dia. mortise for hinge cup

Typical setback is $\frac{1}{4}$ in., but it can vary with the hinge. Check instructions for the correct distance.



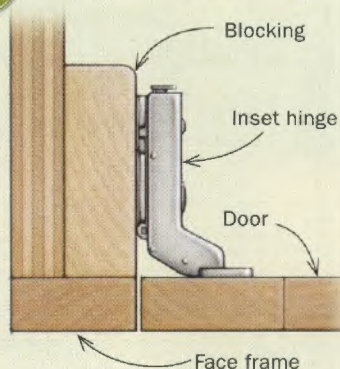
INSET OR OVERLAY?

A full-overlay door needs a different hinge design than an inset door. The examples shown are for frameless cabinets. For face frames, see the tip below.



TIP

TRICK FOR FACE FRAMES



Cup hinges designed specifically for face frames are clunky and unattractive. They are also screwed to the edge of the face frame, which can cause the wood to split. Use one designed for a normal inset door on a frameless cabinet instead. Install some blocking behind the frame for the mounting plate, and then installation and adjustment are the same.

Step 1 Mount the hinge to the door

The hinge cup must be located a specific distance (called the setback) from the door edge. A drill press and fence make it easy to bore consistently located holes for the cups.



Bore a hole for the hinge cup. Mark the hinge centerlines on the door. Then use a 35 mm Forstner bit to drill the mortises.

TIP



NO DRILL PRESS? BUY A JIG

Get a cup-hinge jig, like this one from Rockler. It has a wooden fence to dial in the setback. A toggle clamp locks it to the door, and a stop on the shaft allows you to drill every mortise to the same depth.



Screw the cup to the door. Align the hinge square to the door edge with a combination square. Then screw it to the door.

Step 2 Mount the plate to the cabinet

TWO-DOOR CABINET

On a cabinet like this, mounting the plate is quite simple. Clip it to the hinge, clamp the door in its desired position, and reach inside to drive the screws home.

Clip the plate to the hinge. With the mounting plate clipped in place, there's no guessing as to where to mount it on the cabinet. The hinge puts it right where it needs to go.



is their appearance. To be sure, they would be out of place on a period reproduction or a delicate Krenovian cabinet-on-stand. But they're great for practical cabinetry, both freestanding and built-in. I'll explain the basic types and the features to consider.

Choosing the right hinge

Because of their popularity in kitchen cabinetry—a massive industry—cup hinges are offered in a great variety of formats and features. You can choose among various degrees of opening angles, closing mechanisms, and mounting styles. With so much variety available, there's a cup hinge for just about every situation.

I always use hinges designed for frameless cabinets, even on cabinetry with a face frame, because they're sleeker and easier to install. I'll show you how to install them on both types of cabinet. And I'll focus on hinges for full-overlay and inset doors, the best choices for fine cabinetry.

With that in mind, here are the three most important features to consider.

Opening angle—Standard cup hinges open between 95° and 100°. That is adequate for most situations. But there are times when you want the door to open farther. In the kitchen, a shelf on full-extension slides would require a door that opens more. So too would a cabinet meant for home theater equipment. That's when you should use a hinge with a greater opening angle, like 165° or 170°.

Closing mechanism—Traditional hinges swing freely and require a catch or latch to hold the door closed. In contrast, most

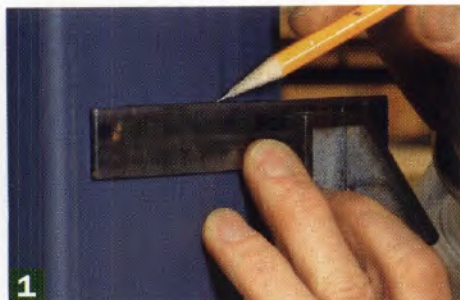


Attach the plate to the cabinet. Lean through the opening and drive home the screws.

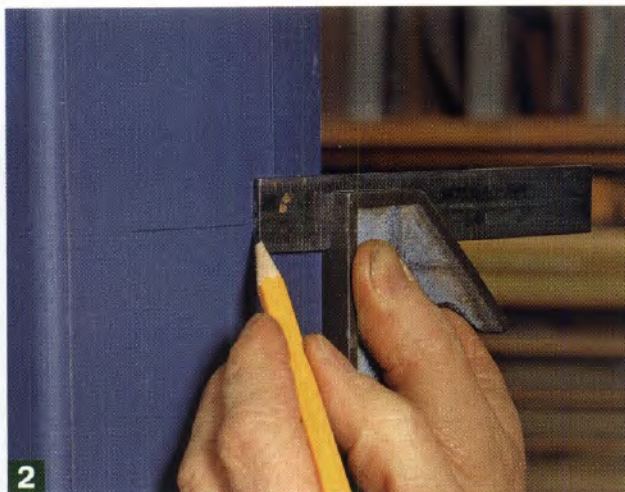
Clamp the door to the cabinet. After the plate is clipped in, set the door in place and hold it with two bar clamps. For an inset door, use shims to create even gaps. Leave the second door off for now.

SINGLE-DOOR CABINET

On a cabinet like this, unless you have the back off you can't have the door in the closed position and reach inside to attach the hinge plate. So you'll have to measure.



1 Mark the centerline. Start with the vertical location of the hinge plate. Add the gap for inset doors, and subtract the overlay for overlay doors.



Mark the setback. The plate's horizontal location is specified by the manufacturer, so check the instructions for the right distance.

cup hinges have a spring-loaded self-closing mechanism that pulls in the door and keeps it closed.

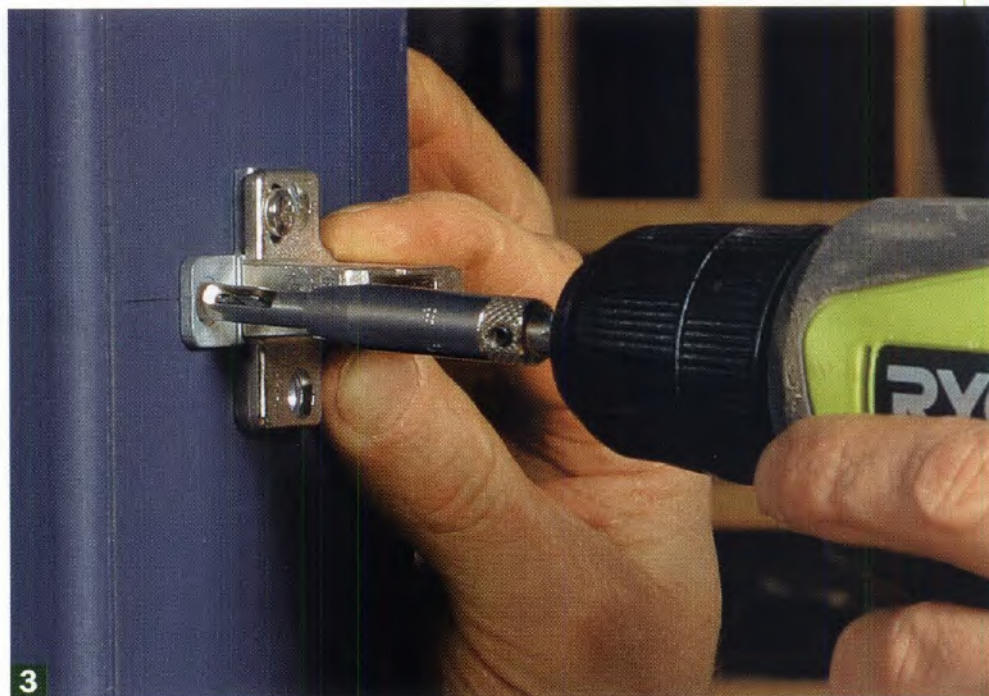
More expensive hinges have a soft-close mechanism that controls the swing of the door as it nears the cabinet, bringing it in for a slow and gentle landing.

Mounting style—A hinge is attached to a baseplate in one of two ways: It either is screwed to the plate or it clips into the plate. Use the latter type. The clips are precisely engineered and have strong springs, so they work well. After the door is mounted and adjusted, you can unclip it quickly, and re-clip it just as quickly, without affecting the door's fit.

Installation in three steps

Cup hinges are not difficult to hang, and they can be adjusted easily afterward. But that doesn't mean you can be sloppy. The setback must be accurate, and the centerlines for the hinge and mounting plate should align. So test your setups on spare parts before installing the cup hinges.

The first step is to mount the hinge to the door. Start by laying out and drilling the cup mortise. Mark the centerline for the vertical location. I've found that 3 in. from the top and bottom works well. But check to see that the hinge won't hit a shelf. When attaching the hinge, make

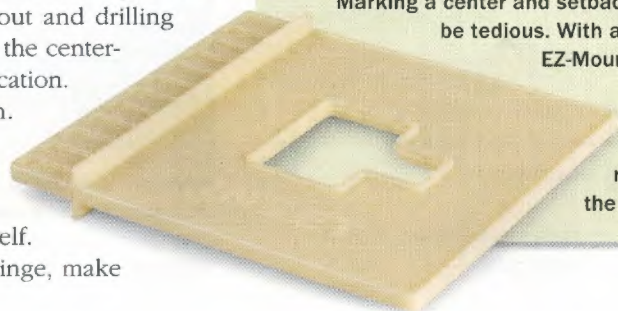


3 Attach the mounting plate. Align it with the centerline and setback line. Hold it in place, and drill pilot holes. Then drive in the mounting screws. O'Malley is using a self-centering bit here.



JIG SPEEDS UP PLATE MOUNTING

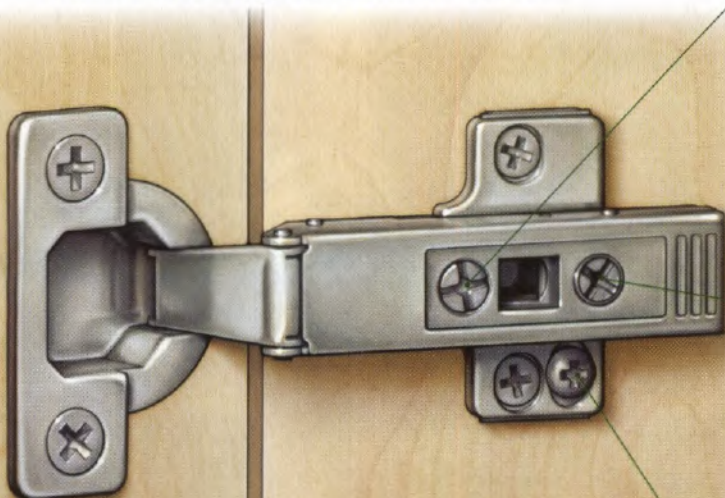
Marking a center and setback for every plate can be tedious. With a jig like this one from EZ-Mount, there's no need to measure. It holds the plate and puts it in the right place when you register the jig against the cabinet.



Step 3 Adjust the door for a perfect fit

The greatest benefit of cup hinges is that they make it easy to fine-tune the door's fit. With the turn of a screw, you can adjust the door horizontally or vertically.

THREE SCREWS OFFER SIMPLE ADJUSTMENTS

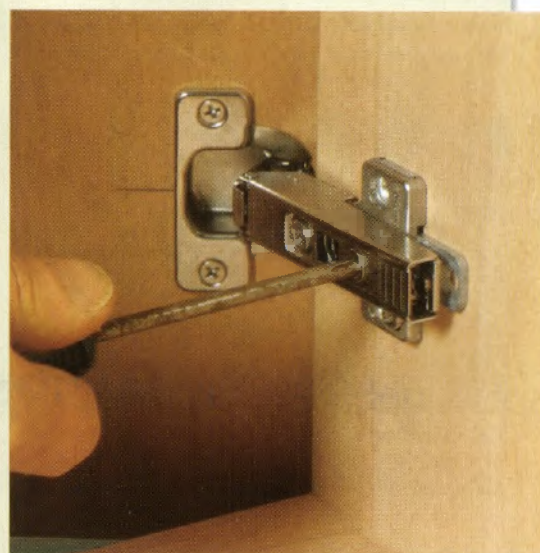


HORIZONTAL ADJUSTMENTS

SIDE TO SIDE



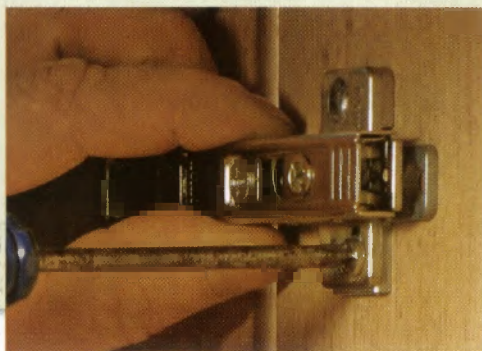
IN AND OUT



Adjust the door horizontally. There are two screws on the hinge for horizontal adjustment. One moves the door in and out; the other moves it side to side.

VERTICAL ADJUSTMENTS

Loosen screws for vertical adjustment. Moving the door up or down requires that you first loosen a screw on each mounting plate. This frees up the door just enough for it to move.



UP AND DOWN



sure that it's perpendicular to the door edge. Otherwise, the hinge and mounting plate won't mate properly.

Next, screw the mounting plate to the cabinet. How you do this depends on whether the cabinet has one door or two (see photos, pp. 48 and 49).

Two-door cabinets are easy. Clip the plate to the hinge, and clamp or shim the door in place. Then lean in through the opening for the other door and screw the plate to the cabinet.

Single-door cabinets take more work, because when the door is in place, there's

no opening to lean through. Instead, mark the plate's centerline and setback on the cabinet wall. Line up the plate with those lines, and screw it in place. Clip on the door.

The last step is to fine-tune the door's fit. Each hinge has three screws that are used to adjust it. One moves the door in and out, another moves it side to side, and a third is loosened so that the door can be shifted up or down. □

Tony O'Malley makes furniture and built-in cabinetry in Emmaus, Pa.



Slide the door up or down. After the screws are loose, it's just a matter of adjusting the door up or down until it's perfect, and then tightening the screws.

The Confusion Over Wipe-On Finishes

BY HENDRIK VARJU

One type is easier to apply...

...the other offers more protection

OIL/VARNISH BLEND

These popular oil finishes add a little bit of varnish to offer more protection than oil alone. Application is easy: Simply wipe on, then wipe off.

WIPING VARNISH

Brushing varnish is thinned with mineral spirits to create a wiping varnish. This offers a thicker film than an oil/varnish blend, but it must be wiped on more carefully.

Wipe-on finishes are a favorite of many woodworkers, both amateur and professional, because of their easy application. However, there is great confusion over what exactly constitutes a wipe-on finish: You'll hear one woodworker talk of wiping varnish, another of an oil/varnish blend; then somebody throws around the term "Danish oil," and pretty soon you have no idea which finish is which.

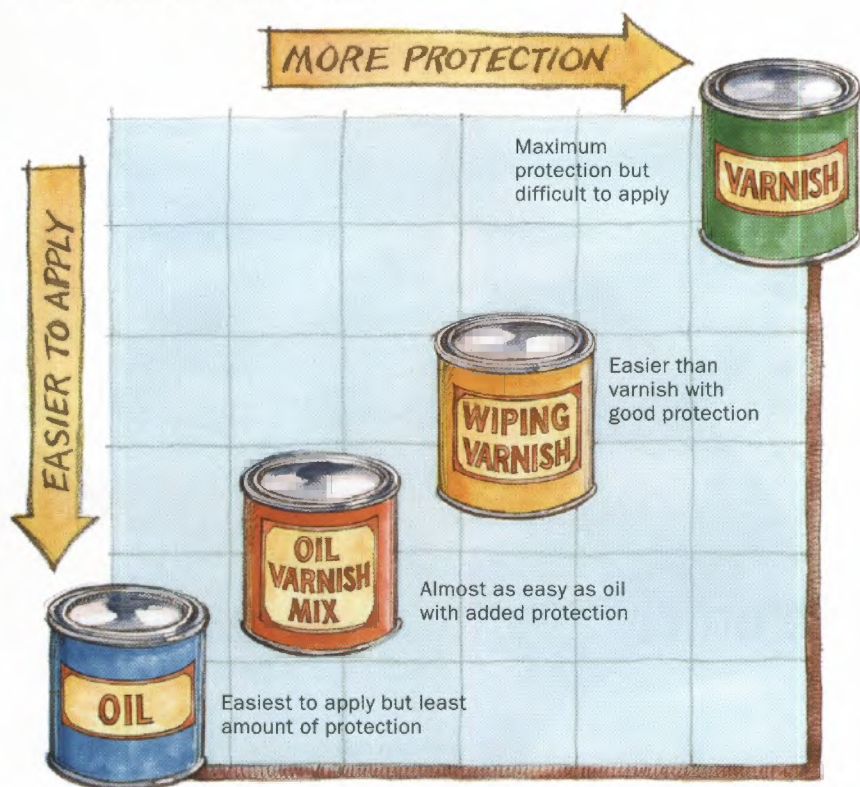
These finishes are not identical. To make the right choice, you need to know what each finish is made from, the pros and cons, where to use each one, and how to apply it. Only then will you discover how practical these finishes really are.

Different ways to create a wipe-on finish

It may help to think of varnishes, oils, and their various offspring as occupying a kind of grid (see drawing, p. 52): In the top right-hand corner is varnish, which is hard to apply (brush marks, sags, runs, and a magnet for dust) but offers enormous protection. In the bottom left-hand corner is pure oil finish, which is easy to

Choosing a wipe-on finish

When choosing among pure varnish, pure oil, wiping varnish, or an oil/varnish blend, you make a trade-off between ease of application and the amount of protection you are giving the wood.



apply (wiped on with a cloth, surplus wiped away, no dust problem) but offers minimal protection.

Between these two extremes are wiping varnishes and oil/varnish mixes. In making these finishes, manufacturers wanted to combine the good points of varnish and oil and avoid the negatives.

Wiping varnish is made by thinning varnish with mineral spirits. It dries faster, attracting less dust, but because each coat is thinner, it offers less protection than a coat of undiluted varnish.

An oil/varnish blend is made by combining linseed or tung oil with varnish. This product gives more protection than oil alone, but less than a wiping varnish. Because it allows you more time to manipulate the finish, it is even easier to apply than wiping varnish.

How to recognize each product

One of the main reasons for the confusion between wiping varnishes and oil/varnish blends is the way manufacturers name their finishes. What is Danish oil? What is salad-bowl finish? Why is Minwax Tung Oil Finish an oil/varnish blend and Formby's Tung Oil Finish a wiping varnish?

There are two ways to make certain of what you're using. The directions on the can may provide the first clue: If the can says to apply the finish with a cloth and let it dry, but doesn't mention wiping off the excess, then you have a wiping varnish. If it tells you to wipe off the excess a short time after applying it, then you have an oil/varnish blend. You also can compare how a puddle of the finish dries (see photos, left).

WHICH FINISH DO YOU HAVE?

If you can't tell whether your can of finish is an oil/varnish blend or a wiping varnish, observe how it dries. Place half a teaspoon of finish on a dished, impermeable surface and wait 24 hours. If the dried finish has a smooth surface, it's a wiping varnish. If the surface is wrinkled, it's an oil/varnish blend.



DRIED WIPING VARNISH

DRIED OIL/VARNISH BLEND



Blend your own

To make a wiping varnish, thin regular brushing varnish, either alkyd or polyurethane, with equal parts low-odor mineral spirits. For an oil/varnish blend, combine two parts boiled linseed oil or tung oil with one part brushing varnish. If you are using tung oil, add Japan drier to speed up drying time. Or, combine three parts Danish oil (a relatively thin oil/varnish blend) with one part varnish. You can reduce the amount of varnish if you find the finish too sticky, or increase it for a faster build.

Picking the best option

So when is one finish better than the other? Here's some advice. For a piece of fine furniture that won't be heavily used, you can't beat an oil/varnish blend.

This finish isn't technically a film finish or a penetrating finish; it's a hybrid that you might call "semi-film forming." It keeps the wood looking natural, but is only moderately resistant to water, heat, and chemicals, and it offers very limited protection from wear and scratches. If you need a protective finish, say, for a kitchen table, no off-the-shelf finish works as well as varnish. Thinning it to a wipe-on consistency makes it really easy to apply.

Oil/varnish blend: widely available

Oil/varnish mixes are popular because they are easy to apply, so almost every hardware store will stock one or two brands. Three or four coats build very little film, giving the wood a low-luster finish that is easy to repair but offers only a little protection.



ADD PROTECTION



If your commercial oil/varnish blend is too thin, mix in some brushing varnish in a 3:1 ratio to add protection.

APPLICATION: WIPE ON, WIPE OFF



Goes on easily. Apply an oil/varnish blend liberally and allow it to soak into the wood. You can use a small paintbrush to get finish into tight spots. Because of the long open time, you have plenty of time to remove any sags and runs. Once the finish soaks in, use a clean cloth to wipe off any surplus; otherwise, you will end up with a thick, sticky mess.

Varnish forms a cross-linking film: It interlocks on a molecular level, making it resistant to water, heat, scratches, chemicals, and so on. By wiping it on, you can still obtain a protective film for high-wear areas; it will just take you longer than brushing on thicker coats. Use a polyurethane varnish for even more protection.

Feel free to combine both finishes on one project to put additional protection where you need it most. For example, you can finish the base of a table with an oil/varnish blend but the top with a wiping varnish.

Oil/varnish blend: Be sure to wipe off excess

Apply the blend generously and wipe it around with a cloth, a cheap brush, or a roller. Particularly with the first coat, you can apply more finish after 10 minutes or so if the wood has absorbed the first lot. Because an oil/varnish blend has a long open time, it is very



Wiping varnish: more protection

You may need to visit a paint or woodworking store to find a commercial wiping varnish, but you can make your own. You have less working time than with an oil/varnish blend, but each coat adds more protection until eventually it reaches the same level as brushed varnish.



APPLICATION: WIPE AND LET DRY

Use overlapping passes. Apply wiping varnish in a thin layer, but don't keep going back over the same area or you'll pull the finish as it starts to dry.



MAKE YOUR OWN



You can thin oil-based brushing varnish with mineral spirits in a 1:1 ratio to create a finish thin enough to wipe on with a cloth.

forgiving. It's easy to remove sags and runs, and if you miss a spot, you can still apply more an hour later and it will never show a mark.

After the finish soaks in, but before it becomes tacky, you must wipe off the excess with a cloth, going with the grain. If you forget to remove the surplus finish, it will stay sticky for many days, and eventually it will dry with a wrinkled surface. Let each coat dry for 24 hours or until it no longer feels oily.

One of the real bonuses of an oil/varnish blend is that it isn't thick enough to catch much dust, so it's a great finish in the average workshop. Although there are no real dust nibs to deal with, a tiny bit of fine

sanding with 600-grit paper helps make the surface smoother just before the final coat.

The modest final thickness, even after numerous coats, isn't suitable for rubbing out. The final coat already has an attractive hand-rubbed look and rarely needs to be rubbed to an even sheen. But a coat of paste wax gives the surface a smooth feel.

Wiping varnish: Sand lightly between thin coats

You can use a lint-free cotton cloth or an untextured paper towel to apply wiping varnish, but you have only a few minutes to manipulate the finish. Apply a thin coat, then let it dry at least eight hours and possibly overnight, depending on the temperature and humidity. Any attempt to wipe off the excess after the finish has begun to tack up will result in a mess of disturbed, half-dried finish.

One of the downsides of varnish is that the long open time allows dust to settle into the finish. Even wiping varnish can have this problem, particularly if you put on a good amount with an overwet cloth. Fine sanding between coats will remove dust nibs and give the next coat some mechanical bonding power (particularly if more than 24 hours has passed since the last coat was applied). I use 600-grit wet-or-dry paper, lubricated with mineral spirits.

For the final coat, I use a rubbing pad, similar to one used in French polishing, to apply a superthin coat that dries very quickly. Take two pieces of lint-



TIP

Shortcut to a thicker coat. You can brush on full-strength varnish if you want to build a protective finish quicker. Sand between coats, and then finish off with thin coats of wiping varnish, applied with a cloth.

free cotton cloth about 10 in. square. Fold up one piece, place it in the center of the other piece, and then gather the sides of the second piece around the first piece, making sure the round end is wrinkle-free. Secure the ends with an elastic band.

Unlike French polishing, you can only cover the surface once, with slightly overlapping, straight strokes. Dip the finishing pad into a small amount of wiping varnish every few strokes to maintain a wet edge while putting down a superthin film. In fact, this finish film is so thin that the surface dries within minutes, barely giving dust a chance to settle into it.

Remember that varnish can look like a plastic film if applied too thickly, particularly on open-pored woods like walnut and mahogany. You can leave the pores crisp and defined under a thin film of three or four coats, or use grain filler first and then build up a thicker, more durable finish. After at least six to eight coats, wiping varnish can be rubbed out to a satin, semigloss, or glossy sheen using materials such as steel wool, pumice and rottenstone, or automotive polishing compound.

Remember the spontaneous combustion risk with all oil finishes. Make sure to unwrap the finishing pad when you're done, leaving it flat or hanging it outside to dry. □

Hendrik Varju is a fine furniture designer/craftsman who operates Passion for Wood near Acton, Ont., Canada.



Remove the dust nibs. Wiping varnish, especially if applied thickly, will dry slowly enough to allow dust and other debris to stick to it. Before the final coat, sand the surface with 600-grit paper lubricated with mineral spirits.



Pad on the final coat. To apply a final thin coat of varnish, create a rubbing pad by wrapping a folded piece of cotton cloth inside another piece and securing the ends with an elastic band. Pad on the very thin coat of wiping varnish in long strokes, landing on the middle of the surface and lifting off at either end.



Edge treatment. The pad also can be used to apply a thin final coat to the edge with one long stroke.

A Box That Earns Its Stripes

Got a tablesaw and tape?
Make a miniature masterpiece

BY ADRIAN FERRAZZUTTI

My first veneered box started when I noticed that some scraps destined for the fireplace were of contrasting colors. On a whim, I glued these offcuts into a thick block and then resawed that into slices of striped veneer. Cutting the slices into geometric shapes, I discovered that making patterns with contrasting veneer is a lot of fun and really gets the creative juices flowing. I've now made many of these veneered boxes and the process keeps evolving, but the basic tools and techniques remain simple.

Both the geometric veneer shapes and the rabbet joinery for the plywood core are cut on the tablesaw, but attention to detail elevates these small boxes into jewels.

Because of their scale, your eye sees every detail, so the workmanship must be crisp and clean. On the other hand, you won't need a vacuum bag to glue on the veneers; simple clamps and cauls work. Once you've pulled off

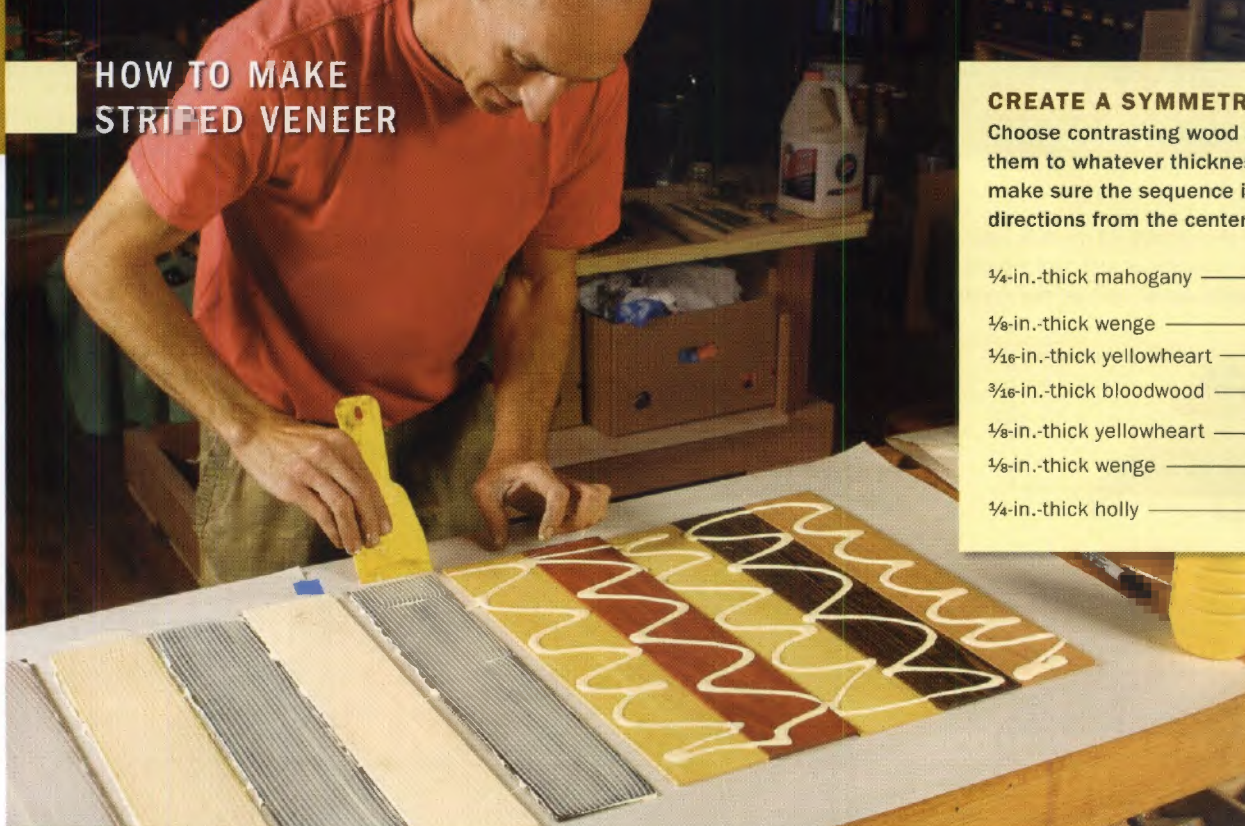


this project, you'll have the skills to tackle larger veneered projects with confidence.

Start with woods that catch the eye

Pick some woods with contrasting but complementary colors and mill them into strips a little over 2 in. wide by 16 in. long, varying in thickness from $\frac{1}{16}$ in. to $\frac{1}{2}$ in. Joint the face of each strip and then thickness-plane each one to whatever thickness

HOW TO MAKE STRIPED VENEER



Glue the contrasting woods. Ferrazzutti uses a notched spreader to apply a liberal amount of yellow glue to the strips of colored woods.

makes an interesting stack of contrasting strips. For the pattern to work, though, the layers should be identical on both sides of the center layer. Also, when glued together, the block should be at least 2 in. thick and 3½ in. wide.

Place the glued strips in a clamping cradle to prevent them from skating around when pressure is applied. When dry, square up the block but remember to keep the two outside layers the same thickness.

Because the core of the box is plywood, you also need to veneer the inside and bottom of the box. You can pick one of the woods used on the outside, or use a different one. In this case, I used bubinga.

Glue a backer board to both the outside striped block and the block you are using for the inside. You can now resaw the whole of each block for veneer and still have a large surface to handle safely. I slice the veneer ¼ in. thick or slightly thinner, jointing the block after each cut to remove sawmarks. You'll need a minimum of 14 slices to provide enough segments for the box along with some spares.

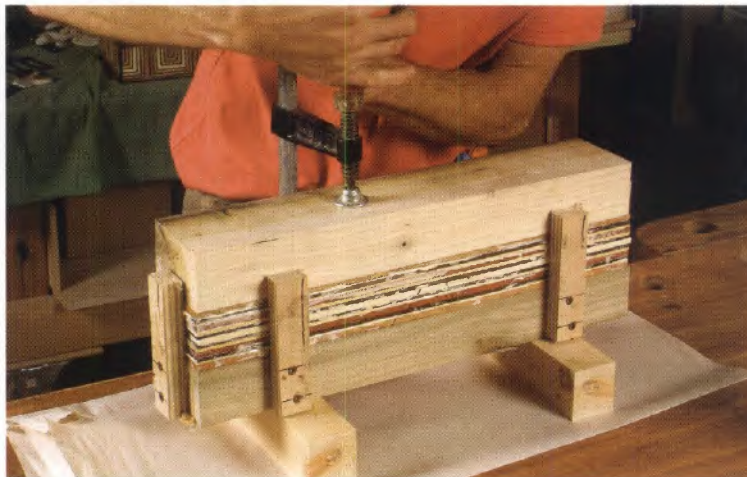
Tablesaw delivers precise pieces

Now cut the stack of striped veneer into the shapes needed to make the pattern. I do

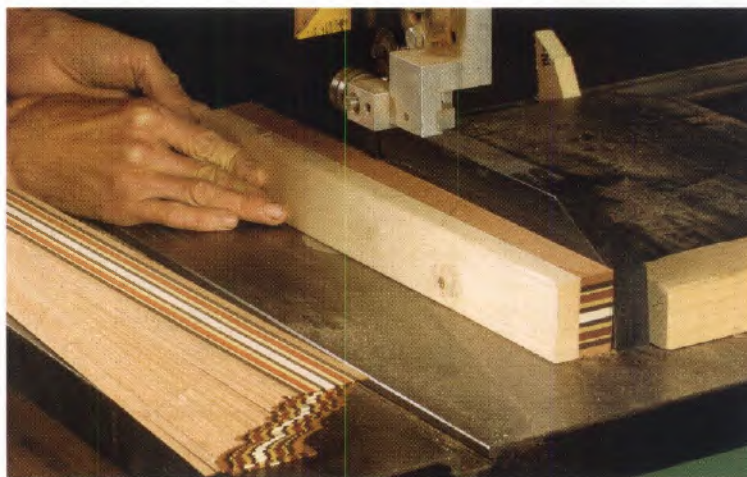
CREATE A SYMMETRICAL SANDWICH

Choose contrasting wood species and mill them to whatever thickness looks right, but make sure the sequence is the same in both directions from the center of the block.

¼-in.-thick mahogany —
 ⅛-in.-thick wenge —
 ⅛-in.-thick yellowheart —
 ⅜-in.-thick bloodwood —
 ⅛-in.-thick yellowheart —
 ⅛-in.-thick wenge —
 ¼-in.-thick holly —



Clamp firmly. Place the glued strips in a clamping cradle lined with packing tape to prevent sticking. Place a thick caul (also faced with tape) on top of the strips and apply plenty of pressure.

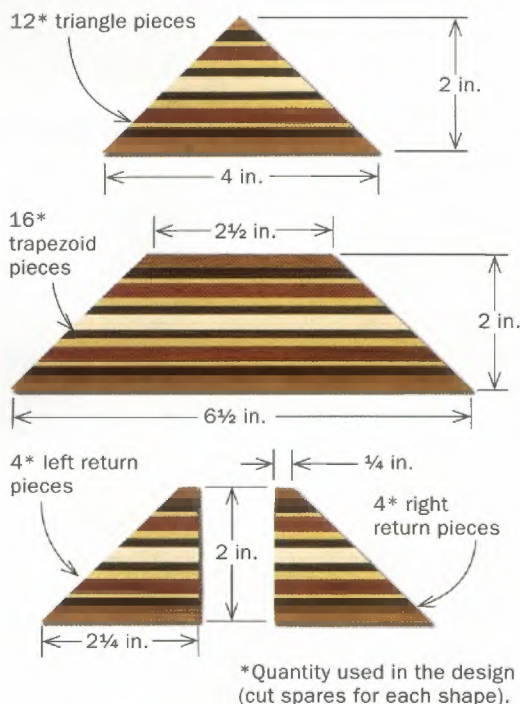


Resaw the veneer. After squaring the block and gluing a backer board to it, resaw ⅛-in.-thick strips of the striped wood for the box's exterior. You'll need to do the same thing with a block of solid wood for the interior.

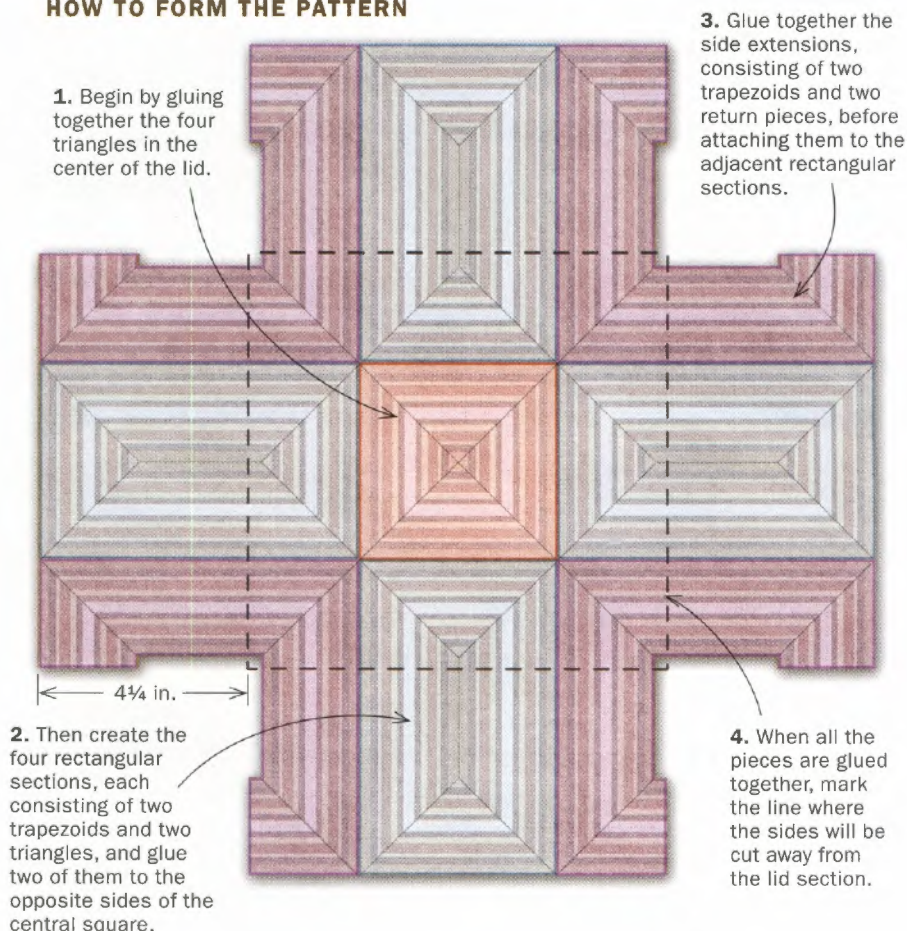
ONE PATTERN COVERS THE WHOLE BOX

SIMPLE CUTLIST

The flowing design on the outside of the box may appear complex, but it consists of just four simple shapes with all the angles cut at 45° on the tablesaw.

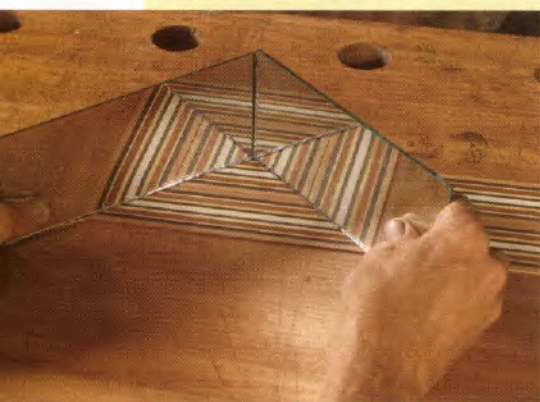


HOW TO FORM THE PATTERN



Online Extra

DESIGN YOUR OWN VENEER PATTERNS



Once you start working with striped veneer, you'll quickly want to create your own designs. The best way to start is to place a couple of mirrors on the veneer and then vary the angle between them to see potential patterns. To read and learn more, go to FineWoodworking.com/extras.

this on the tablesaw using a clean, sharp crosscut blade and a simple sled. The sled's base is 1/2-in.-thick plywood, a little larger than the veneer, with a piece of P220-grit sandpaper glued to the top surface, backed by a 4-in.-tall fence. I clamp the sled to the auxiliary fence of a miter gauge, dial in exactly 45°, and cut through the base and fence of the jig. The sandpaper prevents the veneers from slipping as they are cut, and the edge of the sled tells me exactly where the cut will be.

My aim is to get all the joints crisp off the saw and not to mess around with planes and shooting boards. So after cutting the shapes slightly oversize, I tape them into tight stacks of matching shapes, and trim them to uniform size using the same jig. This leaves a crisp edge that shouldn't need any more fussing.

It's now time to assemble the veneer pattern for the top and sides of the box. Beginning at the center, tape the shapes into

pairs and the pairs into fours, gradually working out to what will be the sides of the box (see drawing above). Once all the parts are glued together, I use a knife and a straightedge to cut away the side panels from the top panel.

The next step is to glue the striped veneer and the interior veneer to opposite sides of the Baltic-birch-plywood core. The top and bottom are pressed onto 3/8-in.-thick material and the sides are pressed onto 1/2-in.-thick material. To make this go quickly, I veneer the sides on one piece and the top and bottom on another.

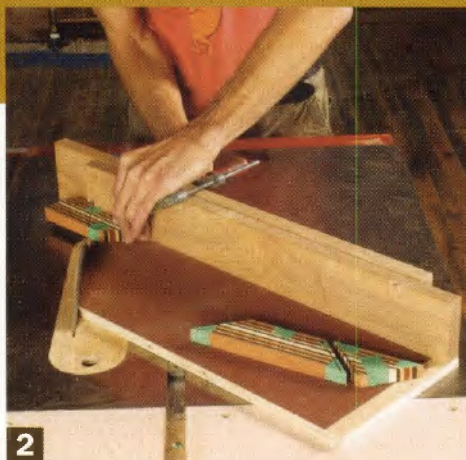
Tablesaw makes joints easy, too

On the tablesaw, rip and crosscut the side panels square and to the same dimensions. Clamp a sacrificial fence to the rip fence, insert a wide dado stack, and then raise the blade into the sacrificial fence. Run one end of each side, pattern up, against the fence and through the dado stack to make

STACK VENEER TO ENSURE PRECISE CUTS



1 *Lay out the segments.* Tape together a stack of the striped veneers and lay out the geometric shapes, keeping them slightly oversize.



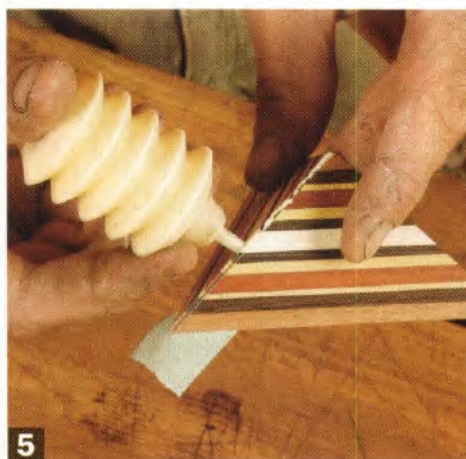
2 *A nonslip sled.* Crosscut the shapes on a dedicated sled whose base has sandpaper glued to it to hold the workpiece steady.



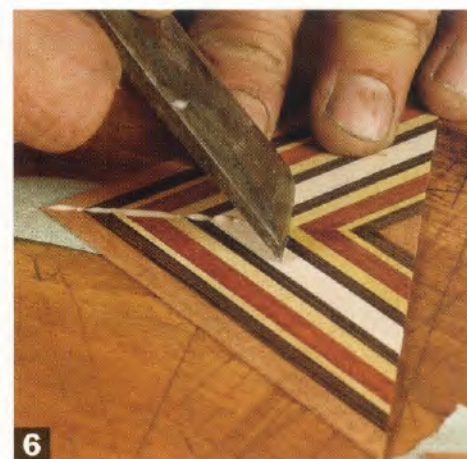
3 *Uniform, precise cuts.* After rough-cutting the shapes, tape them back together and trim them all to the final size.



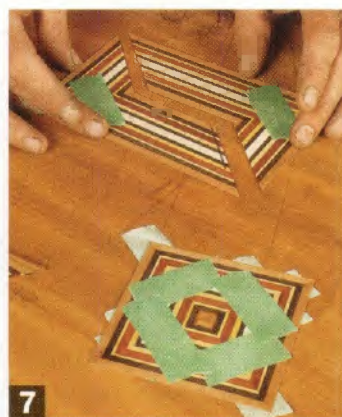
4 *Begin assembling the puzzle.* Use a straight-edge to align a pair of shapes and tape them together on their rougher, bandsawn faces.



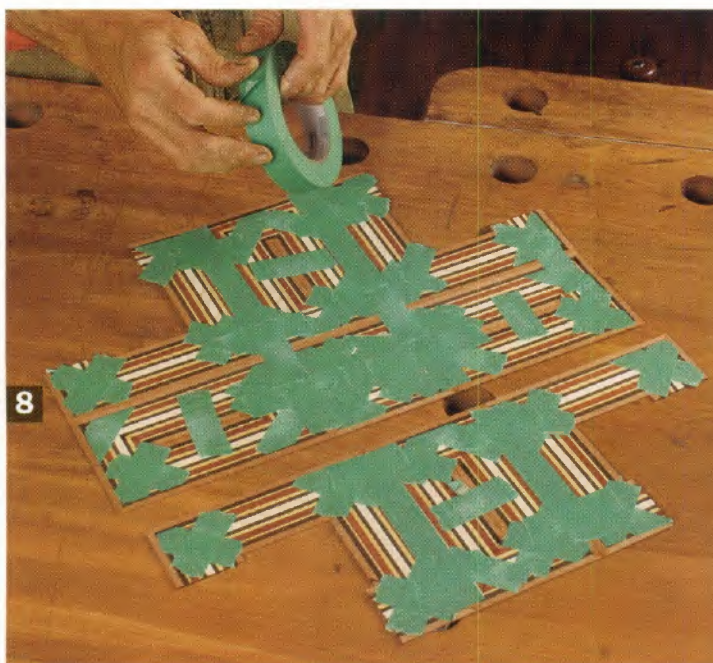
5 *The hinge trick.* Flip over the pair of pieces, open up the joint using the tape as a hinge, and apply a thin bead of glue.



6 *Close the joint.* Use the back of a chisel to remove squeeze-out and bring the joint flush. Tape this face side while the glue dries.



7 *Work outward from the center.* After the center square is formed, construct the four rectangles that adjoin it (above). After attaching the side extensions to two opposite rectangles, attach them to the center section (right). If necessary, you can improve the alignment by planing the edges lightly.



9 *Cut away the side veneer panels.* Align a straightedge with the ends of the side sections of veneer and mark where to slice the side veneers away from the top piece.

TURN THE PATTERNS INTO PANELS

GANG UP PARTS

Press the veneer. To speed things up, Ferrazzutti creates the box top and bottom on one piece of plywood, and all four sides on another. Before spreading glue, he uses veneer tape to hinge the veneer sections to the plywood to maintain alignment.



TRIM AND RABBET THE SIDES



Saw the sides apart. Once the panels are dry, rip the plywood down the middle, leaving two sections, each with two side pieces.



Trim to size. After cutting the box sides to length, rip the plywood down the middle, leaving two sections, each with two side pieces. A piece of masking tape on the back corner prevents tearout.

a $\frac{7}{16}$ -in.-square rabbet. Each of the four corners will form a rabbeted butt joint, leaving a $\frac{3}{16}$ -in.-square rabbet at the outside corner. This is based on a $\frac{1}{2}$ -in.-thick core with $\frac{1}{16}$ -in.-thick veneers on each side for a total panel thickness of $\frac{5}{8}$ in.

The next step is to cut rabbets for the top and bottom panels. Leave the blade height alone but set the fence for a $\frac{5}{16}$ -in.-wide cut because the veneered top and bottom panels are only $\frac{1}{2}$ in. thick. Now run the top and bottom edge of each side, pattern up, against the fence and through the dado stack to make a rabbet $\frac{7}{16}$ in. wide by $\frac{5}{16}$ in. tall. When the top and bottom are dropped in, they also leave a $\frac{3}{16}$ -in.-square rabbet on the outside corners.



Rabbet three edges. Using a dado blade, cut a rabbet on the same end of each side piece and rabbet the top and bottom edges, too.

DIRT-SIMPLE JOINERY

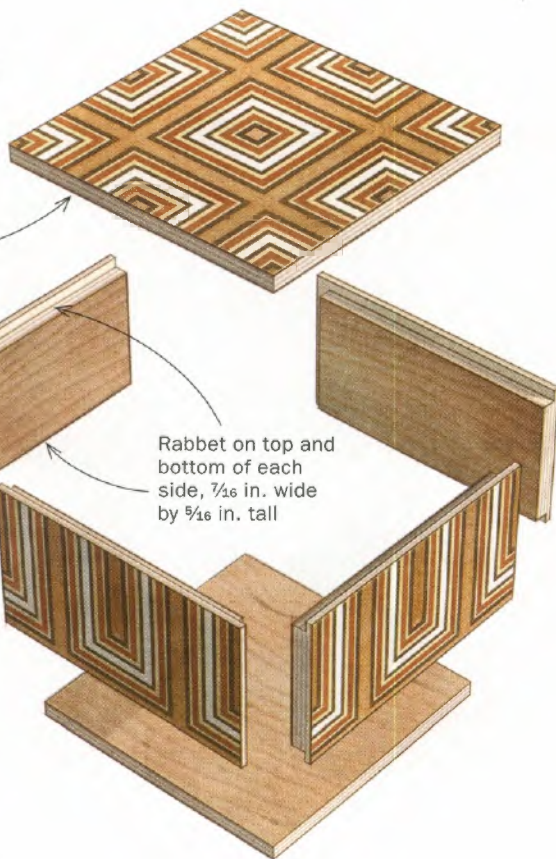
A rabbet cut at the top and bottom, plus one end, of each side holds the box together.

Top and bottom, $\frac{1}{2}$ in. thick ($\frac{3}{8}$ -in. plywood plus two pieces of $\frac{1}{16}$ -in. veneer) by roughly 8 in. square. Fit these to the assembled box.

Sides, $\frac{5}{8}$ in. thick ($\frac{1}{2}$ -in. plywood plus two pieces of $\frac{1}{16}$ -in. veneer) by $4\frac{1}{8}$ in. wide by $8\frac{1}{8}$ in. long

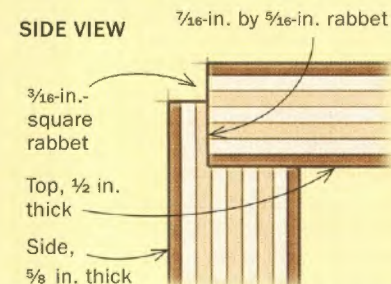
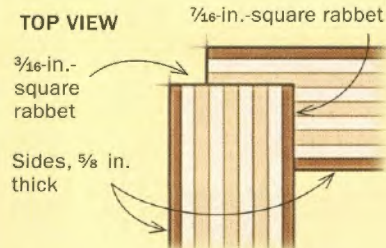
Rabbet on one end of each side, $\frac{7}{16}$ in. square

Rabbet on top and bottom of each side, $\frac{7}{16}$ in. wide by $\frac{5}{16}$ in. tall



HOW RABBETS MULTIPLY

Rabbets along the top, bottom, and one edge of each side leave $\frac{3}{16}$ -in.-square rabbets along each edge of the box where the edging will go.



With the joinery complete, sand the inside surfaces with P220-grit paper, tape off the areas that will be glued, and apply two or three coats of a clear finish. I prefer a wiping varnish, such as Minwax's Wipe-On Poly or Waterlox Original, for the interior and exterior, which offers an in-the-wood look and a little protection.

After a dry run, glue the box together, check it for square, and use a small block and a hammer to ensure the corners of the rabbets are flush (don't let them dry with steps). Let the squeeze-out harden on the inside corners, then pop it off with a sharp plane iron and apply another coat of finish.

Trim the top and bottom panels until they press in nicely without distorting the sides. When sizing the top, take care to keep the pattern lined up with the patterns on the sides. Tape off the glue area around the inside of the top and bottom, then apply some finish.

Using a stiff, flat surface as your table, glue on the top of the box and clamp each corner of the box to the stiff surface. Let this sit for a half hour, remove the clamps, and pop off the squeeze-out around the inside corners with a sharp plane iron. Glue in the bottom the same way, but because you won't be able to get at the squeeze-out, adjust the amount of glue you use based on how much squeeze-out you got with the top.

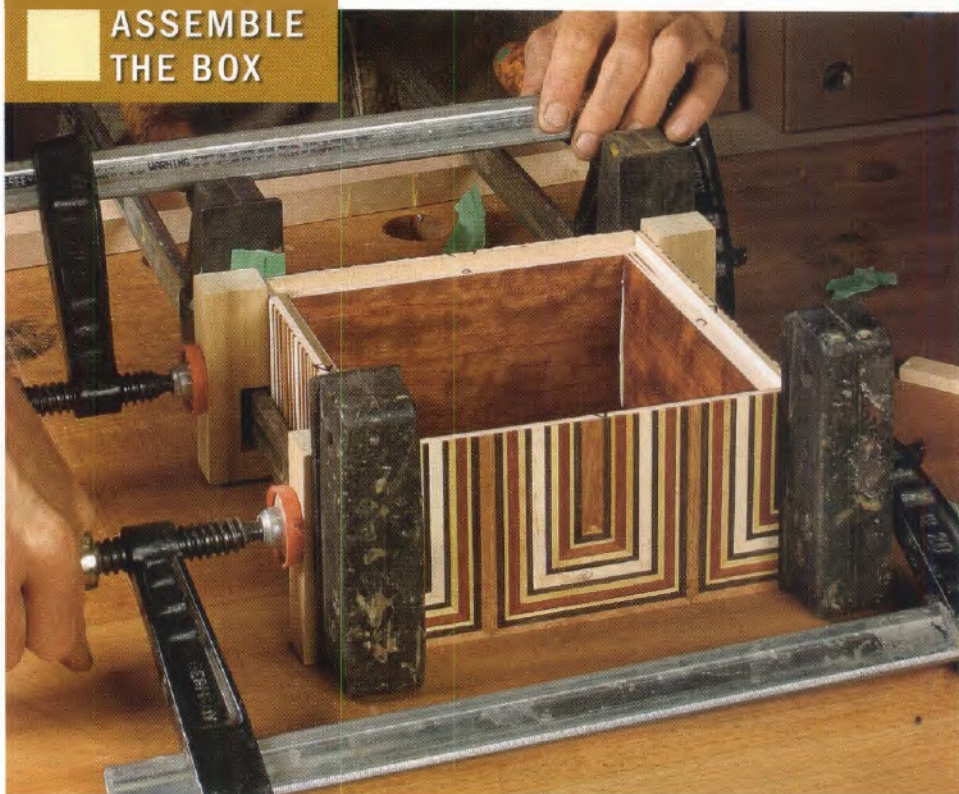
Add the trim and cut open the box

The box has hardwood trim (I like to use holly or ebony) on the corners, around the top and bottom edges, and on the contact surfaces of the lid and the base. Set up a rabbeting bit in a router table to clean up and enlarge the existing corner rabbets to $\frac{1}{4}$ in. square.

Mill the stock $\frac{3}{32}$ in. square with enough pieces to go around the top, bottom, and sides. Cut four pieces for the corners about $\frac{1}{4}$ in. shorter than the total height of the box. Use a block plane to chamfer the inside corner of the edging to help it seat better in the rabbet, then round over the outside corner slightly so that the tape used for clamping is less likely to break.

Apply glue to the rabbet and set in the edging so that each end extends into the rabbets on the top and bottom. Stretch-clamp three or four strips of tape on each corner, let it sit for about an hour, and

ASSEMBLE THE BOX



Sides first. To ensure even pressure along each corner joint, Ferrazzutti starts with a pair of parallel clamps. He then places four notched cauls over the bars of the parallel clamps and applies pressure to the cauls with a pair of bar clamps.



Add the top and bottom. When cutting these pieces to fit into their rabbets, make sure that the veneer pattern is aligned. Then glue and clamp them into place.

SOLID EDGING FRAMES AND PROTECTS THE PATTERN

Clean up the corners. Use a rabbeting bit in a router table to enlarge the corner rabbets where the sides meet. Don't do the top and bottom edges yet.

TOP VIEW

Final rabbet,
¼ in. square

⅜-in.-square
rabbet



Apply the edging. Blue masking tape supplies enough force to hold the corner edging in place while the glue dries.



Bring it flush. Use a block plane followed by a cabinet scraper to bring the corner edging flush with the box sides.



Now the top and bottom edges. Use a rabbeting bit to trim the ends of the corner edging and enlarge the rabbets around the top and bottom of the box sides (above). This edging has mitered corners, so apply it to opposite sides (right) to make fitting the last two pieces easier.

then peel off the tape. Use a fine-set block plane and then a cabinet scraper to bring the edging flush with the sides, taking care not to damage the veneer.

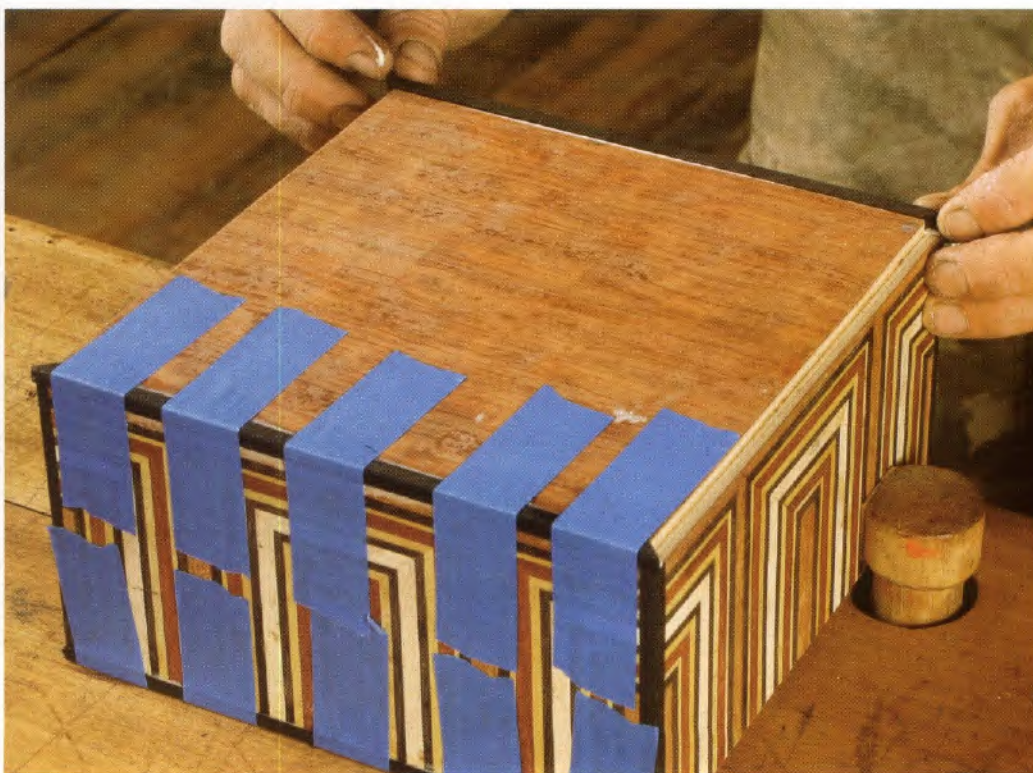
With the side corners complete, rabbet around the top and bottom of the box, taking care not to blow out the side corners you just glued on.

The top and bottom edging gets mitered, and it's best to glue two opposite edgings on the top and bottom first. This avoids cross-grain tearout when smoothing them flush and makes fitting the miters on the remaining edge pieces much easier.

The lid should be at least 1½ in. deep; a thinner lid has a greater chance of springing or twisting. Sawing off the lid on the tablesaw may seem a risky procedure, but with a few simple tricks it's really nothing to fear. Get a good, clean crosscut blade, make a zero-clearance throat plate, and set the rip fence so it is dead parallel with the blade. Set the blade height so it will just break through the box. After each cut, insert a couple of the kerf shims, and stretch tape over the saw cut to hold the lid tightly in position.

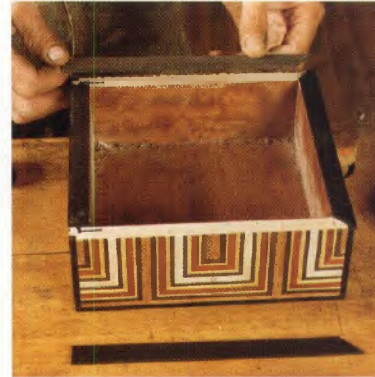
The last step is to cap the plywood that you just exposed. Using the same wood as the edging, mill some strips ¾ in. wide and a fat ⅛ in. thick. When the lid is closed, the thickness of the two cap edges should visually equal the ¼-in. corner edging.

Before gluing on the caps, I use a block plane followed by a cabinet scraper to correct any twist in the lid so that it rests on the body without rocking.



SAW OFF THE LID AND COVER THE CUT

Shim it as you cut. First, to eliminate tearout, apply a piece of tape around the box where the cut will be made. Then apply a piece of tape to each lower corner of the box so it won't rock. Now cut the first side, insert two pieces of wood equal in width to the sawkerf, apply a piece of tape across the box, and then cut the next side. Repeat until all four sides are cut.



Cap the core. After cutting off the lid, glue strips to both parts of the box to conceal the plywood core. The front corners are mitered, but the back corners are butt joints that will be concealed by the quadrant hinges. Apply the sides last.

I miter the front corners of the cap strips but leave the back corners as butt joints; this prevents a tiny piece of the mitered corner from blowing out when routing for the quadrant hinges.

The idea is to have the inside edges of the caps flush with the inside faces of the box so that there is minimal trimming to do. The outside edges protrude, but will be trimmed after glue-up. A bonus of having the strips slightly wide is that if a mitered cap strip gets trimmed too short, a light pass on the inside edge with a plane makes the strip longer, so you don't have to cut another piece.

Glue on the front and back caps, waiting about an hour before trimming them flush. Then cut the side caps with a miter on the front and let the back extend over the edge. Apply glue and stretch tape across the miter joint and the butt joint, pulling the side cap tightly against the adjoining caps.

After installing the hardware (see Master Class, pp. 84-89), I finish the box using P320- and P400-grit disks on a random-orbit sander. You don't want to hand-sand, as this forces different colored dust into the pores of other woods. I finish the outside in the same way as the inside. □

Adrian Ferrazzutti is a professional woodworker in Guelph, Ont., Canada.



Power sanding only. Hand-sanding will force different-colored sawdust into the pores of the contrasting wood, spoiling the appearance. Use a random-orbit sander to smooth the outside of the box (left). Finish the box with a clear coat of your choice (below). The hinges and lock are covered on pp. 84-89.



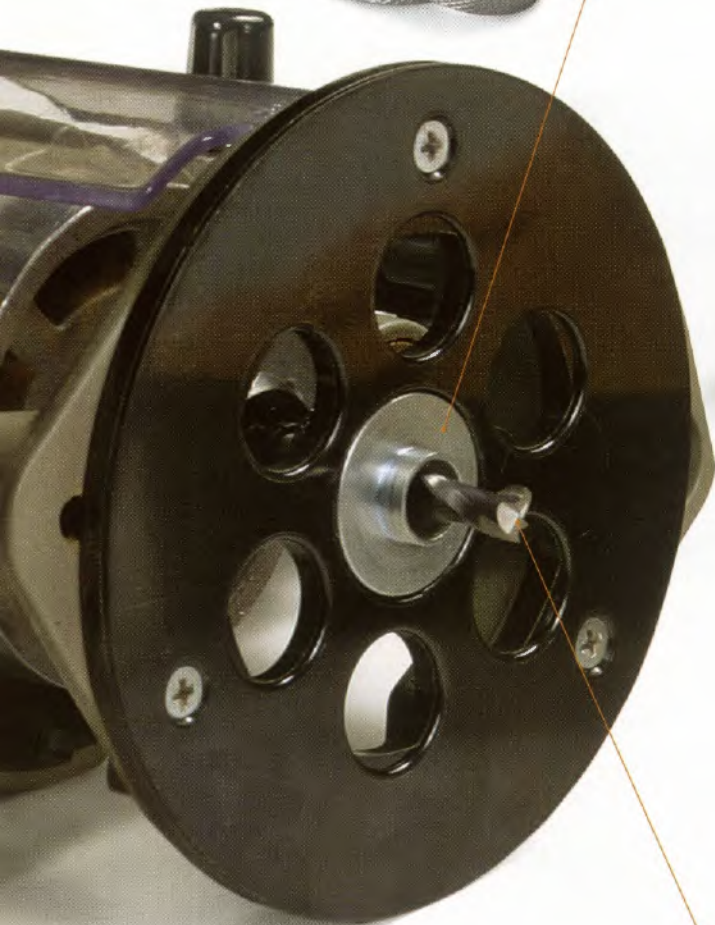
A Guide to Guide

BETTER THAN BEARINGS

The advantage of a guide bushing is that it stays fixed and stable against its reference surface while allowing the bit to spin and plunge freely.

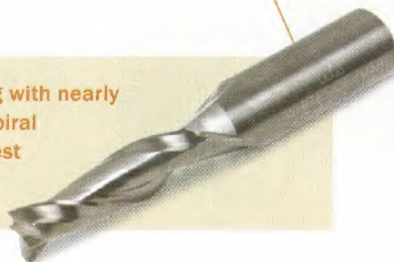
7 simple jigs make it easy to rout mortises, slots, holes, and more

BY GREGORY PAOLINI



THE BIT TO USE

You can use a bushing with nearly any router bit, but a spiral upcutting bit works best for most cuts.



Routers need guidance, something firm and fixed to make sure the bit goes only where you want it to. Think bearing-guided bits, edge guides, and fences.

But there's a type of guide that woodworkers often overlook: the guide bushing. It's often the simplest, fastest way to make accurate and repeatable cuts—some of them difficult or impossible with any other type of guide. Used with simple shopmade templates, bushings make it easy to cut mortises, bore dowel and shelf-pin holes, and rout evenly spaced stopped dados in a carcass.

Bushings have several unique strengths. They allow you to plunge-cut and use spiral bits, which aren't available with bearings. You can cut into the middle of a workpiece, not just along its edge. And you never have to worry about a bearing wearing out and seizing up during a cut or burnishing the edge of the work.

Don't forget the offset

The most important thing to learn about using bushings is the offset—the distance between the cutting edge of the router bit and the outside edge of the bushing. The offset is the key to

Bushings

creating jigs and templates to cut the sizes and shapes you want. To determine the offset, subtract the bit diameter from the bushing diameter and divide by two. For example, with a $\frac{3}{4}$ -in.-dia. bushing and a $\frac{1}{2}$ -in.-dia. bit, the difference is $\frac{1}{4}$ in. Half that, or $\frac{1}{8}$ in., is the offset, so the edge of the template must be $\frac{1}{8}$ in. from the edge of the cut.

Second, be sure the offset is large enough for chips to exit the cut. That's critical if you use a spiral upcutting bit to cut mortises. The bit helps clear out chips that inevitably build up and pack the slot, but you have to give the chips somewhere to go. I like to use a bushing with a $\frac{1}{2}$ -in. or $\frac{5}{8}$ -in. outside diameter and a $\frac{1}{4}$ -in.-dia. bit.

Third, be sure the bushing isn't longer than your template is thick. Otherwise, the bushing will hit the workpiece and you'll be dead in the water. Either make the template out of thicker material or trim the bushing as shown at right.

The other key is that the bit and guide bushing are very close to concentric; otherwise, the offset will be greater on one side of the router than the other. That can produce a too-narrow mortise or a slot with a wavy edge. Some router manufacturers sell centering cones to help adjust the offset, but I use a simpler method (see tips at right). To adjust the bushing location on most routers, you'll need to adjust the base. You may need to enlarge the mounting holes or replace the baseplate.

A final tip

With a plunge router, if you go too deep, the spinning router collet will hit the guide bushing—and burning metal is an unpleasant aroma. So set the depth stop accordingly.

On the next four pages I'll show you my favorite jigs and templates for guide bushings. You'll come up with many more.

Gregory Paolini is a professional furniture maker in Waynesville, N.C.

Setup TIPS



They often need a trim

Too much of a good thing. Most bushings are too long for $\frac{1}{4}$ -in.-thick template stock. As is, this one will hit the workpiece.



Easy to trim. Use a hacksaw to trim the bushing to just under the thickness of your template stock. Clean up the sawn edge with coarse sandpaper.

Alignment is essential



Center the bushing

Dovetail-bit test.

To find out if the bushing and bit are concentric, raise a dovetail bit until it nearly touches the bushing, then spin it by hand. You'll quickly see if the bushing is off-center.



Keep the router in line

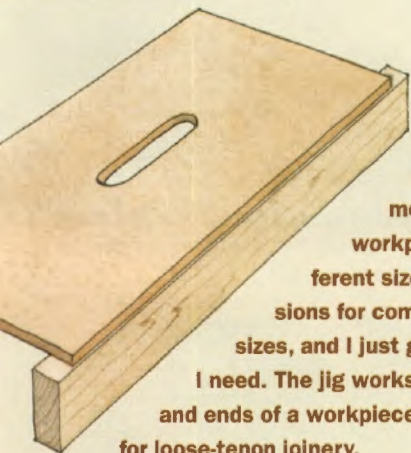
Tape marks the spot.

Just in case the offset between the bit and the bushing is still a little inconsistent, Paolini keeps the router in the same relative position for each pass, ensuring a consistent cut. The piece of green tape is his reference.

7 super jigs for bushings

These simple templates and patterns let you cut mortises, holes, slots, and elaborate shapes with a plunge router fitted with a guide bushing and a spiral upcutting bit. All the jigs begin with a piece of 1/4-in.-thick plywood or MDF.

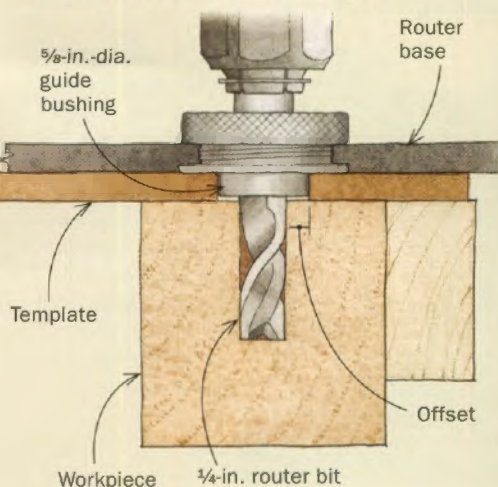
1 Mortising is job one



This simple jig lets you cut the same mortise on workpieces of different sizes. I have versions for common mortise sizes, and I just grab the one I need. The jig works on the sides and ends of a workpiece, so it's ideal for loose-tenon joinery.

Make the base as wide as your router's base and twice as long. Attach it to a hardwood fence milled flat and square. Lay out the mortise slot on the bottom of the template, adding the proper offset to the width and length. Cut the slot at the router table, and try to make it fit the bushing exactly. If you have a bit that's the same size as the outside of the guide bushing, use it. Otherwise, use a smaller bit and cut the slot in multiple passes. Some people drill a starter hole for this kind of cut, but I find it unnecessary. I rest the right side of the template on the router table, then carefully lower the left side onto the spinning bit and move the template right to left to make the cut.

For workpieces of different thicknesses, add shims next to the fence.



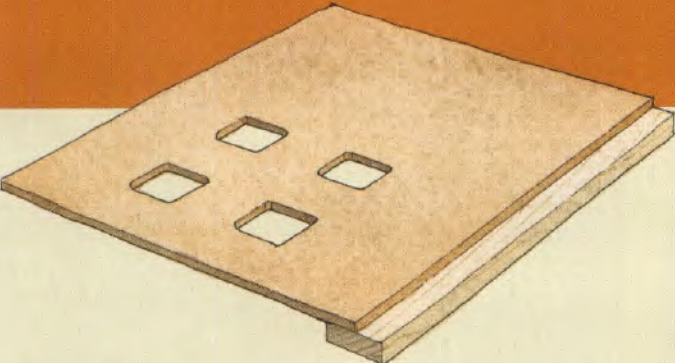
Attach the fence. Leave the fence slightly proud of the base so you can reference off it when cutting the slot for the bushing.



Slot the base. Hold the jig's fence against the router-table fence and carefully lower the template onto the bit to start the slot.



How to use the jig. Attach the jig using a vise (shown) or clamps. Make full-depth plunge cuts at the ends of the slot, with a series of shallower passes to clean out the middle. Blow out the chips before making a final pass. Don't forget to record the bushing size and bit size on the jig for future reference.

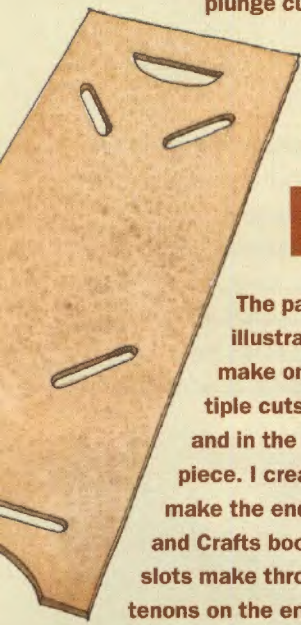


2 Piercing template cuts any shape, anywhere

This template lets you cut a decorative design or a recess for an inlay anywhere on any workpiece. Just like mortising templates, you use a piercing template with a specific spiral bit and bushing so that the cutout you make is always the same size. I find that a $\frac{5}{8}$ -in.-dia. bushing allows good chip ejection around a $\frac{1}{4}$ -in.-dia. bit.

Again like the mortising template, this one has a fence that is proud of the base. However, be sure that the edges of the base are square to the fence. That's because you'll have to rotate the base against the router-table fence to cut the holes, and you want to be sure everything stays square. Again, be sure to consider the bushing/bearing offset when laying out the holes in the template. Make a

plunge cut to pierce the base and begin cutting the template. Position the template on the workpiece with carpet tape, clamps, screws, or a fence.

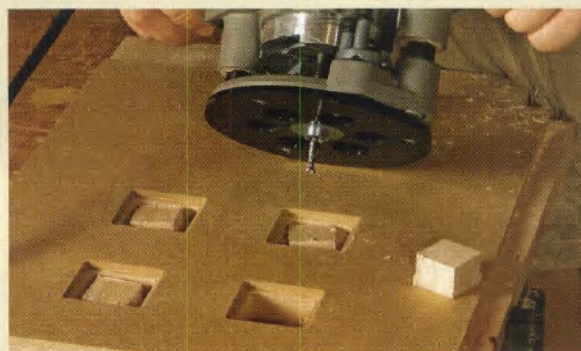


The pattern shown here illustrates how you can make one template for multiple cuts both on the edge and in the middle of a workpiece. I created this pattern to make the end pieces of an Arts and Crafts book rack. The angled slots make through-mortises for tenons on the ends of the shelves; the other shapes are for decorative cutouts. I made all the cuts with a $\frac{1}{2}$ -in.-dia. bushing and a $\frac{1}{4}$ -in. bit. It takes time and a bit of math to lay out and cut the slots. But you end up with a pattern that is well suited to limited production runs.

Just align the edge of the pattern with the edge of the workpiece and clamp the two together.

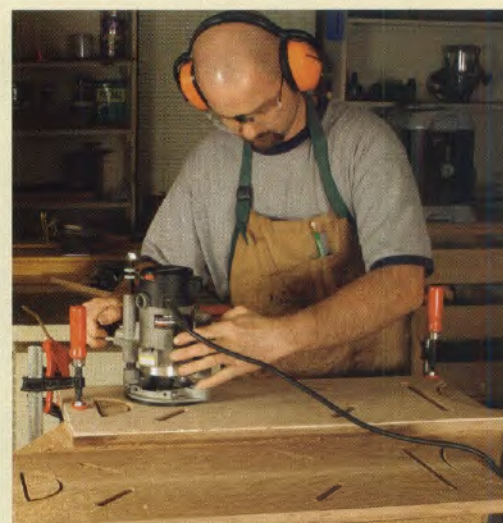


Cut the pattern. Use a $\frac{1}{4}$ -in. straight bit to cut the pattern in the template. In this case, rotate the template against the router-table fence as needed.



Cut the workpiece. To pierce a workpiece completely, make a series of progressively deeper cuts until the waste pieces drop free.

3 Make a full pattern for a furniture part



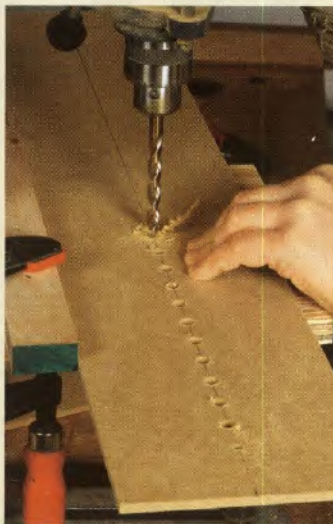
One template, multiple cuts. Paolini designed this template so he could make angled cuts for through-mortises as well as decorative curved cutouts on the ends of a book rack (FWW #197, p. 42).

4

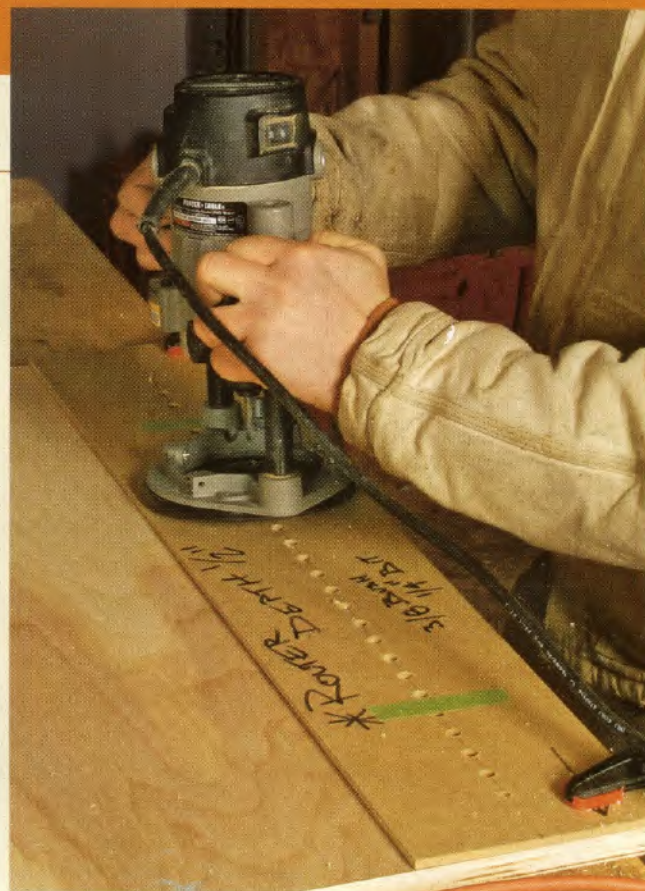
Make your own shelf-pin jig

You can buy a commercial template for drilling shelf-pin holes, but it only takes five minutes to make your own. The router bit has to be the same diameter as the shelf pins, typically $\frac{1}{4}$ in. I use that bit with a $\frac{3}{8}$ -in.-dia. bushing. When setting the router's depth stop, don't forget to factor in the thickness of the template.

I usually cut the template long enough to fit the side of the cabinet I'm drilling, but it will work for taller pieces, too. Just drill the end holes with a $\frac{1}{4}$ -in. bit, then drill the remaining holes for the bushing. To drill a second set of holes, use a $\frac{1}{4}$ -in. drill bit to align the template with the last shelf-pin hole you drilled.



Drill, then drill again. Drill a series of holes sized to match the guide bushing. Clamp the template to the workpiece and make a series of shallow plunge cuts for the shelf-pin holes.



5

Doweling jig solves joinery problems

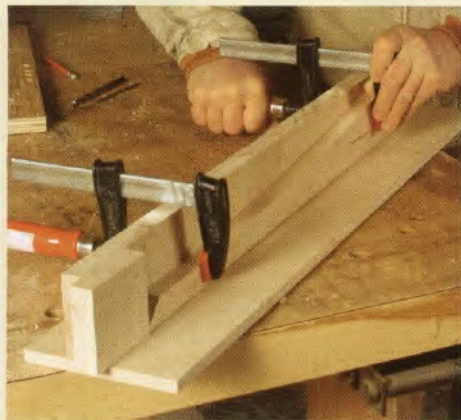
Dowel joints are a great problem-solver, stepping in when traditional joints won't work. You can use this jig to drill dowel holes in mating pieces.

Make the base wide enough to support the router and long enough to hold the longest workpiece. I use the one shown here to attach stretchers to the legs of a table.

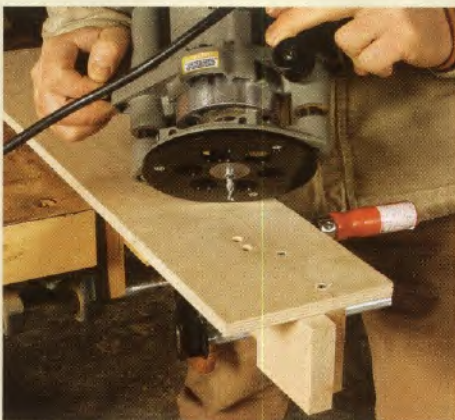
Drill holes to match the outside diameter of the bushing, cen-

tered on the workpiece and spaced as needed. As with the shelf-pin jig, the bit diameter has to match the dowel diameter. In this case, I used a $\frac{1}{4}$ -in.-dia. bit and a $\frac{3}{8}$ -in.-dia. bushing.

It's easiest if both pieces are the same thickness. If they aren't (if you're doweling a thin apron to a thick leg, for example), make the jig for the thicker piece, then use shims to center the thinner workpiece on the template holes. If the ends of the joint don't align (as shown here), you can move the stop block or shim it.



Clamp the workpiece to the jig. The vertical fence and end blocks locate the legs. Paolini moves the stop block for the stretchers.



Flip the jig and make the holes. Use the router like a drill to plunge-cut the dowel holes.



Perfect fit. The jig ensures that the holes in the stretcher and leg line up perfectly. The joint is easy to glue up and very strong.

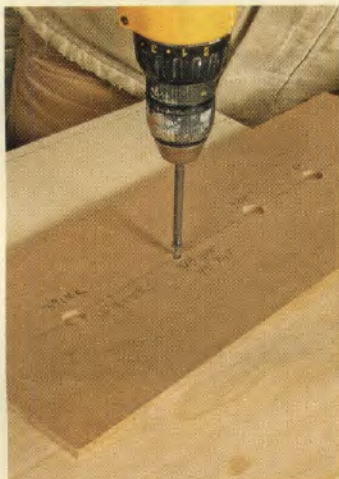
6 Circle-cutting trammel

Cutting a perfect circle for a tabletop is a breeze

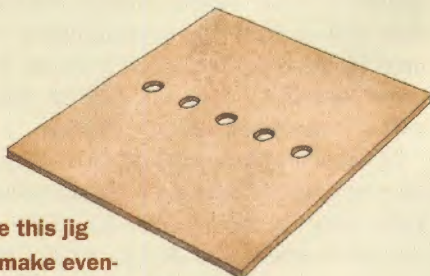
if you use a guide bushing to position the router on a simple trammel—which is nothing more than a rectangle with holes in it.

Drill a pilot hole at one end for a screw that will be the circle's center point. From that center point, measure the desired radius plus half the router-bit diameter, and mark another center point. Drill a hole the same size as the outside diameter of the guide bushing you'll use. You can add more bushing holes to get several sizes of circle from one trammel. The size of the bit and bushing aren't critical. I usually use a $\frac{3}{8}$ -in.-dia. bit and a $\frac{5}{8}$ -in.-dia. bushing.

To make the circle, work on the underside of the workpiece. Anchor the center-point screw, slip the bushing into its hole, and make a series of shallow passes.



World's simplest trammel. A screw acts as the pivot point (in the underside of the stock), and the guide bushing drops into another hole. The bushing allows you to plunge the bit as you make progressively deeper cuts.



Use this jig to make evenly spaced long cuts, such as flutes in architectural elements or dados in the sides of a small cabinet (shown). The jig requires only one setup—you don't need to reset a fence for each new cut. And the jig allows you to make a series of stopped dados or grooves on the workpiece, which is tedious with a router and edge guide, and impossible with a tablesaw.

Unlike the other jigs shown here, this one is meant to slide along a fence rather than be clamped or pinned to the workpiece, so setup takes a couple of extra minutes. Make the jig wide enough that it will slide along the fence without tipping. Drill holes the same size as the outside diameter of the guide bushing, on the centers for the grooves you want to cut. For a $\frac{3}{8}$ -in.-dia. groove, I used a $\frac{5}{8}$ -in. bushing. Clamp a fence to the workpiece parallel to the desired grooves;

7 Parallel-groove jig



One setup, multiple grooves. Think of this template as a large router base that you slide along a fence. The series of holes for a guide bushing produces evenly spaced slots without having to move the fence.

if you're making stopped cuts, add blocks to set the beginning and end of the cuts. Butt the template against the fence, fit the router bushing into the first guide hole, and push the router along the fence to make the cut. Repeat until you have as many grooves as you need.

Give Legs a Kick With Dazzling Inlay

A figured panel with border adds interest, and it's fun to do

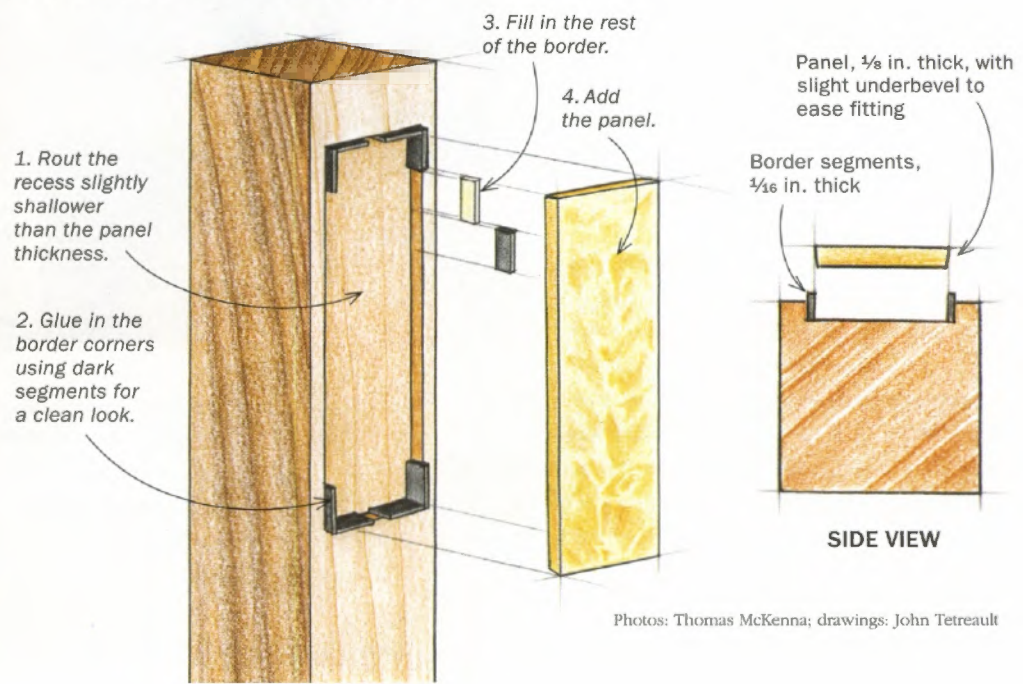
BY GARRETT HACK

Learning to design furniture means building your own visual vocabulary. You can glean these tidbits from nature and your surroundings, but also by studying furniture of the past. I love details in furniture, and I enjoy seeing how past designers used small details to draw a viewer's eye around a piece. The exuberance of inlay on many Federal-style pieces always caught my eye, especially the inlaid panels at the tops of legs or prominent on front aprons.

Inspired by those inlay forms, I've played with panels of many sizes and shapes over the years. These inlaid panels—some with simple borders, others outlined with fun dots and dashes, surrounding highly figured birch crotch harvested from my Vermont woodlot—have become an active part of my woodworking repertoire.

I'll show how you can add spark to your own designs by inlaying a simple rectangular panel in the top of a leg. With the dashed border, this design works well

4 STEPS TO A FLAWLESS INLAY



HOW TO MAKE A PERFECT POCKET

The recess is roughed out freehand with a router and cleaned up with careful chisel work.



Knife in the outline. The knifed lines will help prevent tearout at the top of the recess and will serve as a guide for the chisel work. Use a cutting or marking gauge for the long sides (left), and a knife and square or bevel gauge for the ends (above).

with the fan inlay and matching stringing I illustrated in “New Spin on Fan Inlays” (FWW #204). The design is not that hard to make and can be resized to fit almost any location. What’s more, it looks at home on many different styles of furniture. Let’s take a look at the layout and materials first.

Tips on design: location and material

You always want the orientation of the wood inlays to be face grain—never weak end grain—so they will be especially strong and show the brightest colors. Aligning the grain of the panel with the leg helps ensure that wood movement won’t be a problem.

I try to align the panel with a detail on the apron, say the quirk of a bead, the bottom of a drawer, or even the bottom of the apron itself. Sometimes, though, simply centering it vertically on the apron turns out to be the most visually pleasing option.

I also like to center the panel horizontally on the leg, leaving at least $\frac{1}{8}$ in. of material on both sides of the panel. If the leg tapers in this area, the panel should, too.

Make the panel pop—You don’t need a large panel to make an impression. The color combination is critical, though, because you want to create contrast; otherwise, the inlay will simply blend into the background. I prefer to use wildly figured



Line it in red. Use a colored pencil to mark lines just inside the panel outline.



Rout to the red. Use a $\frac{3}{16}$ -in. straight bit, set to a depth just under the panel’s thickness, and stay within the red lines. Use a spare leg to help support the router base.



Use chisels for the fine work. Chop up to the knifed lines with chisels. Be sure to keep the walls of the recess vertical as you chop; otherwise, you may have trouble fitting the parts.

SLICE AND DICE

Rip the border strips on the tablesaw or bandsaw to just over $\frac{1}{16}$ in. thick. Then trim them to size with hand tools.



Thin slices, please. Use a cutting gauge or a marking gauge to slice $\frac{3}{16}$ -in.-wide strips of the border material. The strips will break away with ease along the kerf.



Clean up with a block plane. Hack planes the stock on a flat scrap board, with a hardwood dowel as a stop. Plane the strips to $\frac{1}{16}$ in. thick, being sure to keep them all the same thickness so the border will have a uniform appearance.



Saw segments to length. Use a saw with a fine tooth pattern. To help hold the narrow, thin pieces steady, use a rabbeted block clamped in a bench vise. Sort the segments by size and keep them in separate containers.



crotch or burl, but even straight-grained wood will work.

Dashed border is dynamic—Whether solid or dashed, the border should contrast with both the panel and the primary wood in order to set the two off. In this example, nothing beats the pop of ebony and holly dashes against the light-colored cherry primary wood.

How you divide the border into segments depends on the level of contrast you're after. In general, increasing the number of contrasting segments increases the dazzle factor of the border. You also could add interest by using different-size segments.

Easy steps to an elegant inlay

There's no "right" way to do an inlaid panel, but there are easier ways to accomplish certain designs. In general, you have two choices: Either you make the panel (complete with border), knife its shape on the work, and then excavate the recess; or you make the recess and fill it with pieces cut and shaped to fit, like a mosaic. I find the latter method to be easier. I rough out the recess with a router and clean up the edges with chisels (see photos, p. 71).

Make the panel—Once the recess is made, cut the panel to rough size. As I mentioned, the panel is just the place for some crotch or highly figured wood, the wilder the better. To get just the right look, cut out a "window" about the size of the panel in a piece of paper. Move it around the panel stock to help frame an area with dynamic figure. Mark the outline and use a bandsaw to cut the panel about $\frac{1}{16}$ in. oversize both ways. Next, plane it flat.

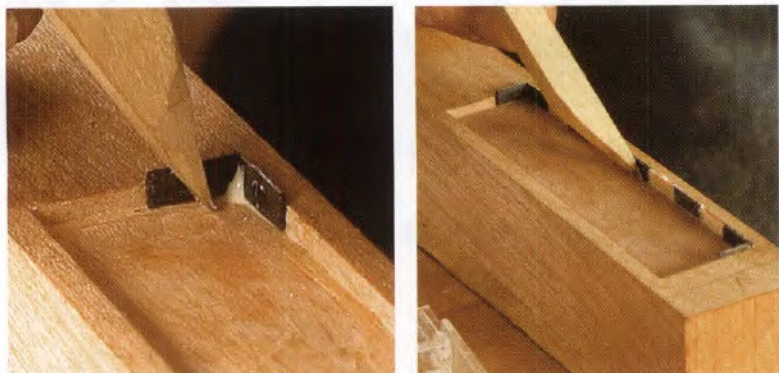
Cut and assemble the border—To make the border, rip strips of ebony and holly just over $\frac{1}{16}$ in. thick. Then use a cutting gauge to slice off $\frac{3}{16}$ -in.-wide lengths of the material. Clean up the strips using a handplane and mark the top edge with a colored pencil. The marks will help you avoid placing the small pieces in the recess with the end grain up. Finally, cut the strips into segments with a handsaw.

When gluing in the tiny segments, install two or three pieces at a time. Start in the corners and work inward (see photos, facing page). As you near the middle, dry-fit the last four or so pieces to check the spacing. If need be, chop the segments to fit. Small variations will hardly be noticed.

Glue in the panel—Once the border is in place, fit the panel with a block plane.

INSTALL IT BIT BY BIT

Hack prefers to assemble the border piece by piece, in mosaic fashion. It's slow going but allows him to trim individual segments to ensure a uniform appearance. Placing the dark ebony in the corners allows him to use simple, easy-to-hide butt joints instead of miters.



Start in the corners and work your way toward the middle. Hack uses the tapered end of a stick to push the bottom of each segment into place (above). Then he uses the square end of the stick to press them against the wall of the recess (right).



Perfect landing. Trim the panel to fit using a block plane (left). Hold the panel flat on the bench and make a slight underbevel on all four edges, which will make the fitting process easier. Aim for a snug fit.



Caul it a day. When clamping in the panel, protect it and the fragile border with a caul that's a bit smaller than the panel. Leave the clamps on for about 30 minutes.

Plane the end grain first—the most fragile and trickiest cuts—then work the sides. As you plane, cut the very slightest underbevel at each edge to ease pressing the panel into place. Check the fit often.

Plane things flush.—Once it fits, glue the panel into the recess and plane it flush after the glue dries. Work at a slight skew for the gentlest cut on the various grain directions of the border, panel, and leg.

If you plan to wipe on a penetrating finish, seal the inlay first with a thin washcoat of dewaxed shellac. This will prevent the color in the various pieces from migrating and discoloring the lighter woods or muting the contrast. □

Garrett Hack is a contributing editor.



The last step. When the glue is completely dry, bring the panel and border flush, skewing the plane to avoid tearout on any of the pieces, which are running in various directions. A scraper might be helpful for the last few passes.

Making Sense of Mahogany

We cover all 5 varieties,
and uncover a few bargains

BY MATT KENNEY

Mahogany is one of the finest furniture woods. Tremendously stable, it has beautiful grain and figure, and ages to a lovely, warm brown. Its diffuse pores give it a consistent density that makes it easy to work and exceptional for carving. It is the wood of choice for classic styles such as Chippendale and Federal. But makers of more modern furniture would be unwise to ignore mahogany's qualities.

Before you head out to the lumberyard to buy mahogany, you should be aware of a few things. First, a great many species are sold as mahogany, and some are no more mahogany than poplar.

Cuban is the original mahogany, and Honduras is closely related to it. Khaya, sapele, and sipo, which all grow in Africa, are kin to Cuban and Honduras mahogany, but distant kin. Each is a strong, though not perfect, substitute. Woods like Philippine mahogany and Santos mahogany aren't mahoganies at all. Although they might be similar in color or grain, they don't offer the same overall quality of workability, beauty, and finishing.

Second, mahogany can be quite expensive. Cuban mahogany costs at least \$20 per board foot, and Honduras mahogany around \$10 per board foot. However, you can buy the three African woods for \$6 to \$7 per board foot. For a period reproduction where authenticity is critical, there is no substitute for Cuban or Honduras mahogany. But if you're making a contemporary chest of drawers and want stellar figure for the drawer fronts, sapele is the way to go. To help you choose, I've put together a profile for each that covers price, looks, workability, and other key factors. Also, if possible, go to the lumberyard to pick your boards. Grain, figure, color, and density can vary widely within the same species. If buying over the phone or Internet, ask to see pictures before you buy.

Matt Kenney is an associate editor.



A WOOD THAT SPANS THE CENTURIES

Mahogany is usually associated with period furniture, like the secretary above by California furniture maker James Betts. However, it's versatile enough to shine in contemporary designs like this curvaceous chair by Don Gray, also of California. Both pieces are made from Honduras mahogany.



Two options for purists

CUBAN MAHOGANY

Latin name:
Swietenia mahagoni
Average price:
at least \$20 bd. ft.
Specific gravity: 0.50
Percent shrinkage,
green to oven-dried:
Tangential 4.1
Radial 2.9
T/R ratio 1.4

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Cuban A rare treasure

Cuban mahogany is the finest of the mahoganies, perhaps even the finest of all furniture woods. Its density, grain, and texture make it perfect for handwork. Working Cuban mahogany is almost like working a cold stick of butter. It's especially good for carving, because it works so easily and has fine pores that allow it to hold very fine and crisp detail. It also takes an excellent finish.

This is the wood prized by furniture makers during the 18th and early 19th centuries. If you're making a reproduction of a Chippendale, Sheraton, Hepplewhite, or Federal piece and you want it to be as much like the original as possible, then clean out your wallet and spring for Cuban mahogany. It would also be a great choice for any piece that is heavily carved. Otherwise, I'd leave it alone. It's too pricey for a coffee table, and there are better choices for contemporary furniture.

Cuban is expensive because the supply is so limited. It has been commercially extinct since the early 20th century and is no longer exported from any of the Caribbean islands where it grows. Salvaged trees are milled in Florida (see top right), and there are several stands growing on the island of Palau (www.blumoonexoticwood.com).

Fine grain, fine details.
When carved or turned, Cuban mahogany takes delicate details, which is why Philip Lowe used it for this reproduction of a Samuel McIntire chair.

Honduras Popular substitute, but still pricey

When Cuban mahogany was no longer commercially viable, Honduras mahogany took its place. So unless you're more than a century old, this is probably the wood you know as mahogany. Fortunately, it isn't far behind Cuban mahogany as a furniture wood. It's just as stable, works easily, and carves well. The most notable difference is that its pores are more open, so getting a glossy finish requires filling the grain.

Philip Lowe, a noted period furniture maker who runs The Furniture Institute of Massachusetts, recommends Honduras mahogany to his students for period reproductions. It's also used for Greene and Greene furniture, where the understated grain doesn't clash with the piece's lines. It can be used to great effect in contemporary pieces as well. Unfortunately, Honduras mahogany is becoming ever scarcer. Brazil, which accounted for 75% or more of the world supply, banned its export in 2001. And with limited availability comes higher prices.

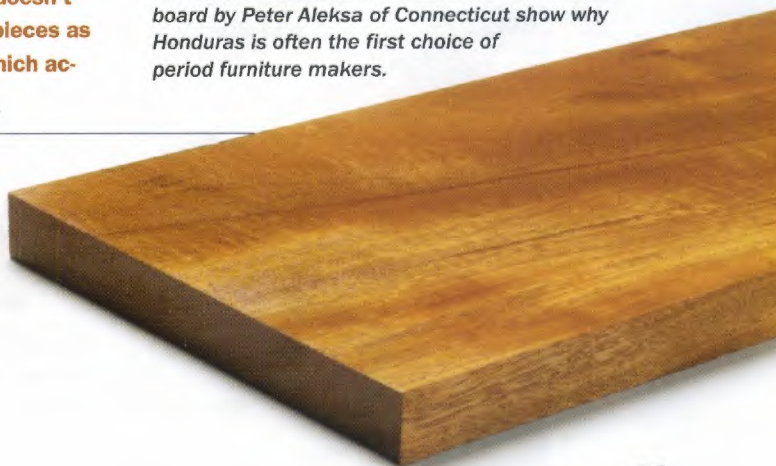
Honduras mahogany might go by another name at the lumberyard, because little, if any, actually comes from Honduras now. Its natural range stretches from southern Mexico to Peru, so it might be called Central or South American mahogany, or named for the country where it was logged.

HONDURAS MAHOGANY

Latin name:
Swietenia macrophylla
Average price:
at least \$10 bd. ft.
Specific gravity: 0.45
Percent shrinkage,
green to oven-dried:
Tangential 4.1
Radial 3.0
T/R ratio 1.4



Period perfect. The crotch veneers on this sideboard by Peter Aleksa of Connecticut show why Honduras is often the first choice of period furniture makers.



African alternatives

Sipo

Best value, if you can find it

The demand for sipo, like the demand for khaya and sapele, has risen since the Brazilian ban on mahogany exports. But this wood hasn't caught on as well, and isn't as widely available as a result. It is, however, worth the effort to find it. Don Thompson, president of Thompson Mahogany (an importer of mahogany since 1843), ranks sipo above khaya and sapele as a substitute for Honduras mahogany. And just about everyone I spoke to agreed that sipo is the best of the three African woods.

Sipo is easier to work with hand tools and machines than sapele. The grain pattern is subdued, if not quite as handsome as what you find on Cuban and Honduras mahogany. It would do very well where figure

Good looks for less. To save money but not give up on beauty, FWW's Matt Kenney chose sipo for this Federal-style table.

might be a distraction, like the side of a secretary or sideboard. Still, it's possible to come across sipo with the same dramatic ribbon striping as sapele. If you prefer one or the other, you should pick out boards in person or at least see pictures.

Sipo is a better carving wood than khaya, which means that it's a good choice for a period reproduction with carvings, like a Goddard-and-Townsend-style lowboy with shell carvings. Sipo is also consistently close in color to Honduras mahogany, another advantage for period furniture makers.

Sipo costs around \$6 per board foot, and is still available in widths over 20 in. It is sometimes called utile.

SIPO (UTILE)

Latin name:
Entandrophragma utile
Average price: \$6 bd. ft.
Specific gravity: 0.53
Percent shrinkage,
green to oven-dried:
Tangential 6.4
Radial 4.6
T/R ratio 1.4



KHAYA (AFRICAN MAHOGANY)

Latin name:
Khaya ivorensis
Average price: \$6 bd. ft.
Specific gravity: 0.44
Percent shrinkage,
green to oven-dried:
Tangential 5.6
Radial 3.2
T/R ratio 1.8

Khaya

Price is right, but grain is tough

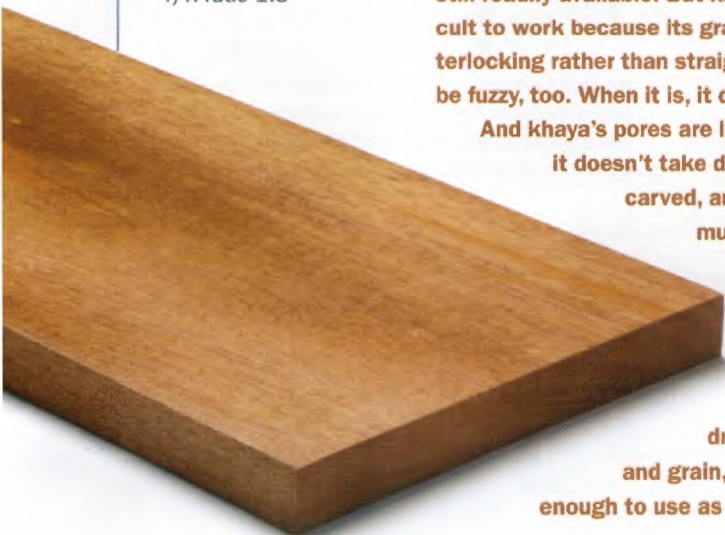
Long recognized as a good alternative to Cuban and Honduras mahogany, khaya became much more in demand after the Brazilian government banned the export of mahogany in 2001. Khaya is similar to Cuban and Honduras in color and figure, and costs much less. Stock 24 in. wide or wider is still readily available. But khaya is more difficult to work because its grain tends to be interlocking rather than straight. The grain can be fuzzy, too. When it is, it doesn't plane well.

And khaya's pores are larger. That means it doesn't take detail as well when carved, and the pores must be filled to get a good finish.

But that's in comparison with Cuban and Honduras mahogany. It's definitely better for carving and finishing than a ring-porous wood like oak or ash.

Philip Lowe recommends khaya to his students for period work, but only if Honduras isn't an option. Jamie Cumming, a furniture maker in Boston, was drawn to khaya because of its closeness to Honduras mahogany in color, texture, and grain, and because of its price. It doesn't hurt that he can get slabs thick and wide enough to use as tops for large tables. Khaya is sometimes called African mahogany.

Contemporary khaya. With quiet grain and a warm reddish-brown color, khaya is a good choice for modern designs, like this settee by Colorado furniture maker Dan Rieple.





A nice twist. By alternating squares of sapele veneer on this chest of drawers, New York's Don Green transformed what would have been an overbearing pattern of horizontal stripes into an elegant geometry.



Sapele Known for its figure

Long used as a veneer and in architectural millwork, sapele exploded as a furniture wood after Brazil banned the export of mahogany. Khaya was the first choice to meet the demand, but there just wasn't enough of it.

Sapele is deep reddish-brown in color and usually has exceptional figure, ribbon stripes being common. Boards 30 in. wide or wider are available, and 45-in.-wide boards aren't unheard of. There is a cost to pay, however, for sapele's dramatic figure. It's caused by reversing and interlocking grain, so sapele requires much more sanding or scraping to get a surface ready for finishing.

When highly figured, sapele is quite distinct and won't be mistaken for Cuban or Honduras mahogany. So it's usually not a good choice for 18th-century-style furniture. But it would be great for elements of Federal-style pieces, or for drawer fronts and door panels on contemporary furniture. Jamie Cumming likes sapele because he can get wide slabs for tabletops (below right), and he has used dramatically figured sapele veneers to complement the clean, straight lines of his pieces.

Big boards available. A wide slab of sapele was just what Jamie Cumming of Massachusetts needed for this table. Not only was it wide enough, but it's also a lovely rich brown color, and the grain is slightly figured.



SAPELE

Latin name:
Entandrophragma cylindricum
Average price: \$7 bd. ft.
Specific gravity: 0.55
Percent shrinkage, green to oven-dried:
Tangential 7.4
Radial 4.6
T/R ratio 1.6

It ain't easy being green

I feel a bit guilty when I buy imported lumber. If possible, I'd like to buy lumber certified by the Forest Stewardship Council, which sets guidelines for the environmentally responsible management of forests. Any species of lumber, including the mahoganies in this article, can be FSC certified.

Lumber is FSC certified only if everyone involved in the chain of custody, from the landowner to the retailer, is individually certified. But finding an FSC-certified retailer isn't easy.

I called more than 20 lumber dealers around

the country, and only two were FSC certified. One told me that there wasn't enough demand to justify maintaining an FSC-certified retail store, which requires that certified and non-certified stock be kept separate.

So, buying certified lumber at the retail level isn't easy, but things could be changing. Rick Hearne of Hearne Hardwood in Pennsylvania told me that his company was recently certified, and that he will maintain separate bins for his FSC-certified lumber.

readers gallery

JOHN IGLEHART

London, England

Iglehart built this dressing table (26 in. deep by 48 in. wide by 30 in. tall) for a client living in a Georgian-style former rectory. The finished piece had to match the existing furniture and the style of the building, so he borrowed the details from the architecture (a curved window, reeded fireplace moldings, and bronze fittings). The Brazilian mahogany is finished with a French polish, using garnet shellac. The top surface is vellum, and the pulls are bronze or African blackwood and cow bone.

PHOTOS: SHUTTERS



KAREL AELTERMAN

Quebec, Canada

This walnut wall cabinet (8 in. deep by 14 in. wide by 32 in. tall) has a concave front with overlapping doors. The doors are tapered and coopered, and Aelterman carried the exterior shape through to the curved drawer fronts and interior dividers. The drawer fronts and back panel are spalted maple, and the finish is shellac and beeswax. PHOTO: DUNCAN MCKIE



VICTOR PERI

Seattle, Wash.

The panels of this solid bubinga folding screen are curved horizontally so it is self-standing when fully open. There also is a slight curve from top to bottom. Peri built the hinges into the panels by cutting overlapping sections and doweling them with a brass rod, separating the sections with a hardwood washer. The legs are wenge, and the cherry blossom inlay is mother of pearl and wenge. Finished with lacquer, the screen is 10 in. deep by 72 in. wide by 65 in. tall.

PHOTO: STEVEN VAN ROEKEL



DOUGLAS LACHER

Blowing Rock, N.C.

It took nearly 80 hours for Lacher to complete the shade of this table lamp (17½ in. dia. by 22 in. tall) and about 30 hours to build the walnut base. The walnut frame members of the shade were soaked in hot water, then molded, laminated, and assembled. He then slid the veneer (ambrosia maple) diffuser panels into the framework. The base and external surfaces have a walnut oil finish, and the interior of the shade is finished with heat-resistant polyurethane. PHOTO: TODD BUSH PHOTOGRAPHY



SCOTT McGLASSON

St. Paul, Minn.

McGlasson designed this media cabinet (21 in. deep by 78 in. wide by 22 in. tall) to blend the clean lines of modern furniture with rustic details. He used locally grown and processed wood and cast the solid brass feet with the help of a sculptor. The ash case is finished with a white-pigmented lacquer, and the birch door and drawer fronts are finished with clear lacquer. PHOTO: MINNESOTA WOODWORKERS GUILD



ALFRED C. ETZEL JR.

Emmaus, Pa.

Etzel modeled this cherry tall clock after one he saw when visiting the Roosevelt estate in Hyde Park, N.Y. After a long search, he found plans in the library of the Columbia Clock Museum in Columbia, Pa. But they were metric, and he had to convert all the dimensions to inches. Standing 93 in. tall, the clock is 13 in. deep by 19 in. wide. Etzel finished the piece with dark brown mahogany gel stain and clear satin gel varnish.



MITCH ROBERSON

Nashville, Tenn.

Roberson immediately recognized the beauty and potential of this wormy, cracked piece of cherry, found in his grandfather's barn, and decided to leave it in as natural a state as possible for this entry shelf (9 in. deep by 30 in. wide by 5½ in. tall). The butterfly keys and drawer fronts are walnut, and the finish is oil-based polyurethane.

PHOTO: J. MICHAEL KROUSKOP



MICHAEL J. HOLTON

Calgary, Alta., Canada

Although Mission-style furniture is typically made from white oak, Holton convinced his client to use cherry on this desk to coordinate with her cherry kitchen. He also added curves under the drawers in another departure from the style. The finish is wiping varnish, and the desk is 24 in. deep by 60 in. wide by 30 in. tall. PHOTO: JOHN DEAN





JIM PROBST

Hamlin, W.Va.

This walnut and butternut dining set is part of a series Probst calls his Meander collection, named for the S-curve that winds its way through each piece. Here it is seen in the table uprights and back legs of the chairs. The table is 42 in. deep by 84 in. wide by 30 in. tall; the chairs are 19 in. deep by 19 in. wide by 39 in. tall. The finish is tung oil and polyurethane.

JOHN STEELE DAVIS

Water Valley, Miss.

Davis started out building traditional furniture and Windsor chairs, but then began making his twist on the traditional using the gnarled wood of the Mississippi forests, where trees and vines twist and spiral together as they grow and compete for light and nutrients. The resulting wood is the basis for all of Davis's work. The Windsor-style chair (18 in. deep by 18 in. wide by 40 in. tall) has a poplar seat with sweetgum legs, stretchers, head rest, and front spindles. The rockers are elm and the back spindles are privet. The finish is an oil stain followed with linseed oil. PHOTO: DAVID LYCO



ANDREW DRAKE

Seattle, Wash.

Drake built this media cabinet (23 in. deep by 62 in. wide by 29 in. tall) to fit his classic Craftsman house. He calls it his "first real woodworking project." The Honduran mahogany cabinet with ebony accents is darkened with potassium dichromate and finished with wipe-on polyurethane.



How to straighten warped plywood

Q: I thought that the whole point of plywood was that it couldn't warp, but I have some that has done just that. Is this a manufacturing defect? If not, is there anything I can do to correct the problem or work around it?

—MARC ALFANT, Melbourne, Fla.

A: THE BELIEF THAT PLYWOOD doesn't warp is common, but mistaken. Even if the sheet is flat when you buy it, it often will cup or twist in your shop. But unless it is intended for a spot where it won't be fastened down, like an adjustable shelf, you can still use it.

Here are a few tips: If the warped piece will be the top of a cabinet, put the crown on top. It's better than having a top that sags. Face the crown in on the sides of a cabinet, as the shelves will push it out.

A sturdy back and a face frame also will help take out the warp. A biscuit joiner will place biscuits evenly along the edge of a curved panel, pulling it into line with a straight row of biscuit slots in the back of the frame. If you absolutely need flat sheet goods for your project, use something with a medium-density fiberboard core.

—Mark Edmundson builds cabinets and furniture in Sandpoint, Idaho.

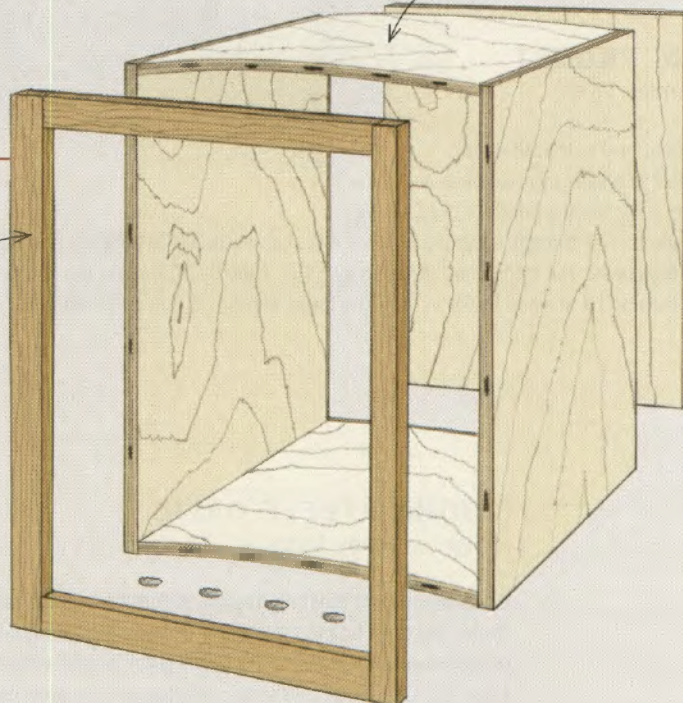
BUILD SMART TO OVERCOME WARPED PANELS

Plywood isn't always flat, but if you point the crown in the right direction and use a back rabbeted into the carcass, you can straighten all but the most severely warped parts.

A slight hump is better than a sag.

CROWN UP ON HORIZONTAL PARTS

A face frame will help straighten the panels. Arrange biscuits in a straight line on the frame and panels to pull the panels flat.



CROWN IN ON SIDES

Shelves and a back rabbeted into the carcass will help push out the crown and keep the sides flat.



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.

Jointer tables should be both parallel and flat

Q: I want to see if the tables of my jointer are within the manufacturer's specifications for flatness, but I'm confused about how to do it.

—THOMPSON
CALLAHAN,
Las Vegas, Nev.

A: FLATNESS ISN'T THE ONLY important thing. To work correctly, the tables must also be parallel to one another.

To check for flatness, use a straightedge and a set of feeler gauges. Place the straightedge lengthwise along each edge and down the middle of both tables. If there is a gap of more than 0.005 in. over a large area, you'll need to return the table to the manufacturer, or have it re-ground by a machine shop.

Now set the straightedge on the outfeed table with at least 2 ft. extending over the infeed table. Raise the infeed table until it just touches the straightedge. If the tables are parallel, there won't be any gaps. If not, you'll have to shim the ways. See *FWW* #142, p. 41, for more on that.

—Roland Johnson is a contributing editor.



Check for flatness first. Use a straightedge and feeler gauge to test each table at each edge and in the middle.



Tables must be parallel to straighten boards. Hold the straightedge on the outfeed table. Raise the infeed table until it just touches the straightedge and check for gaps along the length of the table.

Use dyes and sealers that have different solvents

Q: I stained a table with an alcohol-based dye, and then sealed it with shellac, which dissolved the dye and left it blotchy. Should I have used an oil-based sealer?

—GEORGE CROWLEY,
Enfield, Conn.

A: AN OIL-BASED SEALER is a better choice over an alcohol-based dye. As you've experienced, when a dye and sealer have the same solvent, brushing or wiping on the sealer will pull up the dye, causing it to streak or blotch.

If you want to use a shellac sealer, which is alcohol based, switch to a water-based dye.

—Mark Schofield is the managing editor.

Oil over alcohol. To prevent an alcohol-based dye from blotching or streaking, use an oil-based sealer.



Alcohol after water. An alcohol-based sealer, like dewaxed shellac, won't cause a water-based dye to run or blotch.



Quadrant hinges and a lock elevate any box

BY ADRIAN FERRAZZUTTI



Perhaps the fussiest aspect of making my contrasting veneer box (see pp. 56-63) is installing the quadrant hinges and, to a lesser extent, the lock. While you could eliminate the lock and substitute a nice pair of butt hinges with a positive stop, it's worth going the extra mile to make this box the best it can be. With their stop built in, quadrant hinges make any box look and function much better. A mortised-in lock and escutcheon create a true heirloom.

Quadrant hinges reward precise installation

The trickiest part is getting the hinges dialed into position so that the lid closes dead flush on all four sides. With a veneered box, there isn't much room to flush the lid to the body (or vice versa) without running the risk of exposing the core as the veneer gets too thin. For this reason, while you can install quadrant hinges by hand, I recommend Brusso's router template (model No. TJ-638), designed for their smaller quadrant hinges (model No. HD-638). The jig and hinges are available at www.brusso.com, where you'll also find comprehensive instructions. You'll also need a 1/2-in.-outside-dia. bushing guide and a 5/16-in.-dia. straight bit.

Use a laminate trimmer or a router to cut the hinge mortises, setting the bit depth to match the thickness of the hinge leaf. But before installing the hinges, check that the leaves align when closed; if they don't, grind or file them until they do. Otherwise, you'll have to fuss with modifying each mortise to



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Router template eases hinge installation



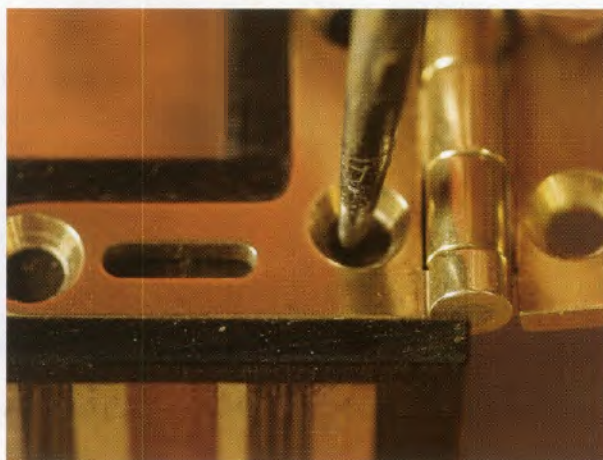
get the lid to fit flush. Once all four mortises are made, insert the hinges and check their fit, marking which leaf goes in what mortise. With an awl, mark the holes for the center screws only.

Drill for these screws and install the hinges using steel screws of the same size and thread as the brass ones supplied with the hinges. In this way you reduce the chance of snapping a brass screw. Close the lid, checking how it lines up with the body. If the stars are aligned, it will be spot on. If not, there are two things you can do: Locate the screws in the remaining holes off center in whatever direction you need to shift the lid; or, if necessary, grind away some of the leaves so they can be pulled forward in the mortise. Then remove the center screw and try it with the other screws in conjunction with grinding.

Once the lid is fitting well, outline the mortises for the stays with a pencil. Remove the hinges and excavate the mortises with a drill and chisel so that



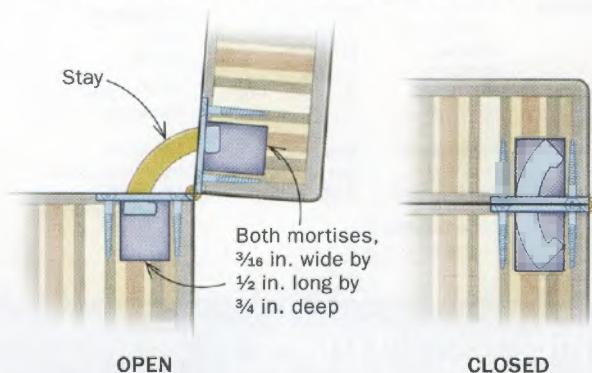
No chisel work. Although you can cut the hinge mortises by hand, it is much quicker and more accurate to use a dedicated router template in conjunction with a straight bit and a bushing guide.



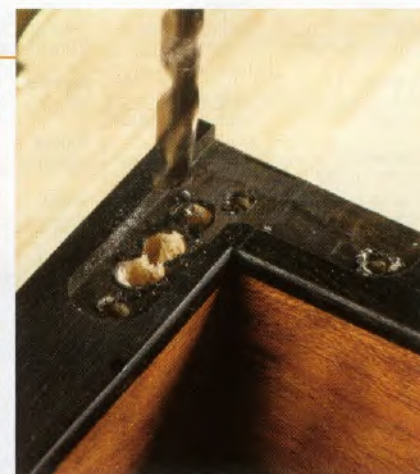
Directional drilling. To ensure that the hinge is pulled into the mortise, use an awl to locate the screw hole slightly off center when attaching the first screw. Use a single steel screw at this point to avoid damaging the brass ones.

MAKE ROOM FOR THE STAY

Quadrant hinges have a stay that controls how far the lid of the box can open. When the lid is closed, the stays slide into mortises cut in the box sides and the lid.



Mark and mortise. With the hinge in place, mark the location of the stay mortise. Remove most of the waste with a drill, then square up the sides with a chisel.



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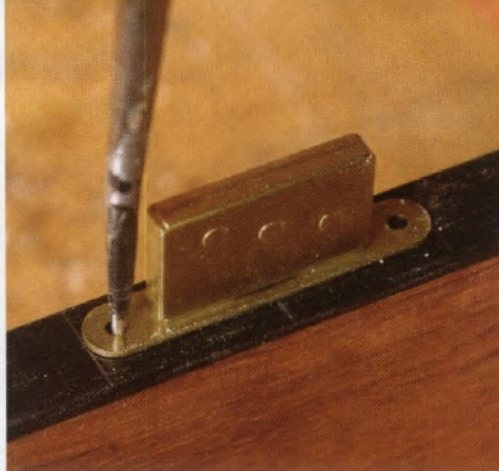
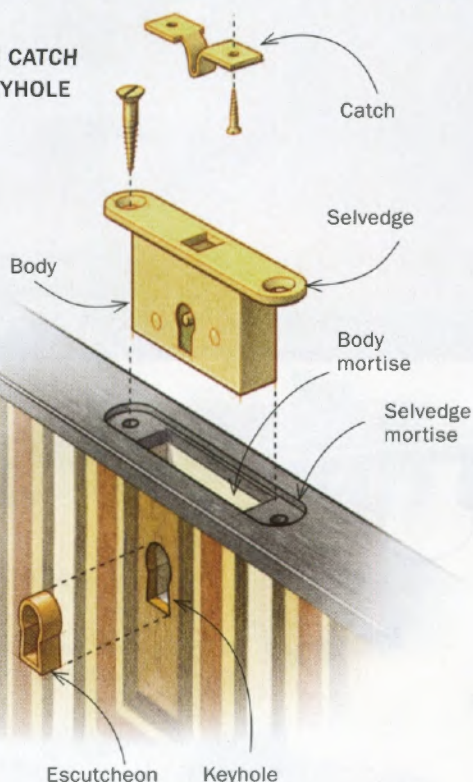
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Install the lock in 3 steps

FROM CATCH
TO KEYHOLE



STEP 1

INSET THE LOCK

Mark the screw holes. With the lock upside down, center it on the front of the box, and then mark and drill the screw holes.



Define the shallow mortise. Use a larger brad-point or Forstner bit to drill partway into the screw holes. This will create the two ends of the mortise for the lock's selvedge. Now you can scribe the edges of this shallow mortise and chop out the rest with a chisel.



Make the deep mortise. Drill and chop out a deeper mortise for the body of the lock, and then test the fit.

half the stay goes into the body and half into the lid. For the stays to drop in properly, the mortises have to extend almost to the screw holes, well beyond the traced outline. Install the hinges again, checking that the lid closes and the stays aren't hitting the mortises. If all is good, move on to installing the lock.

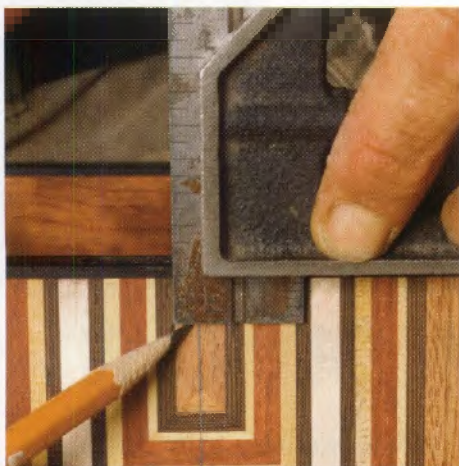
A lock and an escutcheon complete the box

I had trouble finding a delicate lock suitable for a small box, but I eventually found one made by Viola sold at Lee Valley (www.leevalley.com; item No. 00F10.07). The lock has a tiny $\frac{5}{16}$ -in. by $1\frac{13}{16}$ -in. selvedge (the plate attached to the locking mechanism) that matches the width of the hinges.

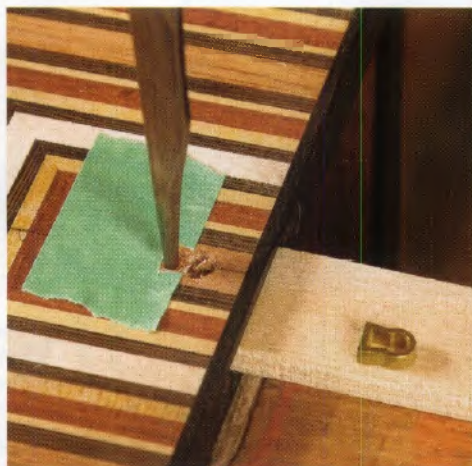
With the lock upside down, center it on the front of the box and mark the outline of the selvedge. There are various ways to mortise for the selvedge: I use a $\frac{5}{16}$ -in.-dia. four-fluted end mill bit in a horizontal mortiser. You could also use a router fitted with an edge guide, clamping a block of wood to the inside of the box flush with the top for support. Or use an awl to mark the two screw locations in the selvedge, and then use a $\frac{5}{16}$ -in.-dia. brad point or Forstner bit to drill the two ends of the mortise. You can then chop out the center using a chisel.

With the lock upside down, keep checking the fit until the selvedge drops in. The mortise should be slightly shallower than the thickness of the selvedge so that after the lock is

STEP 2 INSTALL THE ESCUTCHEON



Locate the key pin. Measure the distance from the top of the lock to the key pin and mark the location.



Cut the keyhole. After drilling a hole to locate the key pin, remove the lock, insert a scrap of wood to fill the lock mortise, and chisel a hole for the key and the escutcheon.



Install the escutcheon. Use a mixture of cyanoacrylate glue and sawdust to attach the escutcheon. File and sand it flush with the wood.

installed it can be sanded flush with the wood. Then create the 1/4-in.-wide mortise for the body of the lock using the same drilling and chopping method you used earlier. The mortise must come close to the screw holes so that the lock body drops in.

Now it's time to attach the escutcheon. You can use the oval plate that comes with the lock and is attached with a couple of brass pins, or you can use the type that is inserted into the side of the box, outlining the keyhole. I haven't found a source for these to fit very small locks, so I make mine out of solid brass. In either case, locate what you think is the center of the keyhole and drill a small hole through the front of the box. Insert the lock again and check if the pin in the lock is in line

with the hole in the box. If not, take a larger drill bit and force it to drill in the direction required to get the hole in line.

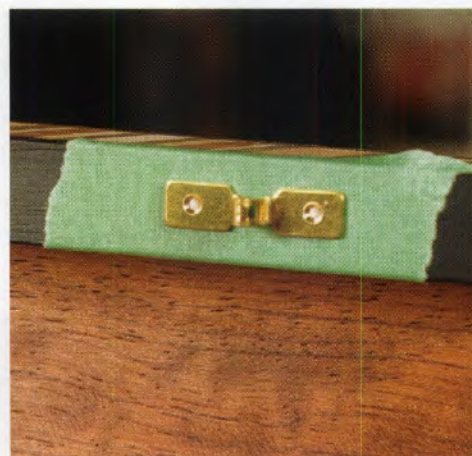
Continue to enlarge the hole until the metal key just fits and then attach the plate escutcheon, or continue to chisel away carefully for the inserted type of escutcheon. Glue the escutcheon in place using a mixture of cyanoacrylate ("Super") glue and sanding dust from the surrounding wood to fill any gaps. File and sand the escutcheon flush and move on to installing the catch.

It's a challenge to locate the catch or strike plate for a lock so that it lines up precisely with the lock, but I've found a foolproof method using tape (see photos below). Fit the catch, secure it with pins or screws, and test the lock. □

STEP 3 NEAT TRICK LOCATES THE CATCH



Use double-faced tape. With the catch locked into the body of the lock, apply two small pieces of double-faced tape to the back of the catch.



Stuck in the right place. Place some green tape on the lid and close it, pushing down onto the lock. Reopen it with the double-faced tape holding the catch in perfect position.



Locate the mortise. Cut around the catch with a sharp knife, severing the green tape. Remove the catch, peel away the cut tape, and mortise these areas.

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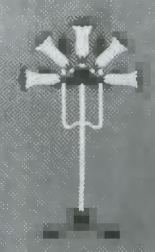
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Anyone for tea?

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BY SEAN CLARKE



You may have heard of food-safe finishes, but how many finishes are safe as food? My guess is not many. There is one such product lurking in the kitchen. The humble teabag not only revives me after a long day in the shop, but it also serves as an inexpensive, easily available, and environmentally friendly dye.

Tea imparts an attractive warm, golden color that can be built up with additional coats with no loss of clarity. I've found that white oak, maple (both regular and tiger), and pine all benefit from this dye. It is particularly useful on pine, a wood prone to blotching, since the weak consistency and finer color particles of the tea stain tend not to collect in the blotch-prone areas.

Brew it, brush it, seal it in

The color and density produced by different brands of tea varies significantly, so do a little experimenting on sample boards first. I have tried different brands and blends (as dyes and drinks), including Lipton, Royal World Indian green tea, Tetley's British

Blend, and PG Tips. While green tea produces too weak a dye, my favorite brew is to combine 12 oz. of hot water and six PG Tips tea bags in a plastic container and allow it to sit overnight.

Sand all the surfaces at P150-grit followed with P220-grit paper. To raise the grain before the application of the water-based dye, wet the surface with distilled water, allow two to four hours of drying time, and then resand with P220-grit paper to remove the whiskers.

Apply the tea using an artificial-bristle brush (the kind recommended for latex paint). Allow the stain to soak in for a few minutes, wipe off any excess with a cotton cloth, and then allow one to two hours of drying time. If a deeper color is required, repeat the application and when dry, lightly sand with P320-grit paper to dull any raised grain.

I like to seal in the dye before applying a topcoat, especially

Many woods respond

The lighter the wood, the greater the change imparted by tea. Among the woods that respond best are pine, regular maple, tiger maple, and white oak.



Instant antique. The cool, pale look of fresh-milled pine is transformed into warm, antique country pine using a dye stain made from regular tea bags.

HOW TO USE IT

Strong brew.

The strength of the dye is up to you, but Clarke uses a recipe of 12 oz. hot water to six tea bags. Keep the paper tags out of the liquid.

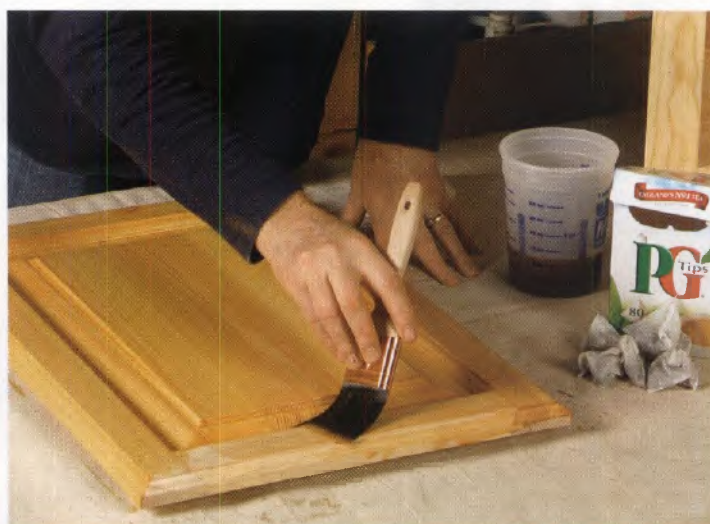


Raise the grain. Wipe the whole surface with a wet cloth and let the wood dry for two to four hours. After the wood has dried, the surface will feel rough. Lightly sand it with P220-grit paper and remove the dust. The surface can now receive the water-based dye without swelling up.

if it is water based, as this can reactivate the dye. Brush on two coats of a dewaxed blond shellac such as SealCoat. Allow the sealer to dry for at least four hours and then sand with P220-grit paper.

If you want the piece to have a subtly darker color, you can tint the clear coat. You can add dye concentrates such as TransTints to many finishes, but if you are using a water-based finish you can continue using tea. Add one part of the tea stain to five parts of finish and stir, but be sure to read the directions on the can, because some water-based finishes have limits as to how much they can be diluted. If you are happy with the color of the piece, simply apply two or three clear coats of your choice, such as more shellac, lacquer, or polyurethane in either solvent or water-based form. Then, if you want a low-luster look, rub the surface with 0000 steel wool and apply a thin coat of paste wax before buffing the surface with a soft cotton cloth.

After all that, you'll have earned that cup of tea.



Apply the dye. Use an artificial-bristle brush to apply the tea stain liberally. After a few minutes, wipe away any surface moisture with a clean cloth. Repeat if you want a deeper color.

SEAL BEFORE TOPCOATING



Lock it in. Before topcoating, seal the surface with a couple of coats of dewaxed shellac.

FOR MORE COLOR



Milky tea? If you want to add more color to the piece, you can add some of your tea mix to a clear water-based finish. Then brush on two or three coats to protect and further darken the workpiece.





Basic, at first glance

BY ANISSA KAPSALES

Hank Holzer has managed to pack an outstanding number of technical challenges into what appears to be a simple chair (seen on the back cover). Working from a single board, Holzer cuts it into smaller blanks, tapering and cooping them into four workpieces and taking care to keep the grain continuous. Those four pieces are then mitered, glued, and splined. The tricky part is maneuvering through these processes with irregularly shaped stock.



1

Mitering on a curve. Once the cooped boards are refined with a power planer and belt sander, Holzer cuts the miter using a crosscut sled. A spacer keeps the angled board square to the blade. When cutting the other end curved side up, blue foam wedged underneath keeps the board from rocking.



2

Glue one L at a time. Two L shapes make up the full body of the chair, and Holzer attacks them one at a time. Because the spring clamps leave a slight indentation, he places them where a spline will cover the mark.



3

Spline the joint. A shopmade jig holds the L in place (left). Holzer uses a mirror and flashlight to improve his line of sight. For each slot, the blade height is adjusted to match the curved joint line. He uses West Systems epoxy, thickened with sawdust, to lock triangular splines in place (right). To maximize the glue surface, the splines go nearly through to the inside of the mitered joint.



4

Join the two Ls together. To cut the spline slots on the final miter joint, Holzer secures it to the same jig. But because the yellow glue and miter now hold the full weight of the chair, he adds a vertical strap and a spacer to immobilize the joint.



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Working Marriage

Soon after meeting in a Seattle drafting class in the early 1980s, Hank Holzer and Judith Ames joined the same co-operative woodworking shop. A few months later, they were sharing a house in town. They have worked side by side since, always sharing ideas on technique and design, but running separate businesses and developing distinct styles. Holzer's zigzagging Akira Chair (right), made of



jatoba with wenge splines in its mitered joints, marries deceptive simplicity with technical savvy. Named after an origami master, the chair is made from a single board cut into short, narrow blanks, coopered into curved panels, and then “folded” into the chair form. Ames’s upholstered Cloud Chair is more traditional in construction but no less personal in spirit. It sprang from a request to build a Morris chair, all straight lines and flat planes. That didn’t suit her, and she came back with curved lines and pointed ends. Holzer and Ames say that making two marriages work—both personal and business—has been challenging, and suggest that they should be credited for twice their 25 years together. As their furniture making has matured, so has their son, Ethan, who enters college this fall.

—Jonathan Binzen

Photos: Hank Holzer

How They Did It Turn to p. 98 to see how Holzer builds his Akira Chair from a single board.

Pro Portfolio Go to FineWoodworking.com/extras to watch an audio slide show of work by Ames and Holzer.