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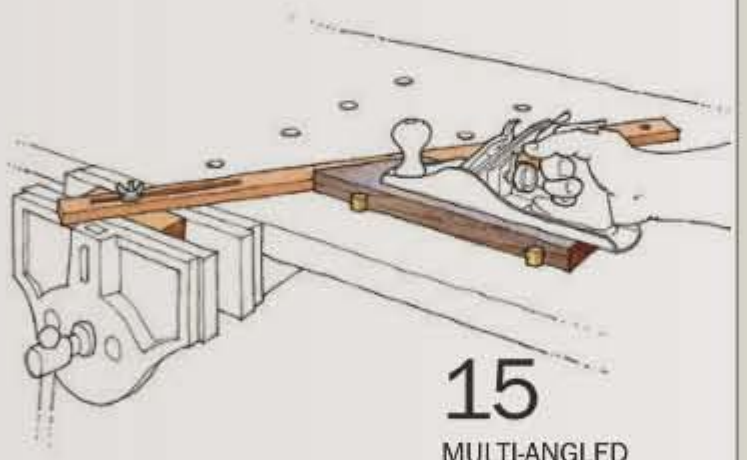

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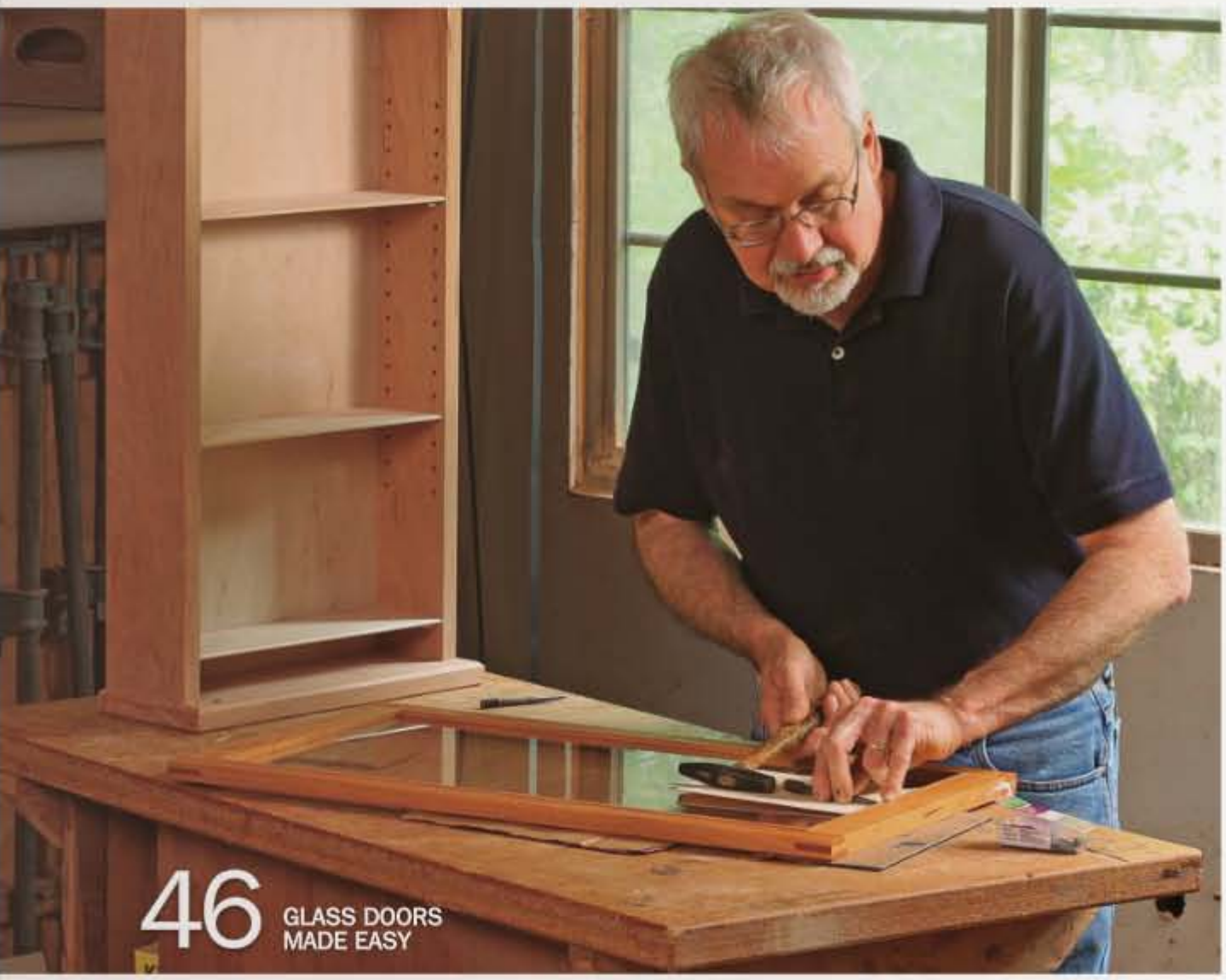

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on the web

THIS MONTH ON FineWoodworking.com/extras

Visit our website to access free web tie-ins, available February 9. While you're there, don't miss our collection of free content, including tool reviews, an extensive project gallery, and must-read blogs.

Inlay any tabletop

Learn how to use inlay to take your tabletops to the next level. Chris Gochnour shows how he used stringing to embellish his curved table (p. 52).

VIDEO: Double Your Milling Power

Jointer/planer combos (p. 62) get you two big industrial-strength milling machines in one footprint, but they require a changeover to get from one mode to the other. Learn what to look for when shopping for a combination machine in our detailed video tour.

VIDEO: Two Tips for Better Boxes

Senior editor Matt Kenney (p. 34) shares the secrets of his favorite router bit, and offers a five-minute finish that's smooth as glass.

Five Decades of Genius

See how Jere Osgood (p. 68) combines brilliant engineering and design in an exclusive audio slide show.

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- and curved ones, too.

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contributors

From a young age, Paul Schürch ("Marquetry, the Italian Way" and Master Class) liked building things better than going to school. So when his Swiss dad moved the family from California to his home country, a 15-year-old Paul began a five-year apprenticeship building pianos and church organs. At 22, he came back to Santa Barbara to open his own furniture shop. With four languages under his belt, Schürch returned to Europe regularly to develop skills in specific areas, working side by side with masters of furniture restoration and design, stone inlay, veneering, and marquetry. In each place, he says, his hosts gave him a workbench, help with whatever he was building, and "a light smack on the head when needed." His shop specializes in marquetry.
Most pieces of veneer in one project? **"2,850, without going blind!"**

For the past decade, **Jonathan Binzen** (*"Jere Osgood: The Best Woodworker You've Never Heard of"*) has discovered and written about inspiring pieces for our back cover. He grew up in Devon, Pa., a few miles from the shop of renowned woodworker Wharton Esherick. A visit there at 16 opened his eyes to the world of handmade furniture. Binzen joined *FWW* in 1993. He left for a freelance career, but rejoined us as a senior editor in February.
Most remarkable interview? "James Krenov. Once we got rolling, he was completely spellbinding—a transporting storyteller."

Tony O'Malley (*Fundamentals: "Plywood for Woodworkers"*) goes through a lot of plywood in his business making custom cabinetry, furniture, and millwork. His shop is in a very old industrial building in Emmaus, Pa., that some seriously claim is haunted by workers past. Over the years, he has written frequently about home improvement and woodworking projects for Taunton and other publishers.
Strangest thing you've made? "A 4-foot wide Gothic church window. It took three guys to maneuver it on the shaper."

Teri Masaschi (*"Are You Sanding Right?"*) began her career as a woodworker but has now, she says, "been elevated to a finisher." She teaches everything from the basics of surface preparation to advanced coloring and spraying techniques.
First thing you ever finished? "43 years ago, I found a dilapidated oak icebox in a field and dragged it home to my parents' basement. When it hit the warmth, termites began to pour out. Furious, my dad dragged it out to the driveway. I soaked it in bug-killer spray and let it dry, then stripped, repaired, and refinished it."

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

We are a reader-written magazine. To learn how to propose an article, go to FineWoodworking.com/submissions.

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letters

Spotlight

ISSUE NO. 224
January/February 2012
p. 49

READERS SPLIT ON TABLESAW QUESTION

I appreciated Thomas McKenna's thorough discussion regarding the pending tablesaw safety ruling by the Consumer Product Safety Commission, but I am disappointed that *FWW* has not taken a stronger stance advocating it. In 32 years as an emergency physician, I have never seen a tablesaw injury in which the guard was in place. The editors should take a leadership role in encouraging all tool manufacturers to adopt SawStop-type blade-braking technology—in more than just tablesaws. How many fingers and hands could be saved? Seat belts and airbags went from options to requirements, and there are scores of vehicular trauma victims who walk away rather than being taken to the morgue. Let's do the same with our power tools.

—JOSEPH KRUG, Knoxville, Ill.

Is blade-braking a must? *The U.S. Consumer Product Safety Commission is considering requiring flesh-sensing, blade-braking technology on all tablesaws.*

Every tool from car jacks to power drills and ladders can be either misused, modified, or both, leading to injury or death. The proposed ruling is ludicrous. Following the CPSC's line of thought, every car sold should have: air bags everywhere, all-wheel drive, adaptive distance control, blind-spot information, collision mitigation braking, rear camera, active suspension, stability control, automatic wipers, to mention a few state-of-the-art safety features. There would be many benefits, including lower insurance rates for those who could afford to own a car; fewer cars on the road, reducing emissions, accidents, and injuries; and increased use of public transportation. One downside, of course, is that it would decimate the auto industry. The most important safety tool is knowledge of the equipment you are using. How many people do you know who have been hurt using a ladder? Whose fault was it?

—JOHN WILLIAMS, Nine Mile Falls, Wash.

Or are riving knives enough? *Manufacturers recently adopted riving knives and better blade guards.*

Shop vacuums: bags or no bags?
I'm curious why Asa Christiana chose not to use the bags in his recent test ("Tool Test: Shop Vacuums," *FWW* #223), and how using them would have affected the performance. In my experience with Wap, Porter Cable, and Festool vacs, the bag keeps the filter cleaner, improving performance and reducing dust in the air. While I usually respect your tool reviews, I found this one to be very questionable.

—NEIL CLEMMONS, Chicago, Ill.

Editor replies: *We knew that leaving out the bags would be controversial, but as we explained in the article, they fill much more quickly than the vac canister on its own, they are not reusable, and they are relatively expensive. So while bags work great as prefilters, keeping a HEPA filter unclogged and flowing freely, we made a judgment call that for most woodworkers, the bags would prove to be a nuisance and an ongoing drain on the wallet, and would ultimately be discarded. Or people would hesitate to use the vacuum for general cleanup for fear of running through their bag supply too quickly.*

Bag the bags? *Bags reduce a shop vacuum's capacity, and can't be reused.*

Thank you for the excellent and informative article on managing wood dust ("A Revolution in Dust Collection," *FWW* #223) and the importance of using dust separators with shop vacuums. I have a Fein Turbo II vac (model 9.55.13) that is about nine years old now. I've been using a HEPA filter and the Fein paper bags up until now, and the HEPA filter stays fairly

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clean. One scenario you did not discuss in your article directly is the use of the HEPA filter and the paper bags, with a separator in place. That would give three stages of filtering, you would rarely (if ever) need to empty the paper bag, and the HEPA filter would be kept even cleaner. Is there a downside to this setup?

—DAVID RUDIG, Seattle, Wash.

Editor replies: *No real downside, David, other than losing a bit of suction power. But there's no big upside either, as separators like the Rockler Dust Right Vortex and the Oneida Dust Deputy do such a fine job of keeping the HEPA filters clean.*

How to connect a big dust separator

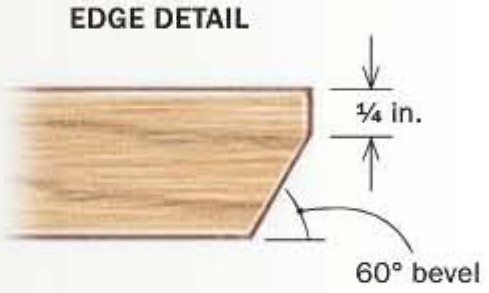
In "A Revolution in Dust Collection" (*FWW* #223), the Oneida Super Dust Deputy received a very complimentary review. I bought one, but I've had trouble mating it up with my single-stage Steel City dust collector. The Super Dust Deputy has a 6-in.-dia. outlet and my dust collector has a 4-in.-dia. intake. I bought a steel 6-in.-to-4-in. reducer, but it doesn't fit the 4-in. hose I have.

—JIM GANNON, North Canton, Ohio

X the Y. *For best airflow, keep reducers as close to tools as possible. This means getting rid of the 4-in.-dia. Y-junction on your dust collector, and connecting a 6-in.-dia. hose directly to the intake.*

Corrections

In "A Study in Squares" (*FWW* #221), there is a mistake in the drawing on p. 61. The angle of the table edge is labeled 30° (and drawn at 45°). It should be steeper, at 60°, as drawn in the side view on the same page.



While the arms and comb of Mark Bellonby's monogrammed Windsor chair were steam-bent (Readers Gallery, *FWW* #224), the spindles were not. As is typical of Windsor chairs, the spindles are shaved thin (and flexible) and do not require steam-bending.

Clarification: Bosch solves HEPA hiccup on vacuums

When we first researched shop vacuums for our recent test (*FWW* #223), we found an online source for the Bosch Airsweep 3913A that included HEPA filters. But at the time the article hit newsstands, those product listings were gone, forcing readers to spend an extra $150 to buy optional HEPA filters. So we contacted Bosch, and they promised to make the vacuum available again with HEPA filters included. Check Amazon and other online sources starting in March.

Editor replies: *Your dust collector, and almost all single-stage collectors, comes with a Y-junction attached at the outlet, which reduces the 6-in. intake to two 4-in. intakes. Ditch it, even if you are not adding a separator. For best flow and suction, you want to keep hose diameters as large as possible for as long as possible, reducing the diameter as close to the ports on tools or machines as possible. Having this bottleneck so close to the collector adds turbulence and chokes power at the source. In this case, we used one of Oneida's 6-in.-dia. flexible hoses to connect our single-stage collector's input directly to the Super Dust Deputy. Everything fit perfectly.*

One work-surface height does not fit all

It was disappointing to see, once again (*FWW* #223), a number of projects that define a work surface at a particular height—most notably a rather low 34 in. surface in "Build Your First Workbench." A number of years ago, after a painful day over just such a bench, I realized that this height was ridiculous for a 6-ft.-1-in. person. So I raised my benches, finding that heights of 40 in. or even 42 in. are far more comfortable for me. Your readers should be encouraged to find their own ideal working height when building benches that they will be using for many years.

—D. ROBERT WIEMER, Houston, Texas

Editor replies: *Great point. We generally shoot for average height. Bear in mind, though, that the task matters. Routing is more comfortable at belly height, more or less, while handplaning works better at the hip, so you can bear down more easily. That's why we made our "Wired Workbench" (also in* FWW *#223) 38 in. tall.*

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.

methods of work

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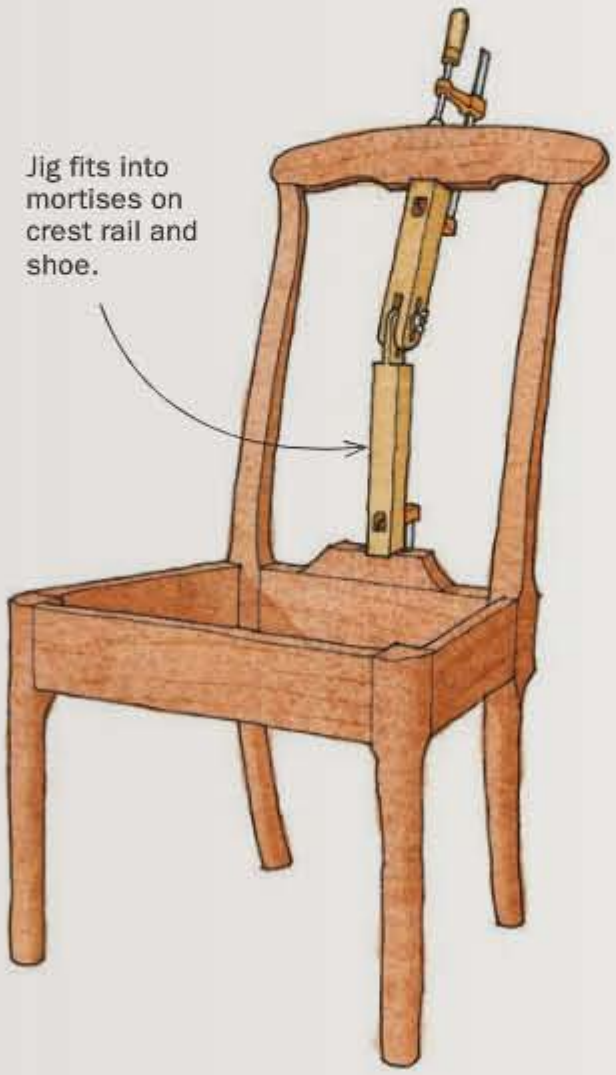
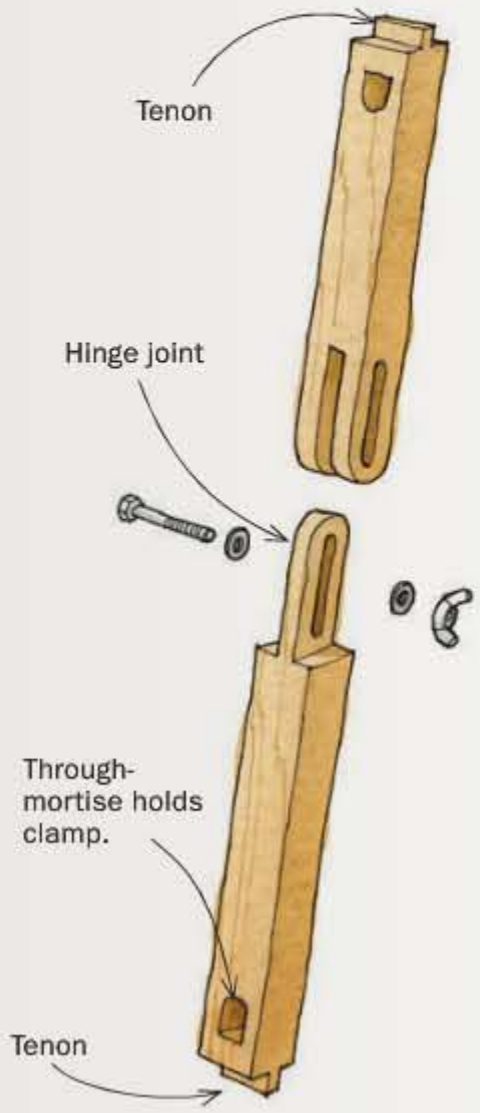
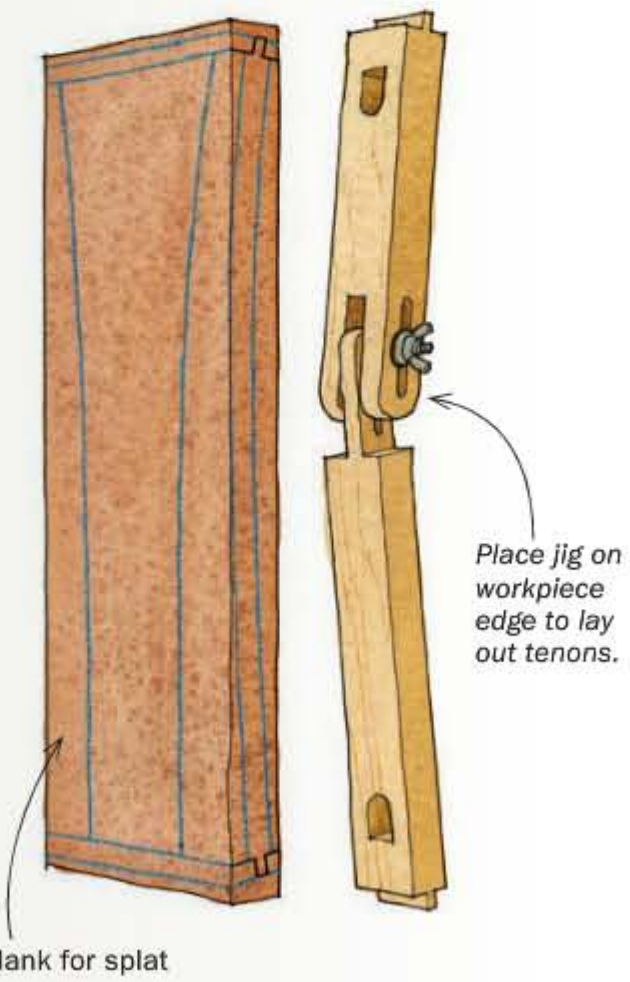






Best Tip

Jig for fitting a curved chair splat

A 1996 graduate of North Bennet Street School's Cabinet and Furniture Making program, Mark Arnold established the Boston Woodworking Co. in Sunbury, Ohio. Inspired by period furniture, he also enjoys adding his own design elements to create original pieces.

Building a chair with a curved back splat is challenging work, in part because the splat itself is tricky to fit. The tenons at the splat's top and bottom aren't parallel or in the same plane with one another. For my Chippendale chair, I simplified the measuring, layout, and fitting of the splat using this jig. Something similar will work for almost any chair with a back splat, and other curved furniture parts, too.

The jig is two pieces of stock, joined end to end with a hinge joint. The opposite ends are cut with tenons that fit the mortises in the crest rail and the shoe (the piece above the back seat rail). To make the jig, cut the tenons first, then the fingers in the hinge joint. Remember that the jig must be long enough to match the space of the chair back. Slide the fingers together and drill a centered hole through both pieces for the hinge bolt. Take the jig apart and use a jigsaw, scrollsaw, or drill press to elongate the hinge-bolt holes in both pieces to allow for adjustment. To complete the jig, cut two through-mortises as shown.

To use the jig, dry-fit the crest rail to the tops of the posts. Loosen the wingnut and slide the jig's tenons into the mortises in the shoe and crest rail, pivoting the hinge joint and elongating the jig as needed. Clamp the jig in place both top and bottom. When the alignment is perfect, lock the jig with the wingnut and remove the crest rail to free up the jig.

When transferring measurements to the splat workpiece, place the jig flat side down on the edge of the blank. The shoulder angles determine the angles that will be cut on the ends of the splat. After establishing the angle of the shoulders (and the angles of the blank ends), and scribing the front and back of each tenon with a marking knife, remove the jig. Add the splat design's outline to the front face and the sides, and you're ready to start cutting.

–MARK ARNOLD, Sunbury, Ohio

A Reward for the Best Tip

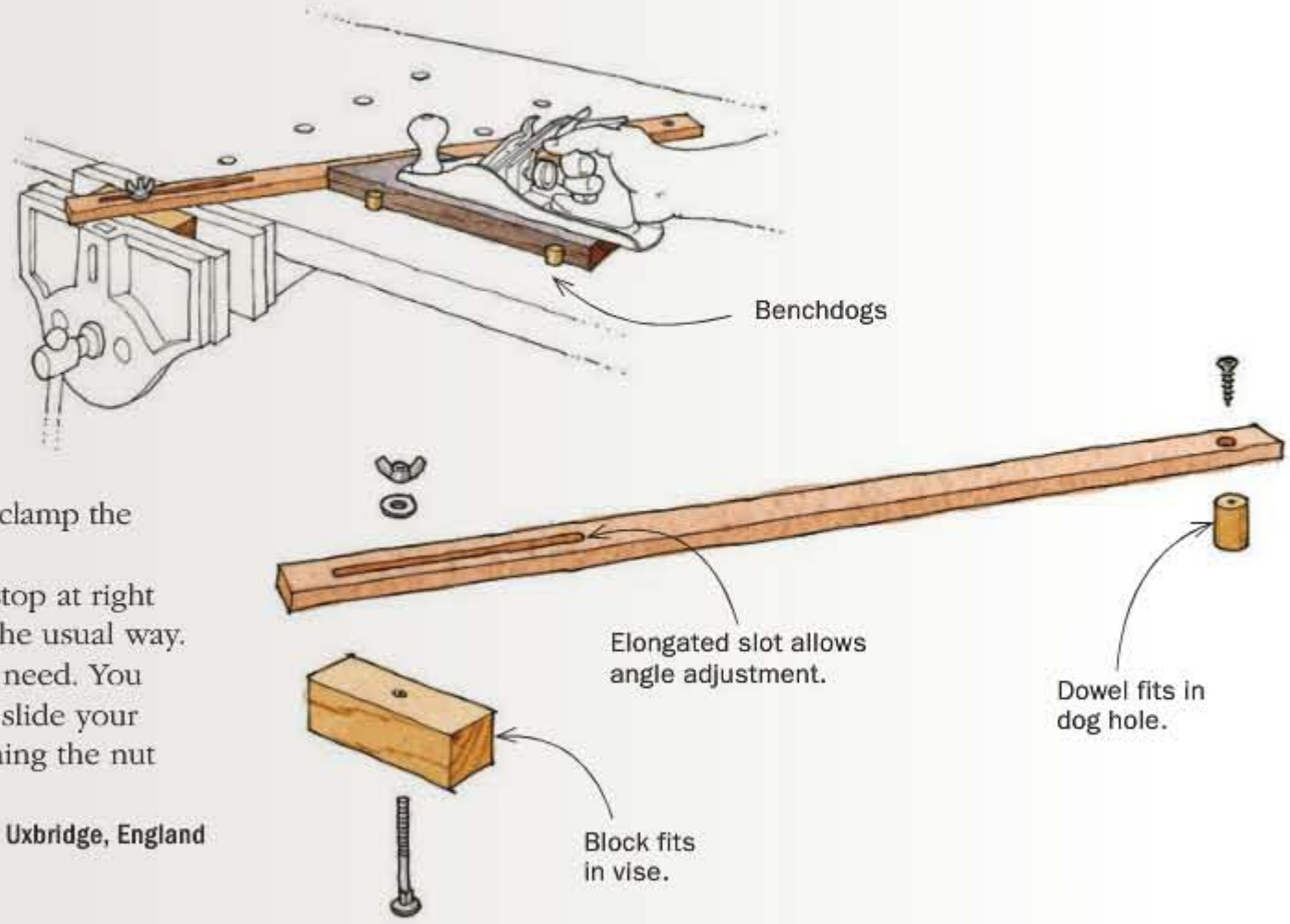
Send your original tips to fwmow@taunton.com or to Methods of Work, *Fine Woodworking*, PO Box 5506, Newtown, CT 06470. We pay $100 for a published tip with illustrations; $50 for one without. The prize for this issue's best tip is a *Fine Woodworking* DVD archive.

Multi-angled bench stop

I needed an angled bench stop, so I came up with this little device: At one end of the stop is a hardwood dowel that can be inserted into any of the dog holes on the top of the workbench. At the other end is a hardwood block that is attached via a wingnut and bolt arrangement through an adjustment slot. I clamp the block into my bench vise to lock that end.

With this arrangement, you can set the stop at right angles to the vise and plane against it in the usual way. Or, you can set the stop at any angle you need. You simply loosen the wingnut and vise, then slide your stop to the desired angle before re-tightening the nut and vise.

—JON PLACE, Uxbridge, England

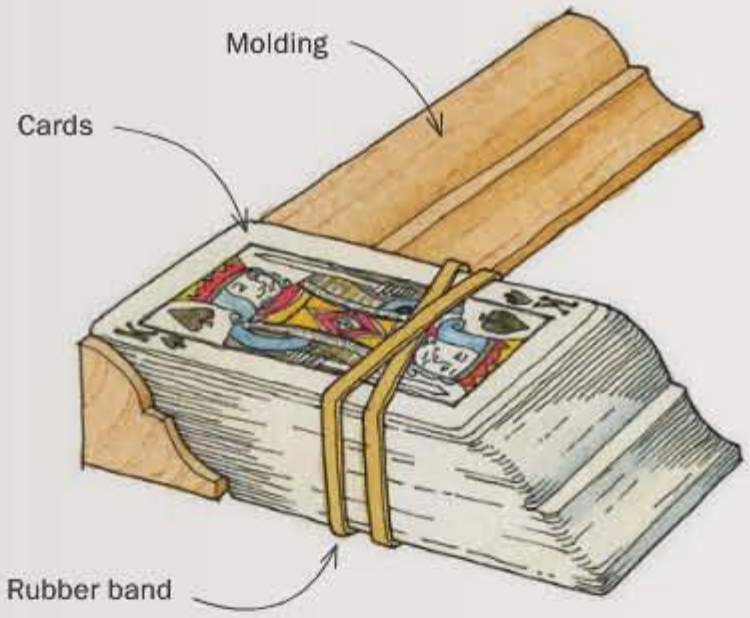


Playing-card profile gauge is a good deal

I like to keep a deck or two of old playing cards handy in the shop for use as shims, but they also make a terrific gauge for copying molding profiles. This gauge is most useful on trim that is attached to a wall or piece of furniture and can't be held against a blank to transfer the profile directly.

Start with a stack of cards the same height as the trim being profiled. Gently push one end of the stack into the trim to set the profile. Now pinch the stack with your fingers or a spring clamp to hold it temporarily and then carefully wrap the stack with a rubber band to save the profile. Transfer the profile to a blank and rout the profile.

—BRIAN CAMPBELL, Winona, Minn.

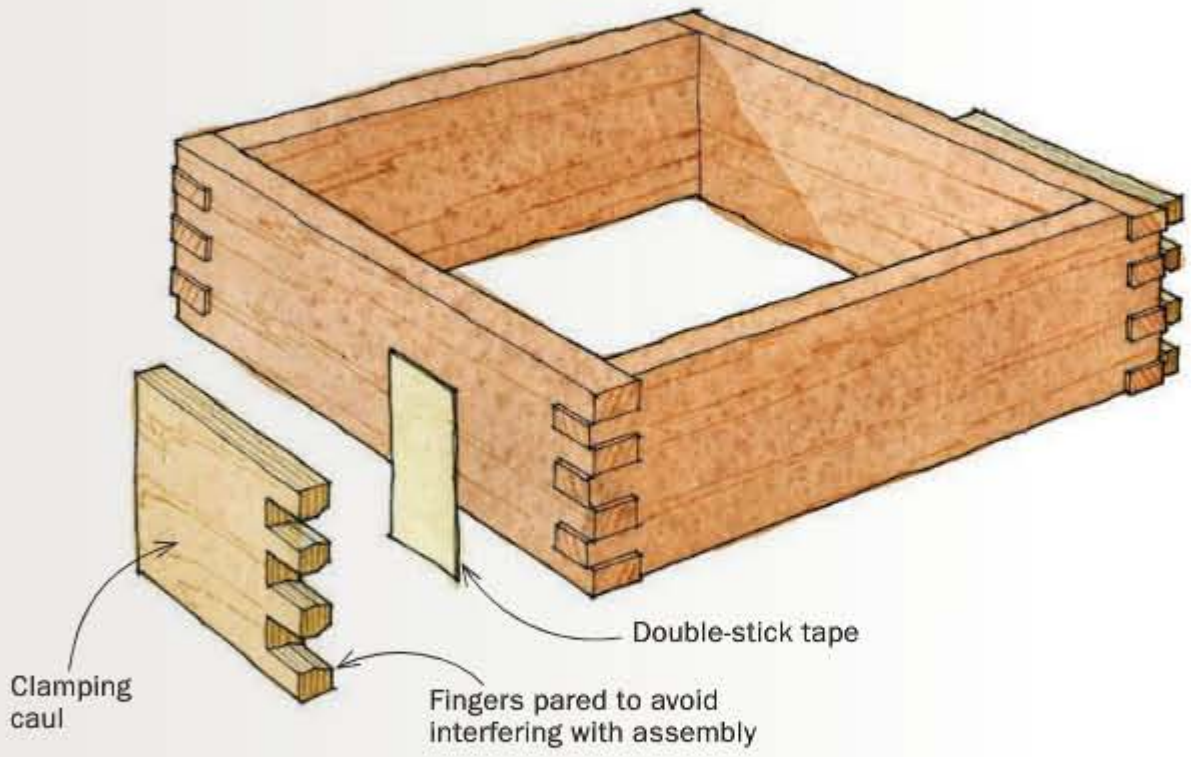


Cut cauls when cutting box joints

When cutting box joints on the tablesaw or router table, I attach a scrap piece of Baltic-birch plywood to the back of the workpiece with double-stick tape.

After the joint is cut, I remove the plywood backing and turn it into a caul by paring a little off the inside corner of each pin with a chisel. This keeps the pins from interfering with the joint assembly and reduces problems with glue squeeze-out. I give the caul a quick spray of shellac and attach it to the workpiece with double-stick tape, lining up the fingers. Two of these, one at each corner, ensure a tight joint.

—DOUG BLACKE, Olivenhain, Calif.

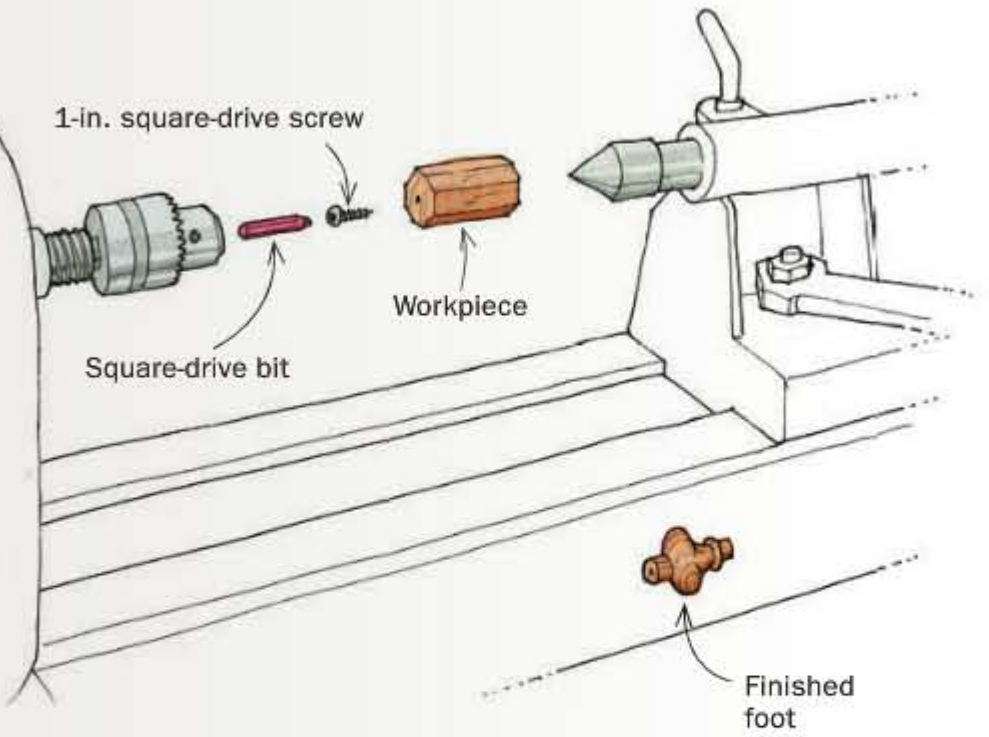


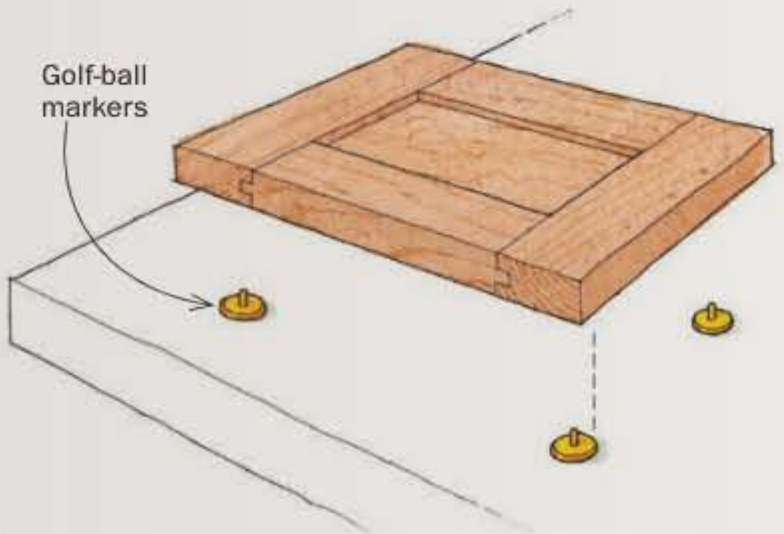
Miniature drive center for the lathe

I recently needed to turn some small pedestal feet for a jewelry box but didn't have a drive center small enough to turn the ½-in. shank on the foot.

To get around this, I fashioned what I needed using a square-drive bit and screw. Start by drilling a pilot hole in the end of the blank and driving in a 1-in.-long round-head square-drive screw. Chuck the square-drive bit in the headstock using either a three-jaw chuck or a Jacobs lathe drill chuck and insert the bit into the head of the screw to drive the workpiece.

–STAN KESSLER, Ft. Wayne, Ind.





Golf ball markers give your finishing a lift

To apply finish neatly to panel edges or to spray both sides of a piece quickly and easily, it helps to raise the workpiece above the work surface on small, pointed risers. You can buy these as specialized accessories from woodworking suppliers, but I've found a lower-cost alternative: golf-ball markers. I got mine free from a local golf course but you can buy them by the bag at any golf-supply shop. They are made up of a 1-in.-dia. plastic disk with a ½-in.-long pin, which provides plenty of height for my purposes. The end of the pin is rounded and will not dig into heavier items.

–TOM CARPENTER, Vernon, B.C., Canada

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■ BENCH HARDWARE

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Glide leg vise by Benchcrafted
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Benchcrafted.com

WITH ITS TAIL VISE AND GLIDE LEG VISE, Benchcrafted tools has given renewed, and deserved, attention to two old-time bench tools.

Though they call it a tail vise, Benchcrafted is really selling a wagon vise, a centuries-old bench helper that is integrated into a slot in the benchtop. Clamping is done with a sliding block (with a hole for a benchdog) that rides in that slot. This vise makes holding workpieces on the bench noticeably more solid—there is none of the flex so common in traditional wooden tail vises.

The glide leg vise is a shoulder vise with a deep throat and a powerful grip—better than any other shoulder vise I've used. The one quirk is that you need to even out the jaw angle by bending down and setting a pin in the lower assembly to the approximate thickness of the workpiece. It does take some getting used to.

The hardware for both vises is beautifully and robustly made (in the United States). The tail vise can be built up in a left- or right-handed version and can be retrofitted to most benches.

Strong grip, no flex. *Benchcrafted's tail, or wagon, vise is integrated into the top, providing solid clamping power without any flex.*

Bench vise with bite. *After setting a pin close to the thickness of the workpiece to even out the jaw angle (inset), the glide leg vise has an unrelenting grip.*

The glide leg vise requires that the front edge of the top be flush with the front of the leg for it to work.

When installing the hardware, you need to make a few components (vise jaw, parallel guide, and roller guides for the glide vise, and the benchdog block on the tail vise). Benchcrafted provides thorough instructions, full-size templates, and helpful videos—all on their website. No print instructions come with the hardware.

The handwheels are quick and easy to use. Although there is no quick release, the almost frictionless spin of the wheels makes them at least as fast as the quick-release vises I've used.

Tail vise by Benchcrafted
$360
Benchcrafted.com

The vises built with this hardware not only hold the work better than any other vise I own, but they also are a pleasure to use. I will definitely install these on the next bench I build.

—Jeff Miller is a furniture maker and teacher in Chicago (furnituremaking.com).

Photos, this page: Jeff Miller; tool photos: courtesy of Benchcrafted

Forrest's 5 Newest Blades

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■ ACCESSORIES

The little router table that could

Trim Router Table from Rockler
$60
Rockler.com

Small table for small parts. *Now you can use a trim router in a table to tackle a number of small-scale jobs, from joinery to profiling.*

ROCKLER HAS TAKEN THE NEW BREED of powerful compact routers to another level with its new Trim Router Table.

The table clamps to a bench, making it quick to set up. Better yet, the insert plate works as a permanent baseplate for the router, meaning you can use the same router for handheld and table routing, switching modes in seconds. The plate is predrilled to fit the DeWalt 611, the Porter-Cable 450 and 7301, and the Bosch Colt. I tried the unit with an accessory 2¼-in.-dia. dust port (Rockler item No. 21528; $12) and was very pleased with how little dust landed on the shop floor.

I used the table to build a small shelf unit, and it made it easy to work with all of the small parts, including making rabbets for the back and chamfering and beveling edges. But where it really came in handy was in cutting the sliding dovetails that hold the piece together. I used the router out of the table to cut the dovetail slots with the help of a fence. Then, to cut the dovetail keys, all I had to do was pop the router and baseplate into the table's recess. There was no need to mess with the bit height because I was already there; I simply adjusted the fence until I had a snug-fitting joint.

The bit opening in the fence is a little large, making the small workpieces want to dive into the bit. I'd recommend screwing or bolting an auxiliary fence to the router table's fence to create a zero-clearance opening (or to make a taller fence for vertical routing, like the dovetail keys).

—Tom McKenna is a senior editor.

Quick change. *You can keep the baseplate on your router all the time, so it's easy to drop it in the table or pull it out for handheld use.*

■ ACCESSORIES

Better magnifier gives you a perfect view

Magni-Focuser by Edroy Products
$24
Lie-nielsen.com

THE MAGNI-FOCUSER HEADBAND-MOUNTED MAGNIFIER has been used by Lie-Nielsen's saw sharpeners for years. The folks at Lie-Nielsen like this product so much that they recently started selling them. Being visually challenged in my middle age, I was happy to test a pair.

What sets this magnifier apart from other headband-mounted helpers is that there is no post in the middle of the lens to obstruct your view. The Magni-Focuser is sold with a lens plate made to see better at a 10-in. distance, which worked well for a lot of jobs. But you also can buy other lens plates (or a monocular lens) for working distances up to 20 in. I'd recommend the accessory lens plate with the longest working distance (#2). With it, I was able to cut dovetails in dark walnut to a scribed line, while keeping my head in a comfortable working position.

Overall, these are the best magnifiers I've used, and the most convenient.

—T.M.

Photos, except where noted: John Tetreault

■ HAND TOOLS

New crosscut saw is a great value

Crosscut carcass saw by Veritas
$70
leevalley.com

VERITAS RECENTLY INTRODUCED a couple of new carcass saws that are about half the price of comparable saws on the market. I was happy to take both the crosscut saw and the ripsaw for a spin.

The saws boast a somewhat cosmopolitan pedigree: The blade is made in Japan, the spine is molded in the United States, and the saw itself is assembled in Canada. Both have an 11-in.-long high-carbon steel blade with a 2⅜-in. cutting depth. The molded spine is a mysterious "stainless steel/glass/polymer composite," which looks like plastic and feels a little like painted cast iron. The bubinga handles felt comfortable, and encouraged a loose but steady grip.

I spent the better part of a day making cross- and ripcuts with both saws in a variety of hardwoods. I was pleasantly surprised at how well the crosscut saw performed, cutting clean dovetails and tenons. The ripsaw was a bit more finicky to handle. It takes a delicate touch to get the saw started in the kerf. Once engaged, the saw cut more aggressively than I like and left a rough finish on most of the samples.

I think the crosscut saw is an excellent value. The same-priced ripsaw, on the other hand, just wasn't right for me.

—Clark Kellogg is a furniture maker in Houston, Texas (kelloggfurniture.com).

***Hooked.** With the help of a bench hook, a crosscut saw makes quick work of miters for frames. It also can make accurate 90° cuts.*

Plywood for woodworkers

FOUR TYPES ARE ALL YOU NEED

BY TONY O'MALLEY

In my business making custom built-in cabinetry, I use more plywood and other sheet goods than solid wood. Whether I'm building kitchen cabinets, TV enclosures, window seats, or library shelves, manufactured panels of one type or another make up the lion's share of a project.

The secret to working with sheet goods is to master the balancing act of looks, strength, and cost when buying the material. Buying the best-looking plywood for every piece of a project can be an expensive proposition, particularly when less pricey sheet goods will work just as well, or even better, for painted cabinetry, drawer bottoms, shop furniture, or woodworking jigs.

Sheet goods have a lot of advantages over solid wood for certain projects. When making large or wide surfaces, sheet goods cost less, are stronger and more stable, and resist warping better than solid wood. They're also time-savers, since they needn't be jointed or planed.

There are dozens of varieties out there, but just four types will cover your needs. The first is furniture-grade plywood, which is distinguished by its high-quality face veneers. But you pay a premium for that quality, so this material should be saved for surfaces that will be displayed prominently. Cabinet-grade plywood, which has surface defects like knots, pins, and mineral stains, is cheaper than furniture-grade plywood, and is ideal for painted or hidden surfaces. Then there's multi-ply plywood, usually Baltic birch, which is suitable for drawer boxes, jigs, and other shop tasks. Last is medium-density fiberboard (MDF), a sheet good made of fine wood particles compressed and glued together. It makes a remarkably flat and inexpensive material well-suited for jigs, shop furniture, and as a substrate for veneering and countertop laminate.

Learning the different ways each is used—along with some lumberyard lingo—will help you pick the best panel for your project.

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

THE FAB FOUR

Whether you're building kitchen cabinets, drawer parts, templates, or workshop jigs, these four go-to sheet goods can handle a huge variety of woodworking tasks and get you through a project more quickly and, in most cases, less expensively than solid wood. Learn to make the best choice by weighing the strengths, weaknesses, cost, and availability of each one.

Photos: staff

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Surface perfection. *Using a furniture-grade, cherry plywood for this built-in gives a fine furniture look without the warping and instability of solid wood. Plus, it's less expensive and easier to work with.*

Furniture-grade is best in show

Pick furniture-grade plywood for large, conspicuous wood surfaces, and then choose a core suitable for how the panel will be used. For open casework, such as a bookcase or fireplace cabinetry, select veneer-core plywood with an A1 or A2 grade (see "Making the grade," below). Veneer-core is the lightest of the plywoods and holds screws best, making construction much easier. Because it is light, it is less likely to sag when used for shelving or other long spans. Plus, it's easier to reinforce its edge by screwing it to a cabinet case or other support. In most cases, go with ¾-in. thickness.

On desktops and similar surfaces where flatness is critical, ¾-in. MDF-core panels are a better choice. They also tend to have better veneers and fewer flaws. In ½-in. and ¼-in. thicknesses, MDF-core is the best choice for cabinet doors or other framed panels, since its ultra-flat surface will look better when finished. Combination-core plywood works well in any of those situations, too. It combines the best of both worlds—the flatness of MDF and the holding power of plywood—and is an excellent all-around choice.

The best bet for purchasing furniture-grade panels is a retail lumberyard. Wholesale plywood dealers will sometimes sell to non-professional builders, usually on a cash-and-carry basis. Choosing between the three cores often depends on availability. As a rule of thumb, opt for the most flattering veneers available on a core that makes sense for the project at hand.

Prices can vary widely depending on the hardwood and core. For a 4-ft. by 8-ft. sheet of ¾-in. cherry, expect to pay between $115 and $150 for an A-1 grade, with veneer-core being at the costlier end of the spectrum.

Buyers' guide to furniture-grade plywood

CORE CONSIDERATIONS

For cabinetry and built-ins, I typically buy three different core types of furniture-grade plywood: veneer, MDF, and a combination of the two. Veneer-core panels are the most common, lightest, and usually the most expensive. They can be fastened easily, but any flaws in their cores can telegraph to the face veneer, showing up after they're finished. MDF-core panels have a smooth, easily finished surface, but are very heavy and don't hold fasteners as well. Combination-core panels are a hybrid. Their inner cores are made of hardwood plies, sandwiched between layers of MDF. They combine the strength and screw-holding properties of a veneer core with the surface perfection of an MDF core.

MAKING THE GRADE

Grades for face veneers on domestic plywood use a letter-number combination. The better face receives a letter grade (AA, A, B, C, D, E) with "AA" being the best, and the opposite face receives a numerical grade of 1 through 4, with 1 being the best. Furniture-grade plywood is an AA or A grade. I most often use A-1 or A-2 panels, which have excellent-looking face veneer on the front, and a veneer that is very close in appearance on the back. For cabinet-grade plywoods (see opposite page), I usually use a B-1, although home centers often sell "C" grades as cabinet-grade stock.

Drawings: Vince Babak

Cabinet-grades work behind the scenes

For painted or hidden surfaces, such as the backs and sides of cabinetry or drawer parts, go with cabinet-grade plywood. There's no need to spend extra money on faces that no one sees. Plus, it's widely available at both home centers and lumberyards and costs significantly less than furniture-grade panels.

Cabinet-grade plywood is almost always veneer-core and has rotary-sawn or plain-sliced veneers. For most of my projects, I use B-grade maple with plain-sliced veneers. I also make drawer parts of cabinet-grade plywood, and use solid-wood edging to cover the cores.

Cabinet-grade plywood can be used for jigs and other woodworking accessories and fixtures. It is a bit pricier and less flat than MDF, but it holds screws better.

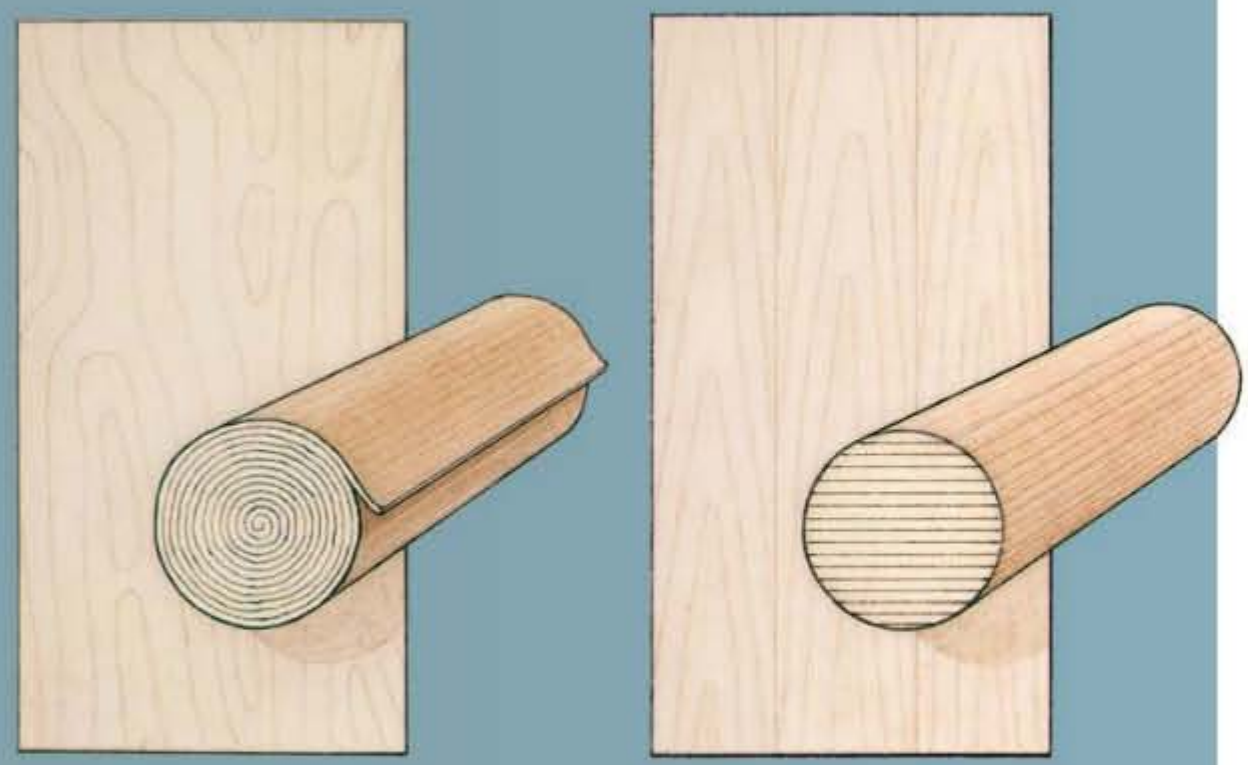
Home centers sometimes sell cabinet-grade plywood, commonly with red oak, maple, or birch veneers. Depending on the hardwood, a ¾-in. sheet of cabinet-grade material can vary from $45 to around $80 for a 4-ft. by 8-ft. sheet.

Shop furniture. *Cabinet-grade, veneer-core plywood holds screws well and is inexpensive, making it an excellent choice for shop furniture like this planer cart.*

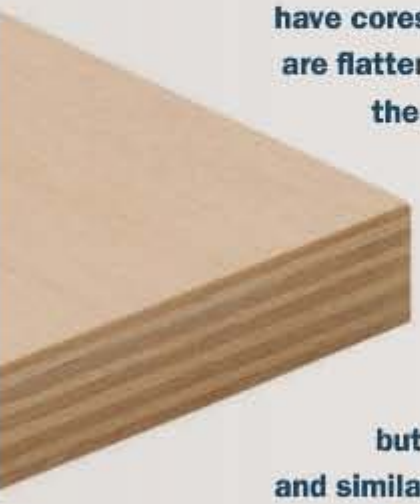
Cabinets, too. *Use cabinet-grade plywood for painted cabinetry, such as these kitchen cabinets. Buying it prefinished with a clear coat is great for interiors, saving time and adding minimal expense.*

TWO WAYS TO SLICE VENEER

Plywood veneers are commonly cut from logs in two ways. Rotary-cut veneer is peeled like a paper towel from its roll, producing a seamless, single-piece face. It's economical but more bland-looking, making it better suited for cabinet-grade applications. Plain-sliced veneer is cut across the width of a log just the way lumber is. Usually it is random-matched, which can be more natural-looking. It also can be book-matched, which produces mirror-image grain patterns. If you need several panels and are planning to use a clear finish, ask for sequential panels, which will have similar color and grain characteristics.



Multi-ply fills many roles



Multi-ply plywoods are manufactured from thinner plies than normal veneer-core plywoods. They are pricier, but have cores that are virtually void-free, and surfaces that are flatter than regular veneer-core plywood. They are also the only plywoods attractive enough to be used without edge-banding.

Multi-ply is a good choice for drawer parts, and its flatness and screw retention make it the best choice for jigs and shop furniture, too.

Baltic birch is the most common version, but Finnish birch, Russian birch, Appleply, Europly, and similar plywoods are also available. It's rotary-cut, and graded differently than standard plywood. Baltic birch, for instance, has both sides graded—from B, to BB, CP, and C, with "B" being the highest.

It's usually available through lumber dealers only. In ¾-in. thickness, a 5-ft. by 5-ft. sheet costs about $75 to $90, and a 4-ft. by 8-ft. sheet costs around $110 to $120.

Distinctive drawers. *Multi-ply is a good choice for drawer parts, as its void-free edges are attractive as is.*

MDF is a shop workhorse

MDF is a versatile, widely available sheet good that will work for a variety of furniture projects and woodshop tasks. Price is the main advantage: A 4-ft. by 8-ft. sheet of ¾-in.-thick MDF costs less than $40.

MDF's stable, smooth faces make it an excellent material for cabinetry, door panels, and other projects that will have colored lacquers or paints. Plus, the edges can be shaped with a router bit, sanded smooth, and painted. Its ultra-flat surface makes it an excellent material for laminating with veneers or countertop material, or building jigs and workshop templates—particularly if they're curved.

There are a few downsides. At around 90 lb. per sheet, MDF is heavy, although some dealers sell "lightweight" versions that can reduce the weight by up to 30%. It does not hold screws well, although specialty fasteners such as T-nuts or Confirmat screws can help when joining pieces. Cutting MDF produces a lot of fine dust, so dust collection is a good idea. Water is a problem, too: It will cause MDF to swell and lose its structural integrity, so avoid uses where it will get wet, such as countertops or toe-kicks in a kitchen.

Top choice for templates. *When building tenoning jigs or other jigs, MDF's flatness and cost make an excellent choice. It's easily shaped, too, making it a go-to material for templates.*

Flat panels. *For painted, flat-panel doors, MDF will resist warping better than plywood. Glue it into the grooves for added stability.*

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Stop by and meet Contributing Editor Roland Johnson as he shares everything you need to know to purchase, set up and use a jointer, planer and tablesaw.

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A honing guide is the great equalizer

GET YOUR CHISELS AND PLANES AS SHARP AS THE PROS', GUARANTEED

BY ASA CHRISTIANA

I hear from a lot of readers who struggle with sharpening, and I always pass along my two personal breakthroughs: Use a honing guide and go up to 8,000 grit. Not everyone agrees with the first part. Roughly half the teachers I know tell their students to hone by hand, balancing the tool on its bevel by feel. That's not the best advice for hobbyists, if you ask me.

Those who advocate handheld honing are mostly professional furniture makers, who sharpen their tools every day and don't want to waste time. I admit, with zero setup time the method is faster than a honing guide, but most hobbyists don't sharpen their chisels and plane blades every day, or even every week, so they never develop and maintain the finely tuned muscle memory that handheld honing requires. And if you rock that edge on the stone, even a little bit, you might not be sharpening the very tip. For

THE DEVIL'S IN THE BEVEL

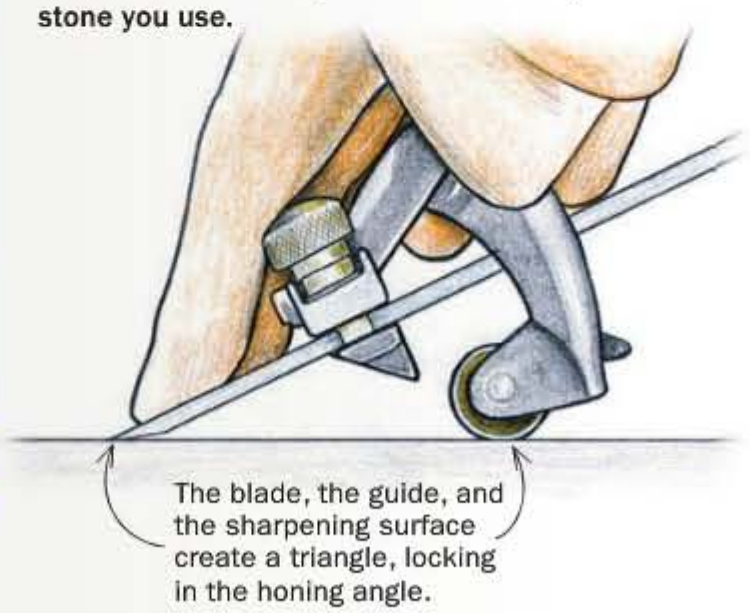
It doesn't hurt to say it one more time: A sharp edge is the junction of two highly polished surfaces: the back and the bevel. The former is easier to handle, as it is a large flat surface and only needs to be done once, when you first acquire the tool. The bevel is trickier.

Why the honing guide beats handheld

GUIDE

ALWAYS THE RIGHT ANGLE

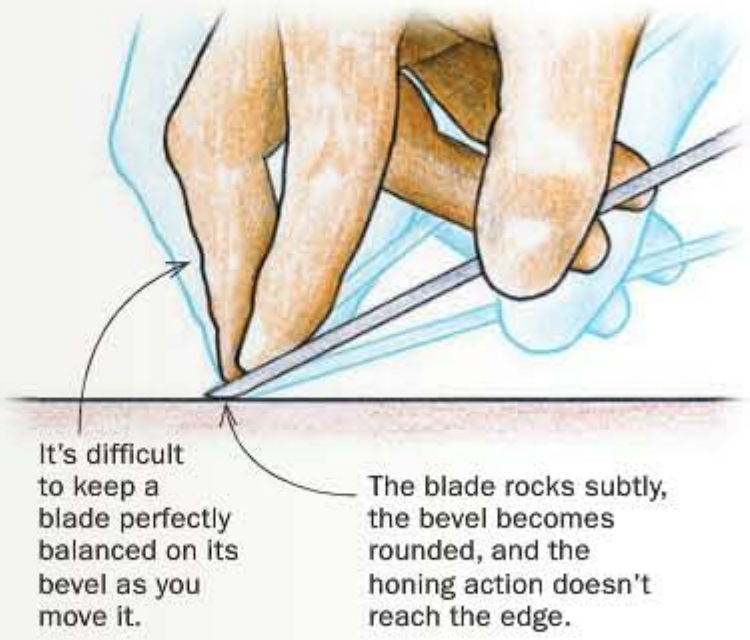
Locking in the angle ensures that the honing action reaches the tip with each subsequent stone you use.



BY HAND

BALANCING ACT

Without a guide it's very easy to change the angle subtly as you move the blade, which rounds the bevel and keeps you from honing the very tip, where it matters.



Photos: Matt Kenney; drawings: John Tetreault

Two good guides

One includes everything you need and clamps flat blades a bit more securely; the less-expensive version works just fine with a shopmade jig.

VERITAS MK. II HONING GUIDE

$64.50
leevalley.com

Best overall. *The Veritas Mk. II honing guide comes with an attachment that locks in a wide variety of bevel angles (above left). A stop sets the angle (right) and a lip along one edge ensures that the blade is square to the jig. Also, the wide roller is very stable.*

BASIC HONING GUIDE

$6 to $15
Widely available

Best value. *For less-expensive guides, make a setup board so that you can quickly set the protrusion of the blade for common angles. To do so, set up the guide for a given angle (left), then position a stop block (center) so you can return the guide quickly and positively to the same exact angle in the future (right).*

peace of mind, use a honing guide. You might experience true sharpness for the first time. Then you'll know what all the hand-tool fuss is about.

Where handheld honing goes wrong

To understand why handheld honing is tricky, you need to understand the process. For starters, it works much better with a "hollow grind," the scooped-out bevel formed by a wheel of some kind. Then you rock the tool on the sharpening stone, feeling for the little bumps that tell you the bevel is resting flat, and then try to keep at that same angle, riding those two tiny points evenly as you move the blade up and down the stone. (It's easier on chisels, which have a longer bevel, than on plane blades, which are thinner.) But if you rock the blade at all as you move it, the system breaks down. Here's why.

Like sanding a wood surface, you need to work your way up through the abrasive grits (grinding at a coarse grit, then usually going to a series of stones: 1,000-grit, then 4,000, then 8,000) to end up with a polished secondary bevel at the tip of the tool. Now picture what happens as you hold that blade by hand, rock it onto its bevel, and try to lock your arms and hold it at precisely the same angle while sliding it back and forth along the stone. Unless you have a good feel for this and practice frequently, you eventually will rock the bevel off its high points, rounding the tip slightly. Now you're a goner, because you have no good way of knowing if each successive grit is getting to the very tip.

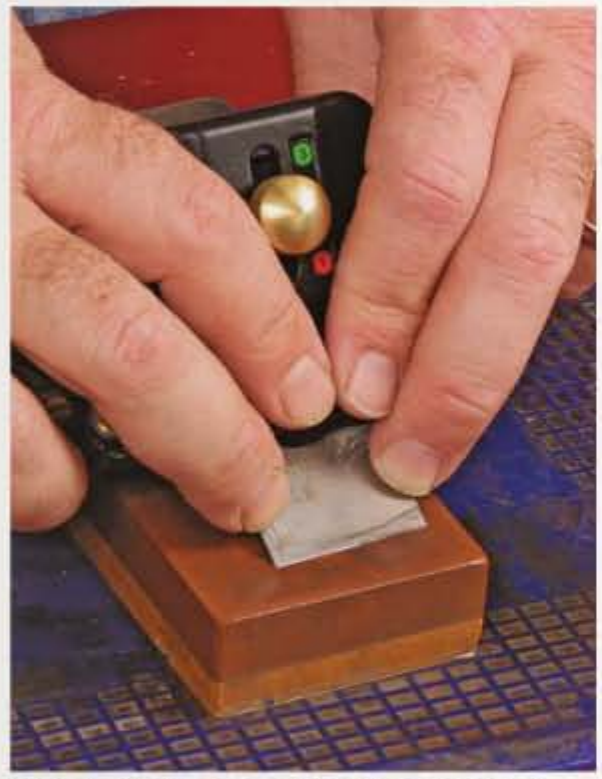
Contrast that tricky operation with the simplicity of a honing guide. You grind the bevel any way you want to. Bench grinders take a bit of skill to avoid burning the edges and softening the steel. So feel free to use your honing guide to form the primary bevel on a few sheets of sandpaper stuck on glass or granite, on a coarse diamond plate, on a motorized sandpaper platter, or any way that is convenient. Just grind at a slightly shallower angle than you want for your secondary (honed) bevel. I grind most tools at 25°.

Now set up your honing jig to raise the tool to 27° or 28° (go higher for chisels that you will pound and chop with, and for certain bevel-up planes), and start honing. It works for hollow-

How to hone with a guide

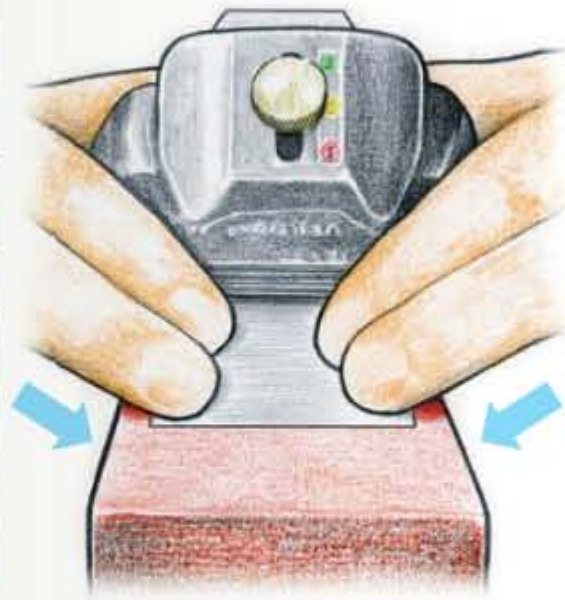
To speed up the process, hone the bevel at a higher angle than you ground it. This focuses all of the action where it matters: at the cutting edge.

Start with the back. *Work up through your stones so that it's flat and highly polished. You only have to do this once, when you first get the blade.*



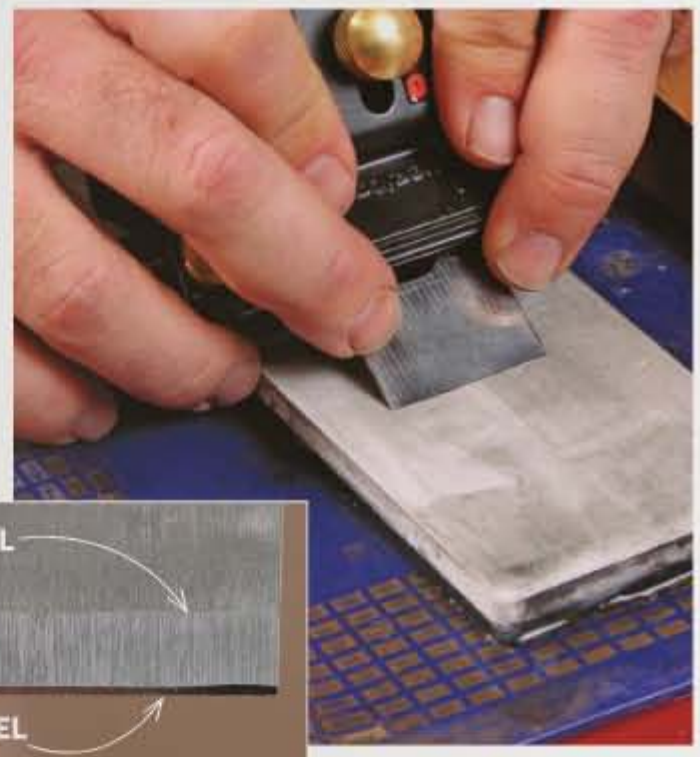
Then prep the secondary bevel. *Grinding can leave deep scratches, so start on a 1,000-grit stone, and then use a 4,000-grit.*

KEEP THE EDGE STRAIGHT



Apply light pressure equally to both sides of the blade (just behind the cutting edge) to keep the edge square to the blade.

Hone it to perfection. *Do this on your finest stone, typically 8,000 grit. The honed bevel doesn't need to be the same thickness across the width of the blade, but it should extend from edge to edge (see below).*



Back to the back. *Take the blade out of the guide and take a few quick strokes on your finest stone to remove the burr that formed there as you honed the bevel.*

ground bevels and flat bevels alike. And the blade will never budge from its honing angle. That's the key. You'll know that every grit is reaching the very tip, where it matters.

Not all guides are created equal

Like most tools, there are better honing guides and worse ones. To be sure your blades are staying at the same exact angle regardless of the abrasive, you need a guide that rides on the stones, not on your workbench. Not all waterstones, for example, are the same thickness. So, if the guide's roller(s) ride beside or behind the stone, you'll have to re-adjust it for each new stone, and you won't know if you are back at the same exact angle.

After that, it doesn't much matter, but you need a quick and accurate way to set up your guide for a variety of angles. □

Asa Christiana is editor of FWW.

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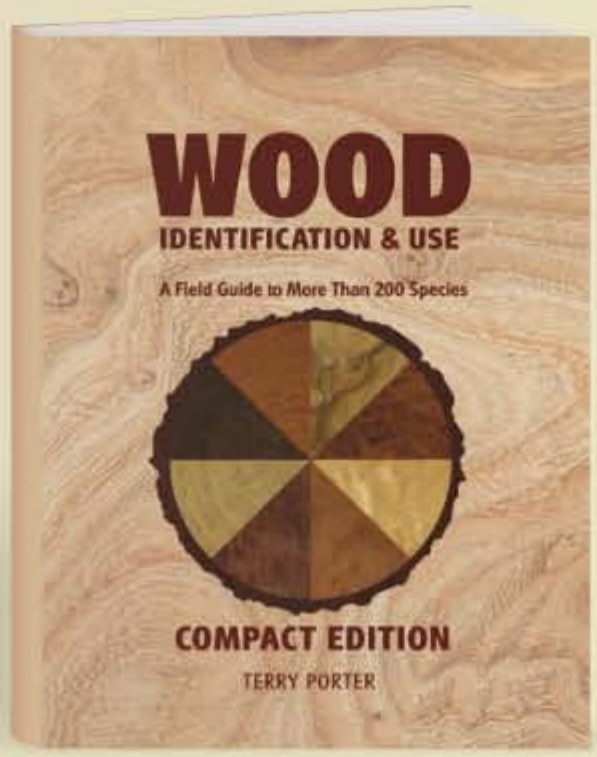

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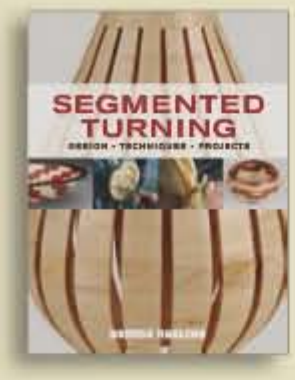

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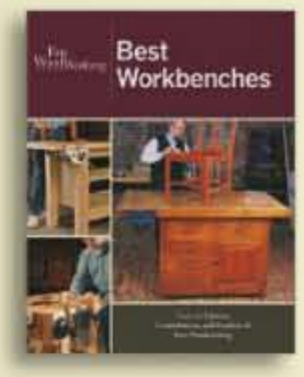

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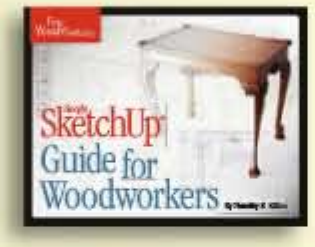

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4 Ways to Top a Box

Low-tech lids open without hinges

BY MATT KENNEY

Boxes are fun to make and can be a pleasant diversion between larger projects. With a bit of nice wood and a clever design, you can turn out a beautiful box in just a few hours. But there is one part of making a box that is never fun: installing high-quality hinges and getting them just right. And don't forget that you also have to buy them, for a box that might otherwise cost you nothing more than some leftover cutoffs.

You can avoid that hassle by making a box without hinges. Of course, you'll need another way to keep the top on, but the challenge of figuring out how to do that can lead to elegant and unique designs. Here are four great ways to do it. One is mine, one is from a *FWW* author, and two are from *FWW*'s art director and most prolific woodworker, Michael Pekovich.

Matt Kenney is a senior editor.

1 INSERTS HOLD THE TOP IN PLACE

They're fitted to the inside after the top is cut free from the bottom.

Online Extra

To see how to make a bird's-mouth joint like the one on Matt Kenney's box, go to **FineWoodworking.com/extras.**

Photos: staff

4 TIP THE LID AND STAND IT UP

The lid rocks back on tapered side rabbets when you press down on the back, allowing you to lift and stand it in a deeper back rabbet.

3 DROP THE TOP INTO A RABBET

The sides do all the work and hold the lid securely in place.

2 ONE BOX TOPS ANOTHER

Make the lid and then build the bottom to fit inside it.

1 Inserts hold the top in place

One of my favorite ways to make a box is to glue up the sides, top, and bottom as a single unit. Once the box is assembled, I simply slice it in two. One half becomes the box, the other, the lid. To avoid hinges, you need some way to align the lid with the box. The answer is a handsome liner that extends above the edge of the box and keeps the lid snugly in place.

—Michael Pekovich

Cut off the top on the bandsaw. *All four edges end up level—something that never seems to happen at the tablesaw, where you cut into one side at a time. To smooth the bandsaw cuts, just rub the parts on a sheet of sandpaper stuck to a flat surface, like your tablesaw's table.*

TIP **DESIGN INSERT FOR GREATER FUNCTION**

This box was made to hold tea packets. The cutouts position your fingers for easy retrieval.

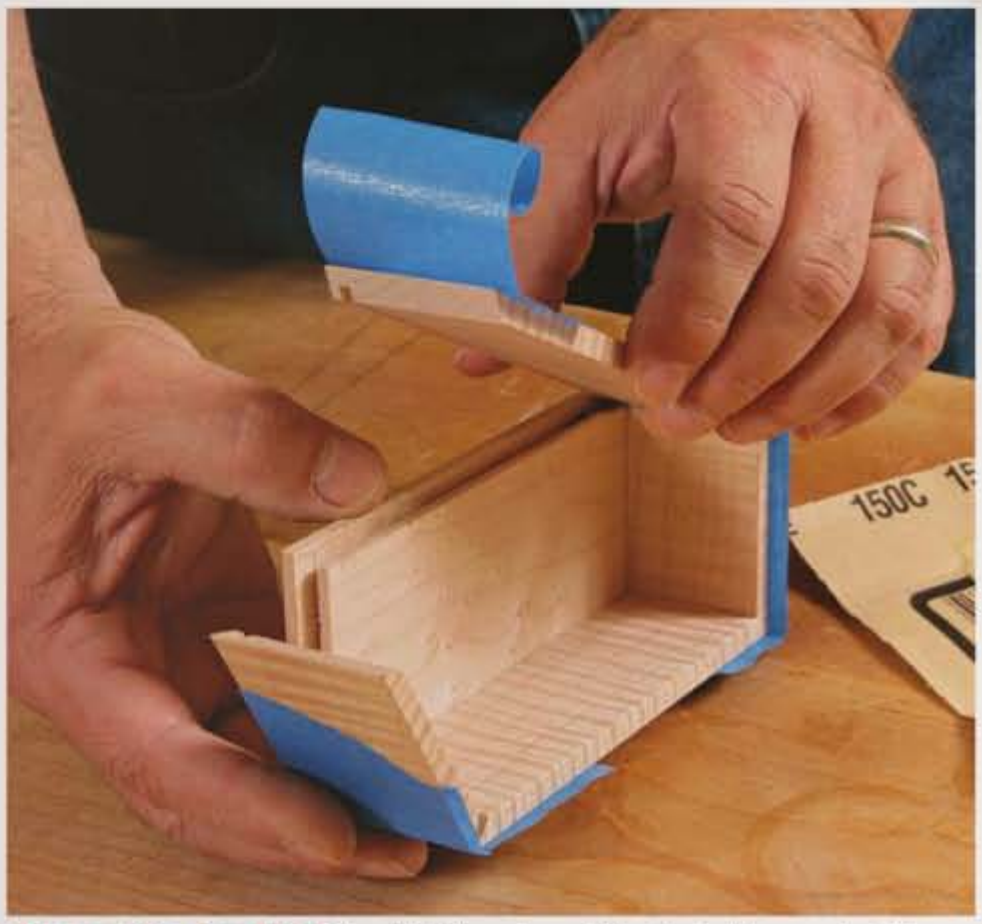
Fit the inserts. *Do the two ends first and then the front and back. For each side, miter one end at the tablesaw, mark the length directly from the box, and then miter the second end. The goal is a snug fit, so no glue is needed.*

Bevel their top edges. *Otherwise, the top won't fit easily over them. Mark the inserts so that you know how wide to make the bevels. The only practical way to do the job is with a block plane, because the inserts are small and the bevels are shallow.*

2 One box tops another

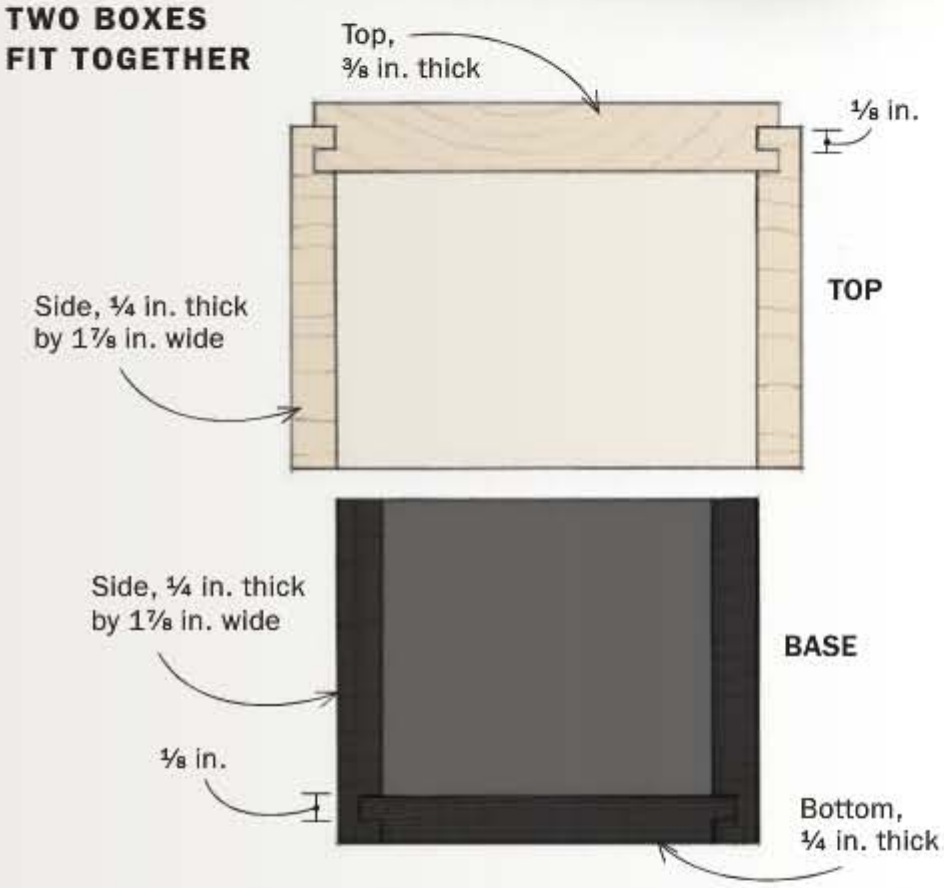
I see this box as a stripped-down version of box No. 1. Here, the bottom of the box acts like its own box liner. The lid nests over it almost completely, so lifting it off is like revealing a hidden box. Make the two out of contrasting woods for a more surprising revelation.

—M.P.

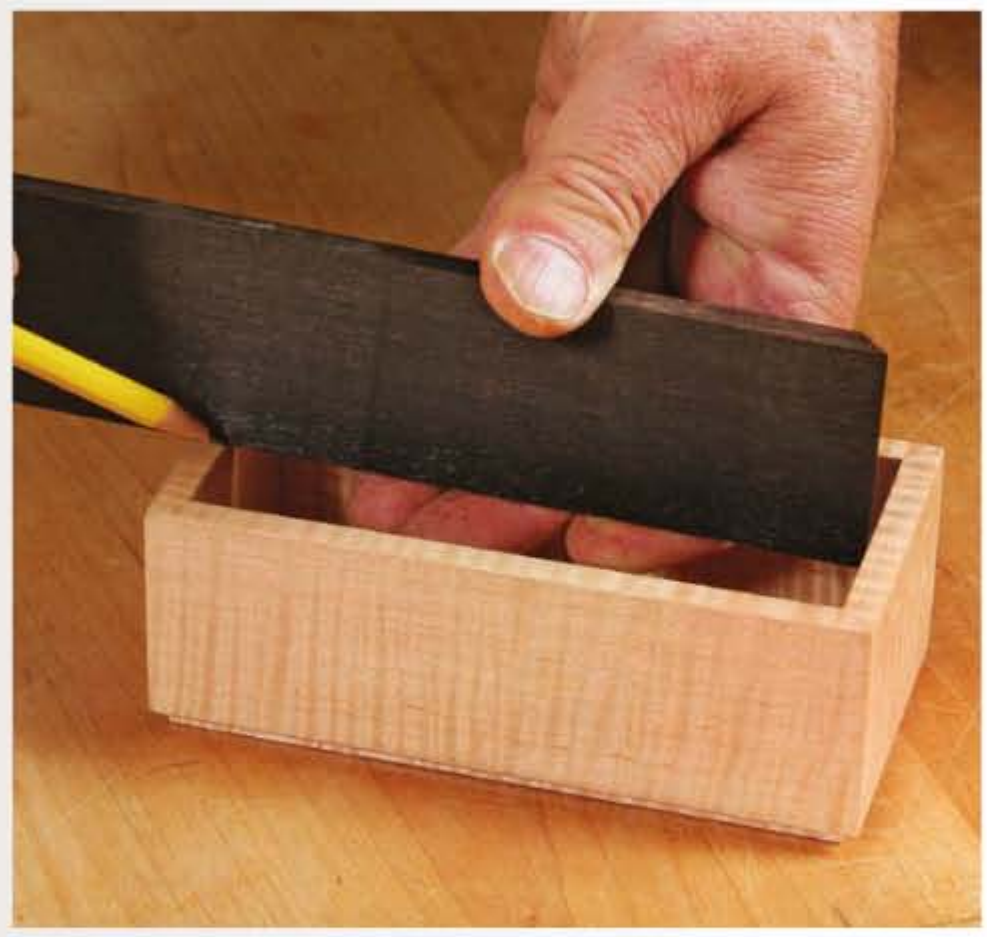


Glue up the top first. *Treat it like a box without a bottom, using blue tape at the corners to create clamping pressure on the miter joints.*

TWO BOXES FIT TOGETHER



How to make the bottom box. *Attach an L-shaped fence to a miter gauge to prevent tearout. Start with pieces that are longer than the side's final dimension and make the first miter cut on each one (above). Then mark each side for final length by putting the mitered end inside the larger box and marking directly from it at the opposite end (right). To cut it to length accurately, line up the mark with the miter cut in the L-shaped fence on the miter gauge.*



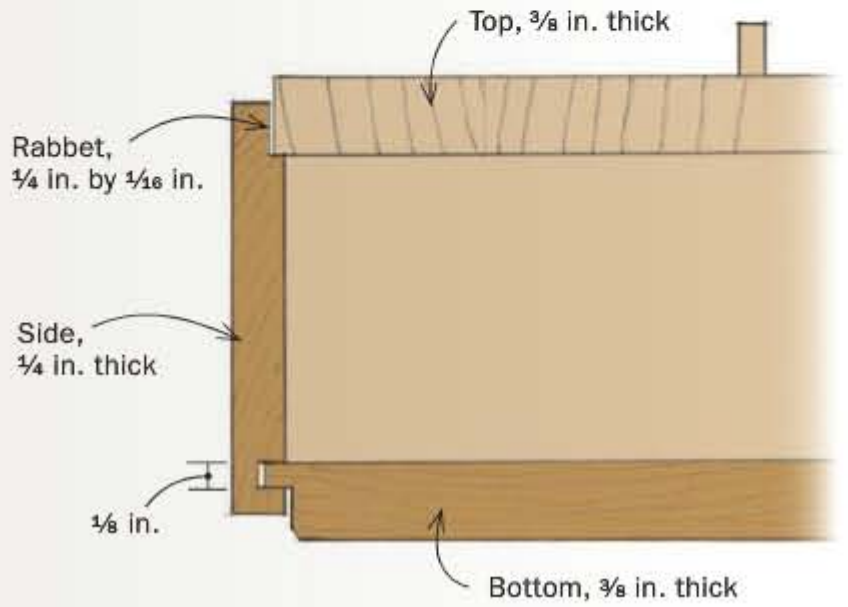
3 Drop the top into a rabbet

I wanted a box with a modern look and a thin top. So I gave a contemporary turn to the old trick of holding the top in a rabbet, putting in a full-height divider that splits the top in two (something that would have required four hinges in a traditional box). By the way, the lifts are attached with cyanoacrylate glue.

—M.K.

ROUT THE RABBETS

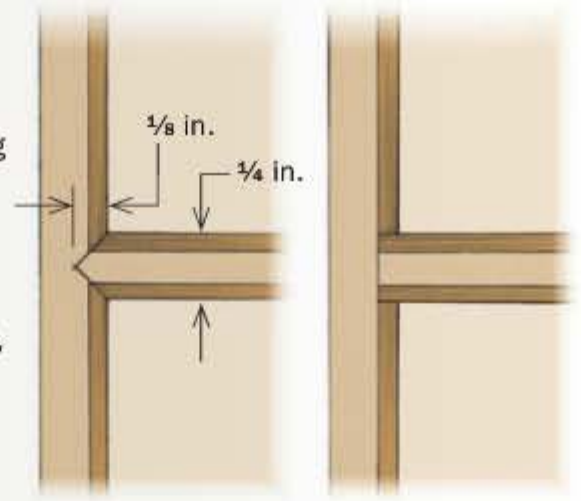
Align the router table's fence with the bit's bearing. Keep the side pressed down firmly; small deviations in the rabbet's depth are noticeable on a little box. (The groove is for the box's bottom.)



V-GROOVE BIT DIVIDES BOX

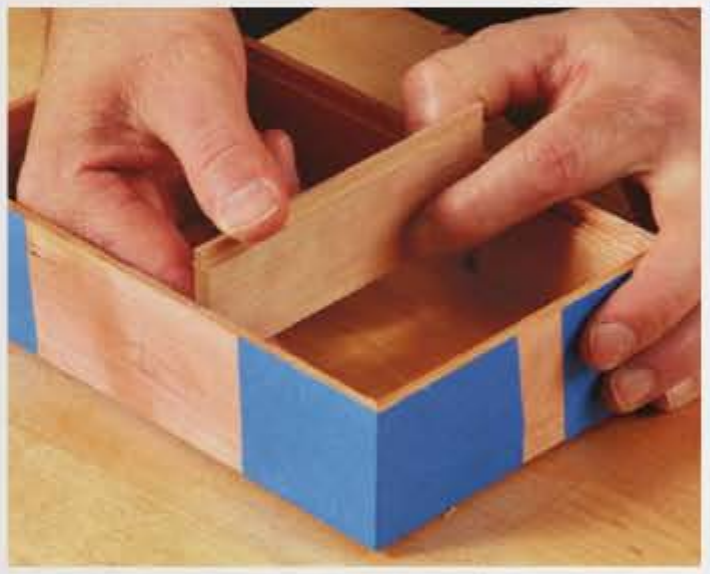
It should be as wide as the divider is thick and set up to cut its full width. Use a large backer board to keep the side square to the bit, and stop the cuts when they reach the bottom groove.

You could leave the divider inside the box, but it looks better full-height, separating the top into two parts. To join the divider to the sides, the best choice is a bird's-mouth joint, because it has a cleaner look that echoes the mitered corner joints.



MITER IS SHARP DADO IS CLUNKY

The same bit shapes the divider's ends. *Attach a zero-clearance face to your fence and align it with the middle of the bit. You shouldn't need to adjust the bit's height.*



Fit the divider. *Do it after gluing up the box (use blue tape in place of clamps). If the divider is long, plane a shaving or two from one tip and re-rout it.*

Cut the two-panel top. *Square one end of your lid stock, mark and cut the longer side to length, and then mark, cut, and fit the shorter one from the adjacent section.*

Drawings: Kelly J. Dunton

4 Tip the lid and stand it up

The lid of this box is a more sophisticated version of a lid in a rabbet, with the rabbets functioning like a hinge. The side rabbets are sloped at the back and the back rabbet is deeper than the other three. To open the box, you press on the back of the lid, bringing up the front edge so you can grab it. It rocks gently into the back rabbet, which holds it upright.

—John Nesset is a furniture maker in Minneapolis.

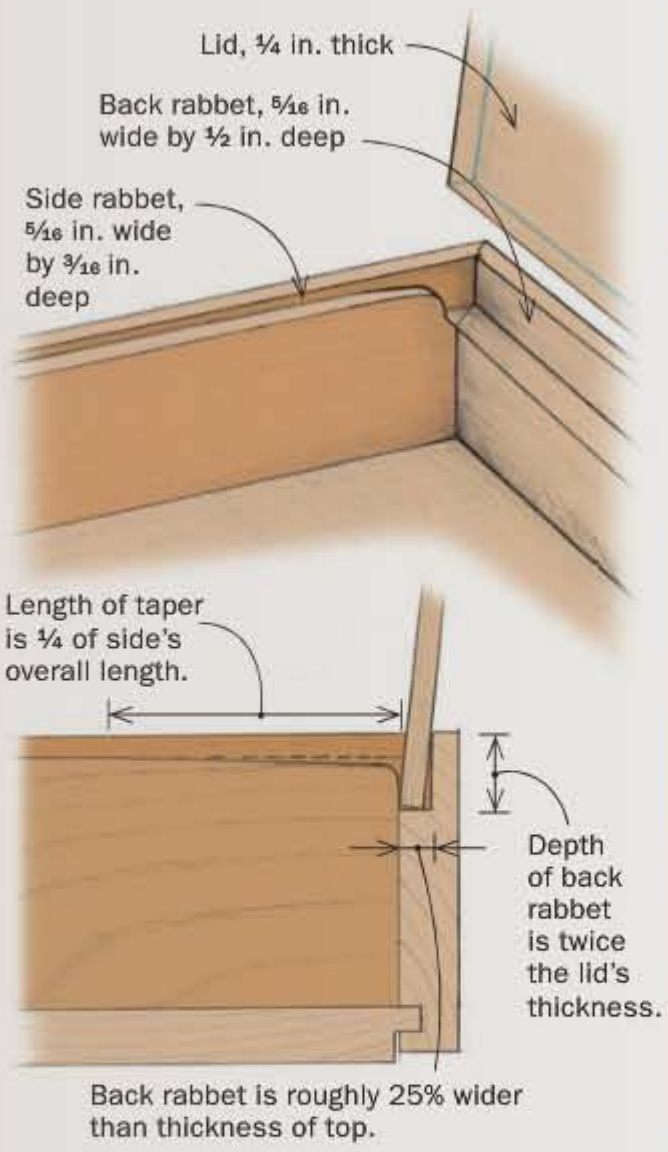
1. Press down. *Because the side rabbets are tapered toward the back, the lid's front edge raises up.*

2. Lift. *The back edge turns smoothly down the rounded corner of the side rabbets, as if it were hinged.*

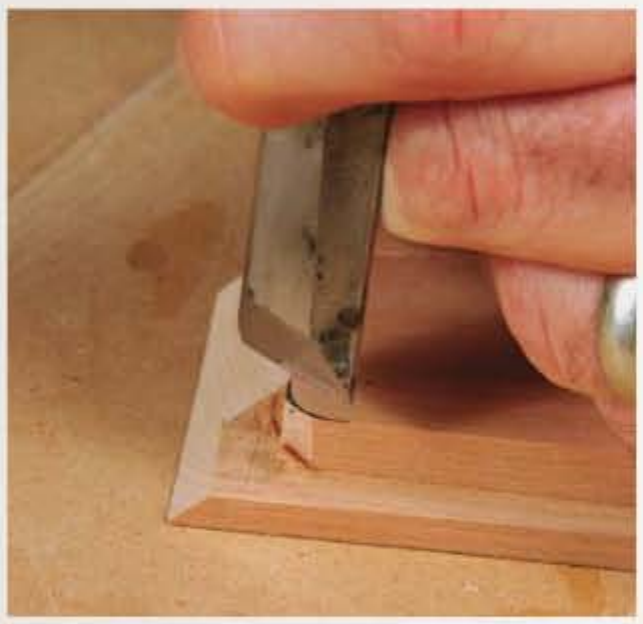
3. Enjoy. *The back rabbet is wider than the top is thick, so the lid leans back, coming to an easy rest.*

MODIFIED RABBETS ACT LIKE HINGES

The back rabbet functions like a built-in stop, holding the lid slightly past vertical so that it won't fall forward.



Start with straight rabbets. *The back one is deeper to hold the standing lid (above). Next, square off the end of the side so that the miter doesn't stick into the back rabbet. Then taper the side rabbet. Start at the back corner and take a slightly longer stroke each time. The final stroke should be the taper's full length (right).*



Round the ends. *Pencil in the layout. Then use a flat chisel (left), making a big chamfer first and then nibbling away ever smaller facets. Smooth the arc with sandpaper.*

Are You

Random-orbit sanders are not as foolproof as they seem

BY TERI MASASCHI

Just about every woodworker has a random-orbit sander. They're cheap to buy, they can handle any job, and you don't need to serve an apprenticeship to use one effectively. But you do need to understand how the tool works. Most people don't. Perhaps they saw one being used on TV, a friend gave them a one-minute lesson, or more likely they simply slapped a disk on their new sander and hit the wood.

The result is too many pieces that show the telltale evidence of poor sanding. These include failure to remove planer and jointer marks or scratches from coarse sandpaper, and surfaces that are smooth but not flat, with depressions and rounded-over edges.

I'll tell you how to handle the sander correctly, what grits to start

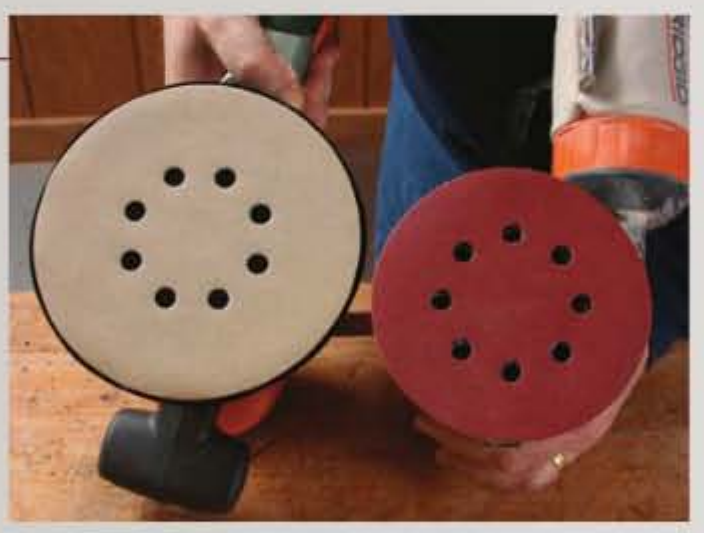
Choose your weapon

5-IN. SANDER IS NIMBLE

Almost everyone owns a 5-in.-dia. random-orbit sander. They aren't expensive, and they can handle almost any task from sanding chair legs and frame-and-panel assemblies to smoothing big tabletops.

6-IN. SANDER COVERS MORE GROUND

The extra inch gives you nearly 45% more sanding surface, which not only covers large, flat surfaces faster but also does a better job of flattening them (for a test of 6-in. random-orbit sanders, see *FWW* #202).



Photos: Mark Schofield

Sanding Right?

and end with, and how to check your progress. It's worth learning how to sand correctly, as sanding is the most critical part of the finishing process. A well-sanded piece is already half finished!

A light touch and a slow hand

One of the biggest sanding debates is about whether to land the sander on the surface running at full speed, to place it on the wood and then turn it on, or to try a compromise, touching down while the motor is still picking up speed. In truth, do whatever feels best (this can vary by model); it really doesn't matter. What is more important is how you sand once you begin.

A key factor is how fast you move the sander over the workpiece. Some people work in a frenzy, moving the sander rapidly back and forth as if they were using a sanding block. Others spend too long sanding the same spot. The correct speed is eight to 10 seconds per foot. The frenzied among you will find slowing down like coming off the highway and going 25 miles an hour, but skittering the tool around doesn't help: You can't possibly move faster than the sander's vibration. On the other hand, slowing down allows you to keep better track of your sanding pattern and to be sure you are covering the surface evenly.

Random-orbit sanders need to float on the surface with light pressure to produce an optimum orbital pattern. Don't push down on the sander in the belief that it will cut faster. You'll just cause the tool to bog down, load up the paper with dust, and leave swirl marks on the wood. Bearing down also will create excessive heat, which can warp the sander's pad. If the sandpaper is constantly wearing out only around the perimeter, the pad has been distorted by heat buildup around the edge and you need to replace it.

Other secrets of success

When sanding a wider surface, overlap each pass by between a third and a half to ensure even coverage. As for the edge of the workpiece, it's fine to overhang it slightly, but keep at least two-thirds of the pad on the surface to avoid the risk of tipping the sander and rounding over the edge. If you are working on narrow surfaces such as legs or the edges of boards that individually can't meet the two-thirds rule, consider clamping identical pieces together and sanding them collectively. The wider surface provides a more stable platform for the sander.

One thing you should never try to do with a sander is to break or bevel an edge. The action is not designed to work on a narrow

The 5-in. sander is the one most woodworkers should buy first. It's versatile and a must for narrow surfaces such as chair legs, but there are some good reasons a 6-in. machine should be second on your list. If you do a lot of sanding, take a look at the Mirka Ceros sander (see *FWW* #218, p. 20). It has the light weight and low center of gravity of an air sander, yet it is electric, so there's no need for a large compressor. That said, the Ceros costs about $500, considerably more than most electric sanders.

Years ago, pressure-sensitive adhesive (PSA) disks were cheaper than hook-and-loop (H&L) ones, but if you were sanding a small piece you often had to discard a PSA disk before it was used up, whereas H&L disks can be reused. Now the cost has nearly evened out and most sanders come with a H&L pad. Yours should, too.

Don't spend extra on a sander with speed control: I have never understood why anyone would sand at lower speeds and not keep the sander at its maximum setting. The only exception is wet sanding or polishing, which you shouldn't do with an electric sander anyway because of the risk of a shock. ***—T.M.***

AIR POWER FOR HARD-CORE SANDERS

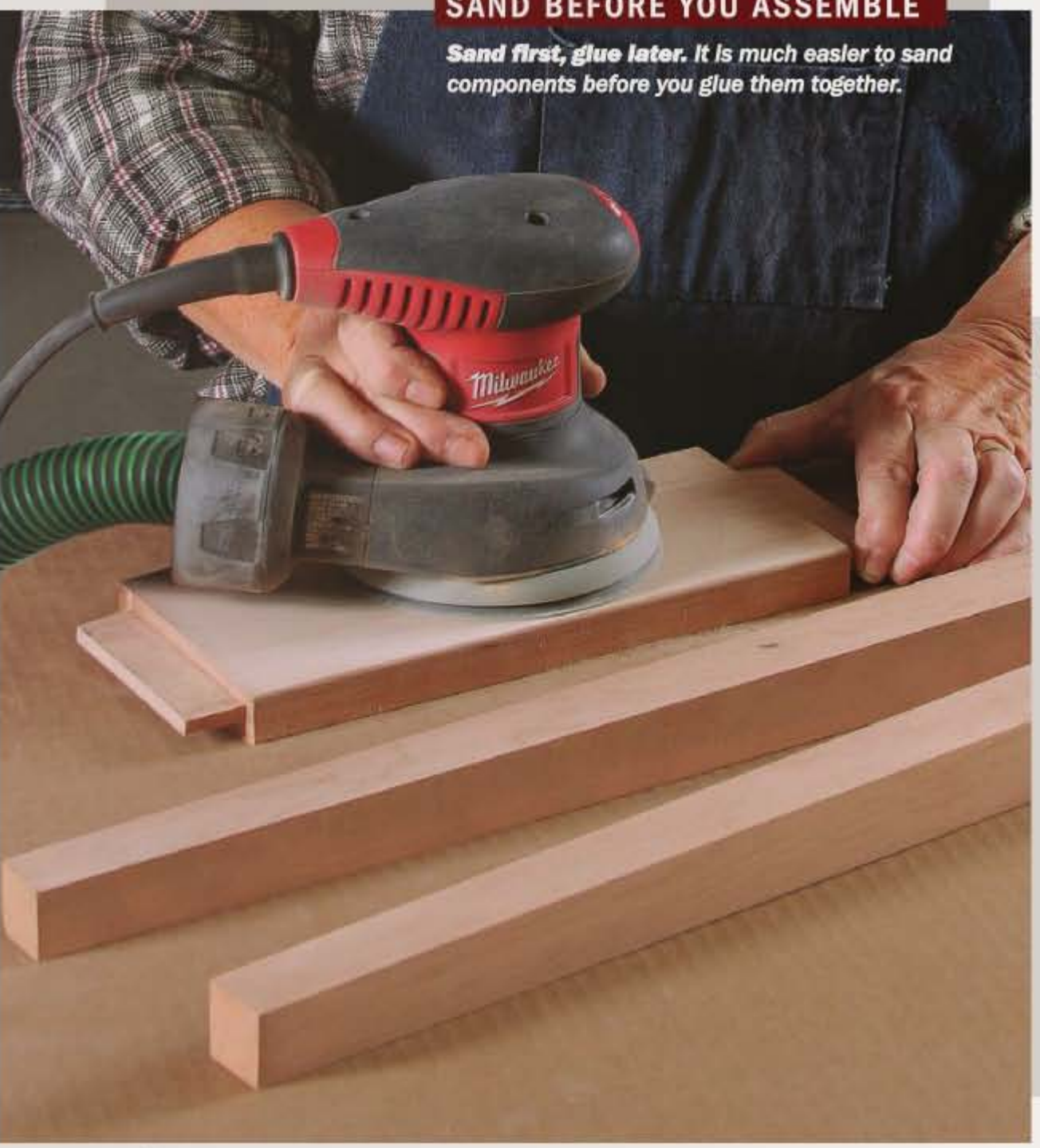
The majority of professional finishers and large cabinet shops use air-powered sanders for several reasons: They are more compact, lighter, and less top-heavy than their electric counterparts. They have fewer moving parts, last longer, and can be repaired rather than being generally disposable. However, these sanders are air hogs and at 90 psi, they need 20 plus cubic feet of air per minute, which translates into a 50- or 60-gal. compressor, compressed air lines, and in-line air filters and driers. That is the real expense of these machines, which makes them hard to justify for a hobbyist.

Random-orbit 101

THE RIGHT RATE

Slow and steady. *Advance the sander at a rate of about 8 to 10 seconds per foot, rather than rushing the sander all over the place. This lets the sander do the work and lets you keep track of your pattern, so you sand uniformly.*

SAND BEFORE YOU ASSEMBLE



Sand first, glue later. *It is much easier to sand components before you glue them together.*

edge and you'll end up with an irregular surface. Break edges using a sanding block or bevel them with a block plane or a router bit.

There is no doubt that random-orbit sanders create enormous amounts of dust. Effective dust pickup from the sander will not only keep the air clear but also keeps dust from packing the spaces between the abrasive particles and killing sanding efficiency. Hooking up a vacuum to the sander speeds stock removal and will extend the life of the disk.

Even with a vacuum attached, it is still necessary to sweep, vacuum, or blow off the surface before switching sandpaper to the next higher grit. Otherwise, leftover abrasive from the previous grit can create occasional deeper scratches even after you've switched to a finer disk.

Guide to the grits, from start to finish

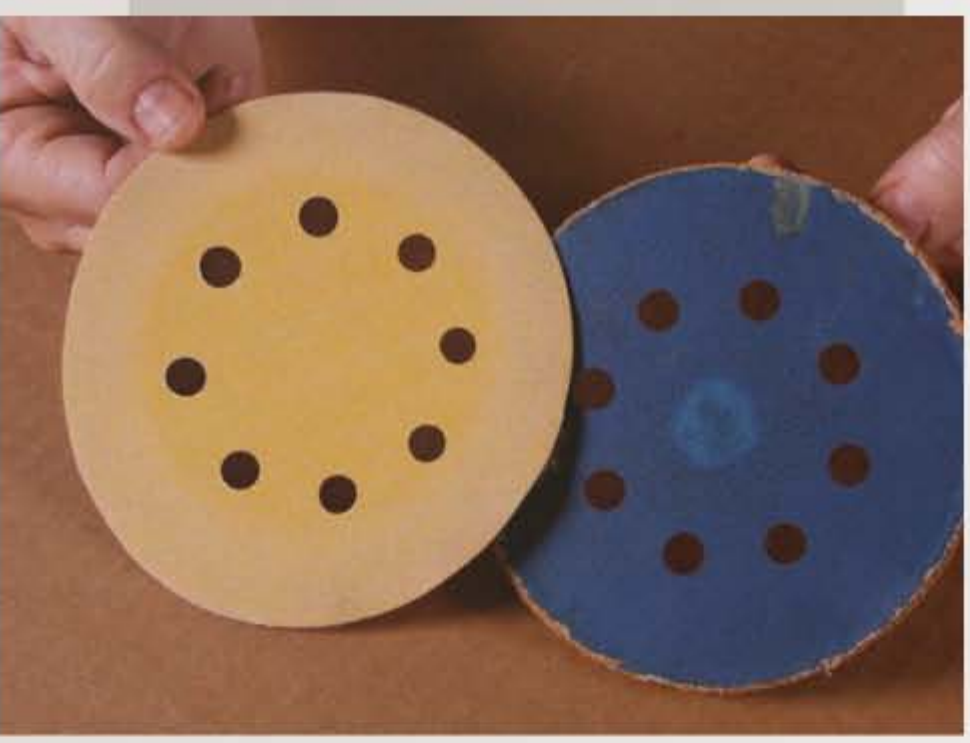
The first grit is unique: Its job is to remove surface defects. How coarse that grit should be depends on the severity of those defects: For large changes in height such as planer snipe or uneven edge-glued boards, you should start with 80 or 100 grit (it would be quicker, though, to remove the bulk of the high areas with either a handplane or a belt sander with a 100-grit belt). If the surface is essentially level but there is some tearout, you can start with 120 grit. If you have a smooth, flat surface left by either a well-tuned planer or handplane, you can start with 150 grit.

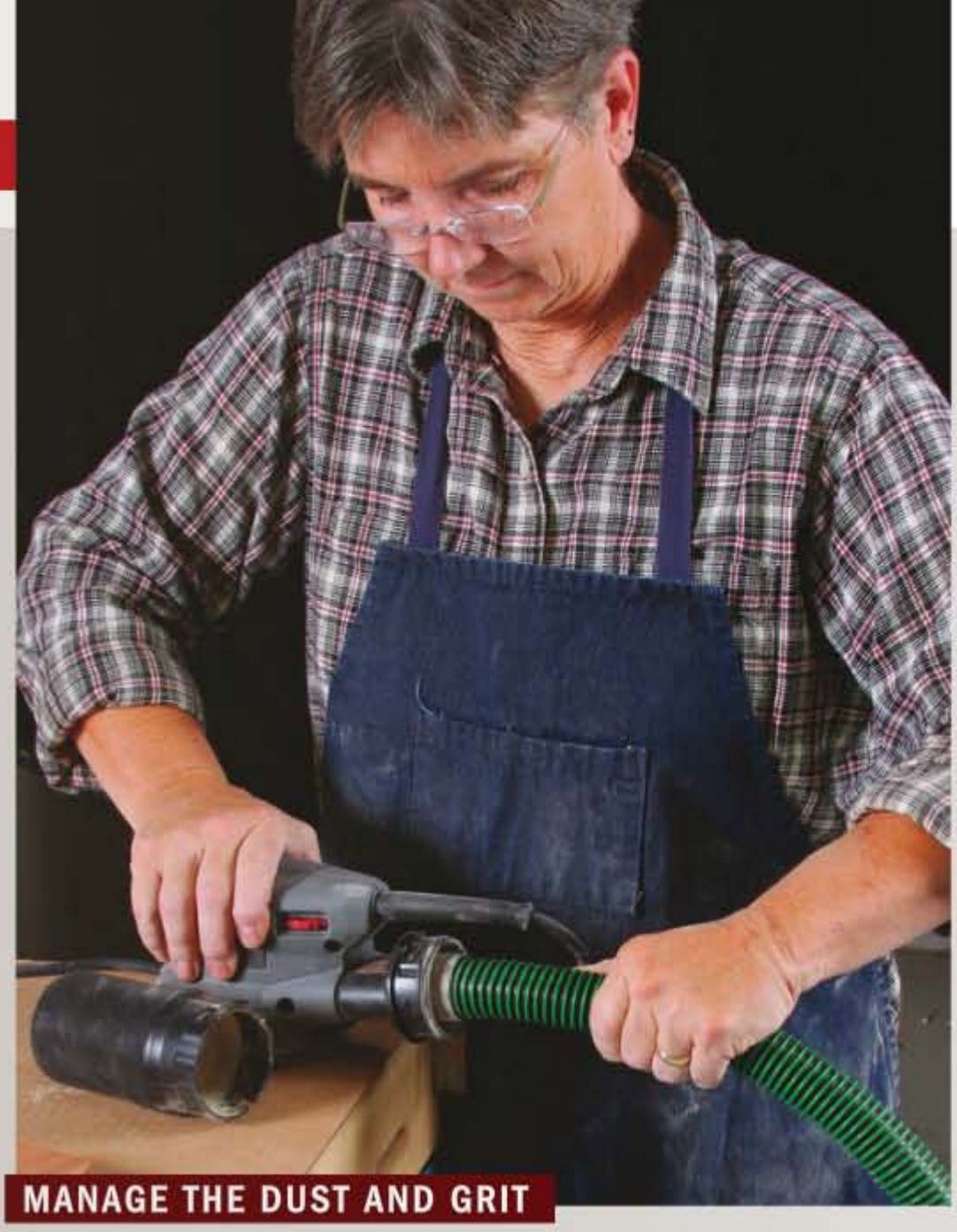
TIP **IF YOU MUST SAND AFTER ASSEMBLY**

If you glued parts together before sanding them, it can be difficult to sand corners without damaging adjacent parts. A large drywall-taping knife lets you work into the corner safely.

NO TIPPING PLEASE

Not an angle grinder. *Don't try to concentrate the sanding power in a small area by tipping the sander. You'll create hollows in the surface. You also risk overheating the rim of the pad and causing it to expand. A sign this has happened is if the disk wears only toward the outside (below).*





MANAGE THE DUST AND GRIT

Attach a vacuum. *As well as keeping your lungs cleaner, attaching a vacuum lets sanders cut faster and extends the disk's lifespan.*

Clean between grits. *Remove any dust left on the workpiece before switching to a higher grit. It reduces the risk of coarse abrasive contaminating the finer disk, and it keeps the shop cleaner.*

Stick with this first grit until *all* of the defects have been removed, and if it is taking too long, switch to a rougher grit. The purpose of subsequent higher grits is only to refine the scratch pattern of the previous grit, not to remove defects. If you switch to a higher grit when *most* of the defects are removed, you may never get rid of them. Most likely you will go through several disks of this initial grit, so don't be tempted to extend their life. Most disks lose their cutting action dramatically after 15 to 40 minutes for coarse 80- to 120-grit disks and half that time for finer 180- to 220-grit disks (see "Tool Test: Sanding Disks," *FWW* #222). After that, it is time to toss them. Continuing to use these disks can cause the dreaded swirl or "pigtail" marks from sandpaper that is clogged. Secondly, don't think that if you start with 100 grit and use it

Two common jobs

IT ALL COMES TOGETHER ON TABLETOPS

The tops of cabinets, chests, and tables are the most visible surfaces and therefore require the most careful sanding.

Level first. *The first stage is leveling the surface. The grit you choose depends on how much material you need to remove. Letting up to a third of the sander's pad overhang the edge of a work surface helps ensure uniform sanding. But go beyond a third and you risk tipping the sander and rounding the edge.*

Check the surface. *Looking across the surface into a raking light (above) helps reveal any imperfections. This pigtail squiggle (right) was probably caused by a piece of debris that the sander picked up when it was set down on the bench.*

long enough, it becomes 120 or 150 grit. It just creates 100-grit scratches, more and more slowly.

To see if you've removed all the defects, vacuum the dust, wipe on some denatured alcohol or mineral spirits, and check the surface with a raking light.

The two-line trick—The subsequent grits go much quicker. Draw a light pencil squiggle across the surface and sand the entire surface until it is gone. Draw a second line and sand it off. Now switch to the next-higher grit; it's as simple as that. As you move to higher grits—120, 150, 180, 220—the appearance of the surface will improve as coarse scratches are replaced by finer ones.

The industry standard for what should be the final grit is 220 for softwoods and 180 for hardwoods. This standard applies when using any film-building finish such as shellac, lacquer, and water- or oil-based poly-

Then smooth. *After you've removed surface imperfections with a coarse grit, the role of subsequent finer grits is to refine the scratch pattern. Here's a great way to know when to switch grits. Draw a light pencil line across the surface and sand the whole surface until the line is gone. Repeat and then move on to the next-grit disk.*

Hand-sand last. *Once you've completed the final grit with the sander, use a sanding block with the same size grit, sanding with the grain. This removes any swirls left by the sander. Finally, use 180- or 220-grit paper and a sanding block to break the edges. Don't attempt this with a sander.*

HOW TO HANDLE A FRAME-AND-PANEL

Right and wrong sanding both before and after glue-up can make or break your frame-and-panel assemblies.

PANEL

Flat surfaces first. *It is fine to use a power sander on the raised portion of the panel and its back.*

Hand-sand the profile. *Don't use the sander, even on a flat, bevel-edged profile. Instead, hand-sand up to the same final grit as used on the sander. Go to 320 or 400 grit on the end-grain sections, so they don't absorb too much finish and end up darker than their surroundings.*

FRAME

Gang up parts. *To sand the narrow sides of the frame, clamp them in pairs to provide a wider surface for the sander to ride on.*

Sand the face after glue-up. *After the frame is glued up, you need to level the joints. You may want to reduce major high spots with a hand-plane, but a random-orbit sander is ideal as it won't leave any cross-grain marks on adjacent parts.*

urethane or varnish. But if the surface is going to get a French polish or a thin-finish such as a penetrating oil, then it is a good idea to continue up to 400 grit. If you can't find 320- or 400-grit disks locally, you can mail-order them or, if you have a small project, you can apply these grits by hand using sheets of sandpaper and a sanding block.

In any case, always do the final sanding by hand. Use the last grit that you used on the machine, wrap it around a cork-faced block or any firm sanding block, and sand with the grain in long, straight strokes. This will remove any sneaky swirl marks or other flaws and will soften the edges and refine delicate details. Check the surface again as before. You'll spot any flaws before you apply a clear coat or stain, and you can finish your project confident in its final appearance.

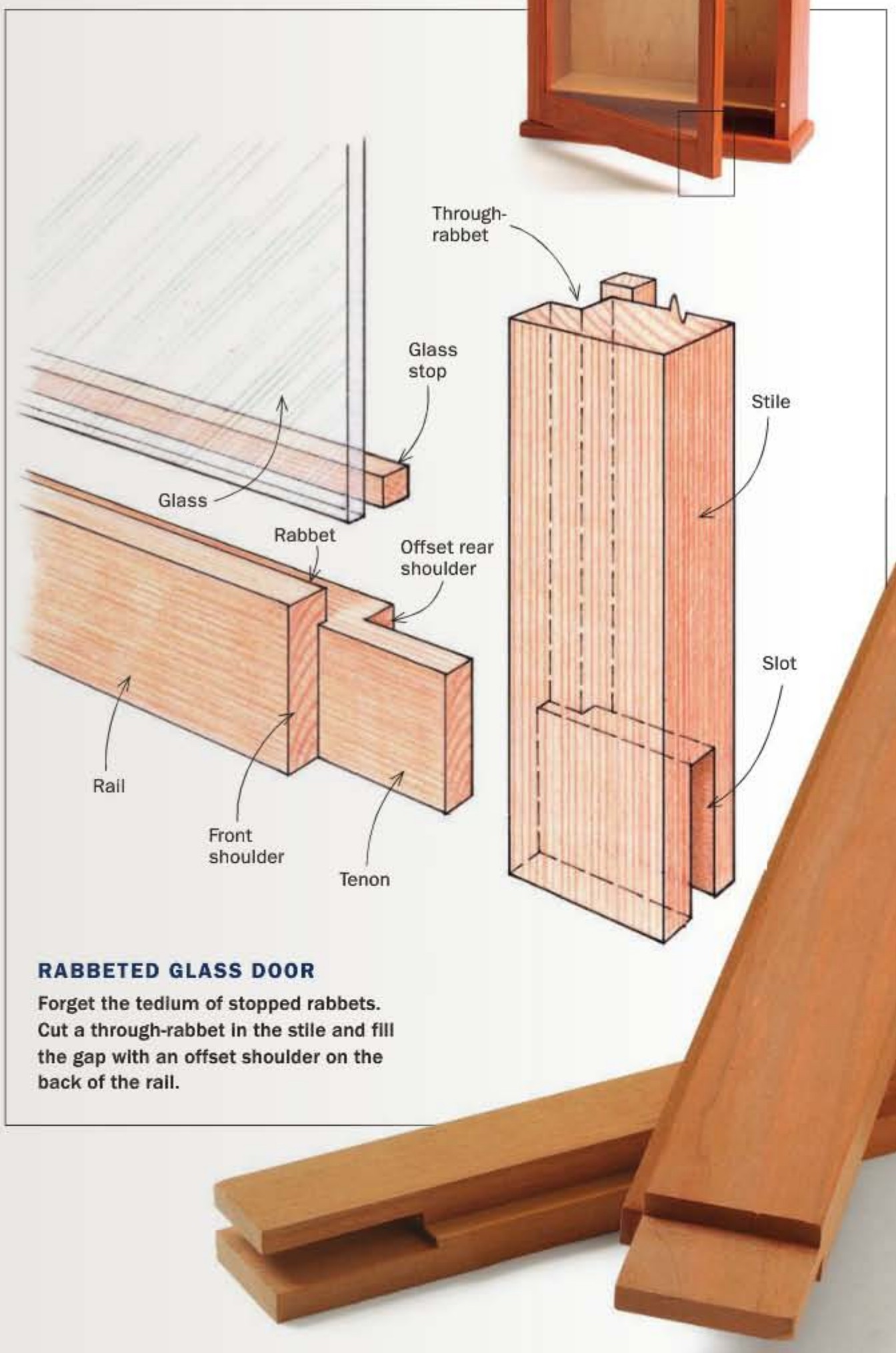
If you've never experienced a well-sanded project, you'll be surprised at how nicely the finish goes on.□

Teri Masaschi is a professional finisher near Albuquerque, N.M.

Glass Doors Made Easy

You can do it all at the tablesaw

BY DOUG STOWE



RABBETED GLASS DOOR

Forget the tedium of stopped rabbets. Cut a through-rabbet in the stile and fill the gap with an offset shoulder on the back of the rail.

I live in Eureka Springs, a small town in northwest Arkansas that's home to many artisans and art collectors. And so I've made several cabinets with glass doors to house art collections. Glass doors are also great for kitchen cabinets, allowing you to display decorative dishes while protecting them, and for enclosed bookshelves. But many people build them in a tedious way, by making a normal mortise-and-tenoned door and then rabbeting the pieces for the glass in a separate series of steps. I've learned that the best way to make those doors is with a bridle joint. Not only is the joint easy to make—I do it with a tenoning jig at the tablesaw—but by shortening the length of the tenon cheek on the back face of the rails, I can cut through-rabbets for the glass at the same time. That saves you the hassle of routing stopped rabbets and squaring their corners after the door is glued up.

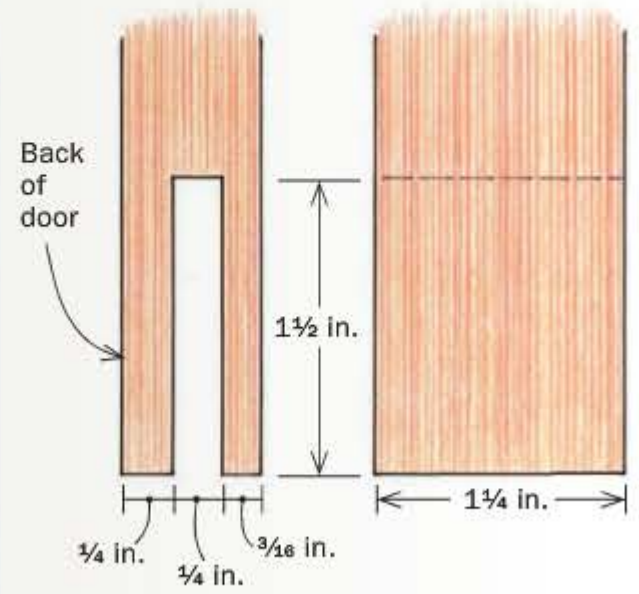
As simple as this joint is to make, it is one of those assemblies—like the dovetail—that can be hard to wrap your mind around, at least at first. That's because it can be difficult to imagine how the offset tenon shoulder on the back of the rail fills the rabbet on the stile. But don't worry, it does. And the steps are easy.

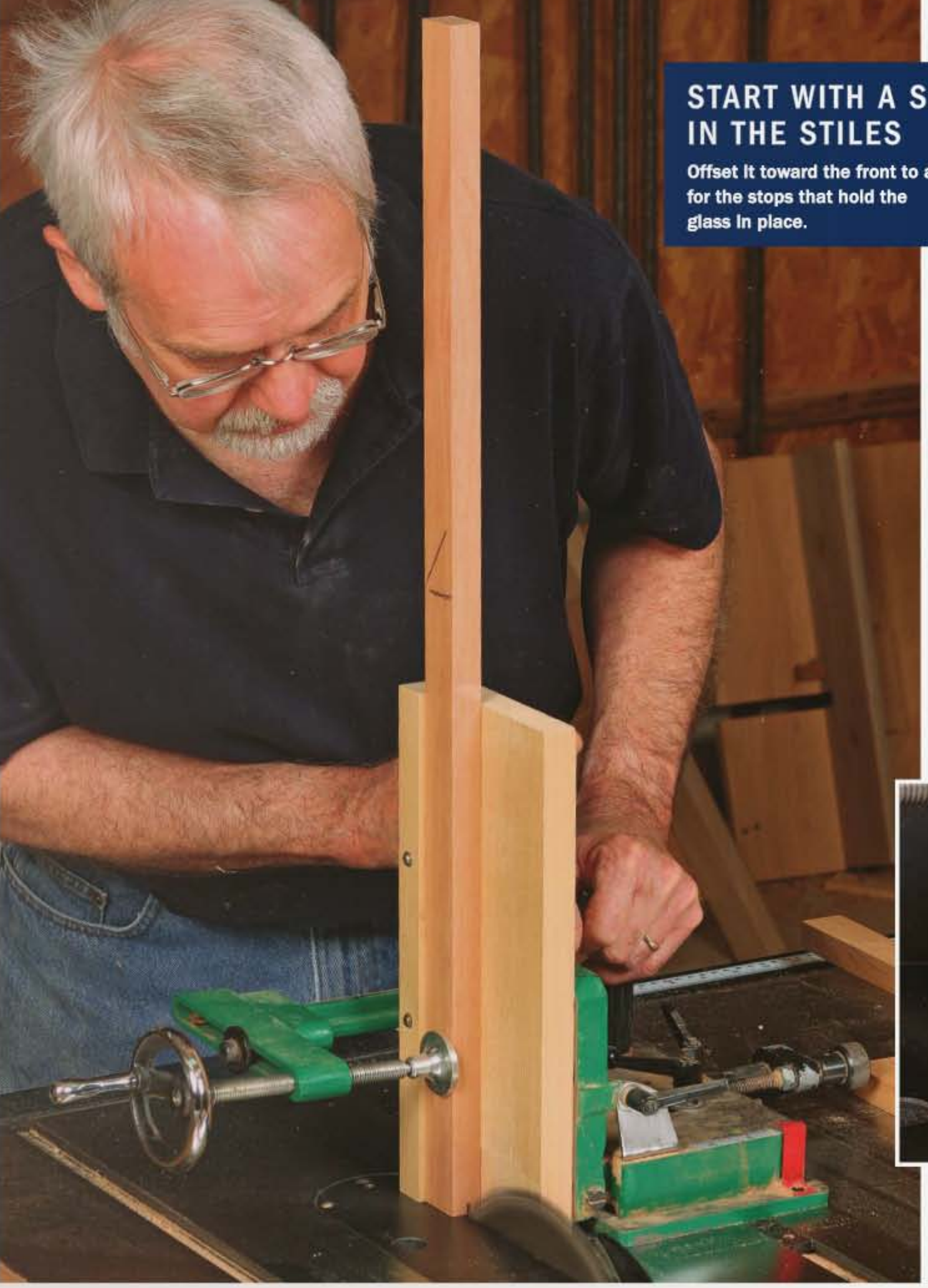
Make the bridle joint first

There are two parts to the joint. A slot is cut into the end of the stile, and a tenon onto the end of the rail. On a door with a wood panel, both of the tenon's shoulders

START WITH A SIMPLE SLOT IN THE STILES

Offset it toward the front to allow room for the stops that hold the glass in place.





Use a tablesaw tenoning jig. *Set up the jig so that the blade cuts the side of the slot closest to the jig first. The slot is ¼ in. wide, so with a standard blade, the second cut will complete the slot.*

are the same distance in from the end of the rail. However, in order to cut through-rabbets on the back of the parts, the cheek is shorter on the back than it is on the front so that the shoulder on the back fills the rabbet on the stile after the door is glued up. That means there are no unsightly gaps in the door frame from the through-rabbets.

Before you make the joint, lay the parts on the bench and mark their faces and inside edges to help keep them properly oriented as you cut the joints and rabbets. Also, I start with rails and stiles that are about ⅛ in. longer than final size. I cut the joints so that the ends of the tenons and slots are 1⁄16 in. proud after assembly and then trim them.

Start with the slots on the stiles. I use a tenoning jig to hold the stile on end as I run it through the tablesaw blade. Use a blade with a flat-top grind, like a ripping blade. Some combination and crosscut blades leave a V-shaped notch in the bottom of the kerf that would be visible after assembly.

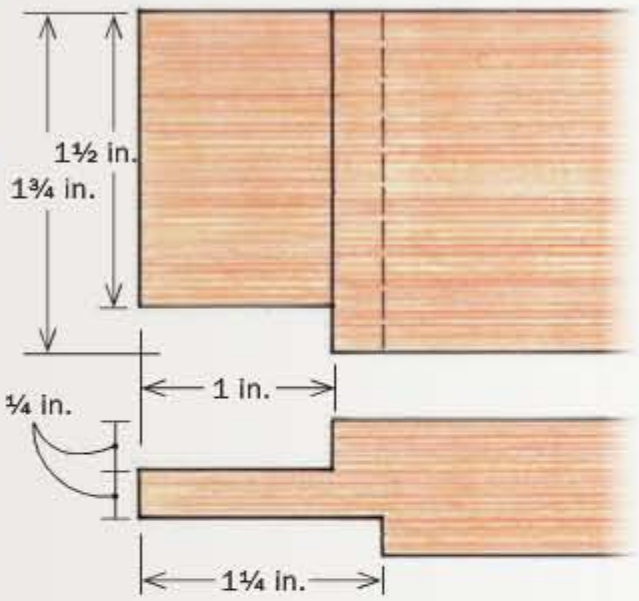
Put the back face of the stile against the jig and clamp the stile in place. Cut the first side of the slot. Make the same cut for the remaining three slots. Adjust the fence to align the blade with the other side of the slot and make that cut for all four slots. I use a blade that's ⅛ in. thick, so those two cuts form the entire slot. A thinner blade requires a third cut to clean out the middle.

Now it's time to cut the tenons on the ends of the rails. This joint will seem strange at first, because the tenon's cheeks

Photos: Matt Kenney; drawings: Vince Babak

CUT SHOULDERS ON THE RAILS

Use your tablesaw sled to cut the offset shoulders.



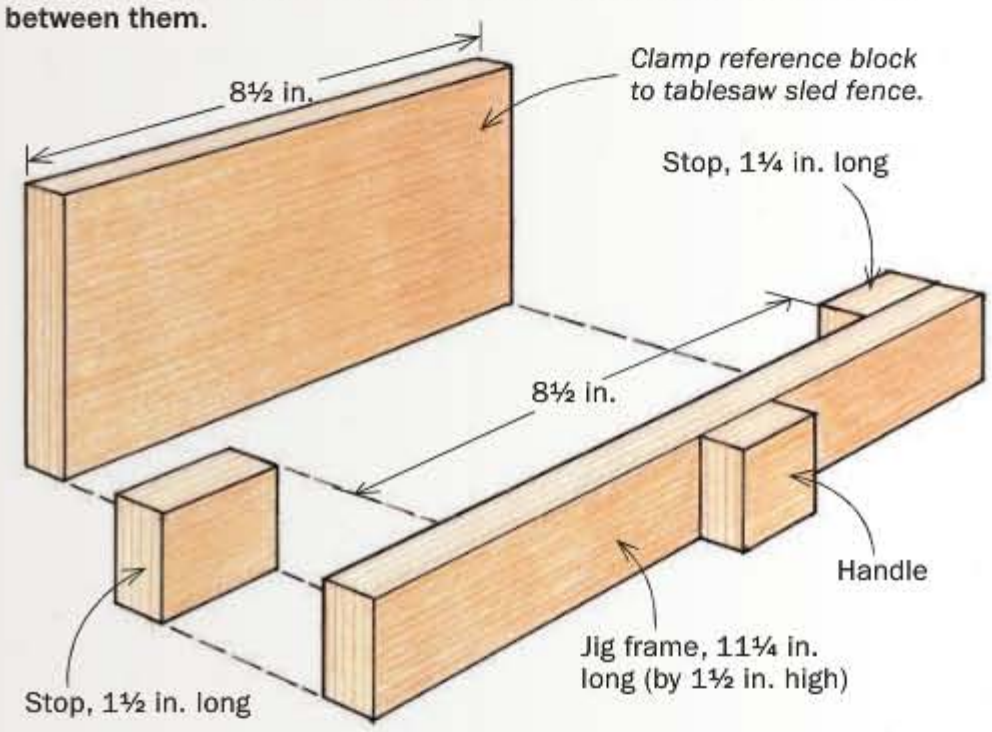
TIP

Set the blade height directly from the stile. *It's quicker and more reliable than transferring a measurement from the slot.*

Cut the short shoulder first. *Use the end with the longer stop to make the shorter side.*

TWO-SIDED STOP BLOCK MAKES PRECISE CUTS

For this joint to work, the shoulders' offset must be precise. That's no trouble with this jig. Flip it end for end to create the ¼-in. offset between them.



All parts made from ½-in.-thick plywood.

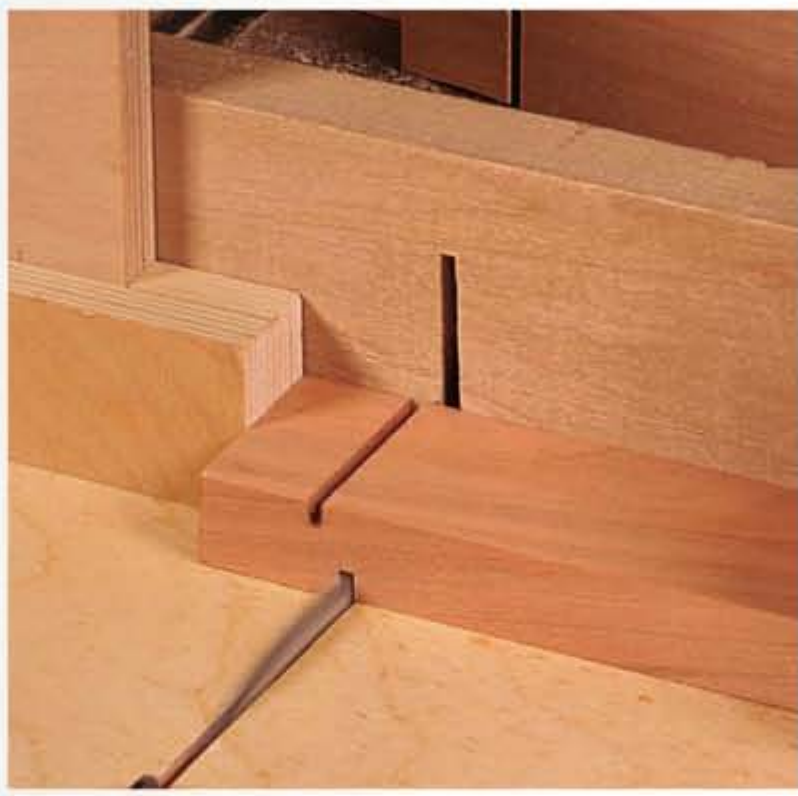
are different lengths. But after you put the joint together, it makes perfect sense.

I cut the shoulders at the tablesaw with a crosscut sled and a jig that has two different stops built into it. One stop lets me cut the shoulder for the shorter cheeks on the rail's back, and the other is set to cut a shoulder for a cheek that is ¼ in. longer. Cut the back shoulders of the rails first. Then switch the stop to its second position and cut the front shoulders.

Now cut the cheeks using the tenoning jig. Because the cheeks on the front are longer than those on the back, cut them first. Put the rail in the jig with its back against the main fence and cut all of the front cheeks. Then lower the blade and cut the cheeks on the backs.

Finally, trim the tenons to their final width. This is more critical than usual for a tenon, since the fit will show on the

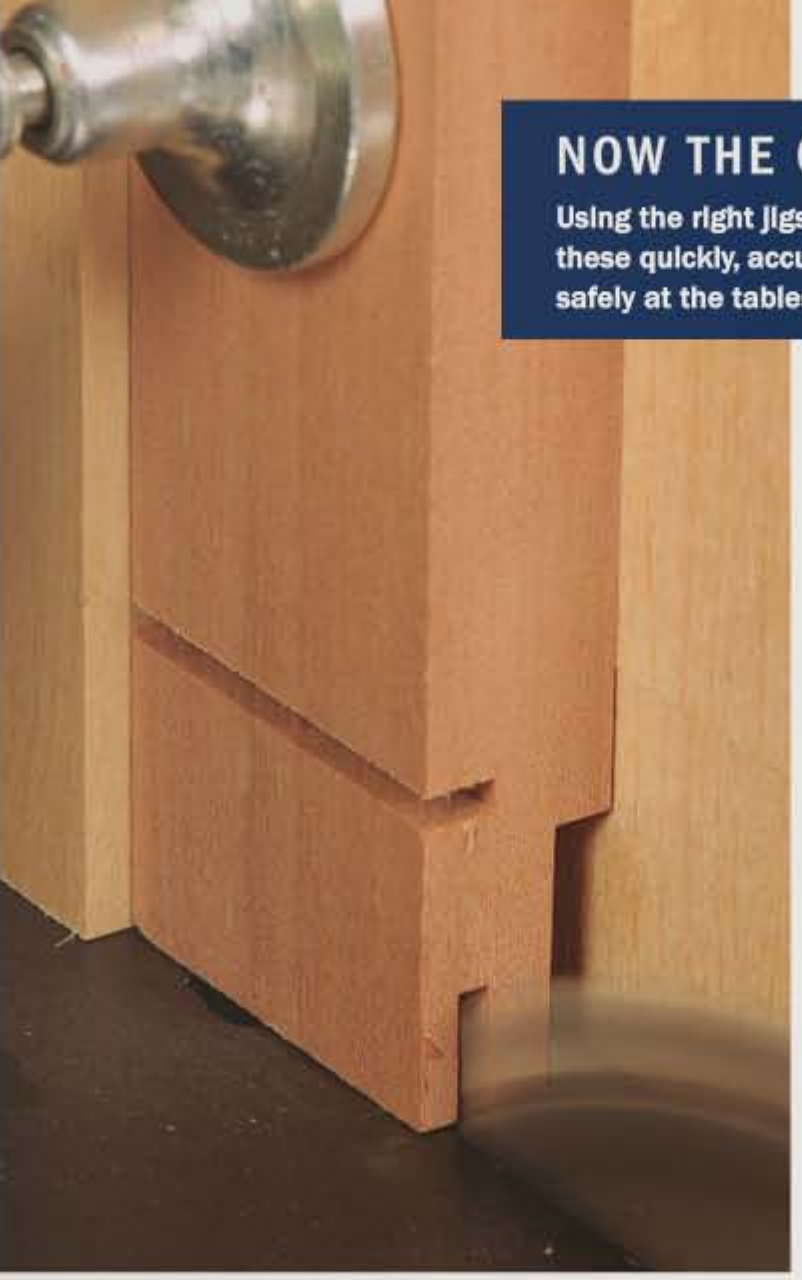
Flip the stop. *The reference block ensures that it ends up in the right place.*



Then cut the long shoulder. *The second stop is ¼ in. shorter than the first, so the second cheek is ¼ in. longer.*

NOW THE CHEEKS

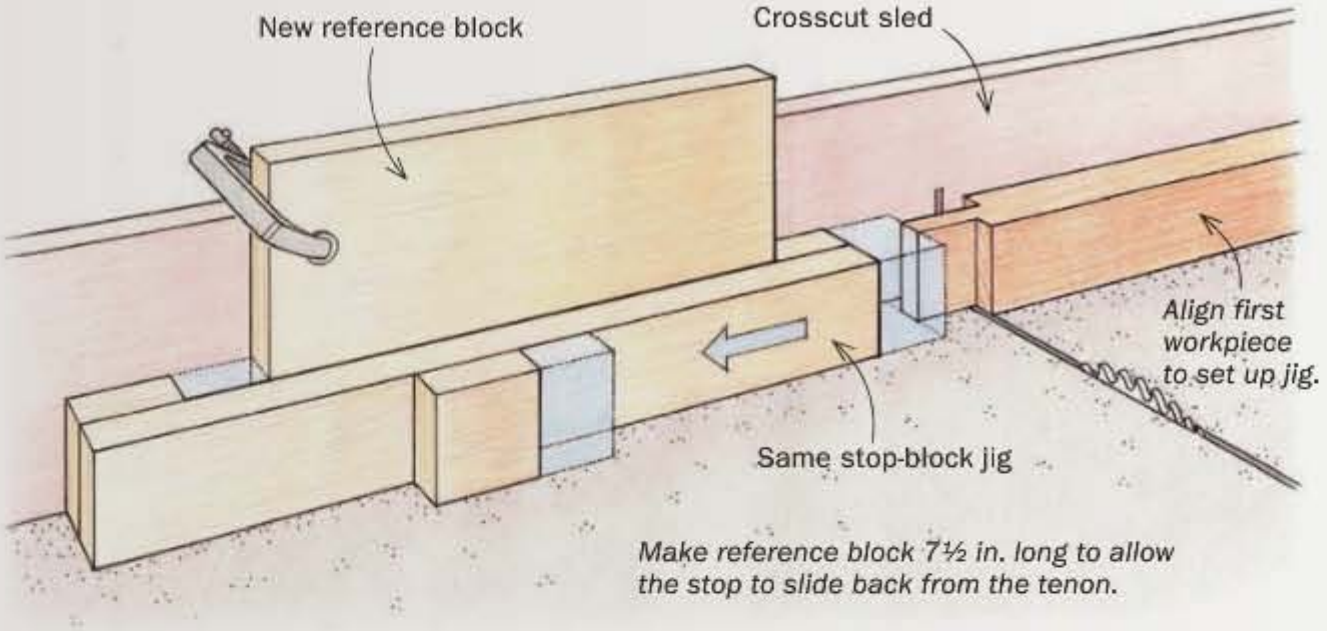
Using the right jigs, you can cut these quickly, accurately, and safely at the tablesaw.



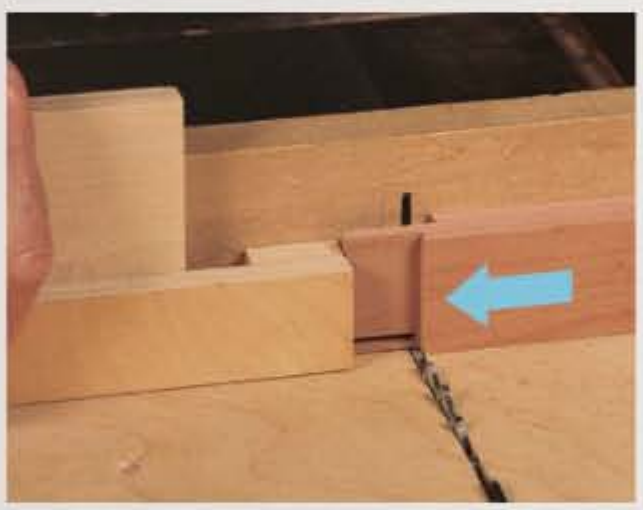
Pull out the tenoning jig again. *Set the blade to cut the shorter cheeks first. Then adjust the jig, raise the blade, and cut the longer cheeks.*

Use the jig to cut the tenon's width, too. *Set the blade height to the lower (rear) shoulder.*

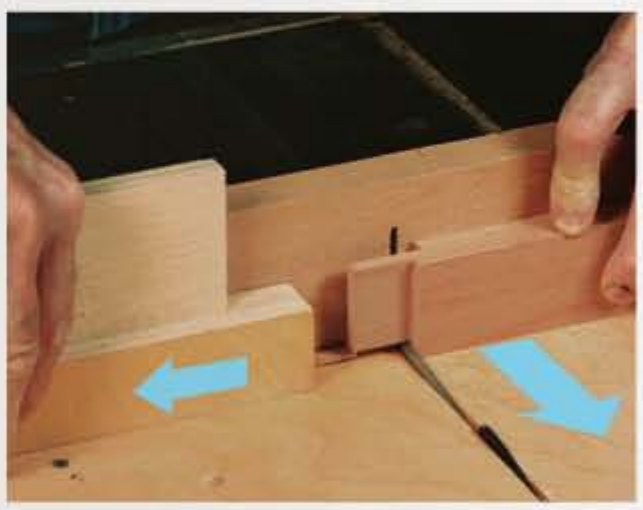
ALTER YOUR STOP SETUP FOR THE FINAL CUT



Make reference block 7½ in. long to allow the stop to slide back from the tenon.



Position the workpiece. *Push the stop block toward the blade, and the workpiece toward the block.*



Move the stop and make the cut. *This allows the waste piece to move away freely.*

outside of the frame. After setting the blade height so that it is just lower than the length of the tenon, I clamp the rail into the tenoning jig with its inside edge against the main fence. I then define the final width of the tenon with a single cut of the blade. Then I use a crosscut sled with a stop to make the shoulder cut that frees the waste piece. The stop ensures that the shoulder aligns with the shoulder on the front of the rail.

Cut the rabbets and assemble the door

Now that the bridle joints are finished, you can cut the rabbets that hold the glass. Because of the way the bridle joint is cut, these are through-rabbets, made quickly at the tablesaw.

Set the blade height to ⅜ in. Set the rip fence so that the outside edges of the blade's teeth are ¼ in. from it. Lay the rail back down on the saw's table and cut the first side of the rabbet. Next, lower the blade to ¼ in. and adjust the rip fence so that the outside teeth are ⅜ in. from it. Stand the rail on its inside edge and cut the second side of the rabbet. The blade can push the waste back toward you after it's cut free, so don't stand directly behind the blade.

After the rabbets are cut, the joint fits together and you can see why the tenon's cheeks are different lengths. Now I dry-assemble the door and rout a slight chamfer on the inside edges of the rails and stiles, using a chisel to square the rounded corners left by the bit. The joint fits tightly enough that you don't need clamps, which would get in the way at the router. Disassemble the door and sand the inside edges of the parts, which would be more difficult to do after the door is glued together.

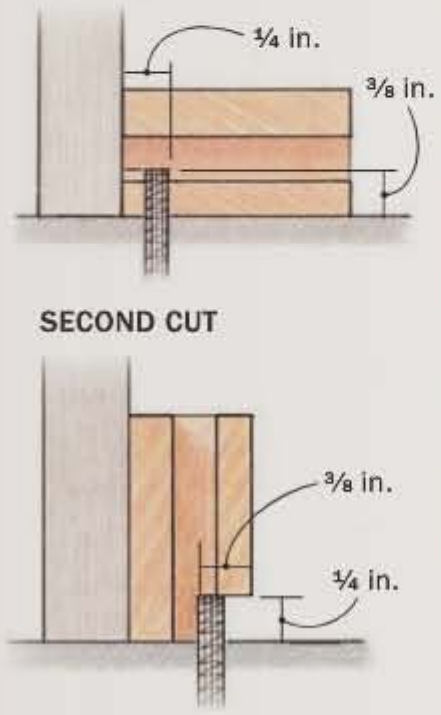
Now glue up the door. Apply glue to the tenons only and push them into the slots. If you put glue in the slot as well, the tenon will push most of it out, creating a mess on the outside edge of the joint. You should be able to bring the joint completely together with hand pressure. Then use a C-clamp and cauls (to protect the door from the clamp heads) to hold the joints together. No other clamps are needed.

After the glue has dried, trim the rails and stiles to length and sand the frame, but don't re-sand the inside edges.

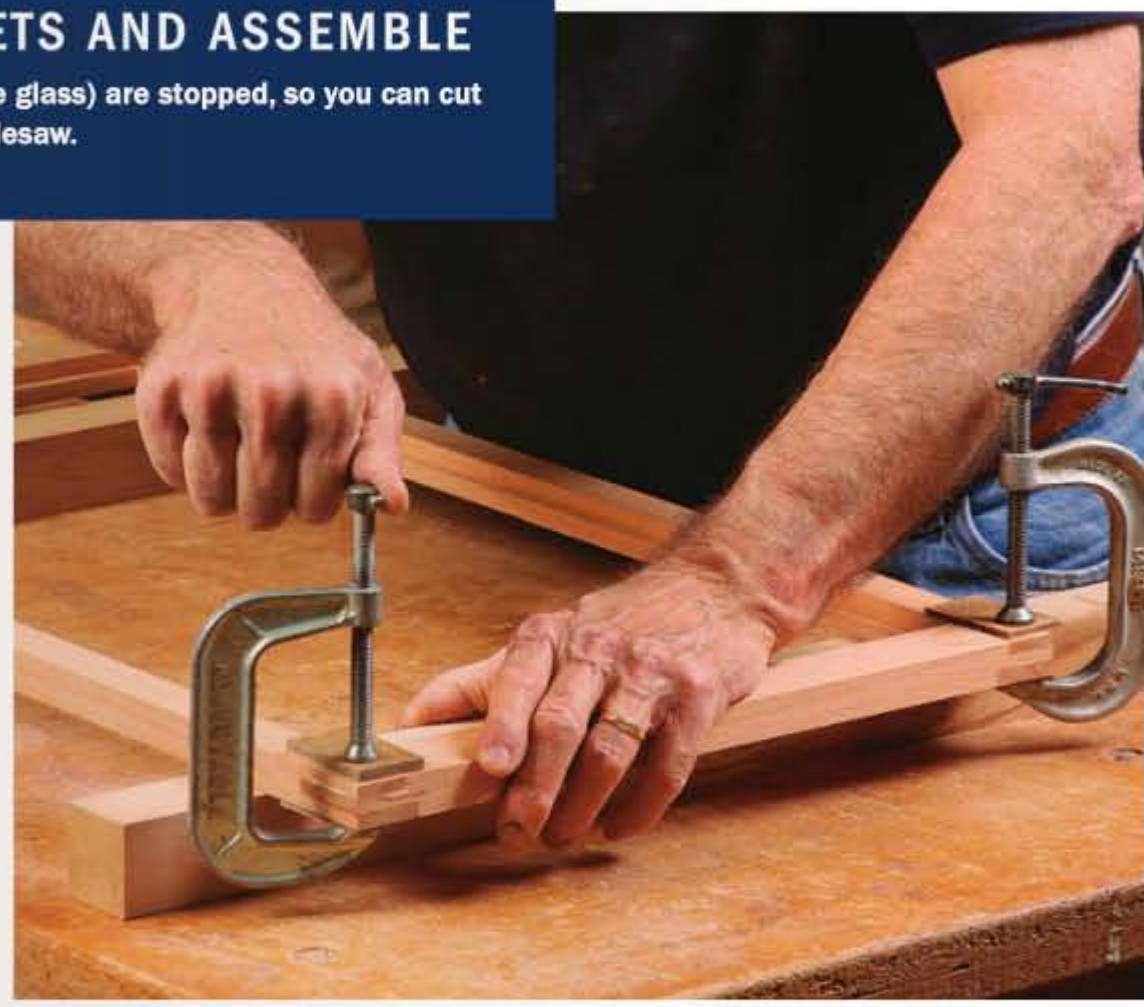
CUT THE RABBETS AND ASSEMBLE

None of the rabbets (for the glass) are stopped, so you can cut them all quickly on the tablesaw.

TWO CUTS FOR THE RABBET



The first one is made with the rails and stiles face down, the second is with them on edge to free the waste.



One clamp for each joint. *If the frame is square and the joints tight, you don't need clamps across the width and length.*

I use glass that is ⅛ in. thick, so the stops (wood strips) that hold the glass in place are made from ¼-in.-square hardwood. After milling them, I sand them and then fit them to the frame, using butt joints at the corners. Fit the sides first, and then the top and bottom. That way, if you make a mistake cutting the sides, you can cut them shorter and use them for the top and bottom.

I hold the stops in place with ½-in.-long #20 gauge brad nails. To prevent the stops from splitting, pre-drill for the nails at the drill press. Now apply a finish to the frame and stops. Clean the glass and put it in place. Use a tack hammer and nail set to drive the nails into the stops, placing a piece of cardboard between the hammer and glass so that it doesn't get scratched or broken. The nail set helps you direct the hammer's force and keep the nail moving straight in. Once a small brad nail begins to bend, there is no correcting it, so just cut your losses by pulling it out and starting a new one. Finally, I install hinges. I generally use knife hinges because they are less visible, but butt hinges will work fine, too. □

Doug Stowe, a furniture- and boxmaker in Eureka Springs, Ark., is the author of Building Small Cabinets *(The Taunton Press, 2011).*

THEN INSTALL THE GLASS

Hold it in place with stops. *Stowe predrills clearance holes in these thin wood strips and nails them in using a hammer and nail set. He uses a piece of manila folder to protect the glass. Use butt joints between the stops, not miters, so they are easy to remove for repair.*

Build a Curved-Front Desk

A smart approach to the joinery makes it an easier build

BY CHRIS GOCHNOUR

Online **Extra**

To learn how Gochnour inlaid the stringing in the top, go to **FineWoodworking.com/extras.**

Of all the furniture that I've designed, this desk is one of my favorites. I love its graceful lines and the inward curve of the front. The stepped drawer fronts echo that arc, but are also practical, creating space for your legs. The shape of the legs—a simplified turn on the cabriole—is curvaceous, too. And the top, which has a curved edge to match the front of the base, completes the picture.

Because it's a study in curves, I know this desk might seem too difficult for many woodworkers. Joinery on curved parts can be demanding. But actually it isn't. All of the joints are cut when the parts are still straight. The shaping is done after they're complete. That's even true of the drawers, which have curved fronts. And you'll be surprised at how easy it is to cut the dovetails, after I show you a trick that lets you treat them as if the front were square to the sides.

Another key is to make templates of all of the curves. You can use a batten or flexible ruler to make the leg template. But because the template for the front rails and top is also used for shaping those parts, I recommend Paul

Photo, this page: Skylar Nielsen

Top, ¾ in. thick by 21¾ in. wide by 44 in. long

Top rail, ¾ in. thick by 4 in. wide by 42 in. long

Back apron, 13/16 in. thick by 5 in. wide by 42⅛ in. long

Divider, ¾ in. thick by 5 in. wide

Sliding dovetail

Apron tenons, 5/16 in. thick by 3½ in. wide by 1 5/16 in. long, mitered at rear legs

Filler block, 13/16 in. thick by 2 in. wide

Tenon, 5/16 in. thick by ¾ in. wide by ½ in. long

Tenon, 5/16 in. thick by ¾ in. wide by ¾ in. long

Drawer runner, 7/16 in. thick by ½ in. wide

Bottom center rail, ¾ in. thick by 4 in. wide by 21 in. long

Side apron, 13/16 in. thick by 5 in. wide by 19¾ in. long

Dovetail, ¾ in. thick by 1 in. wide by ½ in. long

Divider end cap, ¾ in. thick by 4 in. wide by 5 in. long

Tenon, 5/16 in. thick by ¾ in. wide by ½ in. long

Bottom outside rail, ¾ in. thick by 1 5/8 in. wide

1¾ in.

1⅞ in.

Front edge beveled to match curve.

Back leg, 1¾ in. square

Front leg, 1⅞ in. thick by 1¾ in. wide

Drawer back, ½ in. thick

Drawer front, ¾ in. thick

Groove, 17/32 in. wide by ¼ in. deep

Drawer bottom, ½ in. thick

Drawer side, ½ in. thick

13/16 in.

1¾ in.

6 in.

10½ in.

28¾ in.

5/16 in.

15/16 in.

Stringing, ⅛ in. thick by ⅛ in. wide, inset 1⅛ in. from edge

1 13/16 in.

44 in.

21¾ in.

3½ in.

5 in.

9 in.

20 in.

2½ in.

¾ in.

17⅞ in.

29½ in.

39½ in.

WHY SIDE-HUNG DRAWERS?

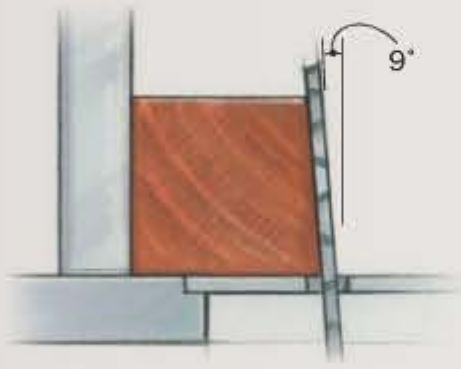
Hanging the drawers from side-mounted runners simplifies construction. You don't need to build a complete pocket for each drawer.

To purchase digital plans and a complete cutlist for this desk and other projects, go to FineWoodworking.com/PlanStore.

Drawings: Bob La Pointe

Shape the legs

The legs are curved along all four faces. Use the same template to mark the curves on the front and one side. Cut the mortises, and then proceed as follows.



Bevel the front leg. *It's part of the curved front, too. Do it after the mortises are cut, but before shaping, because after it's shaped the leg can't be guided through the blade safely.*

Shape the sides. *Stop the bandsaw cuts about ⅛ in. before freeing the waste, so you don't lose the layout you drew on the side.*

Tilt the table and shape the front. *Match the bevel you cut earlier, so the curved section is just a smooth continuation of the top of the leg.*

Glue up the legs and side aprons. *Doing it now makes it easier to build the rest of the table base.*

Schürch's jig for large-radius arcs ("Drawing Big Curves," *FWW* #175), because it produces a smooth, perfectly shaped arc.

Start with the legs and aprons

The side and back aprons are standard fare, straight with tenons on both ends. However, the legs have curves on all four sides—the shape is a version of a cabriole leg. They aren't difficult to make: Just trace and bandsaw a pattern onto the two outside faces. But before you shape them, you'll need to mortise them and cut a bevel on the front face of the front legs, so that they flow seamlessly into the curve of the front rails and drawers. Also tenon the side and back aprons to fit their mortises.

Now you can shape the front legs (see photos, left). Cut the sides of the legs first by cutting the shape marked on the front. Next, cut the front and back profiles of the leg by cutting out the pattern marked on the outside face. Last, break off the waste from the first two cuts and clean up the leg with a spokeshave and block plane.

Make the top rail and connect it to the back

There are three drawers in the desk. To make fitting them easier, it's important to build the rail and divider assembly so that the drawer pockets are square. I do that by dry-fitting the back apron between the two side assemblies, clamping a precise spacer near the front, and then fitting the top rail and drawer dividers.

The top rail is dovetailed into the legs and side aprons, while the divider assemblies are tenoned into the rail and joined to the back apron with a sliding dovetail. After the rail and dividers have been dry-fitted to the rest of the base, the base is square and the drawer pockets are defined. Then the bottom center rail is fitted to the dry-assembled base. Only then are the parts shaped.

After gluing up the side assemblies, dry-clamp the back apron between them. Clamp a spacer between the side aprons on the front of the base to help locate the top rail.

Put the back edge of the top rail blank against the front edge of the spacer. It should stick out ⅛ in. beyond the corner of the leg where the front and inside faces meet and be centered on the base's length. Scribe a baseline where the leg and side apron intersect the rail. Repeat the process at the other end, take the rail off, and

Photos, except where noted: Matt Kenney

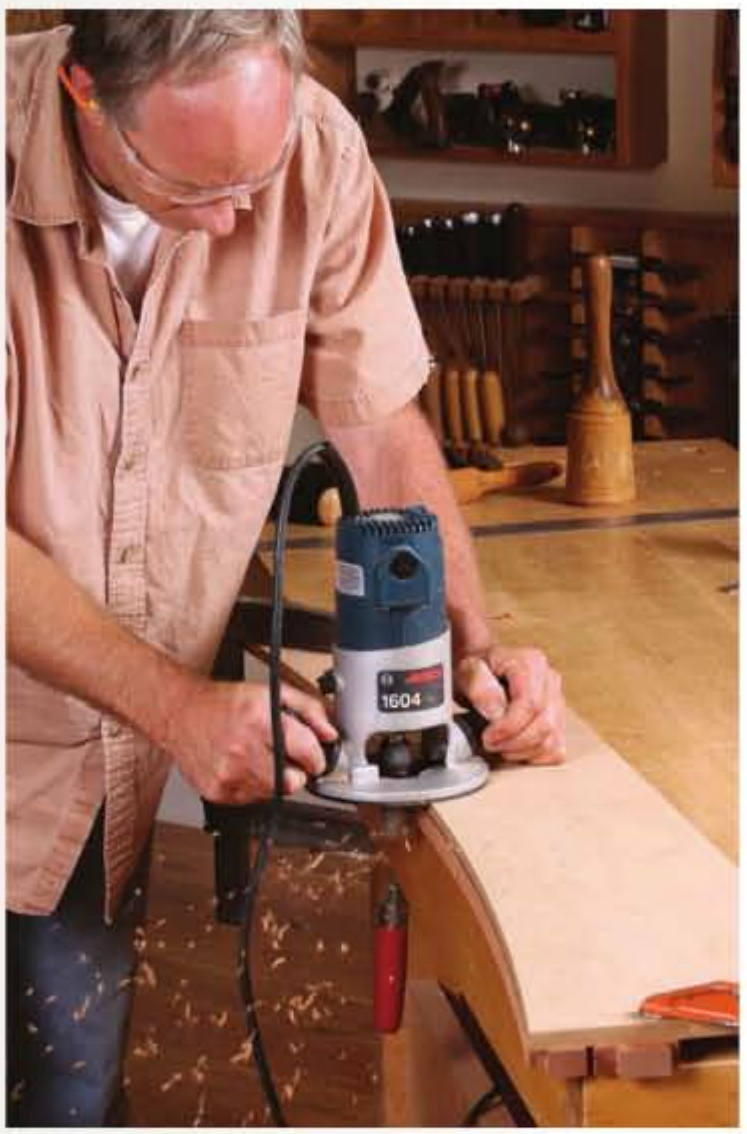
Make the top rail

Cut the joinery before shaping the rail. That saves you the hassle of trying to align the curves and the joints at the same time.

Dry-assemble the base. *Clamp the sides to the back apron. A spacer up front keeps the base square. Place its front edge 3⅞ in. from the leg's front, as a reference for locating the top rail.*

Mark the joint. *Center the top rail, clamp it to the spacer, and mark a shoulder line by scribing around the leg and apron.*

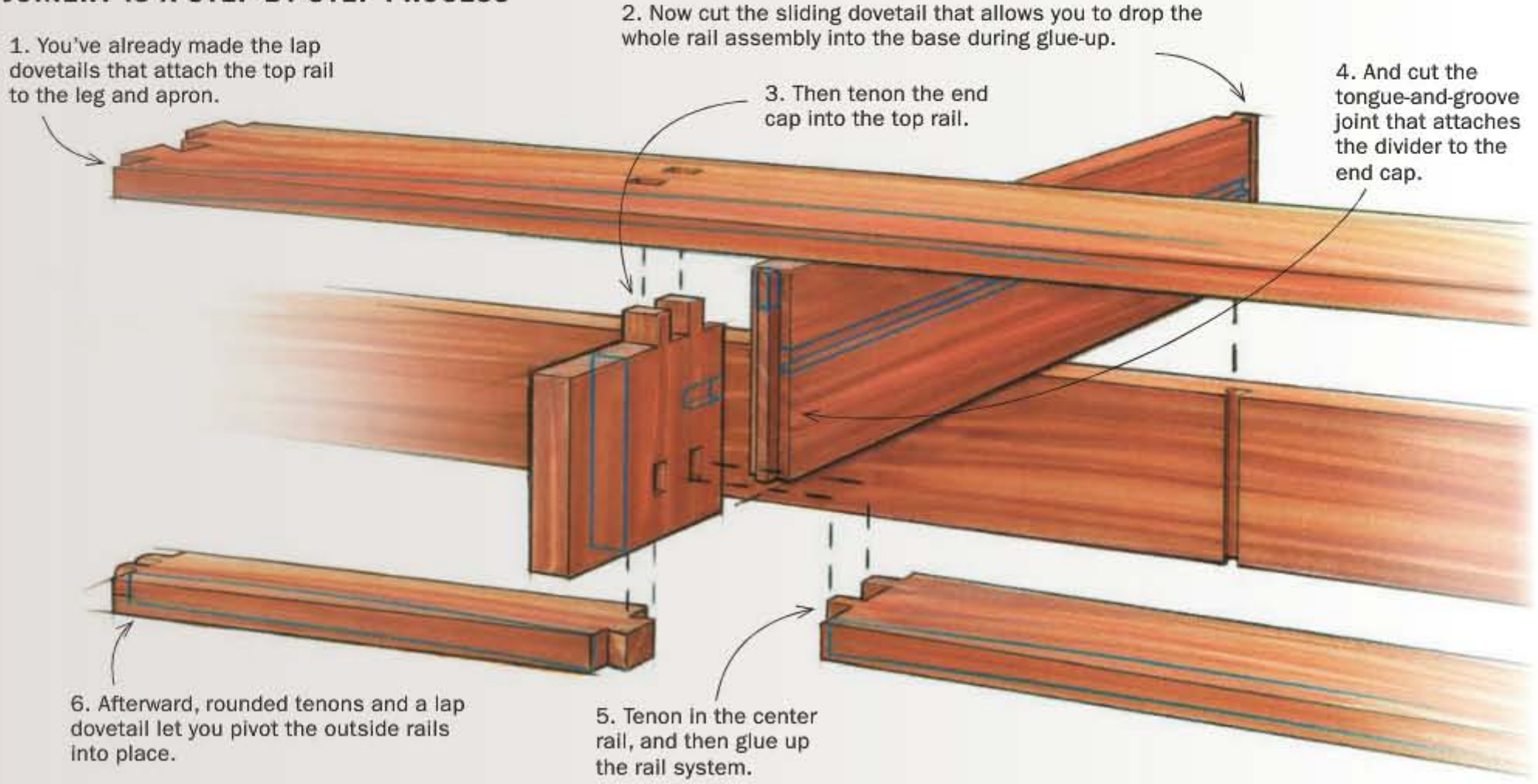
Double dovetail. *After cutting two tails on the end of the rail, transfer their locations to the leg and apron. Make the sockets and fit the joint.*



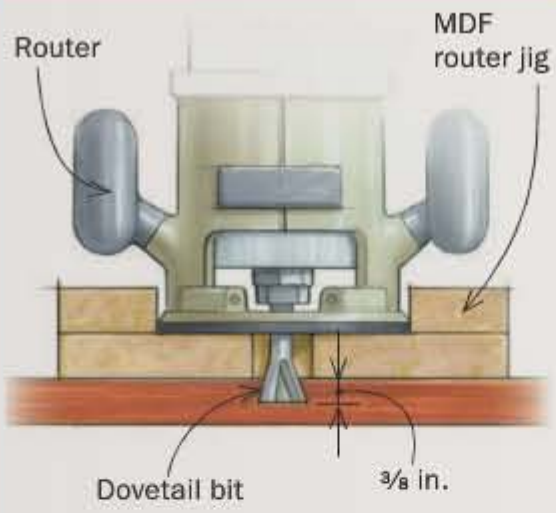
Finish the rail. *Dry-fit it and scribe the arc, lining it up with the legs. Now lay out the double mortises for the drawer divider end caps. Simplify the mortising using a spacer between the rail and fence when making the second mortise (center). Rough out the curve on the band-saw, then rout the rail flush to the template (right).*

Complete the front rail assembly

JOINERY IS A STEP-BY-STEP PROCESS



DOVETAIL THE DIVIDER



Sliding dovetails at the back. *Using a router jig and a dovetail bit, Gochnour routs the socket in the rear apron in a single pass. After the socket is done, he routs the dovetail key, making it slightly shallower than the socket so that it's easier to get the two parts together during glue-up.*

Glue the end cap to the divider. *They're joined with a simple tongue-and-groove joint, similar to the mortise and tenon used to join legs to aprons. The caps are extra-wide at this point.*

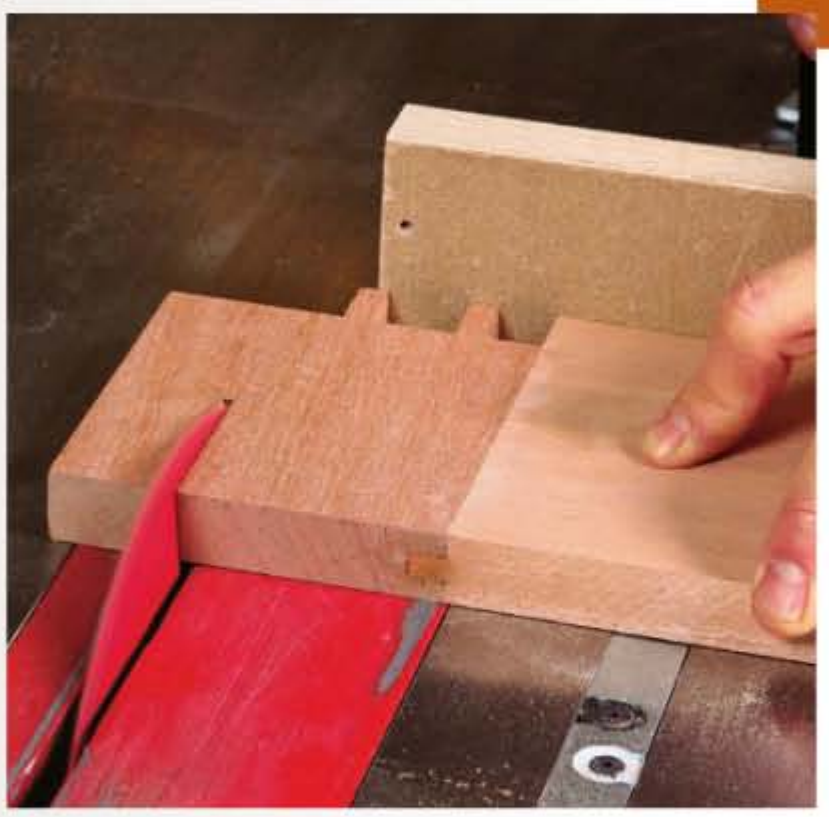
extend the lines around to the top of the rail. Lay out two dovetails at each end of the rail: One goes into the leg and the other into the side apron.

Cut the tails and transfer their locations to the leg and the side apron. Make the sockets. Fit the joints and put the rail in place. Lay the template on the top rail, aligning it with the inside corner of the front legs, and trace the curve. Knowing the curve's location helps with the next step.

The top rail has mortises to hold the drawer dividers in place. After laying out and cutting the mortises, set the rail aside.

SHAPE THE FRONT FROM THE TOP DOWN

Using one part to guide the shaping of its neighbor guarantees that all of the pieces end up perfectly aligned.



Bevel the end cap to match the curve. *The curve intersects the end cap as a straight line. Mark the angle directly from the top rail (right) and then cut it at the tablesaw (far right) after tilting the blade to match the layout line.*

Mark the center rail from the end caps. *The marks show exactly where the curve hits it (above). Next, use the template to lay out the rest of the curve (right). Rough out the shape at the bandsaw and rout the rail flush to the template.*

It won't be shaped until after the dividers and bottom center rail have been made.

Next up are the drawer dividers. Rout the sliding dovetail sockets in the back apron and then rout the mating keys. Cut the dividers to length and make the end caps. Finally, cut the tongue-and-groove joint that joins each end cap to its divider. Glue together the two parts. Reassemble the base and fit the bottom center rail.

Shape the parts in steps

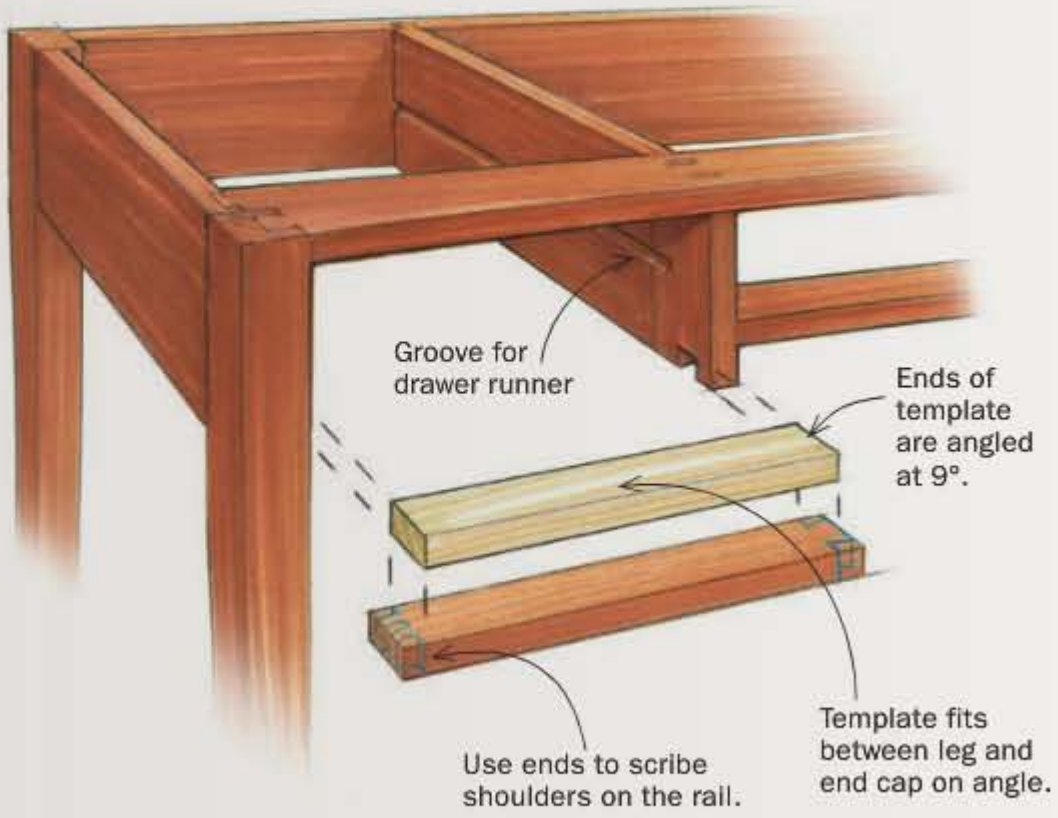
Now start shaping the front, beginning with the top rail. Rough out the curve at the bandsaw and then rout it flush to the template. Dry-assemble the top rail to the dividers and transfer the arc onto the top edge of the end caps. Disassemble the parts and cut that bevel. Reassemble the parts dry, this time adding the bottom center rail. Mark that rail where the dividers run into it. Pull the assembly apart and use the template to draw the arc. Rough it out and then rout it flush. That's all the shaping for now.

Add the bottom outside rails

You could cut the bottom outside rails from a wide blank. However, if you did this, the grain would run out toward the edges, creating short-grain weakness. Instead use a narrower blank, angling its ends so that it fits between the leg and the divider.

First, make a template with ends that run on a slant from the leg to the divider, giving you the distance between the shoulders and the tenon locations. Use it to lay out the shoulders and tenons of the rails. Lay out the lap dovetail, too. Cut and fit the joints. These rails are the last parts glued up during assembly. To make that work, round over the top of the tenon ends (a 3/8-in. radius works), so that you

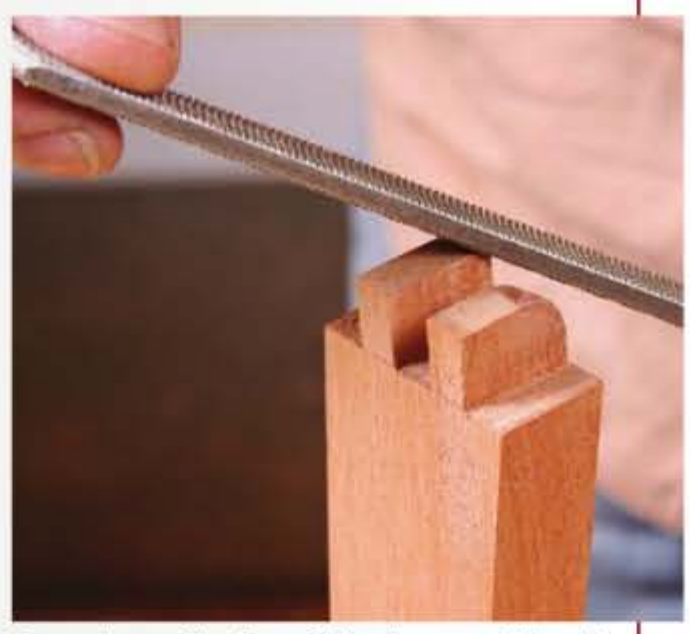
ANGLE THE BOTTOM RAILS FOR STRENGTH



Make a template first. *Use a piece of scrap, and trim the ends at 9° so it fits between the leg and end cap.*

Put the tenon locations on it. *Mark directly from the mortises on the leg.*

Lay out the joints on the rail. *Use the template to lay out the shoulders and tenons.*



Round over the top of the tenons. *This will let you pivot the piece into place later.*

GROOVE THE DIVIDERS

The groove for the center drawer is offset. *That's because its centered on the drawer's height, which is less than the divider's.*

Note: You need to rout all the grooves for the drawer runners before assembly, but don't glue in the outside grooved filler blocks until afterward.

can pivot them into the mortise as you put the dovetail into its socket. Now rough out the curve on the rails and clean it up with a spokeshave.

There is one last thing to do before you can finish gluing up the base: rout grooves in the drawer dividers for the runners.

The drawers ride on side runners

The wooden drawer runners are glued into grooves in the drawer dividers and, on the ends, filler blocks that bring the runners out past the legs. I rout all of the grooves at the router table.

The right order of assembly

Glue the side assemblies to the back apron. Then drop in the rail assembly and locate the outer drawer runners.

The rail assembly goes in all at once. *For the sliding dovetails at the back, use glue only at the bottom end of the socket and top end of the tail. Otherwise, the joint swells and you can't get it together.*

Add the bottom outside rails last. *Put in the tenons and then pivot the rail upward, seating the lap dovetail into its socket.*

After they're routed, finish gluing up the base. First glue the back apron between the two side assemblies. Then glue the bottom center rail to the dividers, and add the top rail. After that assembly is dry, glue it into the base. Finally, glue the bottom outside rails into place. Don't glue the filler blocks in yet. Do that after you've made the runners, because they are used to locate the filler blocks level with the runners in the dividers.

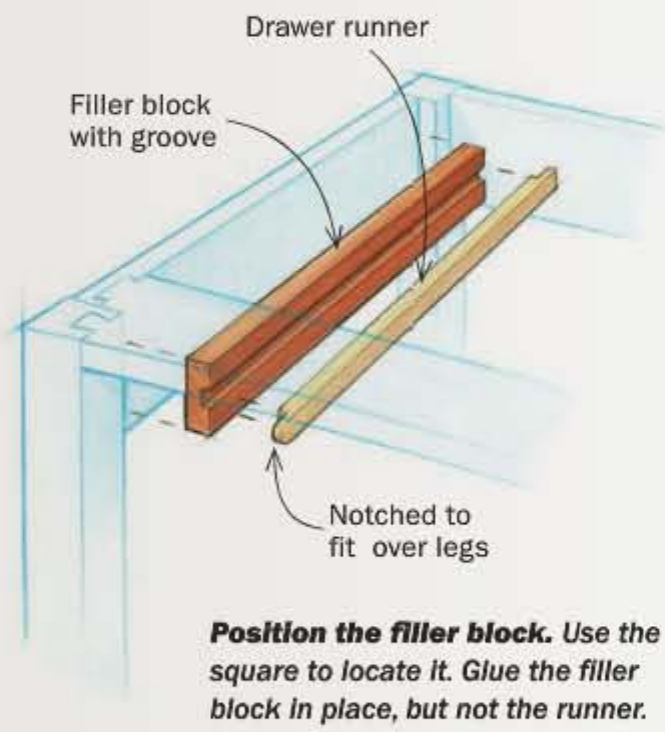
The runners aren't complicated. After rounding over one end of a wide board, I rip the runners from it and crosscut them to length. The two that go in the filler blocks need to be notched at the front and back to fit over the legs. The others just need one notch at the front to fit over the dividers. Make the notches long enough that the runners can move back and forth in the grooves (that extra space comes into play when the runners are glued in).

Now dry-fit the runners in the grooves. Place the head of a combination square on the top edge of the divider and extend the rule down to the top edge of the runner. Lock it at that distance. Use the combination square, referenced on the top edge of the side aprons, to locate the filler blocks (the runners are dry-fitted into them). This guarantees that the two runners are level with one another. Glue on the filler blocks, but don't glue in the runners. That will be done after the drawers are made,

POSITION THE FILLER BLOCK TO POSITION ITS RUNNER

Notch the runners. *This allows them to extend over the end caps without creating any cross-grain problems.*

Measure to the side runners. *Set a combination square to the top edge of the side drawer's runner that's dry-fitted into the groove on the divider (above).*



Position the filler block. *Use the square to locate it. Glue the filler block in place, but not the runner.*

The big lesson from making the base is that it's best to do joinery before shaping the parts, and it applies here, too. Not only that, but the drawer front blanks are angled like the bottom rails are.

GROOVE THE DRAWER SIDES

Make a spacer block. *Like the actual drawer, it should slide smoothly between the top of the runner and the bottom of the rail. Use it to set up the router-table fence for the next step.*

Then rout the groove. *To make the groove 1/32 in. wider than the ½-in. runners, just reset the fence to remove extra material from the bottom edge of the groove.*

because the runners also function as stops.

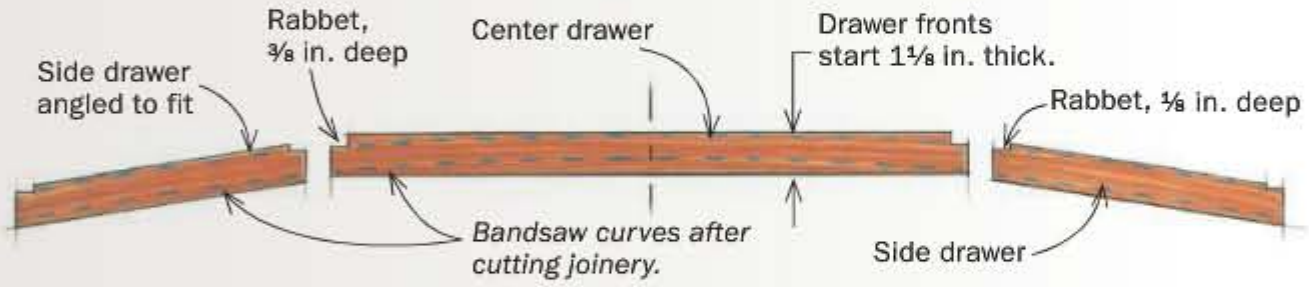
Now turn to the drawers. The curved fronts are cut from blanks after the dovetails have been cut, and their final shaping is done after the glue-up, with the drawers in their pockets so that the fronts can be blended seamlessly into the curve of the rails. Start by routing grooves in the sides for the drawer runners.

To set the router table's fence for these cuts, I make a long spacer block that fits between the top of the drawer pocket and the top of the runner. Use the block to set the distance between the fence and the bit—it should fit snugly between them. Rout the grooves, referencing the top of the drawer side off the fence.

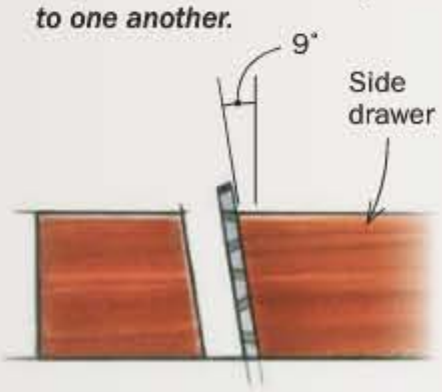
After the grooves are routed, dovetail

DOVETAIL DRAWERS BEFORE SHAPING THE FRONTS

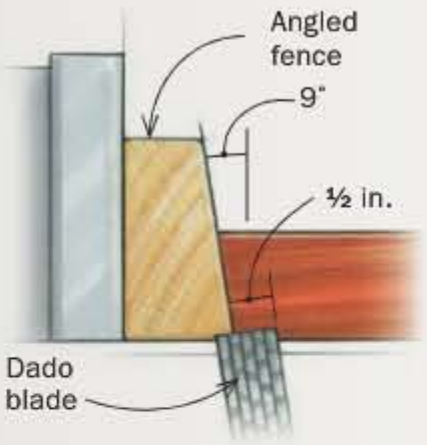
The fronts start thick to accommodate the curve. The side-drawer fronts are angled to make them stronger. Rabbets create a square recess for the joinery.



Bevel the ends of the side-drawer fronts. *Use the same angle as on the bottom rails (9°). Make the two ends parallel to one another.*



Rabbet the back edge. *For the rabbet on the other end, you need to reverse the setup, moving it to the other side of the fence.*



the drawer sides to the front and back. There is nothing tricky about the through-dovetails at the back of the drawers, because both the sides and back are straight. But the half-blind dovetails at the front can be a challenge, so I'll give you a few tips.

First, don't cut the fronts from thick blanks. Rather, make them the same way the bottom outside rails were made. Then rabbet the ends. This creates a square recess for the sides and allows you to cut the dovetails as if the parts meet at 90°.

After the joinery is done, dry-assemble the drawers and slide them onto the runners and into their pockets. Set the drawer in so that you can trace the top rail's curve on the drawer front. Do this for both the front and back curve. Take the drawers apart, rough out the curve at the bandsaw, and smooth the cuts with a spokeshave.

Now it's time to cut the grooves for the drawer bottom. I do it at the tablesaw with a dado set. The challenge here is the groove in the back of the drawer front,

DRY-FIT TO MARK THE CURVE

Assemble the drawer dry. *You'll need to pull it apart after the next step to shape the front.*

Mark the curve. *On the back, the curve lines up with the dovetail shoulder. Then push the drawer in and mark the front curve.*

Shape it at the bandsaw. *Cut both the back and front proud of the lines. Smooth both with a spokeshave.*

THE RUNNERS ARE THE STOPS, TOO

It's a simple matter to set them so that the drawer stops flush with the front when the ends of the grooves hit the ends of the runners.

Glue in the runners. *After spreading the glue and putting it in the groove, push the runner as far forward as it will go.*

Use the drawer to adjust them. *Immediately after putting in the runners, slide in the drawer, stopping when the front is flush with the rails. Now remove the drawer and clamp the runners in place.*

because it's curved. The groove is narrow and shallow, and the curve on the drawer's back is gentle, so it can be done safely. To ensure that the groove is the same depth along its length, rock the front as it enters the dado blades, so that the back is always on the table as it passes them.

Now glue up the drawers. After the glue dries, clean up the drawer sides with a handplane. Then make the bottoms. Start with a square panel cut to final width. Rabbet the sides and slide the panel into the grooves as far as it will go. Then use a small spacer block and pencil to scribe the curve of the drawer front onto the bottom. Cut the curve on the bandsaw and rout a rabbet on the front end.

Now glue in the runners. Put some glue in the grooves and then insert the runners and push them toward the front. Now put the drawers on the runners and push them in so that the drawer front is flush with the rails. This sets the runners at the right location to also function as stops.

Pull out the drawer and clamp the runners in place. Let the glue dry. Make the drawer pulls and screw them on.

Then make the top. It starts as a large panel glued up from several boards. I use a template to draw the curve on the front edge, rough it out at the bandsaw, and rout it flush to the template. The top is held to the base with shopmade buttons. □

Chris Gochnour is a furniture maker in Salt Lake City, Utah.

TOOL TEST

Jointer/Planer Combos for Less

New breed of affordable machines lets you do more in less space

BY ROLAND JOHNSON

WIDE JOINTER
Despite shorter tables, jointer/planer combination machines still allow woodworkers to comfortably face-joint 12-in.-wide stock that is up to 8 ft. long.

POWERFUL PLANER
These heavy-duty planers can handle a heavier cut than benchtop models.

Jointer-planer combos, long popular in Europe, have made serious inroads in North America, for two good reasons. For one, they save space, putting the two essential milling machines into one small footprint. Perhaps more importantly, they get you a wide jointer—one of the gateways to truly efficient woodworking—plus an industrial-strength planer, for close to the price of the big jointer alone. That said, not everyone is ready to plunk down $3,000-plus to upgrade the jointer and planer they already have.

When I last tested combination machines in 2007 (*FWW* #190), three of the four were European-made machines with 12-in. cutterheads and stout price tags. Since then, however, increased interest and competition have prompted several manufacturers to begin building and marketing less-expensive models. For this test, we were able to cap the street price at $2,400, with a few available for far less, putting them in a range that we believe most hobbyist woodworkers or small-shop owners would be willing to pay. The big question is: What do you lose, if anything, by going with one of these less-expensive models?

What matters

I tested five machines—two each from Grizzly and Rikon and one from Jet—by milling an array of exotic, domestic, and figured wood—all of which are commonly used to make furniture. Just as importantly, I timed each machine's changeover, which is the time it takes to convert

Better cutterheads make a difference

The single cutterheads on jointer/planer combination machines are a double-edged sword. It's easier to maintain one cutterhead, rather than two as with separate jointers and planers. Of course, that cutterhead will pull double duty when jointing and planing, so its edges will wear down more quickly. Consider upgrading to a segmented carbide cutterhead, which will stay sharper much longer than straight knives. They're pricey, but since you're only buying one, it should be more economical than buying them separately for both a jointer and planer. Some manufacturers offer segmented cutterheads as original equipment, but aftermarket models are also available (see *FWW* #223).

Next-generation cutterheads are available. *Segmented cutterheads are starting to appear in less-expensive jointer-planers, such as the Grizzly G0634XP. The carbide teeth last much longer than steel knives, and are easily rotated to a fresh edge.*

Most use straight knives. *It can be tricky to re-install and adjust the knives after they've been sharpened. Disposable knives, like those on the Rikon 25-010, are a bit easier to set up, but they must be replaced when dull.*

12-in. models: Bigger is better

Larger machines combine wider jointing and planing capacity with friendlier features.

Segmented cutterhead is a game-changer

This machine combines a powerful motor with a superior segmented cutterhead that ensures good cuts, longer edge life, and easy maintenance. The benefits of this advanced cutterhead helped push this machine to the top (tied with the Jet JJP-12). I also preferred the Grizzly's American-style cutterhead guard, which swings away to let push pads go by.

This machine does have some small quirks. To adjust the height of the jointer's infeed table, you must turn a hard-to-reach, socket-head screw on the end of the adjustment handle before cranking. It's tricky because the scale is on the opposite side of the machine and is difficult to read while cranking the handle. The fence was temperamental, too. It attaches through a bar at the end of the infeed table. It locks securely to the bar once set, but you need extra care to ensure the fence is seated properly. Otherwise, the angle between the fence and tables can be inaccurate. And it has to go on or off for each changeover.

Still, none of these quirks can detract from the high quality of this Grizzly's cutterhead at a price that no other machine can beat.

GRIZZLY G0634XP

Street price: $2,195
Power: 220v, 5 hp
Jointer bed length: 59½ in.
Weight: 610 lb.
Changeover: 49 seconds jointer to planer, 59 seconds planer to jointer
Cutterhead: Segmented, 32 carbide cutters

Familiar features. *Unlike its peers, the G0634XP has a pork-chop-shaped, American-style cutterhead guard—which many woodworkers prefer to European-style guards.*

Not the fastest changeover. *Removing the Grizzly G0634XP's jointer fence (left) and finding a place to store it can be a little cumbersome. Then you pop two levers and lift the jointer infeed and outfeed tables separately (right), before flipping the dust hood over.*

the machine between jointing and planing modes. Changeover is a key measurement for jointer/planer combination machines, and a common concern for woodworkers who are used to working with separate machines. I also tested the machines' dust-collection mechanisms, and evaluated their general performance.

When it comes to planing quality, the differences among machines are negligible. All five delivered excellent cuts with minimal snipe when removing up to 1/16 in. of material in a single pass over wide boards. Differences in dust collection and general performance also were minimal. For those core functions, the machines all performed similarly, and compared well with their pricier cousins from the last review.

There are moderate differences in the machines when it comes to changeover. The good news is that changeovers on the best machines in this test were better than the previous crop I tested. The fastest in this group took just over 20 seconds to switch

Photos: staff

BEST OVERALL
AUTHOR'S CHOICE

Fast and friendly changeovers

Changeover is where the Jet shines. It takes just 21 seconds to go from jointer to planer—fast enough that it no longer feels like a nuisance or momentum-killer to have to go back and mill one or two project parts. The main reason is that the jointer fence can stay attached when you raise the tables. Plus, the infeed and outfeed tables move as a single piece, making this machine the simplest of all five to use. Although its motor is smaller than that found on the 12-in. Grizzly, the Jet produced very good results without bogging down.

The Jet's cutterhead is similar to the others: a three-knife cutterhead with blades that can be resharpened and are held in place with gibs and jack screws.

For its ultra-fast changeover time and overall ease of use, I named it a Best Overall choice. For the ultimate in convenience, you can buy the JJP-12 with a segmented carbide cutterhead, but that adds roughly $1,000 to the price.

JET JJP-12

Street price: $2,200
Power: 3 hp, 230v
Jointer bed length: 55⅝ in.
Weight: 500 lb.
Changeover: 21 seconds jointer to planer, 25 seconds planer to jointer
Cutterhead: 3-knife, HSS

QUICK-CHANGE ARTIST

Unlock. *Two levers keep the jointer beds fixed in place. Release them to switch from jointing to planing mode.*

Raise. *The jointer tables and fence move all at once, simplifying and speeding the changeover.*

Flip. *A single dust chute rotates around the cutterhead to handle jointing or planing, a convenient design.*

between jointing and planing, while the slowest took more than a minute. I found the biggest differences among the machines in the nitty-gritty details—the ease with which fences and settings can be adjusted or changed, or the difficulty involved in changeover.

The best and the rest

This new crop falls into two groups, with either 10 in. or 12 in. of capacity, and the larger machines stood out. The Jet JJP-12 had the fastest changeover time and was also the most user-friendly of the bunch. And the Grizzly G0634XP was the only model that came with a segmented cutterhead. Functionally, the Jet was the best machine tested, but the Grizzly cutterhead gives it a substantial advantage over all other machines (see "Better Cutterheads Make a Difference," p. 63). I picked both as Best Overall choices.

For would-be buyers with slightly deeper pockets, Jet also makes the JJP-12HH jointer/planer, which I tested previously, It adds a

Big but budget-conscious

The Best Value Rikon 25-200 performs almost as well as the Jet, and produces 12-in.-wide cuts of similar quality. It also has the same size motor and a similar, three-knife cutterhead yet costs about $500 less.

Similar to the Jet, the Rikon's fence remains on the machine during changeover, but it must be moved to its rearmost position. It's better than having to remove it altogether, like the Grizzly, but it's a bit more of a nuisance than the Jet.

The Rikon also has a single-table changeover, but that is because only the jointer's outfeed table moves. The drawback is that the fixed jointer infeed table covers the outfeed end of the planer, making it difficult to remove short parts after planing. A set of outfeed rollers helps support longer stock.

The Rikon nearly matched the performance of the best machines in the test, and factoring in the cost, it's an excellent value.

RIKON 25-200

Street price: $1,700
Power: 3 hp, 220v
Jointer bed length: 49 in.
Weight: 386 lb.
Changeover: 31 seconds jointer to planer, 25 seconds planer to jointer
Cutterhead: 3-knife, HSS

Changeover is easy. *You just slide the fence to the rearmost position and the cutterhead guard to the front. Then you lift only the jointer outfeed table into position (left). As with all the machines, you must move the planer bed to reposition the dust collection, but the Rikon's aggressive screw pitch speeds the process (right).*

But access sometimes isn't. *The fixed jointer table can be a nuisance when removing short, thin parts from the planer.*

helical, shear-cutting segmented cutterhead to the JJP-12. The cutterhead brings the cost of that machine to around $3,300 (above our price ceiling), but it will save some money on sharpening over the long haul, and will greatly reduce the tedium involved in replacing blades.

The Rikon 25-200, which changes over almost as quickly as the Jet, for $500 less, was my choice for Best Value.

The motors on all five machines also performed well, despite being less powerful overall than those on the previous batch of jointer-planers I tested. The fences on all five machines were more than sturdy enough for jointing, although some were a bit clumsy to adjust. The two Grizzly machines and the 10-in. Rikon required removal of the fence during changeover, which was a nuisance but by no means a deal-breaker. □

Roland Johnson is a contributing editor.

10-in. models: Good value in smaller packages

The smaller machines have lower price tags, but their changeovers take a bit longer.

Two-knife head but heavy duty

GRIZZLY G0675

Street price: $1,125

Power: 2.5 hp, 220v

Jointer bed length: 41¼ in.

Weight: 317 lb.

Changeover: 63 seconds from jointer to planer, 70 seconds planer to jointer

Cutterhead: 2-knife, HSS

The smaller of the two Grizzlies, the G0675 still offers wide jointing and planing capacity in a much less expensive package. Like the 12-in. Rikon, the G0675 features a single-table changeover. It's simple but slow due to the high number of cranks needed to raise and lower the planer bed, and the design of the dust chute.

It's the only machine I tested that has a two-knife cutterhead, a design drawback that can force a cutterhead to make fewer cuts per inch. The Grizzly compensates by spinning the cutterhead at 6,500 rpm, slightly faster than three-knife cutterheads, but the two knives are bound to dull more quickly than three would. For the price, it represents a solid value and would make a good pick for a hobbyist woodworker.

Remove and reattach. *You split the dust chute in two for changeover, rotating one half into position and reattaching the other half.*

Light duty but handles big stock

RIKON 25-010

Street price: $1,000

Power: 1.5 hp, 110v/220v

Jointer bed length: 40½ in.

Weight: 147 lb.

Changeover: 60 seconds from jointer to planer, 74 seconds planer to jointer

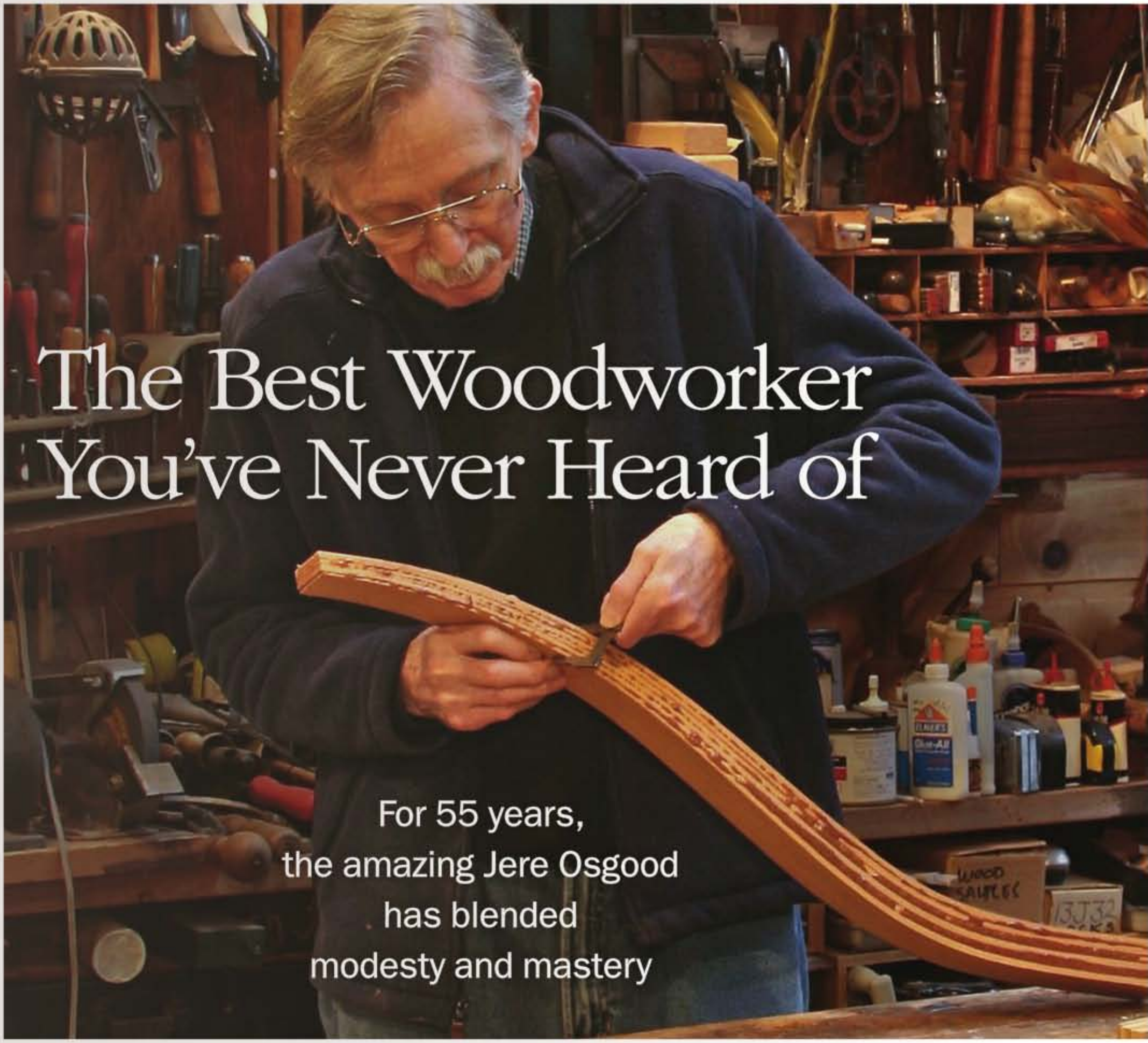
Cutterhead: 3-knife, HSS, disposable blades

Despite its small size, the 25-010 handles big workpieces well, even when planing difficult stock such as wide slabs of white oak. Its plastic gears and light castings aren't the best choice if you plan to mill boards all day long, but it should suit weekend woodworkers very well.

It's the only machine with disposable blades, which cannot be sharpened and must be replaced when dull. But disposables are much easier to install. Unlike the other machines, the Rikon requires you to remove the jointer's infeed table completely during changeover. It's a lightweight casting and has positive location points, so it's simple to do. But it is a nuisance to store the table while the machine is in planing mode.

Got an empty shelf? *The jointer outfeed table, along with the fence, must be removed and stored to change from jointing to planing mode.*

The Best Woodworker You've Never Heard of



For 55 years, the amazing Jere Osgood has blended modesty and mastery

Jere Osgood is one of the most remarkable furniture makers in America. He also happens to be one of the most humble, and, considering the scope of his achievement, one of the least well-known. In the 55 years since he opened his first shop, Osgood has continually reset the boundaries of innovation in furniture-making style and structure. His work has been acquired by museums, widely exhibited, and he has earned The Furniture Society's award for lifetime achievement.

Celebrated for the daring curves of his desks and the subtly convex sides of his casework—as well as for the path-breaking techniques he uses to produce them—Osgood is also noted for a painfully shy manner and a voice that starts in a mumble and tops out at a whisper. Diffidence may not seem an ideal attribute for a teacher, yet in 15 years of full-time teaching in the 1970s and '80s, Osgood proved a powerful mentor to a large number of students, many of whom are now among the country's most prominent furniture makers.

Osgood's own education in woodworking began in his father's basement workshop on Staten Island, N.Y., in the early 1940s. His father was not an advanced woodworker, but he instilled a resourcefulness in his son that stuck: If you wanted something, you made it. Osgood,

BY JONATHAN BINZEN

Photos, except where noted: Jonathan Binzen; drawings: John Hartman

whose first name is pronounced "Jerry," also learned from two uncles and a grandfather, all of them avid amateur woodworkers. At every family gathering, Osgood recalls, "You'd go in the front door and immediately down into the workshop." Before he was 10, Osgood, an only child, was making his own toys. By the time he hit his teens, he had built his own workbench (which still sees use in his shop) and was repairing and refinishing furniture for neighbors. He also began building furniture for himself and others. One early commission was for a large bookshelf he built the winter he was 14—and delivered through snowy streets on his sled.

At 22, when he enrolled at Rochester Institute of Technology in

Signature piece. *Osgood's shell desk brings together two of his major technical innovations in a beautiful package. The legs are examples of his bent-tapered lamination and the lid, inspired by the body of a lute, is made with his compound-stave lamination.*

Museums and galleries agree. *Osgood first had a piece in a museum show in 1958, when he was just 22. Since then his furniture has been collected by major museums and featured in dozens of books. For the past 30 years, he's shown his work at Pritam and Eames in East Hampton, N.Y., the country's foremost gallery of contemporary furniture.*

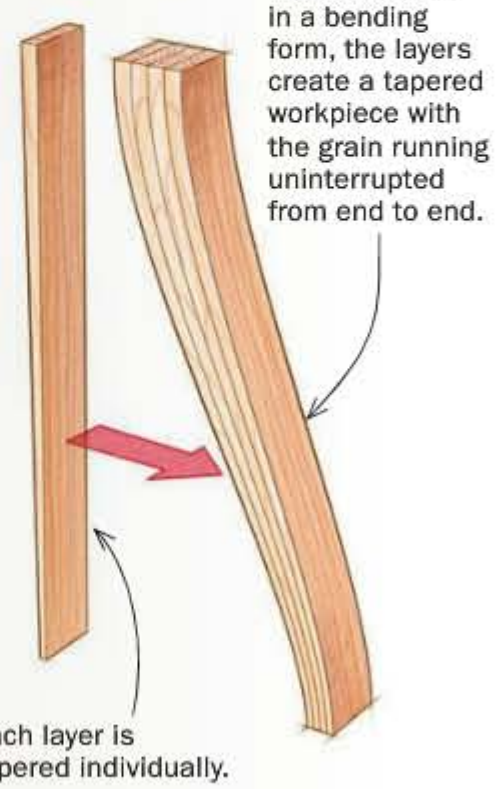
Photos, this page (top two): Dean Powell

DESIGN MEETS ENGINEERING

Osgood's furniture is packed with brilliant solutions to technical problems. He prefers curved lines to straight ones, and this has pushed him to make major breakthroughs in bending wood. He is equally ingenious when it comes to other structures and the joinery that binds them.

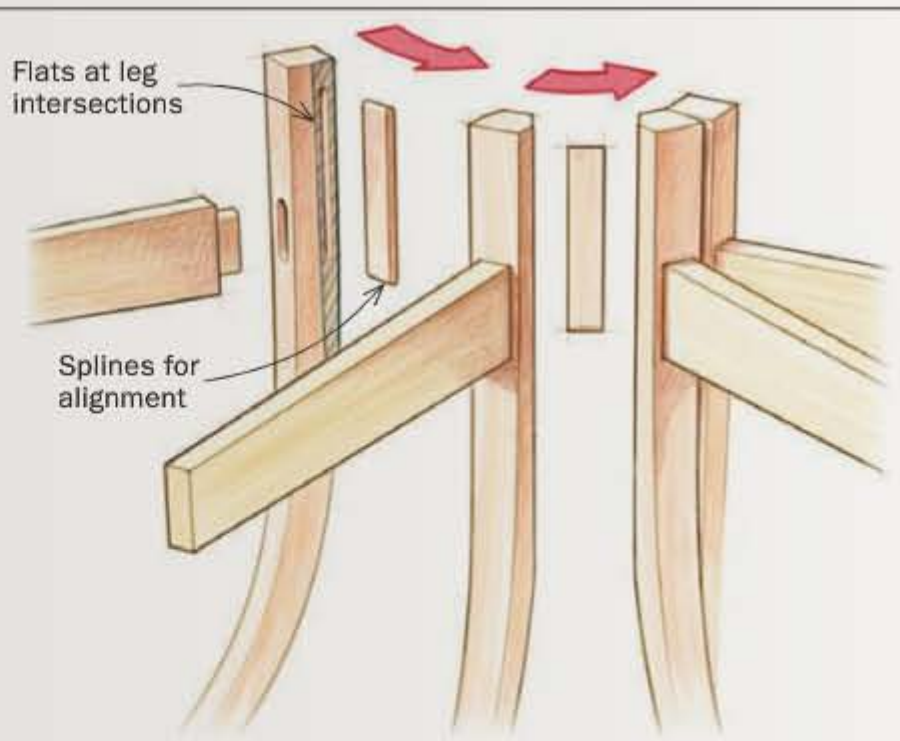
TAPERED BENT LAMINATION

This method, which Osgood developed around 1970, produces a laminated curve that tapers in thickness without compromising strength or appearance. Previously, to achieve the same effect, woodworkers cut through the layers of a laminated curve, reducing its strength and exposing wide glue lines. Osgood's innovation was to taper the individual layers so they would run continuously from one end of the part to the other. Steam-bending can create the same forms, but Osgood prefers bent-lamination for its greater predictability.



CLUSTERED LEGS

Osgood often supports desks and small tables on a cluster of splayed, curved legs. He developed a system of joining the legs that delivers strength and stability while retaining an appearance of lightness and the illusion that the legs are just barely attached.



1958 to study under Tage Frid, Osgood was already showing his work publicly and had two pieces in an exhibition at the Museum of Contemporary Crafts in Manhattan. And he had spent the previous two years studying architecture at the University of Illinois.

All this did not impress Frid, the legendary Danish craftsman and teacher who would later become *Fine Woodworking*'s most important early contributor. Frid had learned woodworking the old-fashioned way, serving a traditional apprenticeship in Copenhagen beginning at age 12 and working for years in a variety of Danish cabinetmaking shops. Osgood still remembers with a wince Frid's gruff assessment of his homegrown hand skills and unorthodox joinery: "You've got to start all over. All this stuff you were doing before you came here—forget about it!"

Setting a quiet example

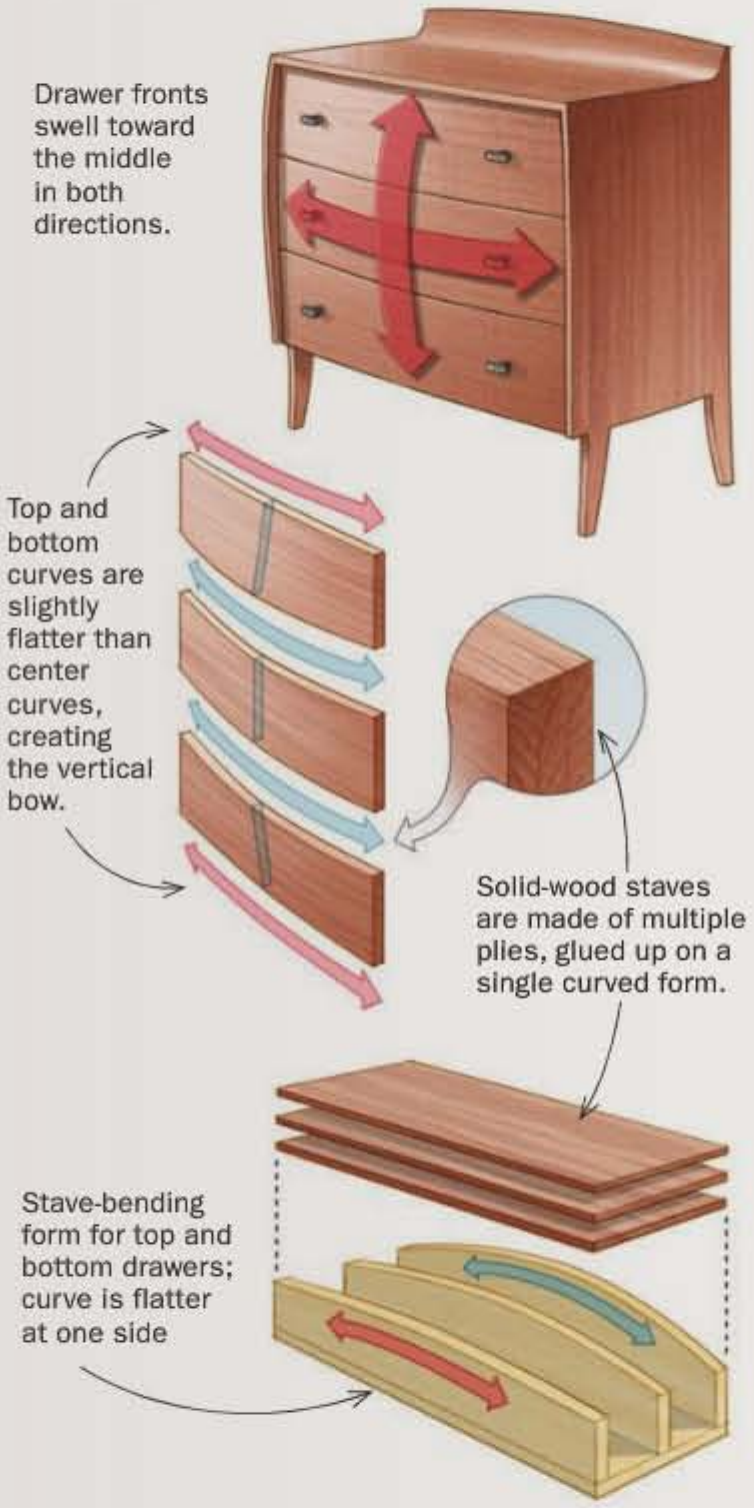
Osgood never fully warmed up to Frid's outsized personality—or to his sometimes clunky designs—but he absorbed all he could from Frid's vast knowledge of woodworking skills, joinery, and structure.

Several years after leaving RIT, Osgood set up shop in northwestern Connecticut and through the 1960s supported himself and

Photos, this page: Bill Truslow (top); Dean Powell (bottom)

COMPOUND-STAVE LAMINATION

In the late 1960s, bored with flat-sided furniture, Osgood began building case pieces with sides and drawer fronts that swelled outward in a compound curve. Wendell Castle and others at the time were carving organic furniture out of large, stack-laminated blocks of wood. Osgood thought that was wasteful and produced heavy-looking furniture. He wanted to build pieces that were lighter, subtler, with more economical use of material. His solution was the method he calls compound-stave lamination, a hybrid between coopering and bent lamination.



his wife and two boys by cranking out hundreds of accessories—clocks and bookends, bowls and stools—which he sold through America House, then the best craft store in Manhattan. As the decade progressed, he began building larger pieces of furniture.

He also began teaching a weekly class in woodwork in New York City. Frid's teaching style had been a charismatic mixture of showmanship, humor, and browbeating—on a foundation of rock-solid instruction. When Osgood began teaching full-time in 1970—first in Philadelphia, then at RIT, and finally at Boston University's Program in Artisanry—he gave students that same firm foundation, but with a different delivery. "He didn't lecture," one student recalled, "you got it by osmosis." Students remember Osgood as "understated," "subtle," and "good for about one sentence a week." Still, the message got through, and Osgood launched an astonishing array of successful furniture makers, talents as diverse as Tom Hucker and David Lamb, Michael Hurwitz and Garrett Hack.

Innovative techniques

After Frid chastised him for inventing joinery ("It drove him up the wall," Osgood says), Osgood held back long enough to learn

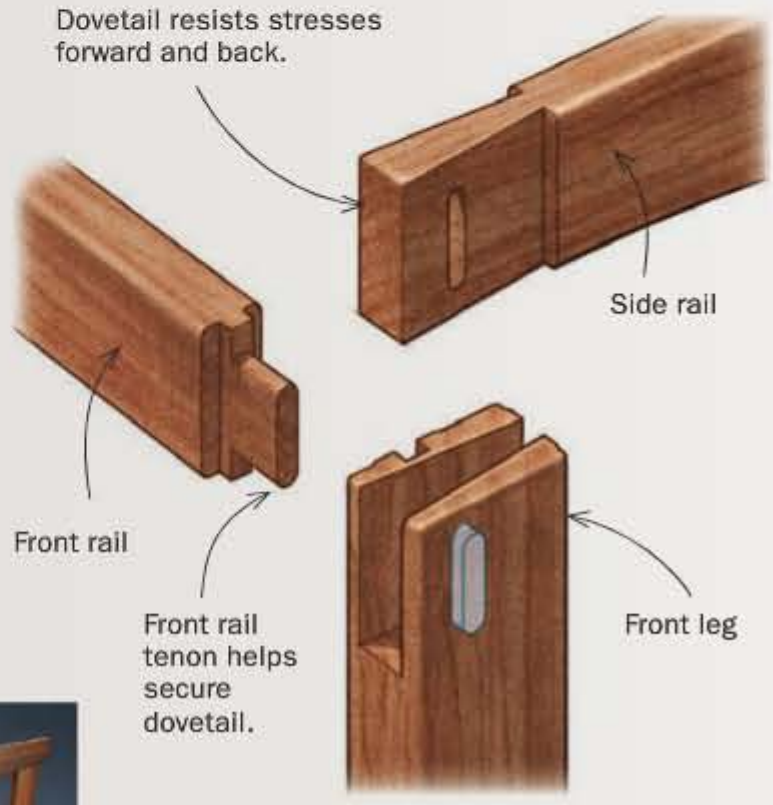
Photo, this page: Dean Powell

REINVENTING THE CHAIR

Osgood has always designed his chairs for visual impact, but along the way he has re-engineered every aspect of the typical wooden chair, inventing and adapting techniques to produce maximum strength and comfort with minimal weight and waste.

LOCKING DOVETAIL SECURES THE FRONT LEG

Wanting a chair that would resist racking stresses without a stretcher system, Osgood devised a locking dovetail to join the front leg to the front and side seat rails.



SHIFTING THE REAR SEAT RAIL FORWARD

Osgood's seat-rail arrangement strengthens the structure while adding flowing lines and more flexibility to the back. He uses slip tenons for much of his joinery, which simplifies the challenges of joining curved parts.

all the traditional joinery Frid had to teach. But within a few years of graduation, Osgood began experimenting again.

And he flipped Frid's favorite dictum on its head. Frid always told students they should "design around the construction." In other words, determine how a piece should be made, and then figure out how it will look. Osgood did the opposite—first sketching the shapes he wanted and then deciding how to build them.

Because the shapes he conjured usually involved complex curves, he often had to dream up new techniques. He was careful, though, always to base his new techniques on sound, traditional principles. Osgood's chief innovations are methods for making curved and tapered legs and compound-curved case pieces. But he also pioneered a long list of other joints and structures. Some he's used in just a few pieces—like the spoked brass hardware he fashioned for his shell desk—others he's repeated and refined through a series of pieces, like the cluster joint in his side table and the ingenious joinery in his side chairs.

Unerring design

Osgood's furniture is impressive both for its aesthetics and its engineering—and perhaps most impressive for the way the two are so seamlessly integrated. The deeper you look into Osgood's work, the more novel details and custom solutions you see. But like all of the seen and unseen efforts in Osgood's furniture, when you stand back they blend into the design as a whole.

When Osgood was in his early teens, his grandfather, an architect, gave him a set of drafting tools and encouraged him to practice. Through that experience and his two years of architecture school, he became very comfortable designing on paper.

Photos, this page: Dean Powell (top)

SERIOUSLY PLAYFUL

Osgood's furniture ranges widely in mood, from the flamboyance of his desks to the understatement of his side chair. But all of it reflects the same rigorous process of design and the same ability to blend arresting form with flawless function.

Performance piece. *With simpler functional requirements than bureaus or chairs, writing desks offer Osgood a chance to build more expressive, sculptural forms.*

Osgood still designs each piece thoroughly on paper before he begins to build. Other makers may shift course as a piece goes together; Osgood tries to have every issue worked out beforehand.

After arriving at a form he wants to pursue in his sketchbook, he develops it further on paper and then builds a full-scale mockup from pine or cardboard. He doesn't bother with scale models, feeling that much of the impact of a piece is lost when it is miniaturized. He does extensive full-scale drawings before building the real piece, often generating dozens of separate drawings to nail down every detail.

Curves are Osgood's oxygen; not perfect geometric arcs, but curves drawn from nature. "Somewhere, way back there," he says, "I got dissatisfied with the square furniture form." So he began trying to design into his furniture a sense of movement, as in the flow of water or wind, or the natural bends a tree makes as it grows.

As a boy, he spent summer vacations by a lake in Vermont and loved the giant cedars he saw there. The memory of their roots, washed clean by the water, inspired the curving legs of his desks and side tables. Osgood has always felt a kinship with the forest, and still walks every day through the woods that surround his home in New Hampshire. He says the slightly bulging sides of his case pieces are meant to link the furniture "to the organic origins of the wood—its treeness—which flat boards do not express."

Now 75, Osgood has been working wood for seven decades. In the past year or two, health problems have kept him from being as productive as he'd like, but he's determined to get back to the bench as soon as he can. Reflecting on his life and work recently, he described the pleasure he still finds in developing designs and solving problems in the shop, and then he said, "It's been a good career." He spoke in his usual reedy whisper, and a listener had to lean forward to hear. But through his furniture, with its clarity, daring, and cleverness, Osgood speaks in a different register, and his voice carries right across the country. □

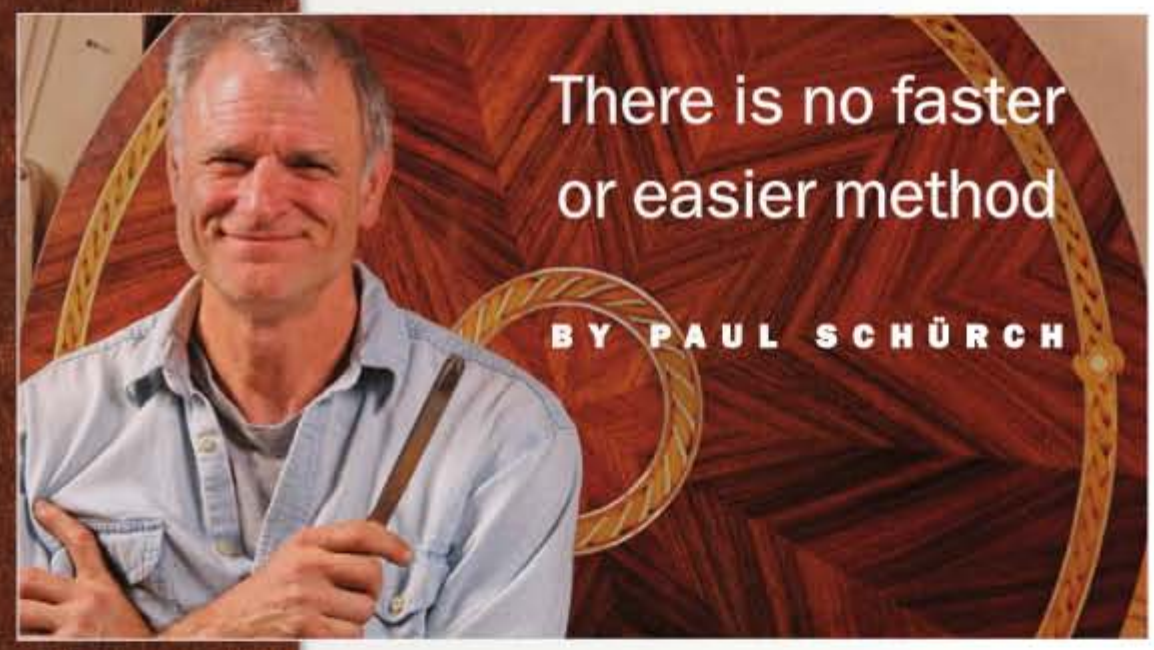
Jonathan Binzen is a consulting editor.

Bringing curves to the cabinet. *Osgood enlivens his case pieces by slightly bowing out the sides, doors, and drawers in compound curves. One student asked him why he put so much effort even into curves and details that were sometimes barely noticeable. "You'd notice," Osgood told him, "if I left them out."*

Modest but masterful. *This cherry side chair illustrates Osgood's ability to design furniture of striking simplicity that fits in easily with other pieces, rather than standing out as his desks do.*

Photos, this page: Eva Heyd (top two); Bill Truslow (center)

Marquetry, the Italian Way



I didn't know much about marquetry when I got my first big table job in California in 1989. I decided to inlay the solid maple top with wood and stone designs by shaping the inlay, routing out the background, gluing the inlay into the recess, and sanding it flush. I got the job done, but I knew there had to be an easier way.

This spurred me to head back to Europe, where I had done my original woodworking training. There I found work in an Italian shop, producing marquetry for the furniture trades, and learned the efficient techniques of knife-cutting, packet-cutting, and contour-cutting that I still use and teach today.

The three techniques are complementary, and allow me to produce any design I can come up with. They require little investment in tooling, are easier and faster than other methods, and deliver better results.

This article builds on an earlier one, "Decorative Veneering" (*FWW* #164), where I showed how to do a four-way bookmatch, stringing, and a border using the knife-cutting technique. These elements combine wonderfully with the marquetry in this article, where I use packet-cutting to quickly create pictures in wood.

By the way, to add depth and realism to these pictures, I also use sand-shading, a classic scorching technique for adding shadows. I cover that in Master Class on pp. 90-93. If you haven't tried marquetry, you will be surprised at how simple, practical, and fun it can be. To demonstrate, I'll create a panel of three flowers, with leaves and a curving stem.

You will need a basic scrollsaw that can hold a 2/0 blade, and for larger projects, you'll need a vacuum bag to glue the veneers onto a core. I also recommend thin tongs, for handling the pieces, and a 23-gauge pin nailer, though hand-nailing the packet also works.

Why packet-cutting?

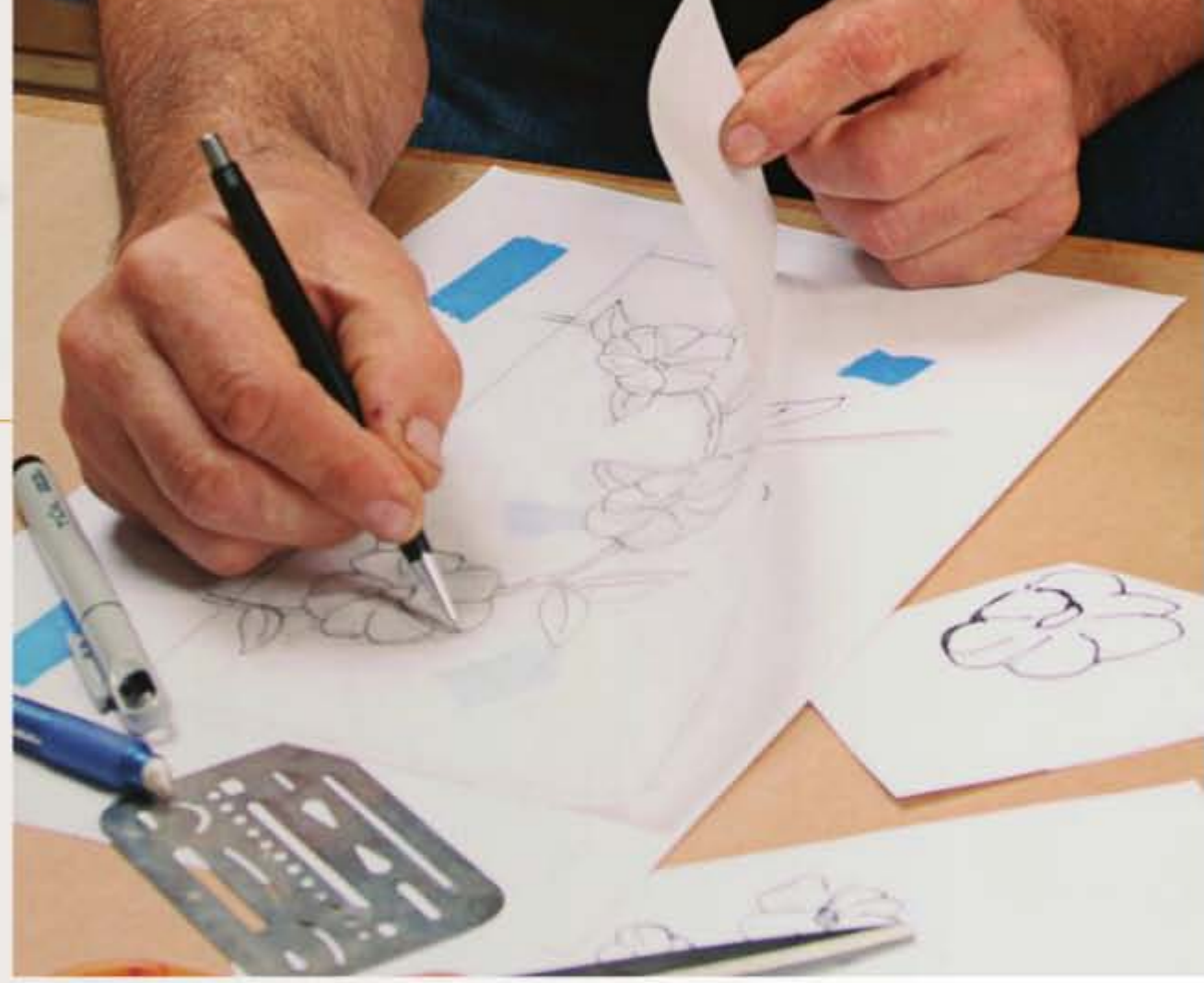
Packet-cutting is simply stacking various veneers on top of each other and scrollsawing the pattern simul-

Photos: Asa Christiana

Design: You don't have to be an artist

If your design is simple or you can draw well, you can create the design from scratch. But there is an easy way to build a complex design without drawing.

Building blocks. *Find line drawings in books, and enlarge or reduce them with a photocopier to make them the right size. Then trace them onto paper or clear film to get clean versions.*



Arrange to create. *Photocopy those traced drawings and arrange them under tracing paper to create a complete design, drawing in the missing elements.*

Clean it up and label it. *To make your final, clean drawing, place another sheet of tracing paper over the top. Put clear film between the sheets so the pencil marks don't transfer from below. Last, mark and label your drawing as shown below.*

taneously in both the background and the picture veneers. You then select the right pieces and reassemble them like a puzzle. The kerf is not an issue, since the 0.008-in. gaps created by the blade are so thin that the gluing and finishing process fills them. I also use the sawkerf lines as a design element, as in leaf veins or other accent lines in the design.

The beauty of packet-cutting is that when you wander slightly off the line, the background and the design will still fit. Also, a single packet can yield multiple versions of the same design.

Start with a drawing

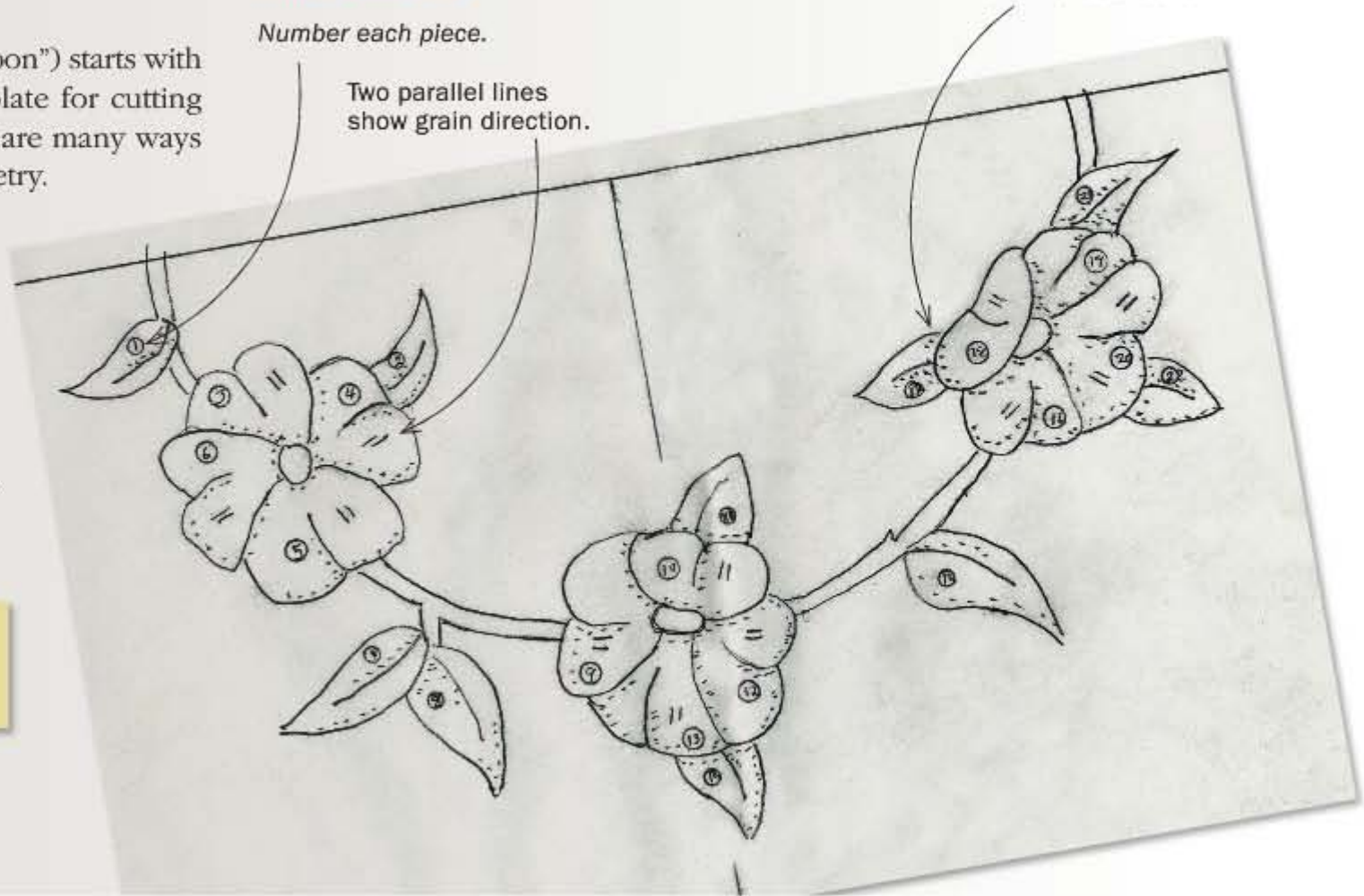
Every marquetry design (called a "cartoon") starts with a line drawing, which acts as a template for cutting out and assembling the pieces. There are many ways to obtain a usable drawing for marquetry. You can trace over photographs in books, using either vellum tracing paper and a 0.5mm mechanical pencil with HB lead, or transparent film and a fine-tipped permanent marker. You can then enlarge, reduce, or reverse the drawing or certain elements of the drawing with a photocopy

Online Extra

Scrollsawing in action: Go to FineWoodworking.com/extras for a free video on Schürch's tips for clean cutting.

MANAGE THE MADNESS

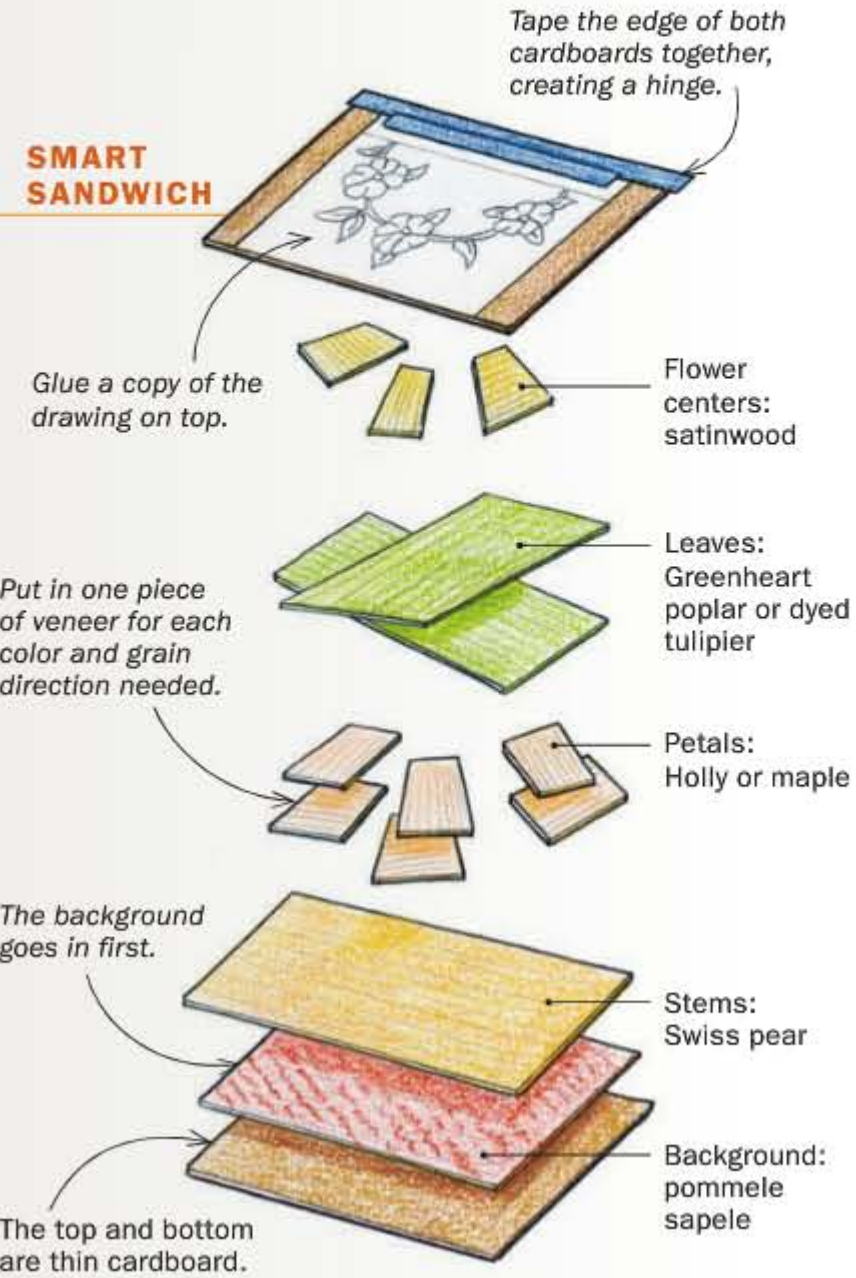
In order to choose veneers for your packet and keep track of the pieces afterward, you need to label each element carefully.



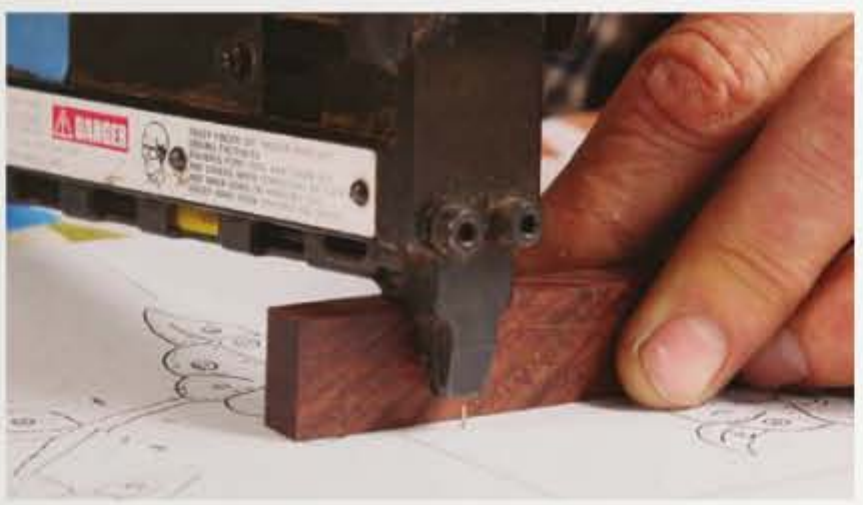
Build the packet

To saw out all the pieces in one shot, you need to bind together all of the veneers in a stack, with the drawing on top.

Reinforce the veneer first. *Put gum tape on the "show" faces. Wet the tape by pulling it over a damp sponge, and burnish it afterward with a brass-bristle brush to improve its bond. Place the veneer under MDF to keep it flat as it dries.*



The flip trick. *To see where each piece of veneer should go, flip the top of the packet up and down quickly. Secure each piece with a few strips of blue tape.*



Pin the packet. *Put the packet on a layer of rigid foam, and use a 23-gauge nailer, with ¾-in.-long pins, to lock the layers together. Placing a spacer under the gun leaves the pins sticking out on each side. Nail into the background areas only, and make sure each piece of veneer in the packet has at least two nails in it.*

Clinch the pins. *Bend over each pin in the same direction above and below for greatest strength and to avoid shifting the layers.*

machine to achieve the proper elements for your project. By the way, a drawing can also be photocopied onto transparent film, which can be used to trace a mirror image for symmetrical designs.

You can also make your own sketch, refining it by placing tracing paper over each new version until you are happy with the picture and all the lines are crisp and clean. My go-to tools are my 0.5mm pencil, an electric eraser (used with an erasing shield), and a photocopy machine. I also use other common drafting tools—from compasses, rulers, and templates I have made in ⅛-in.-thick MDF, to drafting arms and thin wooden sticks to bend a curve just right.

I find that creating a marquetry cartoon is easier after the furniture has been designed, in order to get the form and proportions just right.

For a workable cartoon, you should make all the pieces in the design or background bigger than ¼ in. square, or they will be too small to handle while cutting or sand-shading. I always try to simplify the drawing so that the background is connected together as much as possible, and avoiding narrow background sections between the images.

Drawings: John Tetreault

Saw from the inside out

Start from the inside elements so the outer elements remain attached to the overall packet for support.

Starter hole. *Schürch cuts the head off an 18-gauge nail and chucks it in a drill to create a starter hole for the scrollsaw. The nail parts the wood fibers, which can be re-knit later.*

One stack at a time. *After sawing an element free, press down on it with a pencil, lift the packet, and then reach under it to remove the small stack of pieces.*

Stay organized. *Under each part of the drawing is a small stack of veneer parts. Keep each stack together, with its labeled piece on top. Use a big tray and another copy of the drawing to keep track of the pieces.*

I find that the most challenging designs to scrollsaw are straight lines, thin parallel cuts (stems, border work), lettering, and facial features: All of those show mistakes clearly, so beginners should avoid them.

Labeling is critical

It's very important to number all of the pieces to help you identify, sort, and assemble the marquetry pattern after it is in a hundred pieces, many of them similar.

You'll also need to add little rows of dots where you plan to sand-shade the pieces, as well as lines to indicate grain direction. After the final drawing is done, I make three photocopies, one for choosing veneers (sometimes I paint it first) to get the colors right, one to be glued onto the packet as a cutting template, and one as an assembly guide.

How to make the packet

To build the packet, start with two sheets of grayboard ¾ in. larger than the final panel size. Also known as thin cardboard, base mat board, or notebook backer, grayboard is about 0.035 in. thick, and can be obtained from an art-supply store in sheets up to 3 ft. by 4 ft. It allows for clean nailing, prevents scrollsaw

Pick out your parts. *Now take apart each stack, find the piece with the right color and grain direction, and place it on a copy of the full drawing. Since there is veneer tape on the show face, you'll be looking at the glue face for reference. Bring along the labeled cardboard pieces, too.*

SAND-SHADING IS NEXT

To find out how to do it, see "Master Class" on pp. 90-93.

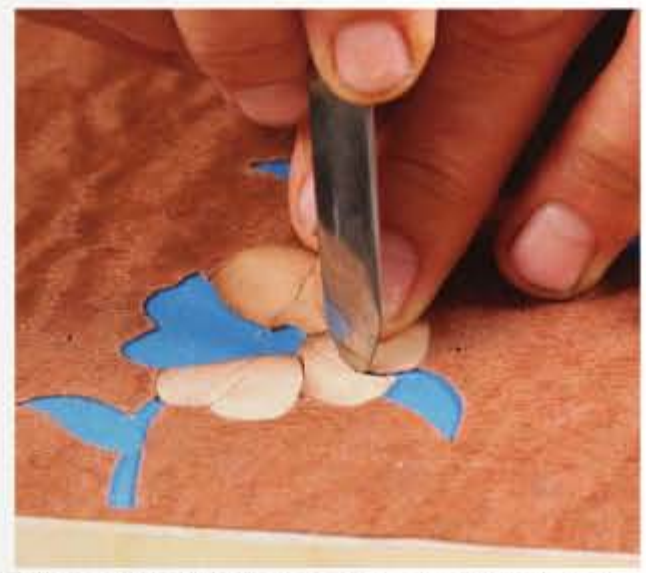
Assembly is the fun part

The process is quick and easy, and it feels great to watch your veneer picture come together.

First pull the pins. *Use a small nail nipper, gripping the pins in the tool's throat to avoid cutting them. They will straighten as they pull free.*

Build bridges. *Schürch uses small stem pieces to connect the two halves of the background, working on the glue face.*

Tape is the foundation. *Working on the show face, now cover all the spaces with blue tape.*



Paint your picture. *Flip the pattern over to the glue face, and start placing pieces (left). Schürch places his thin tongs into the sawn leaf veins (right) to spread the piece and even out the gaps. The blue-tape adhesive allows the pieces to be shifted easily.*

Check the gaps. *Place the completed pattern in front of a strong light to check for uniform gaps. Shift pieces around if necessary.*

tearout, and helps the thin 2/0 blade to stay vertical while cutting. Glue a copy of the drawing onto one layer of grayboard with a spray adhesive like 3M 77. Then tape the two sheets of grayboard together along one side—hinged like a book.

Now select all the veneers you'll need for your design. The first piece in the packet is the background, the same size as the oversize grayboard. It can be a radial match, bookmatch, or just a single sheet of veneer. After that, if you are not using full sheets, each piece of veneer should be prepared at least 1 in. larger than the image it corresponds to in your drawing.

Apply 25-gram veneer tape (also known as gum tape) to the whole "show face" (the side that you will see once glue-up is done) of each layer of veneer to reinforce it, and rub the tape aggressively with a brass-bristle brush to improve its grip. Then immediately place the pieces under a sheet of MDF or plywood to keep them flat while they dry for 20 to 30 minutes.

After that, you can start building the packet. Using a few pieces of blue tape, secure the background veneer to the bottom layer of grayboard. Then open and close the sandwich rapidly to make sure you are positioning each piece of veneer directly under its drawn outline, and secure each one with a few more pieces of blue tape away from any areas to be cut, if possible. Select veneer pieces and orient the grain for maximum effect. Make sure the gum-taped side of all pieces is facing up.

Nails lock everything in place

Close and nail the packet together with ¾-in.-long, 23-gauge pins. These thin nails have a sharp point on one end, which separates the fibers rather than crushing them. Still, lighter background woods can show pinholes after glue-up, so you'll need to fill those holes after the design is assembled (before glue-up). Just apply a spot of white glue, burnish the hole closed with the tip of a chisel, and hand-sand with 100-grit paper, filling the hole with dust and wet glue.

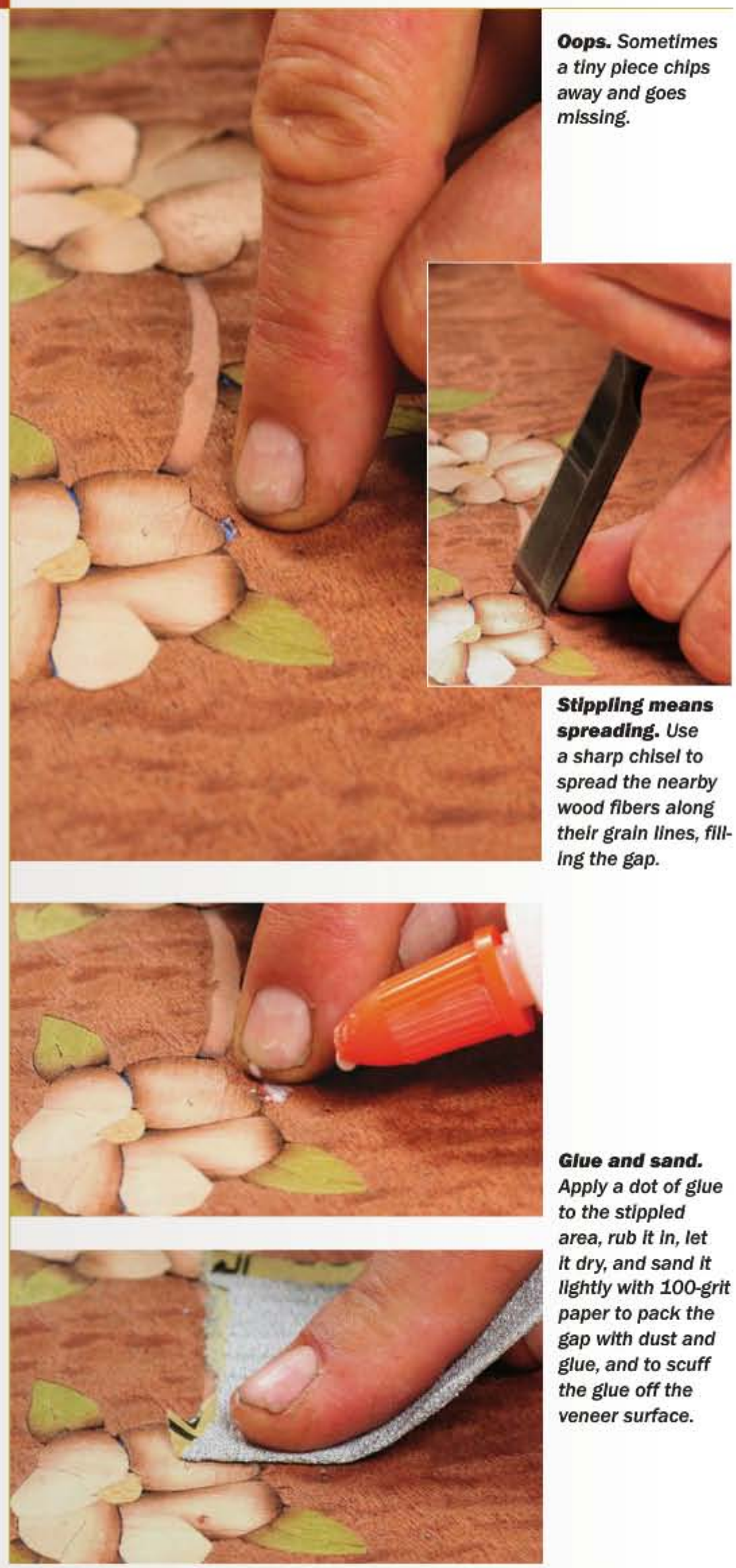
Here are some other important tips: Nail the packet together on a piece of rigid foam so the nails don't stick into your bench. And nail only into the background areas, close to the designs. Hopefully, each piece of background will be secured by at least two nails to keep it from shifting during sawing. I put a ½-in.-thick spacer under the body of my nailer, which leaves each pin protruding ¼ in. on either side of the packet.

Now, bend down (or "clinch") the nails. Don't bend them over a cut line, and be sure to bend both sides in the same direction. If you form an S-shape, you will shift the veneer alignment.

Scrollsaw success

While cutting the packet on a scrollsaw, remove each stacked element of the design as it is cut free, placing them to one side as you go. To get the pieces out, I use a pencil or dental pick to hold down the stack of pieces I just cut,

Got a chunk missing? Repairs are easy



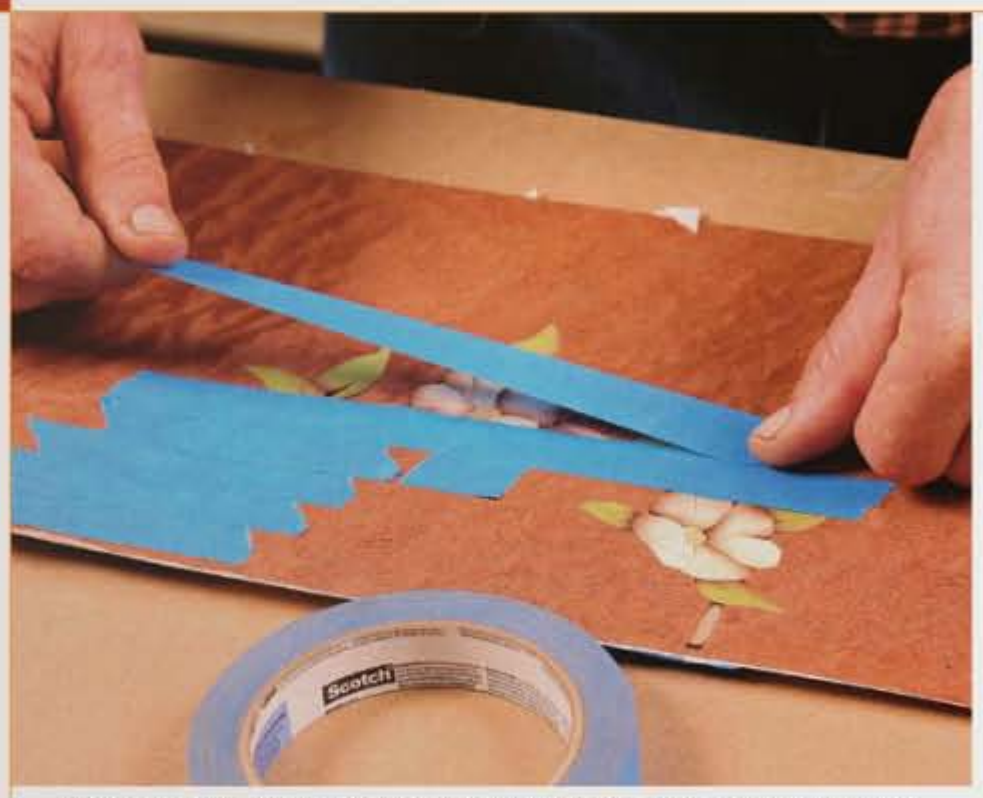
Oops. *Sometimes a tiny piece chips away and goes missing.*

Stippling means spreading. *Use a sharp chisel to spread the nearby wood fibers along their grain lines, filling the gap.*

Glue and sand. *Apply a dot of glue to the stippled area, rub it in, let it dry, and sand it lightly with 100-grit paper to pack the gap with dust and glue, and to scuff the glue off the veneer surface.*

Dance of the tape

Most veneering projects involve a back-and-forth between blue tape and gum tape, in order to move all the veneer tape to the show face while keeping the pattern in perfect alignment.



Tape the glue face. *Use blue tape on the back side to lock in the pattern and placement. Burnish the tape with a brass-bristle brush for a good hold.*

Clean off the show face. *Remove all the blue tape from the show face. Keep the tape low as you pull, to avoid pulling up fibers or a whole piece. Hold pieces down if necessary. Some loose gum tape will come off.*

as I lift the packet. And then I reach under the packet with a pair of thin tongs or tweezers to pull out the little stack.

Your best bet is to start cutting out pieces from the middle of the design, and work your way out toward the edges. This way, the pin nails holding the packet together will support the veneers throughout the cutting process. I make the starter hole for the scrollsaw blade in the center of the packet, by drilling with a sharpened 18-gauge wire nail or dental pick. The spinning point eases the fibers aside, so they will knit back together later. No drills (or faceted nail points), since they remove wood fibers.

It is wise to save all the pieces until the project is glued up, since you may need an alternate piece to replace a damaged or lost one. After cutting, sort and select each piece including its numbered grayboard drawing on a tray for sand-shading. After shading, you can pull the pin nails out of the packet to release the background, and the pattern can be assembled. To remove the pins cleanly, place the packet on the rigid foam again, and gently lever the pins straight out with some wire nippers, without cutting them. The pin will unbend on the bottom and pull out.

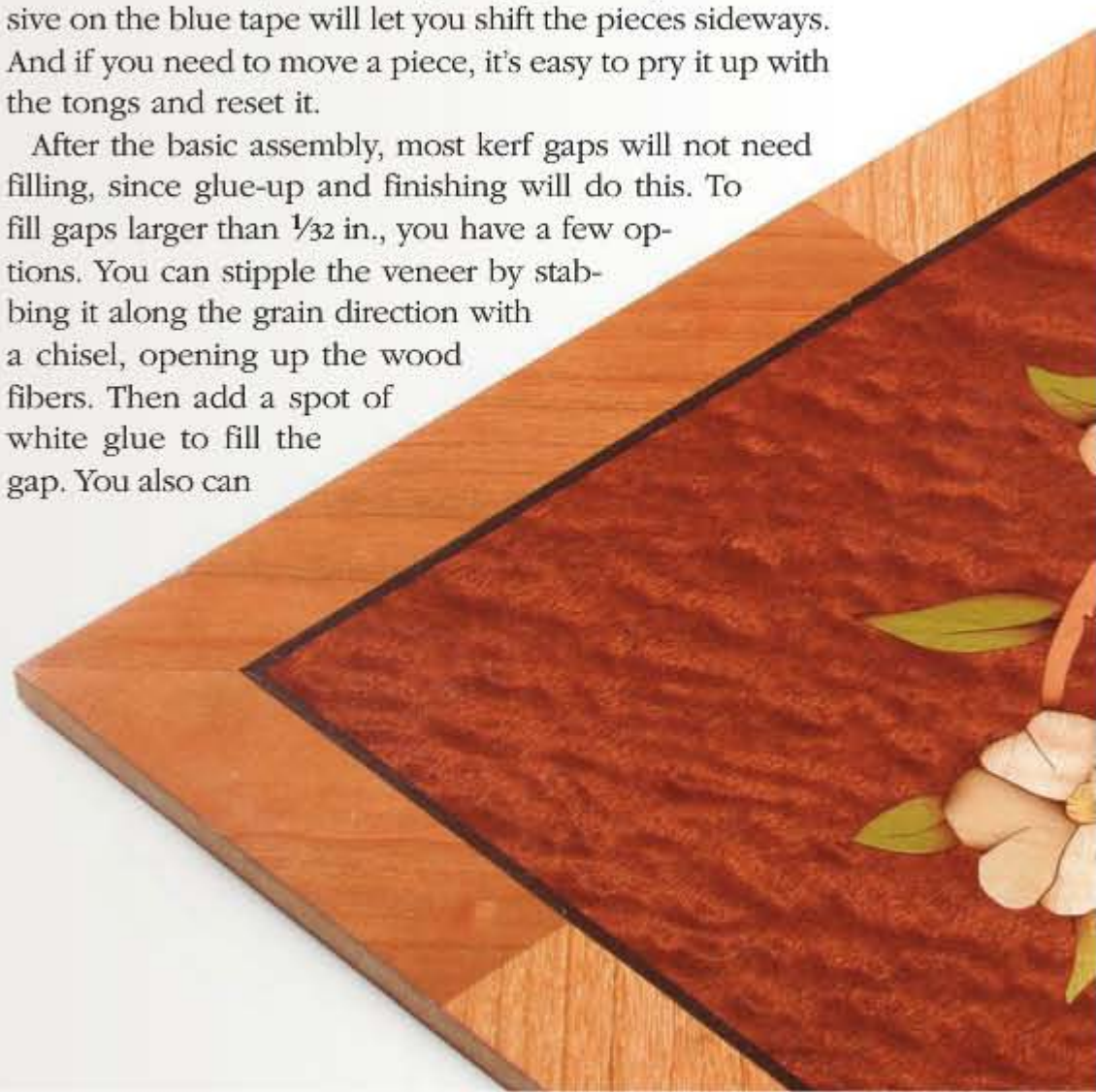
Putting it together: Tape and tape again

When all the veneer parts are ready for assembly, place the background on a flat surface, gum-taped show face down. For this flower design, the stems act as bridge pieces, joining the two background sections together. Use a few pieces of blue tape to secure them.

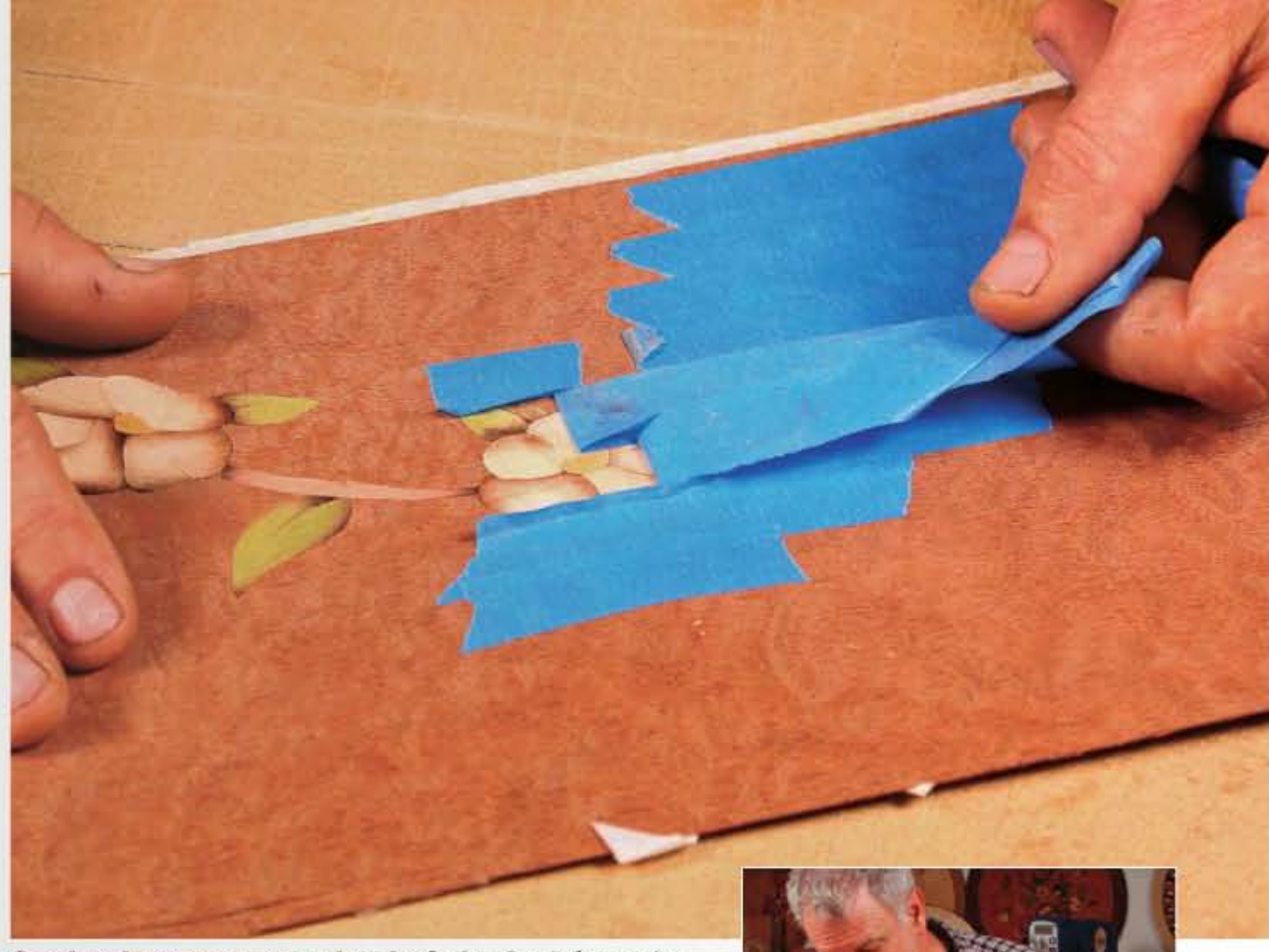
Now flip the pattern over (show face up) and put wide blue tape over the gum tape on all assembly areas. Then flip the pattern over (show face down again), with the sticky side of the blue tape showing through the voids. The large blue tape will hold it all together, and allow you to stick all the small pieces in place. This is the fun part, watching the picture come together.

Spread the leaf veins apart to snug the leaf perimeter tight to the background, which also opens up and accents the vein lines. Place the outer petals of each flower snugly against the background first and then work your way in toward the center, distributing the gaps evenly. The adhesive on the blue tape will let you shift the pieces sideways. And if you need to move a piece, it's easy to pry it up with the tongs and reset it.

After the basic assembly, most kerf gaps will not need filling, since glue-up and finishing will do this. To fill gaps larger than 1/32 in., you have a few options. You can stipple the veneer by stabbing it along the grain direction with a chisel, opening up the wood fibers. Then add a spot of white glue to fill the gap. You also can



Tape the show face. *Now gum tape goes on the show face to hold everything together through the glue-up process.*



One last layer to remove, then let it dry. *Don't forget the blue tape you put on the glue face (above)! Put the veneer under a layer of MDF to keep it flat while it dries (right).*

insert veneer slivers where needed, and dab white glue into the repair areas (or other fragile spots). Lightly sand the glue spots with 100-grit paper to ensure they will adhere properly to the substrate. By the way, like assembly, repair is always done on the glue surface.

The tape dance isn't over. Cover the glue face with blue tape, flip the skin over, remove all the blue tape from the show face, and replace it with slimy gum tape. Once again, brush down the tape and place the assembled pattern under a platen to dry. Last, remove the blue tape from the glue surface.

Now you can trim the edges, and add stringing or borders if needed. Make both the finished pattern and the substrate ½ in. oversize (¼ in. all around) in case the veneer shifts during glue-up. I use the substrate as a template for trimming the veneer to size. Cut a balancing veneer for the back of the panel, do a final check for overlaps in the marquetry, and glue it up. Afterward, scuff the veneer tape with 100-grit paper, wet it for a minute or two, and it will come off with a sharp putty knife. The glue fills most of the gaps in the marquetry, but if any depressions are left after I've finish-sanded the panel and sealed it with a couple of padded-on layers of shellac, I fill them with Famowood or Dap (both walnut color), sand with 220-grit, and seal again with shellac before applying oil or lacquer.

That's it. Lots of steps, but none difficult. You've learned marquetry; the only limit now is your imagination. □

Perfect panel. *To learn how Schürch adds beautiful borders and stringing, read his article in* **FWW #164.**

Paul Schürch makes furniture in Santa Barbara, Calif., and teaches across North America. His veneering tools and DVDs are available at schurchwoodwork.com.

readers gallery

AUSTIN CAMPBELL
Wenatchee, Wash.

Most woodworkers see the bombé chest of drawers as the ultimate tour-de-force, so it's particularly impressive that Campbell made this mahogany and white pine bombé as his second case piece while a student at North Bennet Street School. Campbell says this design is a compilation of different styles he had admired in other bombés. He took the dimensions (19 in. deep by 40 in. wide by 33 in. tall) and construction from an article by Lance Patterson in *FWW* #45. The finish is oil and shellac. The piece took Campbell approximately 500 hours to complete.
PHOTO: LANCE PATTERSON

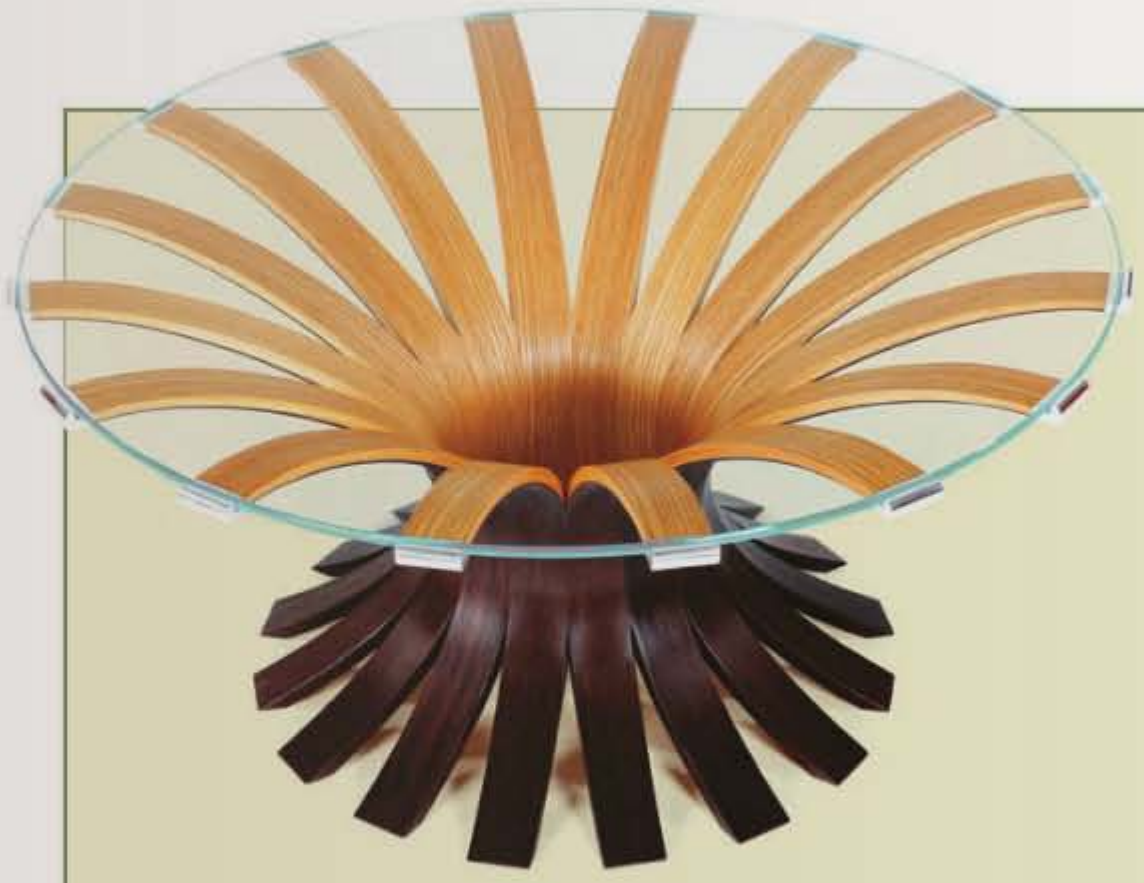
KIP GLOVER
Santa Barbara, Calif.

This wenge and yellowheart table's final form was the result of lots of careful planning and one lucky mishap. Glover started the project (his first as a student at College of the Redwoods) with several drawings and a quarter-scale model. He says the idea of creating the double legs, plus the striking contrast between the wenge and yellowheart, got him "fired up" about the project. But after creating a slight roundover along the edges of the tapered legs, Glover realized that a drawer box would no longer fit flush against them as planned. Having the box wrap around the legs was born from this slight mishap. The table is 16 in. deep by 21 in. wide by 37 in. tall, and the finish is a custom varnish. PHOTO: DAVID WELTER

Submissions

Readers Gallery provides design inspiration by showcasing the work of our readers. For submission instructions and an entry form, go to FineWoodworking.com.

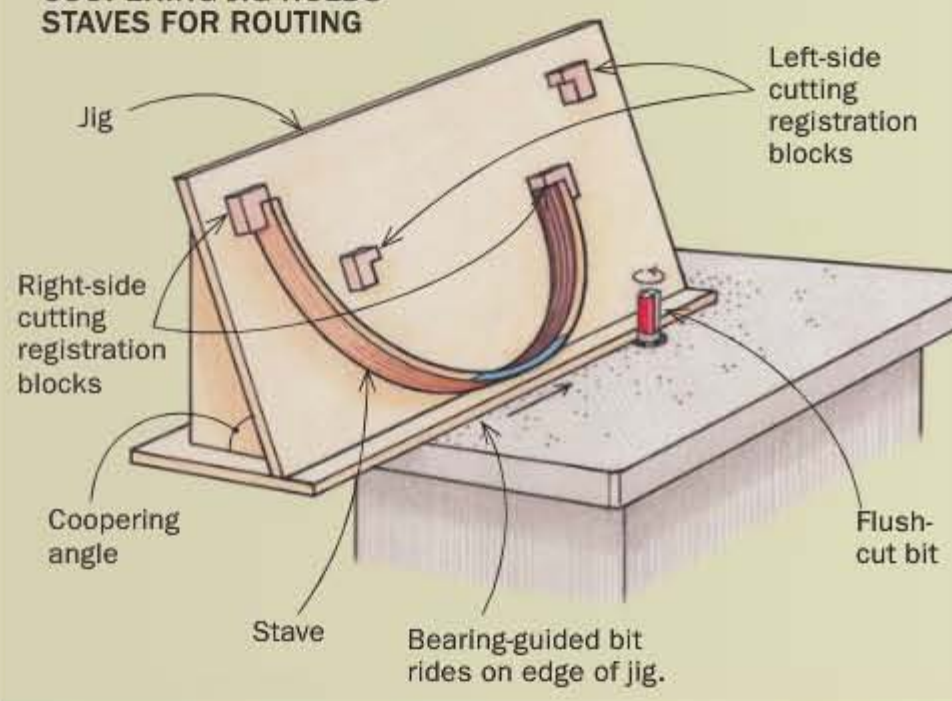
Drawings: Vince Babak



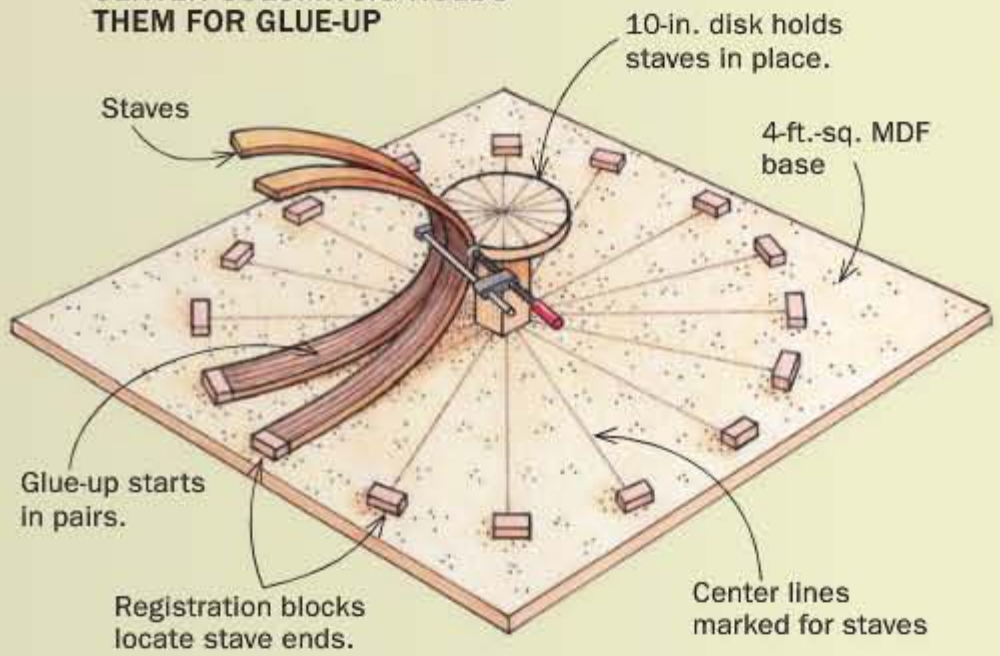
ADRIAN FERRAZZUTTI
Guelph, Ont., Canada

There was plenty of math involved in this coopered ash and wenge coffee table (35 in. dia. by 16 in. tall). The staves taper in width and in thickness, both above and below the joint. After figuring out the angle for the joint, Ferrazzutti made a jig to hold the laminations at that angle and then ran one side of each stave past a shaper (below left). Then he flipped each lamination on the jig and ran the other side through. Only a few of the joints needed some handplane work to change the angle slightly as the glue-up progressed. For the glue-up, Ferrazzutti mounted a center column on an MDF base with a circle drawn on it to represent the glass (below right) and registration blocks for locating the staves. He glued up pairs of staves into sets of four, fours into halves, and the halves into a whole. The glass is held in place with custom aluminum clips.

COOPERING JIG HOLDS STAVES FOR ROUTING



CENTER COLUMN JIG HOLDS THEM FOR GLUE-UP



MICHAEL PRENDERGAST
Kenmore, Wash.

In this white oak and hand-forged mild steel humidor, there are 48 raised panels in the sides, cut from oak and inserted into their half-lap framework from behind, secured with flexible adhesive at the corners. They are then locked in with a layer of plywood that sits between them and the Spanish cedar liner. The two large panels in the lid are captured in a groove. The steel frame is assembled with a combination of welding and rivets hammered flat and tight while hot. The humidor is 15 in. deep by 21 in. wide by 17 in. tall. The lid weighs 12 lb. and has a custom-made hinge to support it. The finish is shellac, nitrocellulose lacquer, polyurethane, and wax. PHOTO: LINDSAY VON JULIN

ART HOFMANN
Santa Rosa, Calif.

Hofmann was drawn to the tansu form for the way it uses grain as a design element, and he arranged the wood in this double chest to suggest plaid, "with strong horizontals broken by verticals and the curves of brass handles." The chest took approximately 1,000 hours to build, and measures 19 in. deep by 38 in. wide by 72 in. tall. The frame is kiaat, an African wood, and the panels are acacia. The finish is General Finishes Seal-a-Cell, Arm-r-Seal, and wax. PHOTO: LARRY STROUD

MICHAEL ALLISON
Storrs, Conn.

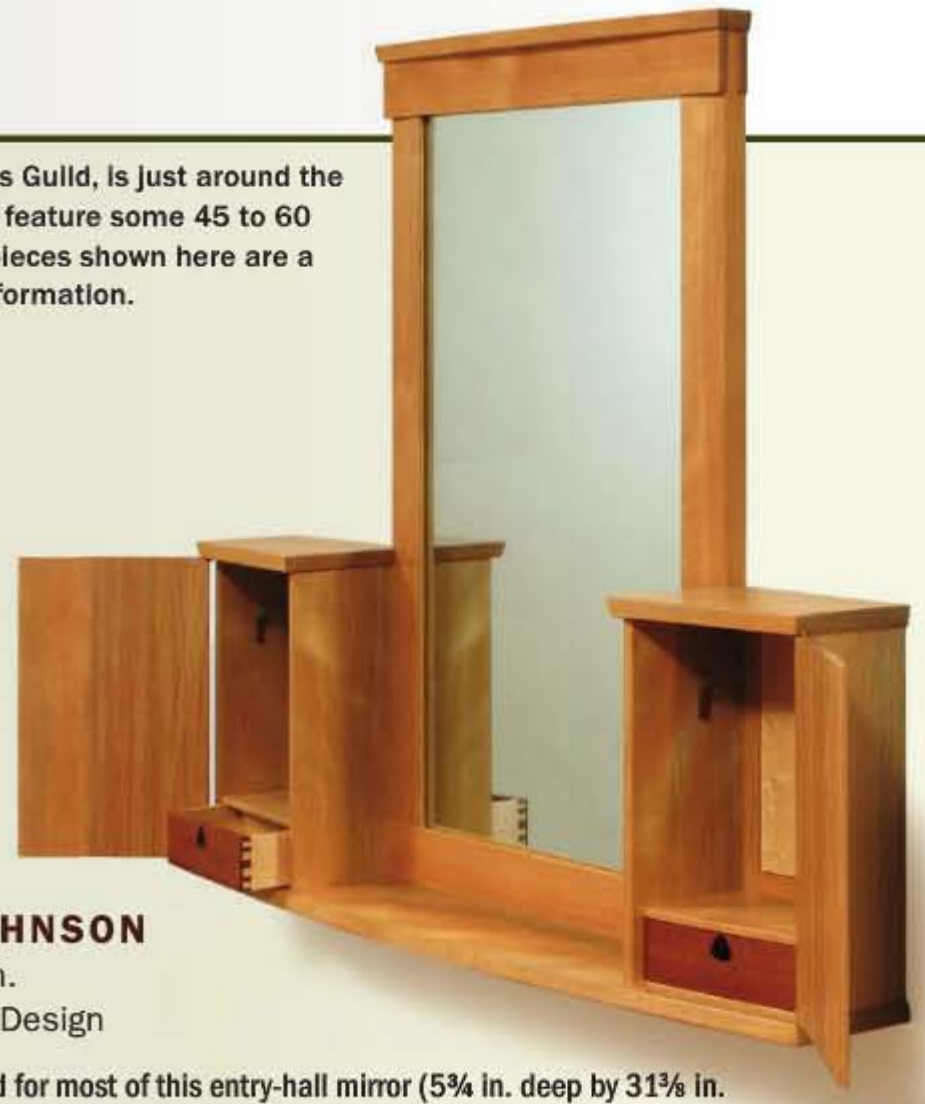
Like many of Allison's turnings, this pierced ash bowl (13 in. dia. by 5 in. tall) is made from green wood he found near his home. He achieves the luminescent color with water-based transparent dye, followed by a high-build, high-gloss finish, in this case, about 14 coats of Minwax Wipe-On Poly. The piercings are done with a high-speed rotary air tool. Turned while green, the 3/32-in.-thick walls distort upon drying, giving the bowl a sweeping shape. To see more, go to www.michaelallison.us.

TONY CLARK
Tasman, New Zealand

This hallway table was inspired by the fact that when a piece of wood is sliced thin, it will droop. The table (6½ in. deep by 36¾ in. wide by 26½ in. tall) is made of laminated maple, and the legs are also split, echoing the theme. Clark said he particularly liked the challenge of assembling all the layers, and he loves the way the light looks when it shines through them. The table is finished with Penetrol Wood Oil. PHOTO: DANIEL ALLEN

OUT OF THE NORTHERN WOODS

The 29th annual Northern Woods Show, sponsored by the Minnesota Woodworkers Guild, is just around the corner: April 26 to 29 at the Southdale Mall in Edina, Minn. This year's exhibit will feature some 45 to 60 pieces ranging from sculpture to original furniture designs to reproductions. The pieces shown here are a few of last year's winners. Mark your calendars, and go to mnwwg.org for more information.



CRAIG JOHNSON
St. Paul, Minn.
Best Original Design

The yellow birch used for most of this entry-hall mirror (5¾ in. deep by 31⅜ in. wide by 29½ in. tall) was reclaimed from where it sank—probably in Lake Superior, according to his lumber supplier—after it was logged more than 150 years ago. The subtle discolorations in the wood are evidence of its long history under water. The drawer fronts are kwila, and the interior panels are bird's-eye maple. Johnson hand-carved the key hooks and drawer pulls. He also made the brass knife hinges. The finish is shellac and beeswax. PHOTO: STUDIO TUPLA

TONY KUBALAK
Eagan, Minn.
Best Carving and Paul Lee Memorial

Kubalak says the carving on this Philadelphia high chest was the most "elaborate, ambitious, and voluminous" he has ever attempted, and he is proud of the results. The judges agreed! The mahogany chest (22 in. deep by 46 in. wide by 101 in. tall) is a reproduction of the 1769 Gratz family high chest, now on display at a private museum. Secondary woods are pine and poplar; the finish is aniline dye, shellac, and wax. The project took about 800 hours to complete. PHOTO: RAMON MORENO

TIM HEIL
St. Paul, Minn.
Best Handwork

This Nanny Rocker comes with a gate that keeps an infant safe while being rocked. With the gate removed, two adults can sit side by side. Heil made the piece for his second grandchild. The chair (18 in. deep by 42 in. wide by 40 in. tall) is made of red oak, pine, and maple; the finish is milk paint and polyurethane. Heil says the biggest construction challenge was to locate and drill more than 80 holes by hand, none of which are plumb or square to the frame. The rocker design is by friend and fellow chairmaker Jim Van Hoven. PHOTO: RAMON MORENO

Q&A

Angled mortise is better than angled tenon

Q: I'm making a chair, and the front is wider than the back. The side rails and legs are joined with mortise-and-tenons. Should I use angled mortises with straight tenons, or straight mortises with angled tenons?

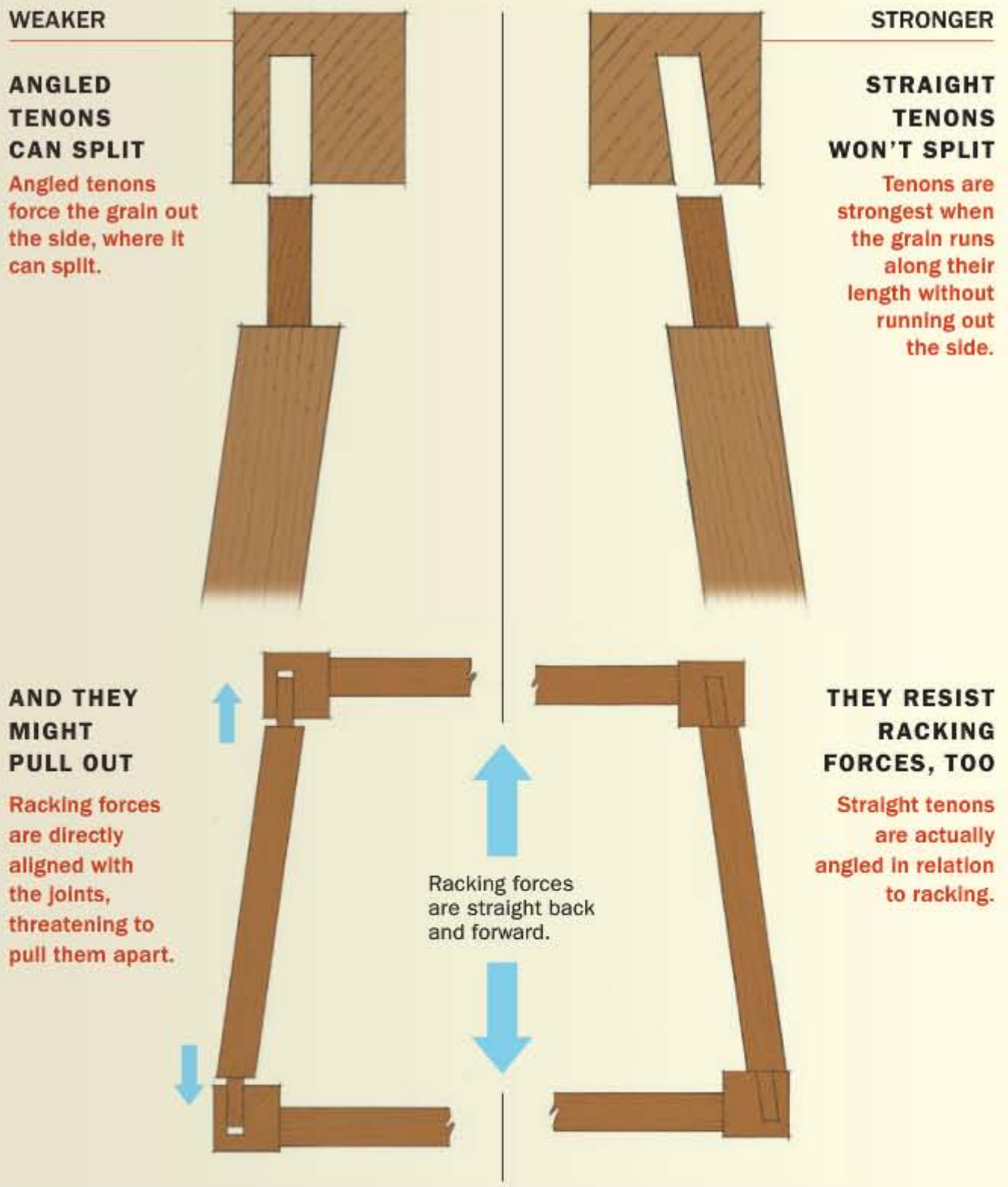
—BILL ECKEL, Lowell, Mass.

Ready to rack. *Major forces are exerted when we sit down on, lean back in, and get out of a chair.*

A: AN ANGLED MORTISE WITH A STRAIGHT TENON is more difficult to make (the tenon has angled shoulders), but it is a better choice for two reasons. First, because the tenon is straight, the grain runs along its length, making it strong. On angled tenons, the grain can dive toward one side, making the tenon weaker and prone to breaking. Second, after assembly a straight tenon in an angled mortise resists the stresses of racking very well, and the chair as a whole is stronger.

By the way, when building a chair with angled mortises and straight tenons, you must assemble the sides first and then attach the front and back rails. If you do it in the opposite order, you won't be able to get the chair together because the ends of the straight tenons won't line up with the mortise openings.

—Jeff Miller is a furniture maker in Chicago, Ill.



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.

Photo: Tanya Tucka; drawings: Kelly J. Dunton

Empty your compressor after every use

Q: I've just bought a compressor. Is it OK to leave the tank under pressure between uses?

—DECLAN LANGDALE, Macclenny, Fla.

A: I SPOKE WITH DOUG SCHLEFKE, the National Service Manager for Rolair Compressors. He advised emptying and draining your tank after every use. When the compressor pulls air into the tank, it's also pulling in the moisture in the air. If you don't drain the tank, the moisture builds up and can rust the inside of the tank, which decreases its life. You might be tempted to drain the tank only partially, because that initial burst of air exiting the drain valve seems to get rid of the water, but resist the temptation. The compressed air still in the tank has more moisture than the air outside, so drain it completely.

—Matt Kenney is a senior editor.

Moisture is enemy number one. *Left inside, it causes rust and that can lead to holes in the tank. The solution is to drain the compressed air completely from the tank after every use.*

Seal miter joints before glue-up

Q: I've heard that sizing a miter joint before glue-up strengthens the joint. Is that true, and how should I apply it?

—JO JESTY, Mount Sinai, N.Y.

A: GLUE SIZING DOES STRENGTHEN THE JOINT, because it slows down the capillary action of the end grain. Standard woodworking glues (yellow and white PVA glues) are a combination of water and solids. As the water evaporates, the solids bind to one another. This becomes a problem when the glue is applied to end grain, like on a miter joint. Looked at from the end, a piece of wood is like a bundle of straws. When you put glue on the joint, they immediately begin to pull moisture (and some solids) away from the surface and into the wood. That causes the glue to dry too quickly and leaves behind a smaller amount of solids, resulting in a weaker joint.

Sizing the joint slows down the capillary action and makes a stronger joint possible. I recommend making the size from 50% glue and 50% water. Brush it on the joint, let it dry overnight, and the next day, assemble it as you normally would.

—Bob Behnke is a senior technical specialist at Franklin International.

Thin some glue. *A mixture of equal parts water and glue is thin enough to be absorbed readily by end grain.*

Size the joint. *For the strongest joint, let the mixture soak into the fibers and dry before gluing and assembly.*

Photos, except where noted: staff

Level tablesaw wings for better cuts

Q: The cast-iron wings on my new tablesaw are not level with the table in the center. At the far edges, they are about 0.015 in. higher. Will that difference be a problem when I use the saw?

—DARREN SANFORD,
Gulfport, Miss.

A: THAT IS ENOUGH OF A DIFFERENCE to cause problems, especially when crosscutting a rail, leg, or other long part. The edge of the table lifts the board, resulting in a cut that's not square.

The solution is to loosen the bolts that hold the wing to the saw and shim the joint. Because the edges of your table are higher than the throat plate, put the shims above each bolt (if your wings sagged, the shims would go beneath the bolts). Use thin brass sheet material for the shims. You can buy it at hobby-supply stores. After shimming, check for flatness with a 36-in. straightedge.

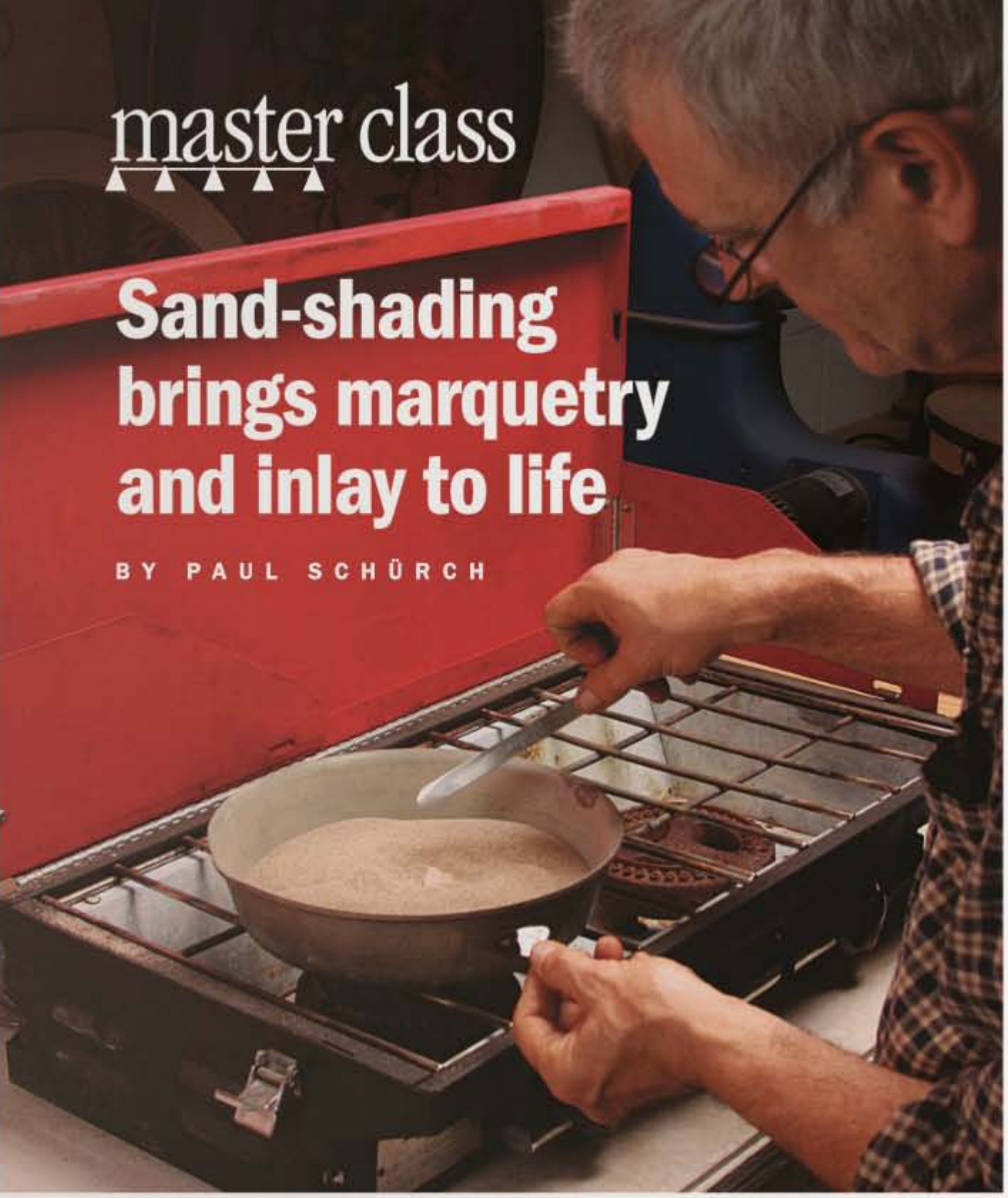
—Roland Johnson is a contributing editor.

Look for high and low spots. *Check wing alignment with a straightedge and feeler gauge (above). Install shims as necessary at bolt locations–above the bolts for a rising wing (left) and beneath for a sagging one.*

master class

Sand-shading brings marquetry and inlay to life

BY PAUL SCHÜRCH



Simple setup. *Schürch uses a propane camping stove and a non-coated pan filled with clean, washed silica sand.*

Without shading, marquetry can be flat and lifeless. With it, you get a 3-D effect that brings pictures to life, whether they are the folds in a linen cloth, the petals of a rose, or the shadows and lines of a face. It brings the same depth to many types of inlay in solid wood, too.

The good news is that shading is easy to do, using a low-tech, traditional method called sand-shading, in which a piece of veneer is scorched along one edge in a pan of heated sand to create a permanent, realistic shadow that goes smoothly from dark to light.

The process starts when you are making the initial drawing of the pattern or image. Pencil a series of small dots on the drawing along the edge to be shaded.

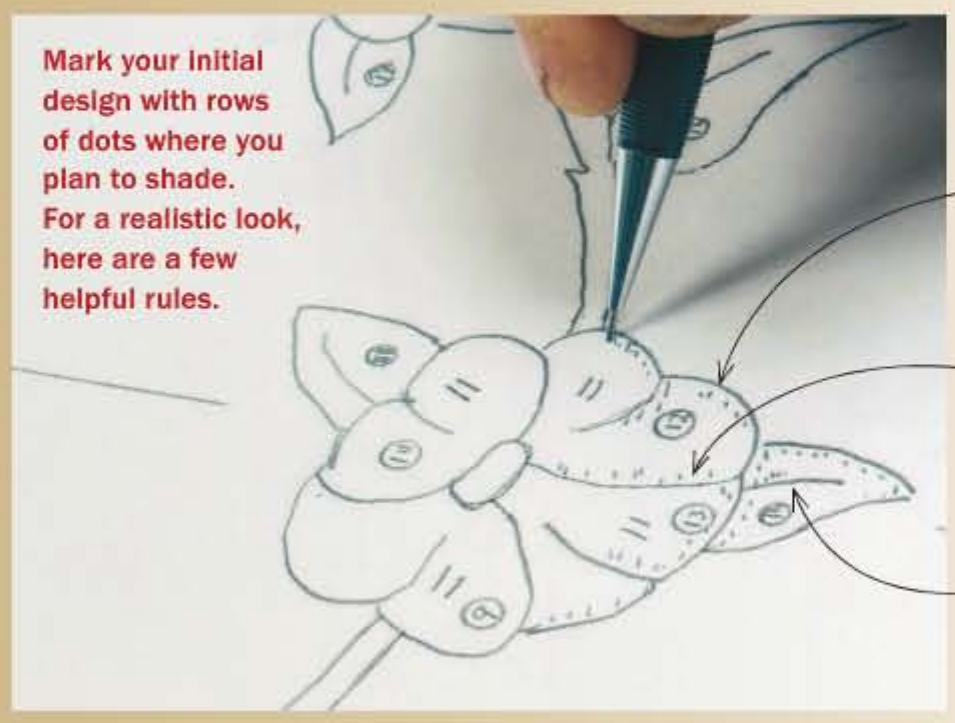
To decide which edges to shade, imagine a light source from the top right or left of an image, projecting down onto the design and creating shadows. Objects that appear to be underneath, or behind, should be shaded accordingly. There is one exception to that rule: When an image has the same type of wood side by side, as in two adjoining flower petals, I shade only one edge or the other, never both, because that would create a dark, unattractive furrow in the picture. But even if I don't shade an edge, I heat each piece a little, so its overall hue doesn't stand out.

How to shade safely

After cutting out all the parts (see "Marquetry, the Italian Way" pp. 74-81), keep each stack of pieces together, including their corresponding "cartoon" drawing piece,

Where to shade

Mark your initial design with rows of dots where you plan to shade. For a realistic look, here are a few helpful rules.



1. In general, shade the lower edges of elements. But shade upper edges, too, if they appear to be behind another element.

2. When two elements of the same color are next to each other, shade one edge or the other, but never both.

3. Shade along the veins in leaves, too.

Photos: Asa Christiana

then pull the right-color piece out of each stack, and place it and the cartoon onto a tray next to the sand-shading pan. The dots on the cartoon are your guide through the sand-shading process, and assembly, too. I also like to have a full copy of the drawing nearby as a reference.

You'll need 100-grit, clean washed silica sand, the crushed kind used for sand blasting or children's sandboxes, not beach sand, which has debris and salt in it. Put an inch of sand in a large, noncoated metal frying pan and heat it over a natural-gas kitchen, propane, or butane-gas flame. An electric hotplate may not get hot enough, though an electric stove might.

Let the sand heat up for about 15 minutes over a medium flame, and then use tweezers or thin tongs to pick up and insert the edge of a light-colored veneer test piece into the sand to see what happens. If the heat is right, the piece will be shaded with a dark-to-light gradated line in 5 to 10 seconds. If the sand is too hot, the wood edge will char and the piece may crumble. If the sand is not hot enough, the shading will take 20 seconds or more, and the whole piece will darken as it shrinks and curls. Note that some of the shading effect will be removed during final finish sanding, so exaggerate the shading a little bit.

Dark or dyed woods will take more heat to shade, and every wood species shades slightly differently, requiring you to change the depth you plunge some pieces into the sand (the deeper, the hotter).

By the way, if you've taken my advice and reinforced your veneer pieces with veneer tape prior to scrollsawing, don't worry: The heat will penetrate through the paper and work just fine.

You'll find there is a sweet spot of heat in the pan, and long pieces can be shaded by moving them through that spot in stages. Also, the inside of a leaf can be shaded along one edge of a vein by bending or breaking the leaf in the middle of the vein cut, using the veneer tape as a hinge. You can then insert the whole leaf at an angle to shade both a middle edge and an outer edge at the same time.

Pieces need to be rehydrated

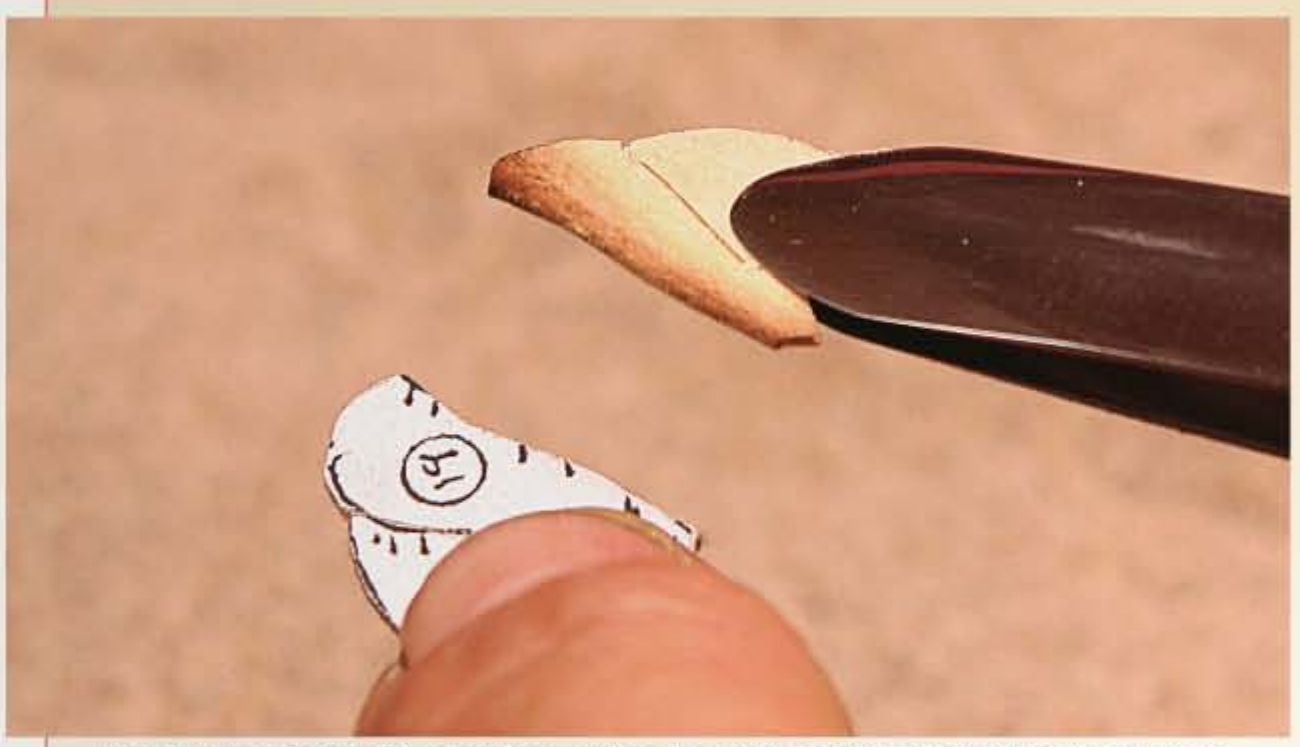
Shading the veneer pieces will curl and shrink them slightly, making them brittle. So

Dial in the temperature

Try a test piece. *Let the sand heat up for 15 minutes over a medium-to-high flame, and then dip the edge of a light-colored piece into the middle for 5 to 10 seconds.*

Too hot. *A dark, charred line means the sand is too hot.*

Too cool. *If the sand is too cool, shading will take 20 seconds or more and the entire piece will darken, shrink, and curl excessively. (An unheated piece is at right.)*



Just right. *Look for a fine dark line at the edge, with a gentle gradient beside it. There is veneer tape on the show face, so you'll have to flip each piece to check the color. The cardboard pattern piece is at left, showing which edges should be shaded.*

Stay organized. *To keep the small pieces organized, move them onto an offload tray when they are shaded. Always keep their cardboard template pieces with them for reference.*

The double edge trick. *For leaves with a sawn vein down the middle, you can shade both the edge of the leaf and one edge of the vein at the same time. Bend or break the leaf open (the tape will hold it together) and dip it as shown.*

you need to re-introduce some moisture to make the wood swell back to its original size and become pliable again.

To do this, brush off any sand stuck on the piece and dab its bare face with a moist sponge or wet finger. When the wood starts visibly expanding and becomes pliable again, I place the piece and its cartoon between small 4-in. by 4-in. plywood or MDF cauls to keep them flat and absorb the excess moisture as they dry, which will take 10 to 20 minutes. The cauls stack nicely.

By the way, too much hydration will loosen the veneer tape, over-expand the piece, and create too tight a fit. You definitely don't want pieces to overlap in your marquetry pattern. So you might have to reheat pieces a bit to dry and shrink them, or you'll have to pound the pieces with the butt end of a chisel during assembly to get them to fit. On the other hand, small gaps will fill with glue during the pressing process. As I always say, "Better gaps than laps in marquetry." □

Paul Schürch makes furniture in Santa Barbara, Calif., and teaches across North America.

Always rehydrate. *The pieces will shrink a bit as they are shaded. To rehydrate and re-expand them, just dab a bit of water onto the veneer (not the veneer tape) side and place them between pieces of MDF or plywood so they will dry flat.*

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WOODWORKERS MART

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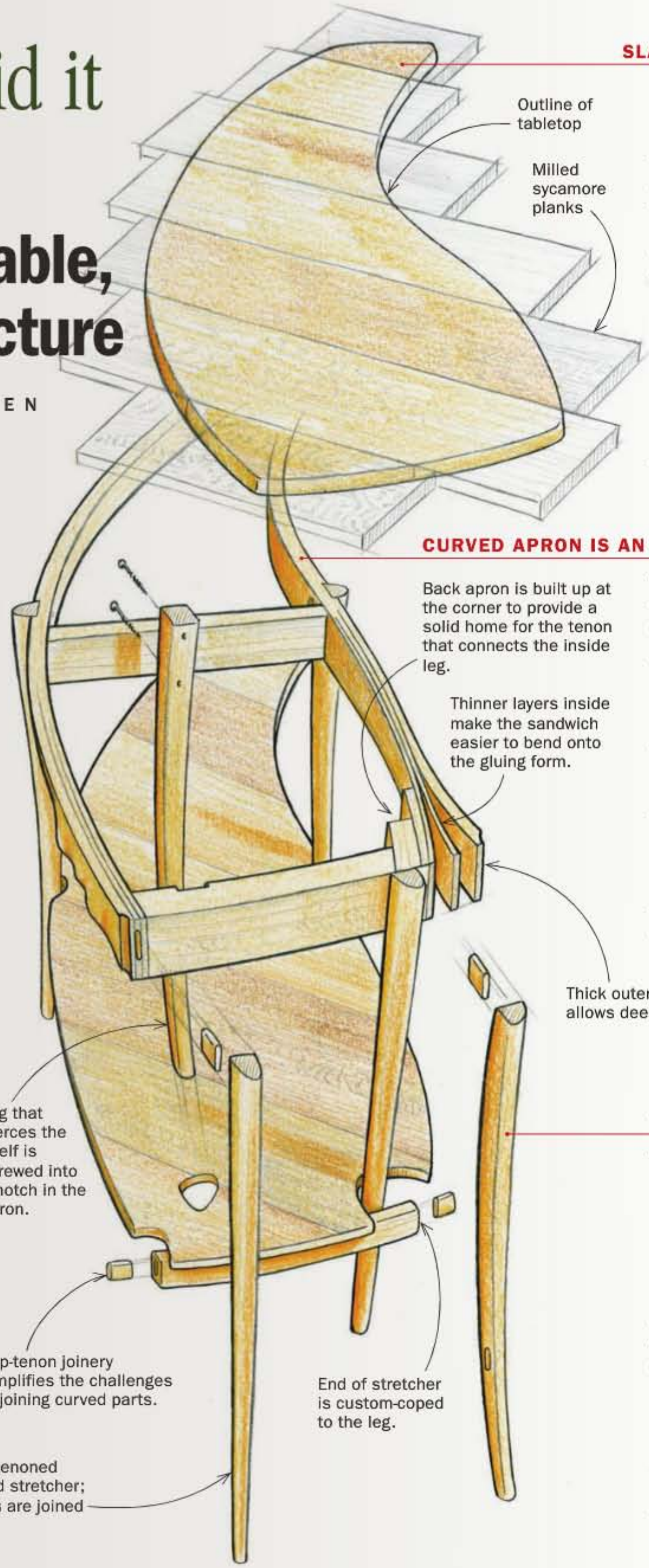
how they did it

Whimsical table, serious structure

BY JONATHAN BINZEN

Jere Osgood describes his Wave table, with its curves and contours imitating ocean waves and its legs inspired by reeds, as "metaphorical furniture." But there's nothing metaphorical about the techniques required to build such a playful piece. From its curved and twisting legs, each one unique, to its S-curved and deeply carved aprons, the table required engineering solutions just as inspired as its unusual shapes.



SLANT-GRAIN GLUE-UP

Osgood ran the grain of the top and shelf at 45° to the length of the table, which required a series of glue-ups. With the boards angled, the grain lines work with the sinuous curves of the table instead of competing with them. Osgood deliberately mixed the sycamore's lighter sapwood and darker heartwood to create an effect he hoped would suggest tidal streaks on a beach.

CURVED APRON IS AN UNEVEN SANDWICH

To make strong aprons that would retain their S-curves without springback, Osgood used bent-lamination instead of steam-bending, gluing up three layers of solid wood on a curving form. Because he would later be carving contours into the face of the apron, he used a thicker layer of wood on the outside, but kept the inner layers thin to make bending them easier.

HOW TO ATTACH A THICKET OF LEGS

The curving, twisty legs on Osgood's table are hand-shaped and no two are alike, so each joint is a custom operation. He uses slip tenons for all the legs except the two that pierce the shelf. Those two are screwed to a notch inside the apron and are attached only after the shelf is in place. They are not glued in, so they are removable in case the shelf needs repair.

Photo: Bill Truslow; drawing: John Tetreault

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Water Table

Photos: Bill Truslow

For Jere Osgood, design begins outdoors. He fills his sketchbooks with lines and shapes that catch his eye as he walks the woods around his home and workshop in New Hampshire. He might jot down the silhouette of a cloud, a seedpod, or a tree's shadow on the snow. This sycamore table, made for a house by the ocean, embodies Osgood's love of the seashore. The S-curved outlines of its top and shelf evoke breaking waves, while the contours of its carved aprons recall a wavelet rippling across the sand. The table is supported, he says, not by legs that pierce a shelf but by reeds growing up through a sandbar. In building this table, and most other pieces throughout his six-decade career, Osgood ignored the philosophy of his early teacher, Tage Frid, who advised students to "design around the construction." Osgood's approach is to determine how a piece will look and then figure out how to build it. This method keeps his furniture—and the process of making it—as fresh as a sea breeze. Turn to p. 68 for a full profile of the man and his work.

—Jonathan Binzen

How They Did It Turn to p. 98 to see how Osgood tackled the structural challenges in this table.

Pro Portfolio To see a range of Osgood's innovative work and hear him discuss it, go to FineWoodworking.com/extras.