

Fine Woodworking

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September 2026 No. 324

- Bevel-routing jig
- Arts & Crafts taboret
- Smart shop design
- Marquetry made easy



Coopered lampshades, p. 56



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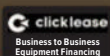
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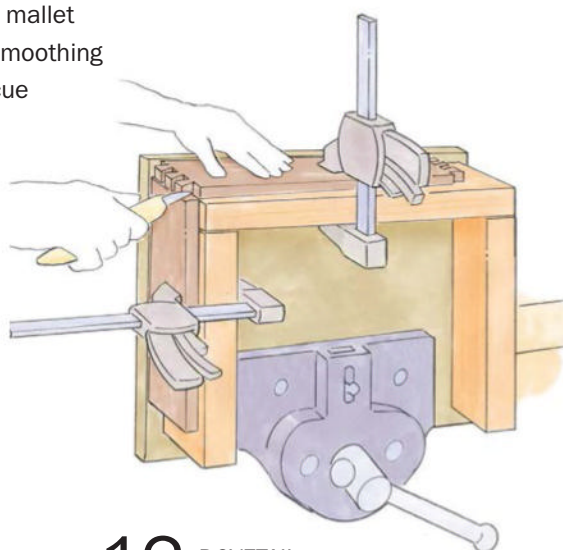
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VIDEO

Joinery machine

Ben Strano reviews the Shapeoko 5.1 CNC and demonstrates its ability to be used for creating traditional joinery.

VIDEO

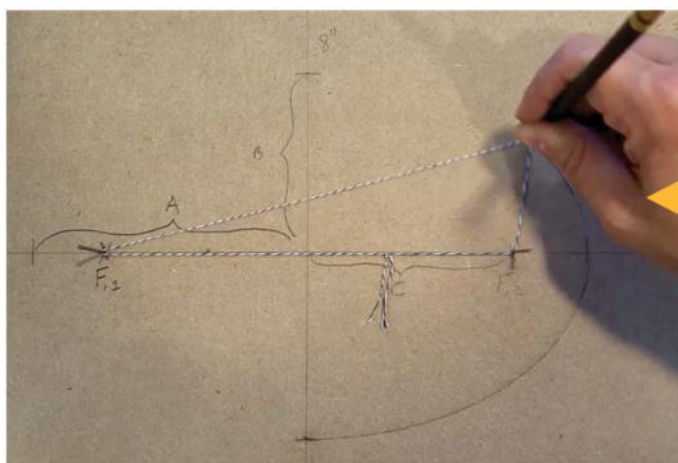
Marquetry in motion

Look over Craig Thibodeau's shoulder as he assembles a marquetry panel. He makes it look easy.

VIDEO

Adjustable jig for large bevels

Billy Hoysgaard introduces the router jig he designed and built to create custom beveled edges on square, rectangular, and round tables.



VIDEO

Oval time

What sets the ellipse apart from other ovals is that it can be mathematically defined and mechanically drawn. Bob Miller breaks it down in this video.

VIDEO WORKSHOP

Shaker oval box

Follow along as Chuck Thorne from Hancock Shaker Village demonstrates how to construct this quintessential Shaker object. In this series you'll learn how to:

- Carve the box fingers
- Prepare the stock for bending
- Create an oval bending form



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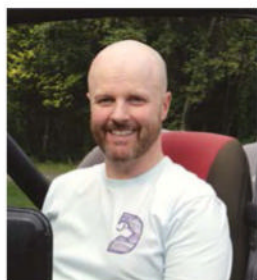
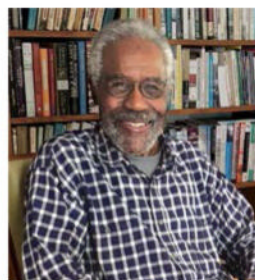


contributors

When **Seth Rolland** ("Creating Coopered Lampshades" and Master Class) went to Bogota, Colombia, and taught a three-week workshop at Escuela de Artes y Oficios Santo Domingo several years ago, he found a class of students who were highly motivated and deeply creative. "And just wonderful people," he adds. Rolland, seen here with his Colombian coopering class, has been building furniture and sculpture from wood for 30 years. After growing up near New York City, where furniture maker Janice Calella was an important early mentor, he moved to New Mexico, where he and his wife built a passive solar tire house and workshops. Drawn away by the "trees and green and water" of the Pacific Northwest, they moved to Port Townsend, Wash., in 2000 and have lived there since.

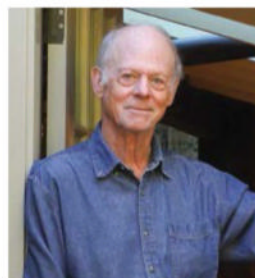


Michael Puryear (Designer's Notebook) is a self-taught furniture maker and designer based in the Catskill Mountains of New York and has been creating original work for more than 40 years. The simplicity of Shaker and Scandinavian design greatly influences his work, as well as Asian and African cultures. His work has been exhibited in museums and galleries such as the Museum of Arts and Design, the Mint Museum, and the Peabody-Essex Museum, and it is in the collections of the Newark Museum and the Smithsonian Museum of African American History and Culture.



Billy Hoysgaard ("Shopmade Router Sled") is the owner and principal woodworker behind River Dog Woodcraft. After more than a decade in residential construction, he hung up his tool belt and threw on a shop apron to focus on custom woodwork. Billy lives in Ipswich, Mass., with his wife, two children, and River, the company's namesake, a yellow lab who contributes nothing to production but is integral to the functioning of the business. When he's not in the shop, he can be found somewhere outside, either fly fishing, backcountry skiing, hiking, or golfing.

For three decades, **Charley Sawyer** ("An Architect's Woodshop") practiced architecture in eastern New England. His shop, and the house a few steps away that he designed for himself and his wife, Barret, embody his dreams as a designer: "that limits are good and smallish can be plenty; ordinary spaces can be made interesting with a gentle push or twist to familiar geometries; and humble materials become valuable and beautiful when used with imagination." In addition to building and woodworking, his passions include Nordic skiing, golfing, and particularly tai chi.



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

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From the Editor



Craft in the age of AI

These days, whether I'm watching a video, reading meeting notes, Googling diet advice, or listening to music, I find that the line between human- and computer-generated content has blurred beyond the point of recognition, and the world we live in feels more and more like an exquisitely fabricated simulation.

One vital antidote to this increasingly digitally generated world is the handmade object. In my first book, *The Why and How of Woodworking*, which predated widespread use of AI (and COVID, for that matter), I argued for the importance of handcrafted objects, whether cutting boards, mugs, hand-knit mittens, or even home-cooked meals as a means of connecting individuals to each other.

In the age of AI, that notion of human interaction is more important, and more at risk, than ever before. The human and manual connection that was ubiquitous for millennia has become a precious resource. And so the things we woodworkers build from often-antiquated tools have assumed new significance in our daily lives. But our tools don't have to be antique or analog to produce genuinely human-crafted objects. For me it comes down to the question of whether technology is empowering the realization of our ideas, or whether we are instead abdicating the realm of human creativity and thought to a digital surrogate.

Those issues are also on my mind as we make this magazine, which, to us on the staff, represents the ultimate handcrafted object—one that can help serve as a refuge from the onslaught of AI for both our readers and those of us who make it. One may question the efficiency of asking a woodworker with often-limited literary experience to grind out a manuscript, having an editor fly across the country to snap photos, and having that same editor ultimately hand off those words and photos to an art director to craft into a finished article. However, the process we've followed for 50 years—even as we've transitioned from typewriters to iPads, transparency film to digital files, paste-up to computer layout—remains entirely personal, and it remains the living tissue of the product we deliver. Yes, the photos are corrected in Photoshop, and spell-check plays a vital role in my writing, but the ideas, experiences, opinions, and passions of all involved—from authors to editors, art directors, and illustrators—are what drive the things we make.

Real people making real stuff—it's odd how such a simple concept from our past has the power to point the way forward.

—Michael Pekovich

CAD software for 3D printing

I enjoyed Ben Strano's article on 3D printing in *FWW* #323. He mentions CAD software multiple times but doesn't say which software he uses. Can you offer a recommendation for a beginner?

—DREW A. DUNN, Silver Spring, Md.

Ben Strano replies: I gravitate toward Fusion 360 because it is free for personal use and still incredibly powerful. In fact, I would guess that I use less than 10% of its capabilities. TinkerCad and OnShape are also worth checking out. Both are free for personal use, and I have friends who do great work with each. In the woodworking world, SketchUp has long reigned as the king of CAD programs, and if you're familiar with it, Dave Richards has some great information on FineWoodworking.com about using it to create models for 3D printing.

Hats off to Frid and Hoadley

Fine Woodworking #323 is a real gem, with lots of varied information and wonderful articles about many aspects of woodworking. But the real winner in my book is the anthology of storied contributors Anissa Kapsales penned for the issue ("Committed Contributors"). A couple of my favorites are the first two, Tage Frid and Bruce Hoadley. As a charter subscriber of *FWW*, I learned a great deal about wood technology and how to design and work wood from these titans of the woodworking world. Their lessons are the foundation of my personal expertise that I have drawn upon for over 25 years of teaching woodworking and almost 50 years as a designer/craftsman.

—TIM HARRISON, Chesterfield, Va.

Correction

Our profile of Roland Johnson in "Committed Contributors" (*FWW* #323) incorrectly stated that in 1997 when Johnson published his first article in *FWW*, "he had been in the woodworking business for about a year." In fact, by that time Johnson had been in the business for 21 years.



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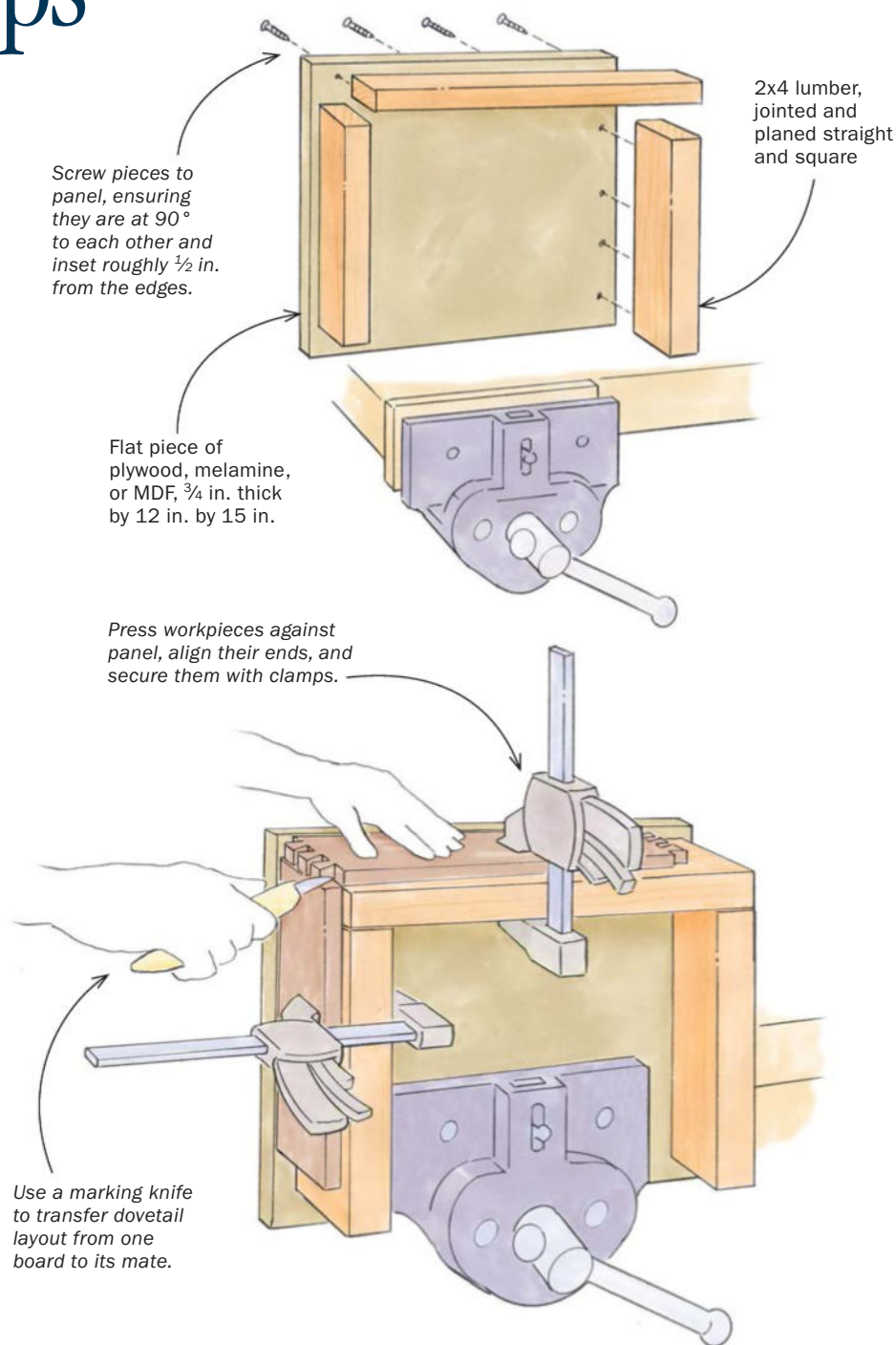
workshop tips

Workpiece holder ensures accurate dovetail transfer

I got the hang of sawing and chiseling dovetails by hand but found I was struggling with another essential part of the process: transferring the layout of the tails I had cut on one board to the mating pins board. This marking jig solved the problem for me. It lines up the two parts perfectly and holds them securely as I transfer the layout with a marking knife. And it's much quicker and easier than the usual method: clamping one part in a vise and the other on the benchtop.

My marking assistant is nothing more than a flat, rectangular piece of sheet goods (I used a melamine cupboard door) with three straight, square boards attached to it that are inset evenly from the edge of the panel. I used 2x4 lumber for those boards, jointing and planing the pieces flat, straight, and square. These pieces could be made from wider stock to make it easier for the jig to handle wider pieces. The 2x4s team up with the panel to align parts quickly and accurately. I secure them with quick-release clamps.

—NEIL MCKAY, St. Albert, Alberta, Canada



Best Tip



Growing up on a family farm instilled a self-reliant attitude in Neil McKay. If something was needed, in most cases his family would either fix it or make it. His career as an engineer furthered his can-do attitude, giving him a deeper knowledge of how things work. McKay's woodworking has ranged from building boxes and furniture to renovating his homes and even building a log house.

A Reward for the Best Tip

Send your original tips to fwtips@taunton.com. We pay \$100 for a published tip with illustration; \$50 for one without.

The prize for this issue's best tip was the choice of an online course from the *Fine Woodworking* Online Learning Library.



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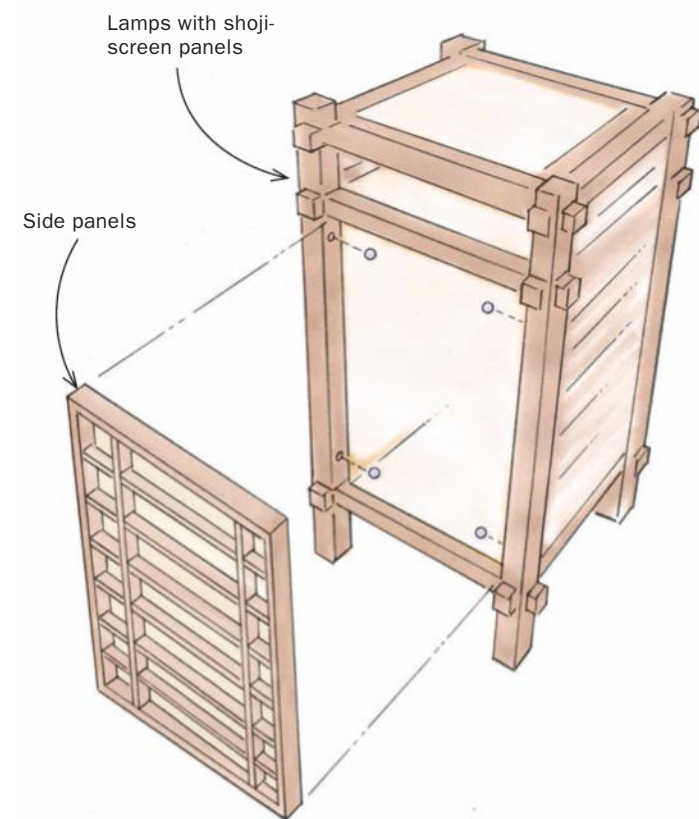
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Space balls hold panels in shoji-style lamps

I've been making shoji lamps for the past few years. Most woodworkers secure the side panels in the structure with a friction fit, which is tricky to pull off. I use "space balls" instead, which hold the panel securely, even if the fit isn't absolutely perfect. I use the 1/4-in.-dia. variety of these rubber balls, which are used in cabinet-door frames to keep panels centered and rattle-free while allowing expansion. For this application, I drill 1/4-in.-dia. holes in the lamp's corner posts, just under 1/4 in. deep. These holes hold the balls securely while leaving just a bit of them protruding. The panels press easily into place and stay there securely.

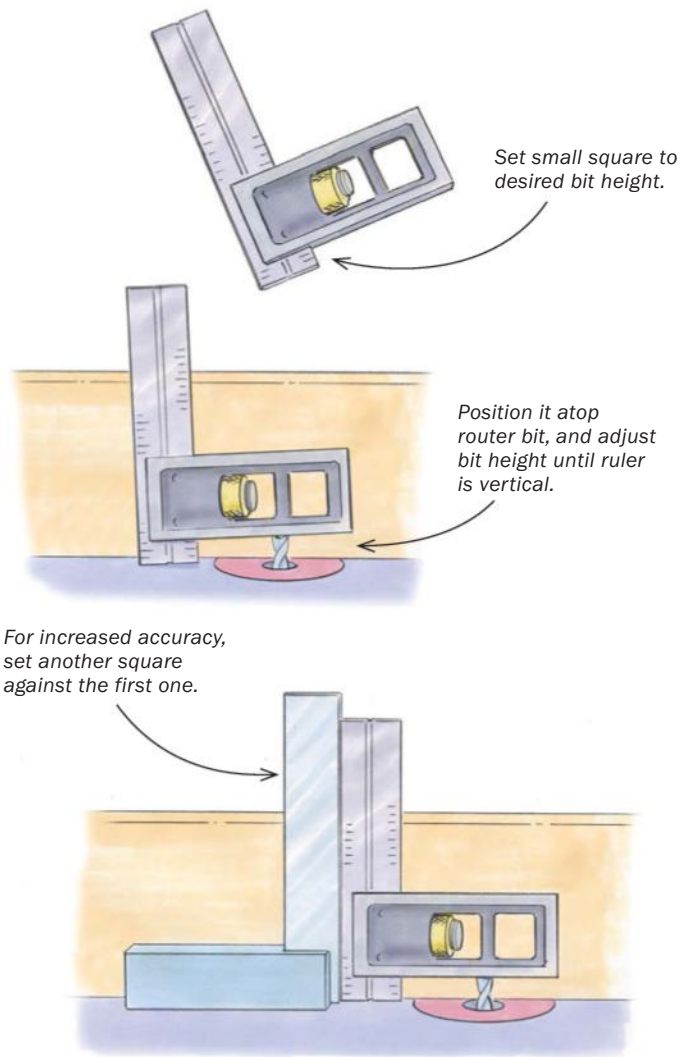
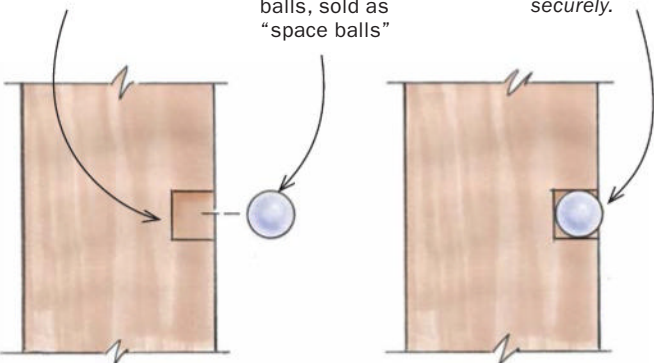
—PHIL GRUPPUSO, Seekonk, Mass.



Drill 1/4-in.-dia. holes in posts just under 1/4 in. deep.

1/4-in.-dia. rubber balls, sold as "space balls"

Rubber balls protrude slightly to hold panels securely.



Easy, accurate way to set bit and blade heights

Here's how I use a small square to set the height of router bits and table-saw blades quickly and accurately. Start by setting the blade to the dimension. Now adjust the bit or blade to the rough height you need, and lean the square against it as shown. If the blade of the square leans away, adjust the bit or blade downward. If it leans inward, the bit or blade is too low. When accuracy is critical, set another square against the first one to be sure it is perfectly vertical.

—JEFFREY FIORE, West Chester, Pa.

Quick Tip

Easy wood filler

To fill small gaps in joinery and such, I squirt a small amount of cyanoacrylate glue into the crack and then immediately sand the area—without using a vac to remove the wood dust. The dust adheres to the glue and fills the gap. Being from the same wood, it matches the surrounding color perfectly.

—STEVE STERMAN, Shenorock, N.Y.

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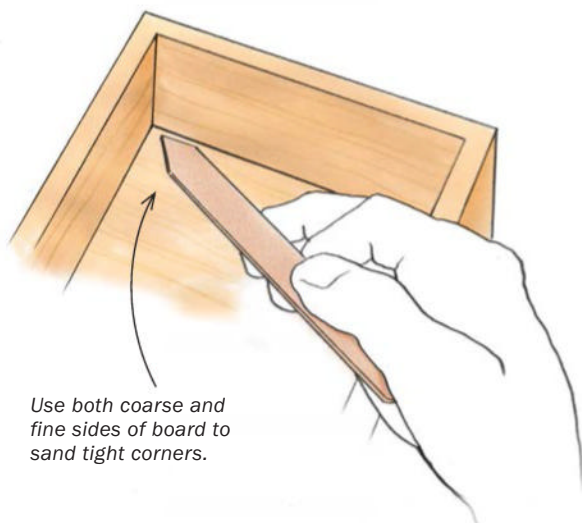
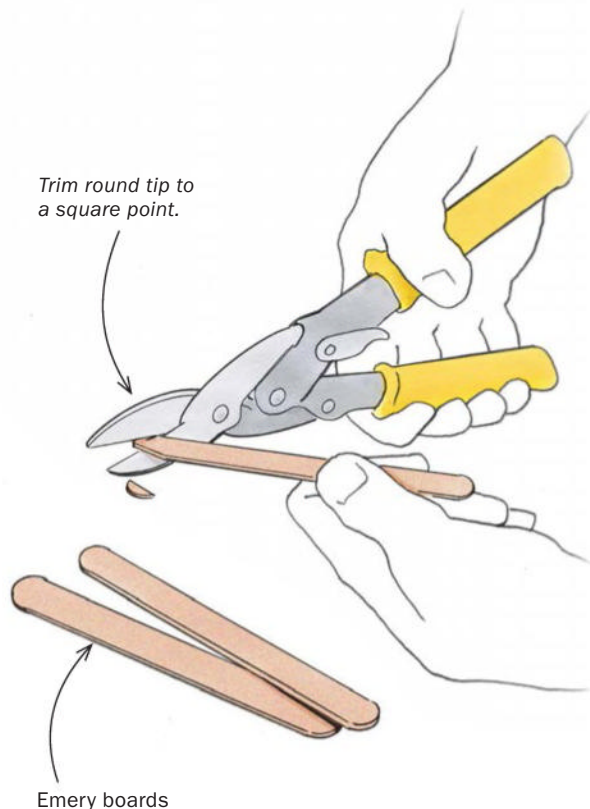
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Emery boards sand tight corners

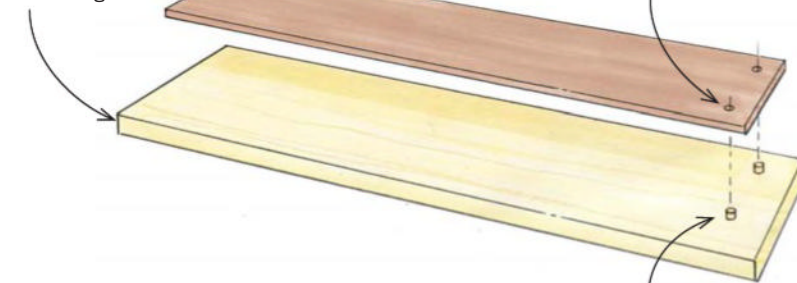
To remove stubborn squeeze-out from tight corners, I turn to my little stack of emery boards—the type used for filing and shaping fingernails. I use tin snips to create a square tip on the end of a fresh board, and then sand into the corner. Emery boards have coarse and fine sides, and I use both.

—DAVID GLEASON, Houston, Pa.



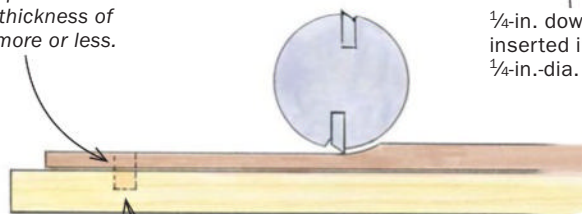
Sled body, made from solid wood, jointed and planed flat and straight

Cut stock overly long, and drill slightly larger holes in it, $\frac{1}{2}$ in. to 1 in. from leading edge.

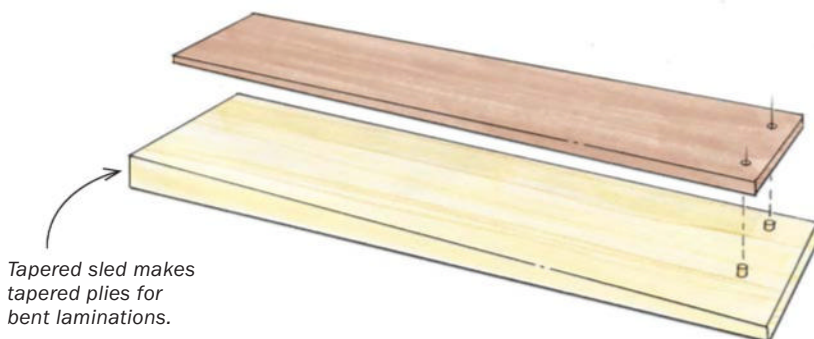


Dowels protrude to match thickness of stock, more or less.

$\frac{1}{4}$ -in. dowels, inserted in $\frac{1}{4}$ -in.-dia. holes



Dowels pull thin stock through planer, helping to prevent it from lifting.



Better sled for planing thin stock and tapered laminations

I'm on the faculty of the Vermont Woodworking School, where we developed this sled as a quick, secure way to make tapered plies for bent laminations. We also make parallel versions for planing anything thinner than $\frac{1}{8}$ in.—such as shop-sawn veneer. As opposed to traditional planer sleds, which push the parts into the knives, our sleds pull them through the machine, keeping the thin stock in tension and preventing it from lifting up and getting damaged. If the leading (doweled) edge of the thin stock wants to lift, we add some double-stick tape under it.

The sled is nothing more than a board with two $\frac{1}{4}$ -in.-dia. holes drilled near the leading end, which receive dowels (unglued). The stock has the same hole pattern drilled at its leading edge, which is cut away later on. The holes in the stock are drilled just slightly larger than the dowels, and we generally drill an entire bundle of stock at the same time.

To taper the sled board for tapered plies, we use a jointer trick that involves making a thick cut halfway down the board and then tilting the board down on the end with the stopped cut for a second pass. The thinner end of the sled (and thicker end of the plies) is the leading end.

—BRETT KINCAID, Cambridge, Vt.

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tools & materials

■ MACHINES

Sturdy CNC offers a complete package

I'VE BEEN USING THE CARBIDE 3D SHAPEOKO

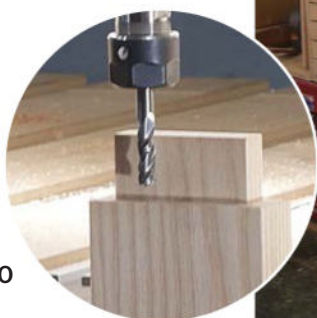
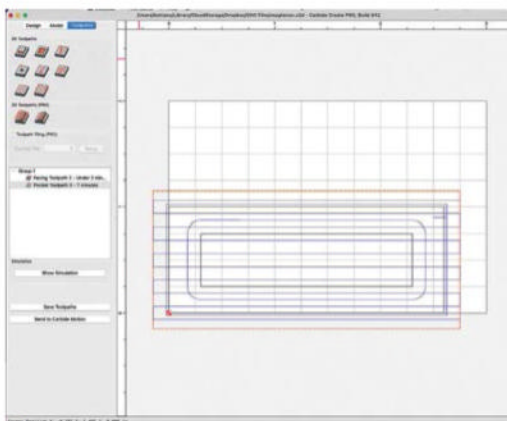
5 PRO for a couple of months now, running it almost every single day. In that time I've put it through its paces across a wide range of tasks: cutting joinery for woodworking projects, flattening boards too wide for my jointer, milling aluminum and UHMW plastic, and even taking on small manufacturing projects like tool handles.

Overall, the build quality is high throughout. One standout feature for me as a furniture maker is the ability to move the gantry forward past the front of the machine, which allows me to clamp boards vertically and machine their ends. While mortises have always been easy to cut with the workpiece lying flat on the bed, being able to cut integral tenons on the end of a board is a game-changer. I've now used this machine exclusively for joinery on multiple projects, and while it won't replace every joinery method in my shop, it is a fully viable option.

Carbide 3D makes two companion pieces of software: Carbide Create (CAD/CAM) and Carbide Motion (machine controller). Both make the machine very accessible and keep the ecosystem self-contained. Customer support is available to help with every aspect of the workflow, from file creation to actually running the machine.

Carbide Create handles everything I've needed for most projects. I only reach for Fusion 360 when I'm working with files I've already built there. Carbide Create's default feeds and speeds are conservative, but you're more likely to get a successful cut and less likely to break bits. I haven't broken a single one using the defaults, which is not something I can say when left to my own devices with feeds and speeds.

Simple and quick. Carbide Create is all you need for most 2D and 2.5D cutting. It works on both Macs and PCs, unlike the more common options that only work on a PC.



Carbide 3D Shapeoko 5 Pro
4-ft. by 2-ft. model with legs, \$3,900
carbide3d.com

Rock solid. The optional legs are incredibly sturdy—so much so that Strano regularly uses the CNC as a platform for hand planing. It doesn't move or wobble at all.

On the other hand, Carbide Motion, the software that controls the machine, feels limited, and I'd like to see more advanced functionality available for users who want it. As my workflows grow more sophisticated, I expect I'll eventually explore third-party controller software to get back some of the capabilities I've been missing. I should note that the Shapeoko isn't locked down to its own software; there is no reason you can't wander if you prefer another program.

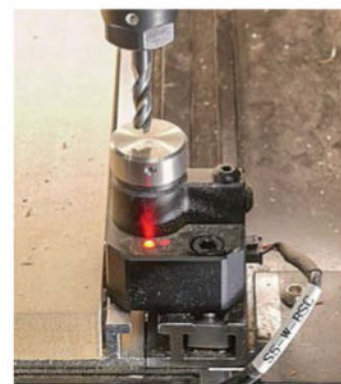
I did run into a wiring issue right out of the box (this was no fault of the manufacturing), and the customer service experience was one of the best I've ever had. I was able to video chat with a support technician who could see exactly what was going on and then walked me through the repair in real time.

For someone just starting out with CNC, the closed-loop Carbide 3D ecosystem is hard to beat. Everything works as you'd expect it to. That's not something I can say about most digital woodworking experiences.

—Ben Strano is the editor of *FineWoodworking.com*.



Hang tight. The power pendant features a feed hold that pauses all gantry movement without powering the CNC down.



Bit-set luxury. The first time you run a multi-tool job, you'll immediately become addicted to the included tool-length setter.

■ MARKING AND MEASURING

A wheel marking gauge that wows

MARKING GAUGES ARE BEAUTIFULLY SIMPLE TOOLS. A cutter at the end of a stick with an adjustable fence is all that's required. The appearance of wheel marking gauges made things a little more complicated but also easier to use. If the term *luxury* can be applied to such a tool, the Woodpeckers Wheel Marking Gauge deserves the description.

Because wheel gauges can cut equally well along and across the grain, I've become a convert; of course, the Woodpeckers gauge excels at this. What separates it from the competition are the details. The fence is rectangular rather than round, which prevents it from rolling away and presents options on how it's registered to the material. The aluminum main body feels good in the hand, with recesses for a better grip. Both the cutter and the fence are fixed with Torx screws, and the fence can be rotated 90° if you prefer. The blade can be retracted into the main body, so it's protected even with the fence off.

The cutter is easily set to the correct depth with the fine-thread adjustment barrel. Set screws keep the rod from drifting out of adjustment while setting, and knurled brass screws lock it securely.

The edges of the fence have crisp, squared edges that are a little sharp for me, but that's nothing a quick swipe with a file couldn't solve.

—David Johnson teaches woodworking and seat weaving across the country.



Woodpeckers Wheel Marking Gauge
\$110
woodpeck.com

■ HAND TOOLS

Carve and chop with a single mallet

MY NEW MALLET HAS EXCELLENT BALANCE, GOOD HEFT, A SOLID HEAD, AND A COMFORTABLE SHAPE, no matter where I grip it. I used it almost exclusively to carve an oak frame-and-panel in low relief before chopping some dovetails. From arcing whacks to gentle taps, this boutique mallet from PersonMakeObject proved a treat.

To me, the tool's main strengths are its shape and balance. I prefer round mallets in general, but the one I use for heavy carving is rarely the one I use for fine joinery, and vice versa. PersonMakeObject's mallet bridges that divide. For controlled taps, my hand wraps naturally around the head and down onto the body. For heavy chops, I can still feel in control while gripping it all the way down toward the generous pommel. Larger mallets can feel loose and whippy like a wet noodle at the peaks of these swings, especially for carving, when the swings are closer to horizontal as opposed to the vertical swings for joinery. I always felt in control with the PersonMakeObject mallet, which made me more confident in my work.

These strengths are clearly the result of the mallet's construction. The head, a composite of brass shavings and urethane, lands solidly without bouncing or vibrating. You can request custom handle profiles and woods. My profile is stock, and the wood is granadillo. Every mallet has ½-in. stainless-steel hardware embedded from the head down through the handle, including nuts in the head for added heft. Each mallet's target weight is 15.5 oz. to 16.5 oz. PersonMakeObject's website lists every mallet individually with its finished weight, distinguishing characteristics, and photos.

Like every tool from PersonMakeObject, each mallet is designed and made by a single maker in Minnesota. When I reached out to him with questions, he responded quickly and thoroughly.

If you're in the market for a boutique mallet, consider PersonMakeObject's. Its versatile, considered design lets me focus more on my work and less on the tool.

—Barry NM Dima carves lovely things and auctions them off for charity.



Choke up, hammer down. Mallets rarely handle both carving and joinery duties in Dima's shop. This one does.



PersonMakeObject Mallet
\$119
personmakeobject.square.site

■ HAND TOOLS

Grasp these rasps for easy smoothing

THESE THREE NAREX PREMIUM HAND STITCHED RASPS ARE READY TO WORK right from the package. The hornbeam handles are a nice size, have a modest finish that I found favorable for gripping, and are also a comfortable shape to hold. The transition from the brass ferrule to the handle is smooth, which eliminates the risk of snagging your hand on a rough edge. My hands are on the smaller side, so a handle that isn't overpowering is important for me. With that being said, I think these handles hit the mark perfectly for an average hand size.

I put the rasps through their paces, working on end-grain red oak while shaping stool seats to a convex curve. I found them to have a nice balance overall, from the comfortable handle to the rasp's length and width. The rasps feature 9 in. of toothed surface in this useful half-round shape. There were no clogging issues, and the rasps cut cleanly and quickly. They are nice and sharp, and the quality of the hand stitching is perfectly irregular, which leads to quick cuts and the ability to remove the previous scratch pattern well. Hand stitching is also preferable



Narex Premium Hand Stitched Rasps
\$95 to \$150 each, \$330 for set of three

because the stitches go to the edges of the rasp, giving more working surface. The set transitions well through the various grains (levels of coarseness), from a heavier cutting action with the coarse rasp to a prescraping or presanding finish with the fine one.

I approached my testing of these tools with a critical eye, but I do not have a complaint. I would recommend these to any woodworker looking to add rasps to their hand-tool cabinet.

—Ashley Pieper is a furniture maker/designer in Pennsylvania.

■ ALL-TIME FAVORITE TOOL

Screw-head pliers to the rescue

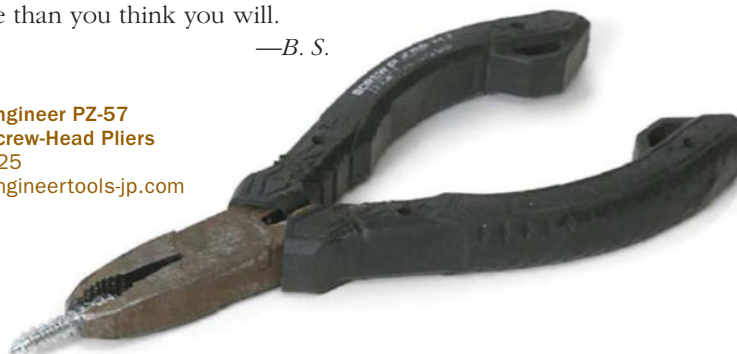
THE ENGINEER PZ-57 PLIERS HAVE BEEN EARNING THEIR KEEP in my shop ever since I spotted them in an Adam Savage video on YouTube. Specifically designed to grip small, round objects, these pliers are built for the moments woodworkers dread most: a stripped screw head or, worse, a screw snapped off flush with the surface of a workpiece.

The jaws wrap the entirety of the screw shank, gripping it firmly all the way around and giving you more purchase on the screw than you get from regular pliers or even locking pliers. This is also the perfect tool for holding a screw while trimming it to length at a grinder.

Imported from Japan, these PZ-57 pliers can be had for under \$25. The first time you use them successfully, you'll thank me. You won't reach for them every day, but you'll use them more than you think you will.

—B. S.

**Engineer PZ-57
Screw-Head Pliers**
\$25
engineertools-jp.com



A near-sure solution. If you find yourself with a stripped-out screw, these screw-nose pliers will almost always save the day.



One last screw. Breaking a screw while installing hinges is no longer a tragedy. These pliers excel at pulling out a broken screw near, or even flush to, the work surface.

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Product Showcase



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Quiet observation

BY MICHAEL PURYEAR

For me, design is the result of observing things in the natural and man-made worlds. I aim to look with “a quiet eye,” which to me is looking with curiosity and without judgment—not needing to name or identify something, but appreciating it as a form that catches my eye. It’s important to notice these forms that attract you and mentally store them away until they feel appropriate for a piece.

These observations may contribute to an idea for a whole piece or a detail within a piece. I originally used a sketchbook to remind me of the things I had seen. Now I simply remember them. I don’t recommend using a camera. Sketching separates the thing from its surroundings, allowing it to be observed independently, while a photograph locks the element in its environment.

Three components are involved in making something: the concept, the material, and the technique. The concept, which is what I’m focusing on here, is the first element—what the thing will look like, the design. Function plays a part in the concept. At times it drives the concept, but at other times it might take a back seat. The material is what the piece is made of. And the technique is the process used to achieve your result.

Once I have a clear idea in my mind of what the piece will look like, I do a loose sketch. Then I create an orthographic drafting on a large enough sheet of paper to have three views in scale: a front elevation, a plan, and a side elevation. From this it is possible to create a model by making several copies of the drafting and then cutting out the three views, gluing them onto materials of approximate thickness with a light coating of spray adhesive (so they can be easily peeled off). I cut out those shapes and attach them to each other with hot glue. I carve any parts that need to be three-dimensional, such as legs. I draw on details such as knobs. This gives a sense of the piece in three dimensions, which may also be helpful for your client to envision the final piece.

Only after I have the concept fully resolved do I move on to finalizing the materials and starting to build.

Michael Puryear is a woodworker in New York’s Catskills region.



REMINISCENT OF JAPANESE SWORDS

While in Brazil helping with the installation of his brother’s exhibition at the São Paulo Art Biennial, Puryear received a commission for this bubinga bench. The client had requested a bench she could use to put her stockings on. Its seat is upholstered in leather, and the rails and stretcher, inspired by Japanese swords in their scabbards, are curved to maintain unity with the rest of the curvilinear parts. The legs are elliptical forms loosely reflecting paired Yoruba steel gongs.

Online Extra

For a biography that explores Michael Puryear’s remarkable life and woodworking path, go to **FineWoodworking.com/324**.

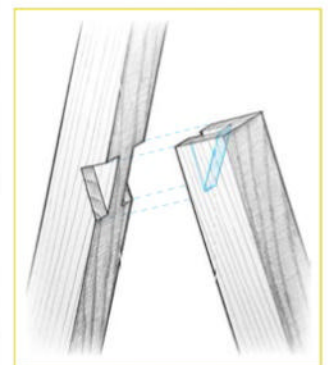
THE ROUND TABLE

This ash table, bleached on top and dyed below, was built for a New York City apartment with a large foyer that serves as an entrance but also as a dining area. The location and function informed the design. For formal use, the table would stand at the center of the foyer; for everyday use, however, it was to be placed by a corner that projects into the space. Puryear designed this piece so that a quadrant of the top could be removed and the table fitted against the projecting corner.



DESIGN BY JOINERY

These chairs, with their distinctly Scandinavian feel, can be used separately or joined together, with or without arms. Inspired by the book *The Art of Japanese Joinery* by Kiyoshi Seike, Puryear used a *kashigi-dire* joint (a notched mortise and tenon) to connect the rear brace to the back post.



ARCHES AND THE WEIGHT OF COLOR

One of Puryear's design techniques is to float a rectilinear shape above an arch, as in the coffee table below and the buffet at right. Arches imply support even when there is no apparent connection between the two elements; and even heavy things appear lighter when you can see under them. In terms of the color relationship, Puryear places the darker color on lower elements, which grounds the piece and makes the lighter-colored



section above appear to float. The bleached and dyed ash coffee table is in the collection at the Newark Museum of Art in New Jersey. The buffet, commissioned by an art dealer in Washington, D.C., is made of wenge and bubinga and follows the same principles. Even with a large case above, the arch in the base makes the top appear to float above it.

THE POWER OF LINES

In his frequent travels from New York City up to the Hudson Valley, Puryear often noticed the high-tension electric lines strung along the New York State Thruway. They hang from glue-laminated arches supported by two telephone poles. He found them intriguing structures and adopted the idea for a table base, using variations of it several times.



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Arts and Crafts Taboret

A refined piece packed with classic techniques

BY JOHN HARTMAN



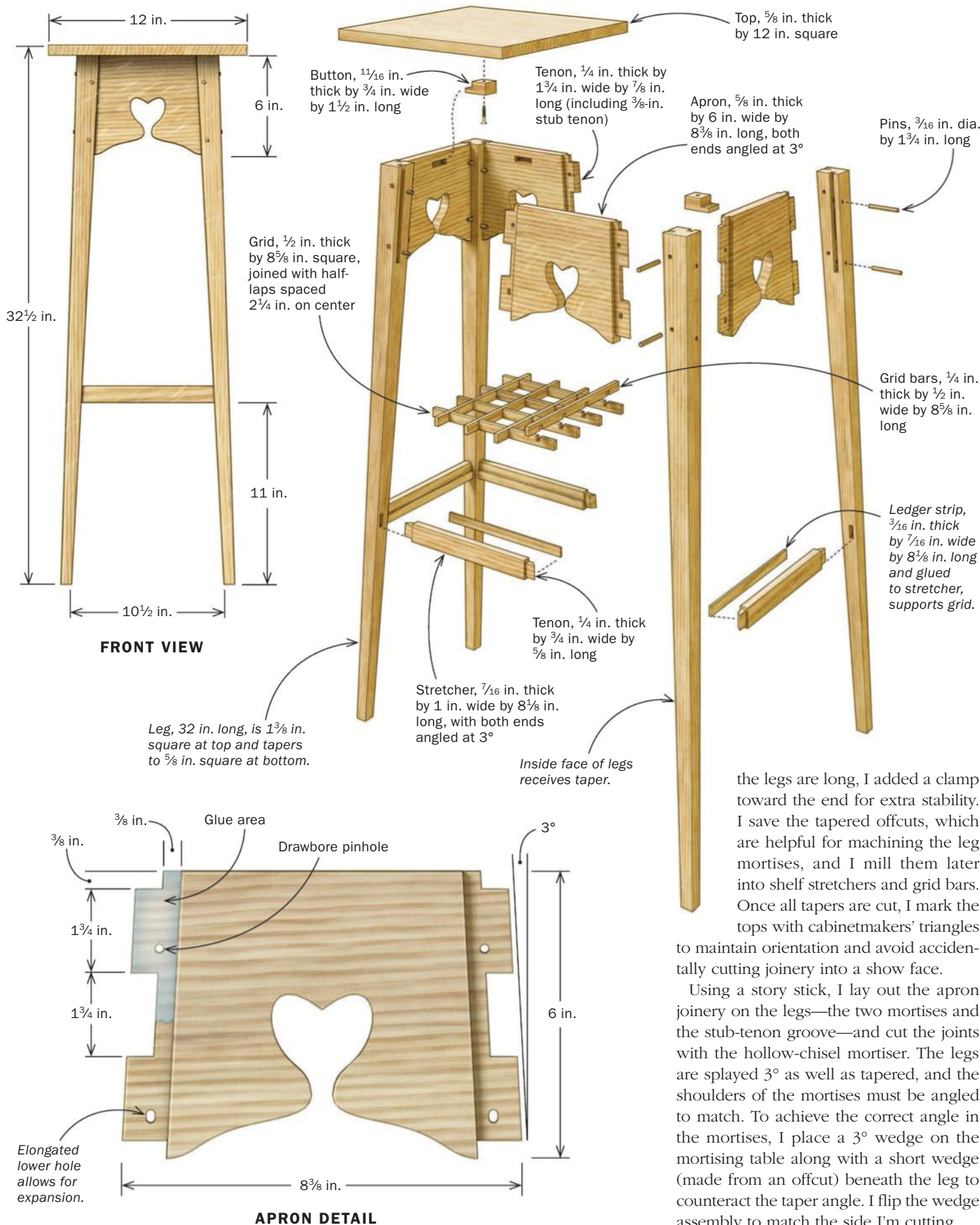
Having just finished a lengthy bookcase project, I was in the mood to build a smaller piece of furniture. I began working on design options to show my partner, Christine, for our home. We wanted an original design that would complement our other Arts and Crafts-style pieces. Turning to our collection of books on the Arts and Crafts movement for inspiration, we found that we preferred the lighter forms of British makers rather than the often-boxy interpretations produced by many American builders.

I decided to design and build a taboret with thin, tapered legs that splay outward. We agreed that a solid shelf would look too heavy, so in keeping with the lighter theme, I designed an open grid shelf. The heart-shaped cutouts are inspired by Nancy Hiller's article "Voysey Two-Heart Chair" (*FWW* #301). I incorporated other hallmarks of Arts and Crafts furniture, using quartersawn white oak and pinned tenons.

Building this piece was an exercise in separating what was essential from what was not, stripping away distractions, and focusing effort where it mattered most. For example, I wasn't overly concerned with the precise angle or exact width of the leg tapers—only that all four legs match. I kept the legs about 2 in. overlong until the aprons were attached, which made it easy to trim the legs flush to the top of the aprons after assembly. And the joinery for the shelf stretchers was cut to match the actual span of the legs at dry assembly, rather than to the drawing's dimensions.

Start with the legs

The legs are made from riftsawn 8/4 white oak. Using riftsawn wood here produces parallel grain lines, which look good and keep the legs straight. Adding a taper to the legs causes minor runout when cutting across the grain lines, but tapering only the inside faces hides that; the outside faces retain straight grain. I cut the taper on the table saw using a jig based on one designed by Steve Latta (see "Perfect Tapers on the Tablesaw," *FWW* #229). Because



the legs are long, I added a clamp toward the end for extra stability. I save the tapered offcuts, which are helpful for machining the leg mortises, and I mill them later into shelf stretchers and grid bars. Once all tapers are cut, I mark the tops with cabinetmakers' triangles to maintain orientation and avoid accidentally cutting joinery into a show face.

Using a story stick, I lay out the apron joinery on the legs—the two mortises and the stub-tenon groove—and cut the joints with the hollow-chisel mortiser. The legs are splayed 3° as well as tapered, and the shoulders of the mortises must be angled to match. To achieve the correct angle in the mortises, I place a 3° wedge on the mortising table along with a short wedge (made from an offcut) beneath the leg to counteract the taper angle. I flip the wedge assembly to match the side I'm cutting.

Taper the legs

Add visual interest with a taper cut on two sides of each leg. The taper along with the splay gives a lighter feel to a normally stout style.



Cut the taper. A shopmade tapering sled holds the square stock securely with a set of toggle clamps while you cut the leg's angle.

Rotate the leg.

To cut the second angle, turn the leg 90° with the leg 90° with the cut side facing up. Use various-sized blocks in place of the missing material to reclamp, and then cut the second side.



Because the mortiser's depth stop doesn't reliably control depth at this angle, I mark the chisel with a pen $\frac{15}{16}$ in. up from the tip and determine the mortise depth by eye. This will cut the mortises about $\frac{1}{16}$ in. deeper than the tenon length, which makes for an easy assembly. To cut the stub-tenon groove, I remove the 3° wedge but leave the tapered offcut beneath the leg to make it parallel to the mortiser bed. I set the depth stop and chop the stub-tenon groove along the leg.

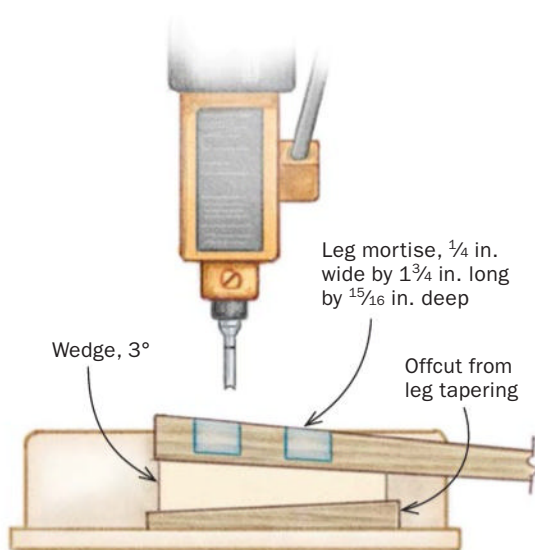
Prepare the aprons

To set the splay angle for cutting the aprons to length, I attach a 3° wedge along the fence of my crosscut sled with double-stick tape. I cut one end of each apron, then use a stop block while cutting the other ends to ensure that all four aprons are identical.

With the splay angle already set, cutting the tenon shoulders is simple using a dado stack. I set the fence $\frac{7}{8}$ in. to the outside of the stack and run the ends of the aprons against the fence. Using a test piece, I adjust the blade height to fine-tune the fit; the tenon should be easy to insert but tight enough so it won't fall out when turned upside down. I take multiple passes to remove the waste, moving the fence closer to the blade for each pass. On the final pass, I bury the blade in a sacrificial fence to remove the last bit of material.

Each apron receives two tenons, plus a stub tenon that runs the whole height of the apron. I use the bandsaw to remove

MORTISER



An angled mortise. Use an offcut from the leg and a 3° wedge taped together and propped under the leg to achieve a properly angled mortise.

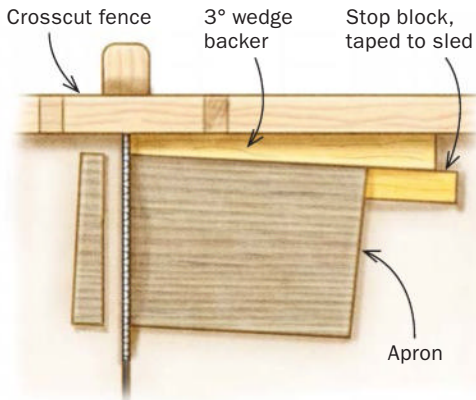


Chisel a groove. To cut a groove in line with the mortises to accept the stub tenon, remove the 3° wedge (but leave the tapered offcut) and make a series of shallow mortise cuts.

Angle the apron

The apron ends are cut at a 3° angle, which sets the rake and splay for the legs of the piece.

SLED



waste between my two tenons. I fine-tune the tenons with a shoulder plane, trimming only the inside faces to maintain proper offsets from the front of the leg. Because adjacent apron tenons will meet inside the leg mortises, I partially bevel their ends so they seat fully in their mortises.

Drawbore pins

To secure the aprons to the legs, I drive $\frac{3}{16}$ -in. oak pins through the leg and tenon, creating a strong mechanical joint. To make it a drawbore joint, I slightly offset the hole in the tenon from the one through the leg so the joint is drawn tight as the pin is sent through. I start by drilling the holes in the legs on the drill press, using the fence to maintain a consistent offset from the inner edges. I offset the holes on adjacent faces by $\frac{1}{2}$ in. vertically to make sure they don't run into each other.

After the holes in the legs are drilled, I dry-fit the aprons and mark hole locations using a $\frac{1}{8}$ -in. transfer punch. Because the diameter of the punch is smaller than the holes, I favor the punch to the side of the hole closest to the apron. Keeping the punch vertical, I mark the tenons with a light tap of the hammer. If everything is right, the center mark on the tenon should be $\frac{1}{32}$ in. offset toward the shoulder of the tenon. I then drill the tenon holes using the $\frac{3}{16}$ -in. brad-point bit with a pine backer board to prevent tearout. To account for seasonal wood movement, I also elongate the holes in the lower tenons by drilling



Sled with a wedge. Attach a wedge to the bed of your crosscut sled with double-stick tape; it will give you perfect repeatable angles on each apron end. Make sure to add a stop for your second cut to keep all four sides the same length.



Table-saw tenons. Using the angled ends as a reference, run the apron along the fence of the table saw to establish the shoulder of the tenon. Before cutting the aprons, Hartman tenons a test piece to make sure the fit to the mortise is perfect.



Sacrificial fence. In multiple passes, move the fence closer to the blade, taking away material along the cheek. The final pass, which cuts away the last bit of material left on the tenon, is made with the blade embedded in a sacrificial fence.

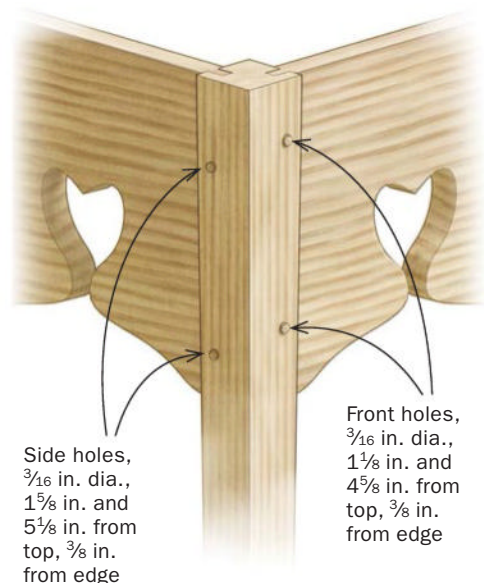


Twin tenons. Simultaneously adding strength and accounting for wood movement, two tenons are a must when the aprons are on the wider side.

Create drawbore tenons

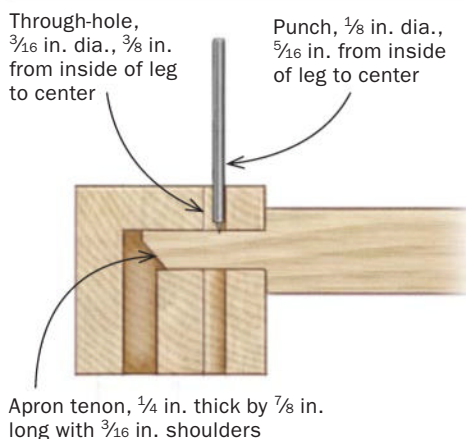
Pinned joinery creates a strong and easily assembled piece. Add the offset of the hole in the tenon to create tension that draws the joint together, eliminating the need for clamps.

PIN LOCATIONS



Avoid a collision. Vertically offset the two sets of pin holes on each leg so you can drive the pins all the way through without interfering with the pins for the adjacent apron.

DRAWBORE TENON



Favor one side. To mark for the pin hole in the tenon, use a transfer punch slightly smaller than the hole in the leg. This will offset the tenon hole so the tenon is drawn tight into the mortise.



Drill the tenons. At the drill press, bore the holes in the tenon. A piece of scrap under the tenon avoids tearout and keeps the hole perpendicular by preventing any tipping downward.



overlapping holes, which I clean up with a file afterward.

Cut the legs to length

With the legs and aprons dry-assembled and the drawbore pins installed, I scribe the tops of the legs to final length using a straightedge and a sharp knife. Although I could cut these compound angles on a table saw, I prefer to skip all the sleds and blade angles and make the cuts with a backsaw. I deepen the scribe with a chisel to create a shoulder for the saw to ride against, guiding a nice straight cut. I reassemble the table and make sure the aprons and legs are all in plane at the top. If there are any high spots, I shave them down with a block plane.

To trim the bottom of the legs, I place the assembled frame upside down on my bench. I clamp a story stick vertically in my vise as a height reference and mark each leg on its outside corner. The distance from the top of my bench to the top of the stick is the height of the taboret, minus the top

thickness. With a straightedge held from leg to leg, I connect the marks, then trim each leg to length with a backsaw. I don't bother to disassemble the parts but cut the legs with the frame still together lying on my bench hook.

Install the stretchers

When designing the taboret, I knew I wanted the stretchers to be a certain height from the floor, but I didn't care how long they were, nor did I want to do the math to figure out their length. I skipped these steps because I have found it sim-

ple enough to cut the stretchers slightly long and trim them until they land where I want. This approach also eliminates any mistakes if there is a variance between the legs' splay angles, no matter how slight. With the stand dry-assembled, I mark the stretcher height. I measure between the legs at that height and add 1¼ in. for the tenons. I cut the tenons on the table saw using a ¼-in. box blade and the 3° wedge from before. Once they are cut to length, I lower the blade to ⅜ in. and set a stop block to get a consistent shoulder for the tenons. I cut one side of each tenon cheek, wasting out the material with the flat-top blade. I then rotate the wedge 180° so I can cut the other sides of the tenons.

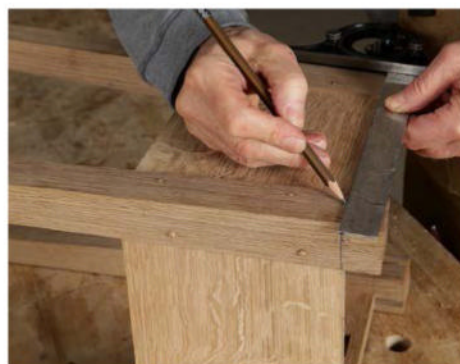
Moving over to the bandsaw, I cut the tenon to its width by taking ⅛ in. from each side up to the shoulder. I cut the last two shoulders with a backsaw and clean up the tenon with hand tools. Because the leg is so skinny down at the bottom, I need to miter the ends of the tenons to create clearance where the two stretchers meet inside the leg like the aprons. I sneak up to the perfect fit by placing the stretcher between two legs with its tenons resting on the legs; then I slide the stretcher up until it meets my mark. If it's below the mark, I trim a little bit off with a shoulder plane. If it goes past the mark, it's too small. I can either make another one or just make the rest of the stretchers the same as the short one, which is part of the beauty of this technique.

Trim the legs

Leaving the legs overlong at both the top and bottom allows them to be scribed and trimmed to fit, giving you slack to compensate if the joinery is slightly misaligned.



An easier dry-fit. The oak pins work as de facto clamps when putting together the base, allowing easy assembly and disassembly with just a few taps of the mallet.



Scribe and saw. With the base assembled, lay a straightedge across the legs aligned with the top of the apron and mark the legs with a pencil, connecting the lines around the outside. Once the base is disassembled, scribe with a knife and saw to the line.



As above, so below. With the base on its newly flattened top, Hartman uses a story stick clamped in his vise to mark the length of the legs. Four cuts later the base is flat and level.



Fit the stretchers

Cutting each stretcher to fit is a great way to hide any errors you may have made in the build. Sneak up on the fit to get to your desired height by adjusting the stretchers' length.



Miter the tenons. Because the two stretcher tenons in each leg meet in their mortises, Hartman miter the tenons. He trims them at the table saw using a miter gauge and riding the tenon shoulder on an L-fence.



Set the shoulders. The bandsaw makes quick work of trimming the tenons to width. Register one side to the fence, then flip and cut the other. It's an easily made, perfectly centered tenon.

To find the mortise locations, I trace each tenon onto its leg and mark out a mortise location on the inside face. I then cut the mortises using the same mortiser setup as before but with the fence moved forward so that the back of the mortise bit is $\frac{1}{4}$ in. from the fence. I hand-tune the fit of each stretcher tenon before making one final dry-fit. I check the joints to make sure they all come together, correcting any problems now so my glue-up goes smoothly.

The shelf grid

The shelf consists of a grid assembled with half-lap joints. Making use of the waste



Dial in the fit. With the stretcher height marked on the legs, slide the stretcher toward the apron until the shoulders are snug. Use each stretcher as a guide to mark the location of its mortises.

from the legs, I mill their tapered offcuts into uniform sticks, leaving them slightly overlong. I cut the lap joints using a $\frac{1}{4}$ -in. flat-top blade. To space the joints evenly, I clamp an auxiliary fence to the back of my sled. This fence has an indexing pin that is $\frac{1}{4}$ -in. square and exactly 2 in. from the blade. I make my first cut with the end of the stick butted against the pin. Then I lift the workpiece and fit the notch I just cut over the pin to make the second cut. This is similar to using a box-joint jig, only the cuts are spaced wider apart.

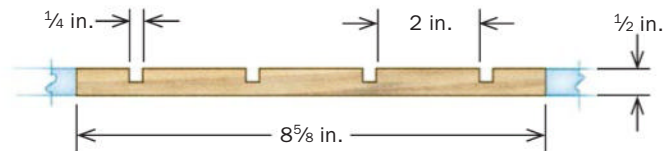
To glue the grid together, I make a press using some scrap MDF pieces, adding



Cut the mortise. Using the same wedge setup as for the apron mortises, cut the mortises into the legs for the stretchers.

Make the gridded shelf

Instead of a solid wood shelf, this grid, consisting of small strips lapped together, is a suitably strong replacement that brings a lightness to the design.



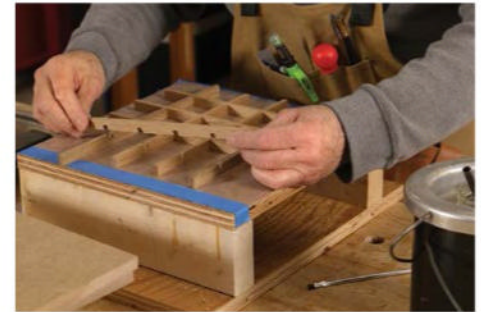
GRID BAR DETAIL



Box-joint basics. Like a box-joint jig, this auxiliary fence on the crosscut sled has an indexing pin sized to the sawkerf, which lets you create equally spaced notches that make up the half-laps of the grid.



Match the material to the blade. Instead of trying to stack the perfect combination of dado blades and shims to match a given material thickness, make a test cut and mill your parts to the dimension of the kerf.



Assemble the grid. Fit the grid together using hot hide glue, making sure to keep things square. Hartman clamps the shelf in a shopmade press made from plywood and wax paper.



Make a template. Because the shelf fits inside the stretchers, an MDF template is a simple way to create a perfect fit. Cut the template approximately to size, and hone the fit with a block plane.



Center on the template. Use double-stick tape to attach the grid to your template. Centering can be tricky, but a couple of reference lines on the template will help keep things even.



Clamp the grid. Hartman uses a shopmade press to create a flat, even clamping surface. Wax paper prevents the glue from sticking to the press, allowing the grid to be released easily when dry.



Trim to fit. The L-fence on the table saw is the best way to cut this grid to size. Sawing the end grain leaves much less tearout than something like a pattern bit on a router would.

Assemble the base

A lovely pattern.

Trace the pattern on your aprons, cut out the shape on the bandsaw, and refine it with a spindle sander. Leaving decorative details for the end ensures no wasted time if the part gets tossed for a misaligned tenon.



Start small.

Hartman glues the base in two sections, making front and back sub-assemblies. The pins hold the apron in place, and a light bar clamp is used to hold the stretcher tight.



All together now. Hartman prefers hot hide glue for the way it lubricates joints, making the final assembly easier. He also notes its reversibility in case anything goes awry.



Gluing the base together in multiple steps takes the stress out of the process, giving ample time to focus on the details.

wax paper to prevent sticking. After the grid is assembled, I set the top of the press on, being careful not to shift anything. Then I add clamps on each side to create even pressure. Once the glue is dry, I level off any high spots on the grid by rubbing both its faces over sandpaper adhered to a flat sheet of plywood. To achieve a precise friction fit within the stretchers, I make an MDF template that's sized to the shelf opening, with its corners relieved for clearance of the legs. I attach the template to the oversize grid with double-stick tape, centering it as best I can. Using my L-fence setup at the table saw, I trim the grid precisely to its final size.

Finishing touches

For decoration, I add a simple cutout to each apron. I create a template from MDF and then trace the pattern onto the apron. I rough-cut at the bandsaw, being sure to cut escapements for the waste. I sand right up to the line with a spindle sander and clean up the edges by hand. I'll use buttons to attach the top to the base, so now I cut a slot in each apron for the buttons with the hollow-chisel mortiser.

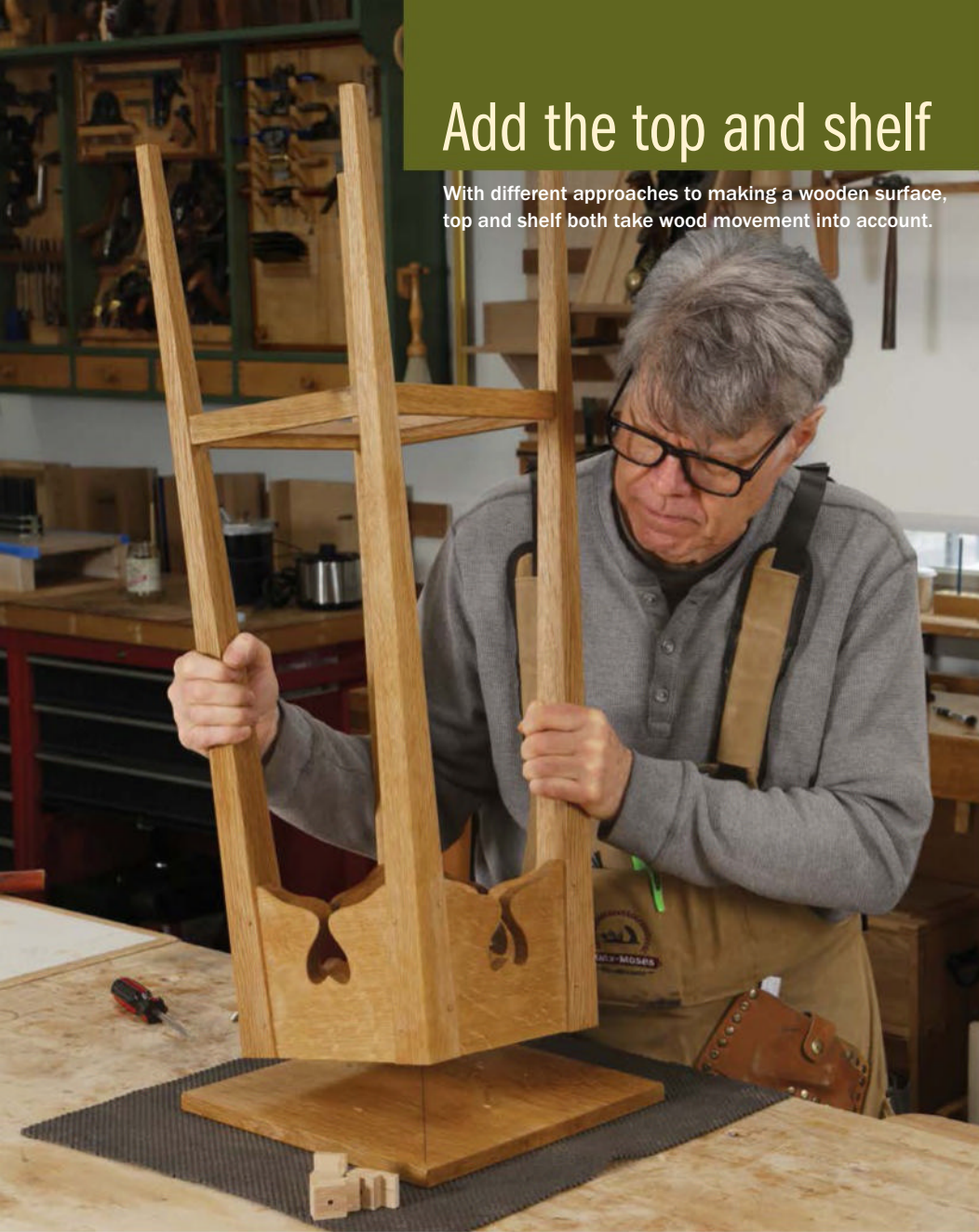
I prefer to apply finish to my parts before final assembly. It's much easier to finish them flat, and this makes it easier to clean up any squeeze-out when gluing. I have found that gluing the taboret together in two stages saves the stress of rushing through the glue-up. For the first stage, I



I'm with the band. Although regular clamps would work fine, the band clamp creates even pressure on all the stretchers, resulting in a square assembly.

Add the top and shelf

With different approaches to making a wooden surface, top and shelf both take wood movement into account.



Center the base on the top. Pencil lines on the underside of the top travel from corner to corner, creating an easy reference as you place each outside corner to center the base.

glue the front apron and stretcher to the legs, then do the same for the back, making two frames. I make sure to glue only the upper tenons of the aprons, leaving the bottom ones dry for seasonal movement. The drawbore pins provide clamping pressure for the apron, but the stretchers need a clamp until the glue sets. After the glue is dry on the front and back assemblies, I finish the glue-up by adding the side aprons and stretchers, creating the four-sided base. Again, the pins hold the aprons in place; I use a band clamp around the stretchers to keep everything snug.

To attach the top to the frame, I place the square top upside down on my bench

and flip the base onto it. Then with the buttons in their slots in the aprons, I center the base. I mark the locations for screws with a sharp punch. I drill pilot holes at the mark and then screw in the buttons. There should be enough downward pressure to hold the top tight but not split the button.

The grid rests on thin ledger strips that I glue to the inside face of the stretchers. I use hot hide glue and spring clamps to secure them. Finally, I turn the taboret upright on my bench and drop the grid into place. □

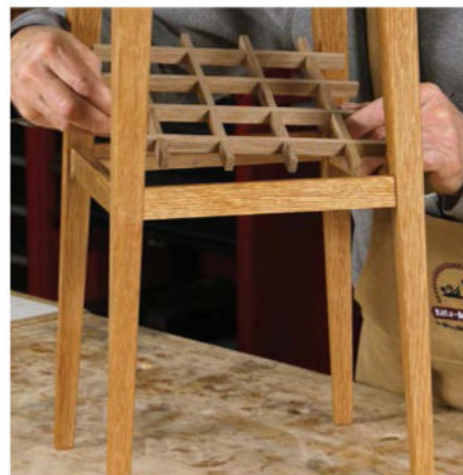
John Hartman builds and illustrates furniture in West Springfield, Mass.



Attach the buttons. Wooden buttons are slipped into slots in the aprons and screwed to the top, allowing for expansion and contraction of the top while still holding it snug to the base.

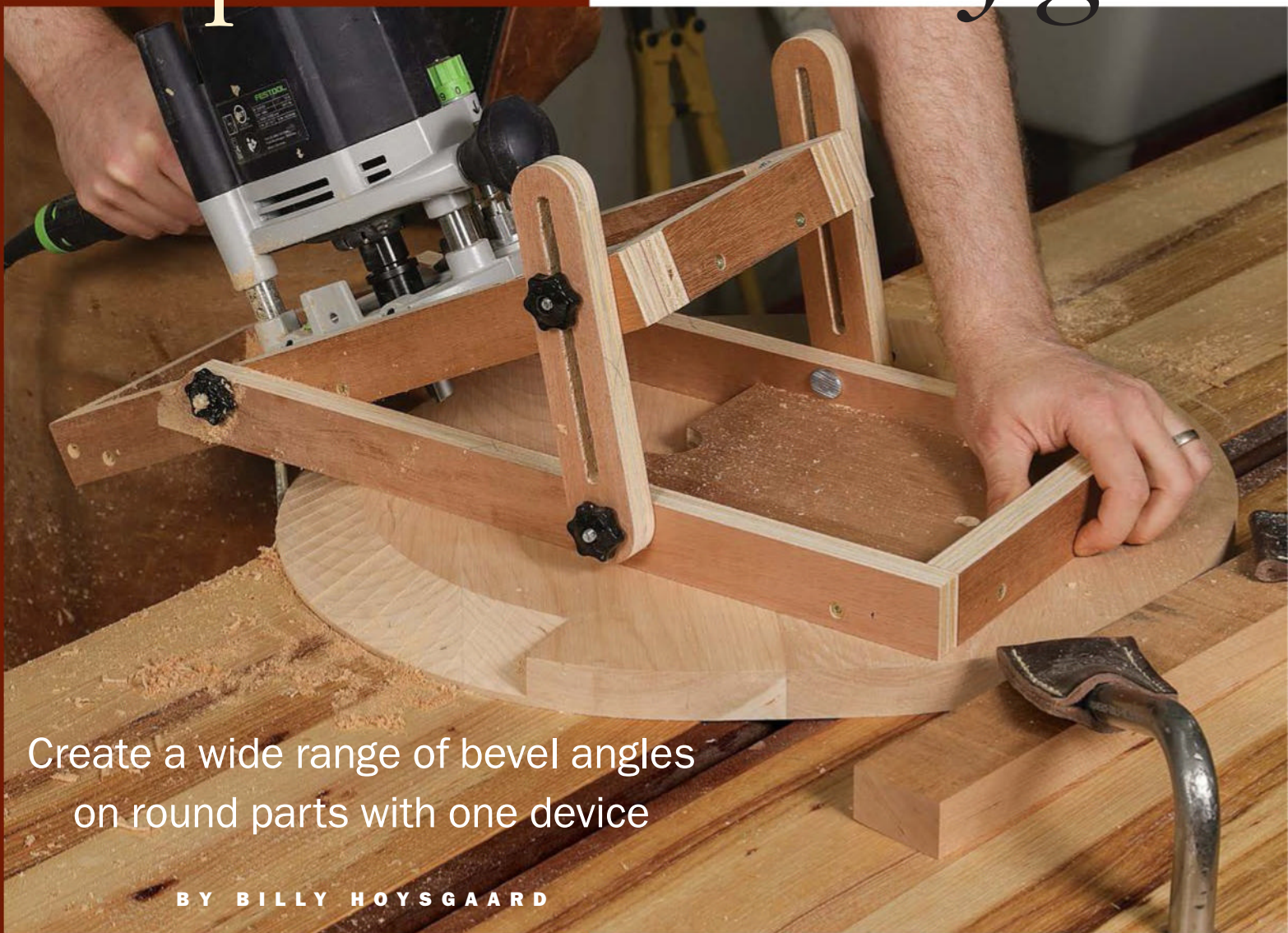


Add shelf cleats. Hartman adds ledger strips to the inside of the stretchers for the shelf to sit on. Made from offcuts and held on with hot hide glue, these little strips are a simple way to support the open grid.



A friction fit. Because of the construction technique of the shelf grid, wood movement isn't an issue, so a tight fit cut right from the template is ideal.

Shopmade Router Jig



Create a wide range of bevel angles
on round parts with one device

BY BILLY HOYSGAARD

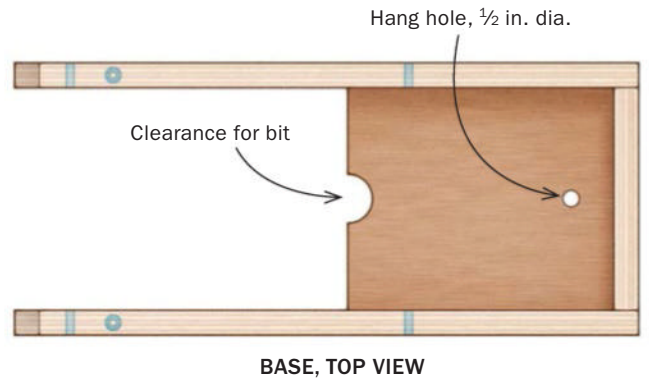
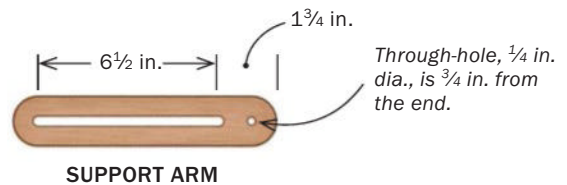
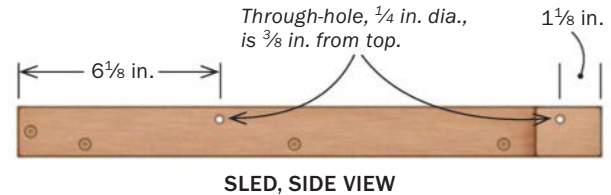
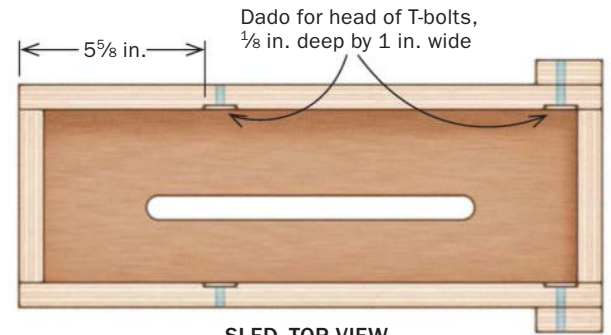
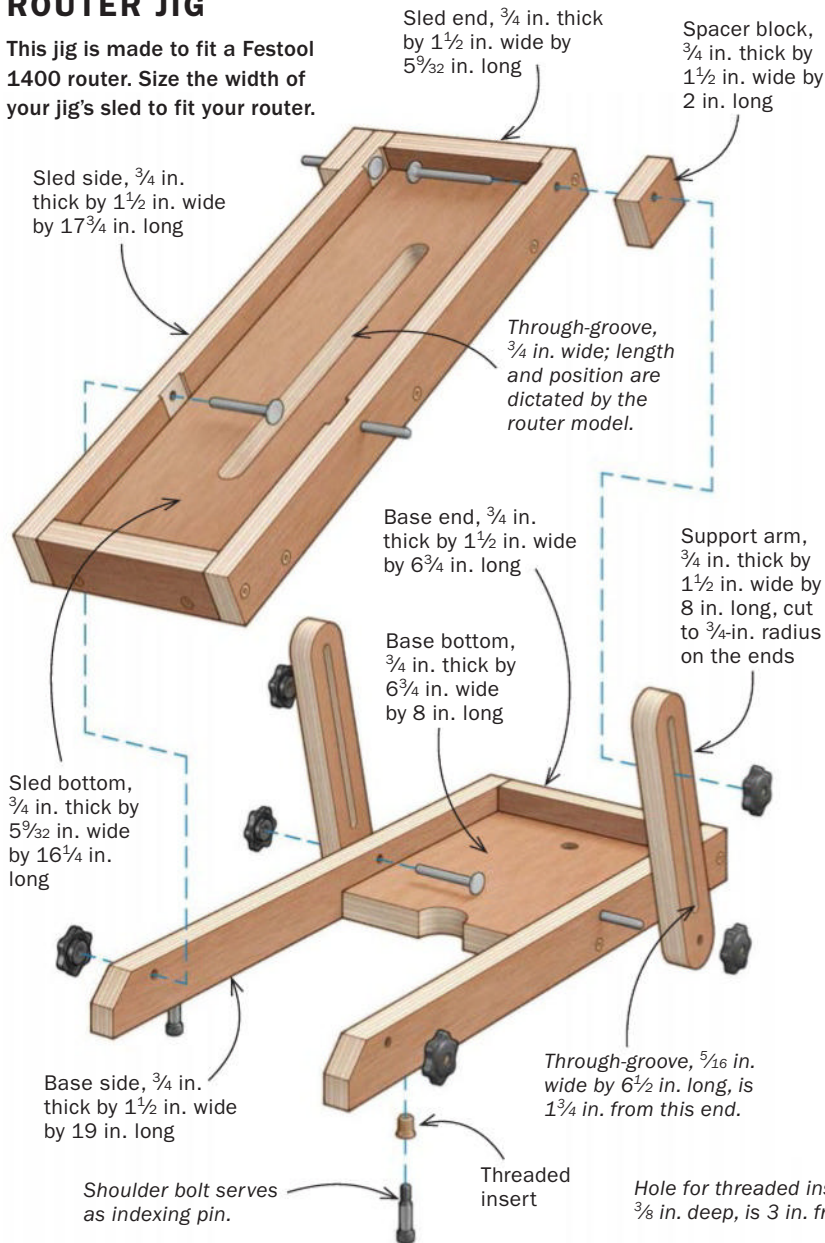


Recently I was commissioned to build a round kitchen table with a substantial underbevel. This brought up a few challenges. Since the table was too cumbersome to lift onto a saw, I needed to bring the tool to the material; my plunge router seemed like the perfect option. Since the bevel was over 45° and larger than any commercial bit could cut, and because I wanted some flexibility for future projects, I decided to make a jig that could be adjusted to different angles.

The jig I built, which consists of a base and a sled, is similar to ones used for flattening slabs, with a couple of additional features. The adjustable arms connecting the sled to the base allow you to cut different angles with the same jig. And the two shoulder bolts in threaded inserts at the bottom of the jig act as an edge guide to keep the bevel consistent around the curve.

ROUTER JIG

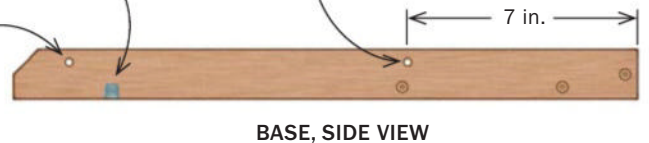
This jig is made to fit a Festool 1400 router. Size the width of your jig's sled to fit your router.



Hole for threaded insert, $\frac{3}{8}$ in. dia. by $\frac{3}{8}$ in. deep, is 3 in. from the front end.

Through-hole, $\frac{1}{4}$ in. dia., is $\frac{3}{8}$ in. from the top and $1\frac{1}{16}$ in. from the front end.

Through-hole for arm's pivot bolt, $\frac{1}{4}$ in. dia., is $\frac{3}{8}$ in. from the top.



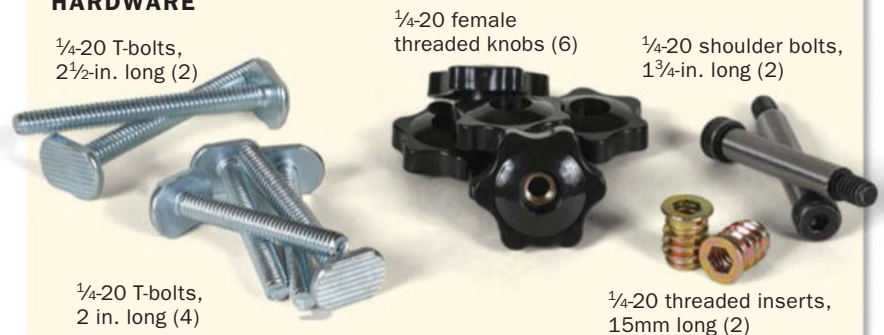
Build the jig around the router

To make all the parts, you only need half a sheet of good-quality $\frac{3}{4}$ -in. plywood and a small amount of hardware that's widely available at home centers. I start by ripping all frame parts to size, being sure to reserve enough material for the baseplate and router-sled base. After I rip long strips for my frames, I cross-cut them to size with a chopsaw. To determine the interior width of the router sled, I use the width of the router base plus $\frac{1}{2}$ in. for some play. These dimensions are specific for the Festool 1400 router but can be adjusted to fit any plunge router. The base assembly width is dictated by the outside width of the sled.

Clearance is key

After I cut everything to size, I label all my parts so I don't get them mixed up. Since the sides of the sled

HARDWARE



Create the framework

Use brad nails to tack the parts together, and countersunk screws to secure the assembly.



Prepare the sled parts. Adding the spacer blocks and drilling before construction saves time and avoids misalignment down the road. Hoysgaard also cuts the dadoes on the sled sides that will let the router glide snag-free past the hardware.

guide the router, the heads of the T-bolts need to be inset. I cut a shallow dado for each one. With a dado stack in the saw, I make two dadoes on the inside face of each sled side. I then take them over to the drill press and drill a 1/4-in. hole in the center of the dadoes for the T-bolt to pass through.

I add blocks to the front end of the sled sides using cyanoacrylate glue to hold them in place. When the jig is assembled, the blocks will act as spacers, keeping the adjustable arms in plane. I continue the 1/4-in. holes for the T-bolts from the sled sides through the blocks.

Again at the drill press, I drill holes for the threaded inserts on the base where the indexing pins will go (which is easier to do now than after assembly). I drill these 3/8-in. holes with a brad-point bit. I put a dab of cyanoacrylate glue in the holes to make sure the inserts stay snug, and with a final tightening of the Allen wrench, it's time to build the sled and base.

Simple construction

For the assembly of the sled, I start by tacking the frame together with some 18-gauge 1 1/4-in. brad nails.

Assemble the sled. Align everything well, since accuracy now ensures smooth and precise cuts while using the jig.



Add threaded inserts. The inserts accept shoulder bolts that act as indexing pins to align the jig with the tabletop.



Assemble the base. Hoysgaard taps the parts flush and uses brad nails to set them before securing with screws.

Assemble the jig

With the star knobs cinched down, the T-bolts hold the jig firmly at the desired angle.



Add the support arms. The support arms are the key to adjustability, allowing the sled to articulate to a large range of angles.

I then drill pilot holes with a #8 countersink bit and fasten the pieces together with 1¼-in. T20 flat-head screws. I'm careful to flush everything up and check for square.

To create the slot in the bottom of the sled, I set the ¾-in. bit into my router and then place the router in the sled. I want to make sure the router fits snugly in width, but with just enough play to let it move freely lengthwise. I place the router in the sled with the handle facing me and prepare to make the first cut through the sled's base. The Festool 1400 has a directional handle that makes it easy to drop the router in the jig consistently. With the more traditional two-handled routers, I position the handle with the motor trigger to the rear so it can be operated one-handed like the Festool. To cut the slot I simply start my router and plunge, making passes along the length of the sled in a push motion. I try not to take passes over ¼ in., so three passes should do the trick, with the final depth set just below the ¾-in. material so that I cut all the way through the bottom panel.

Move on to the base assembly

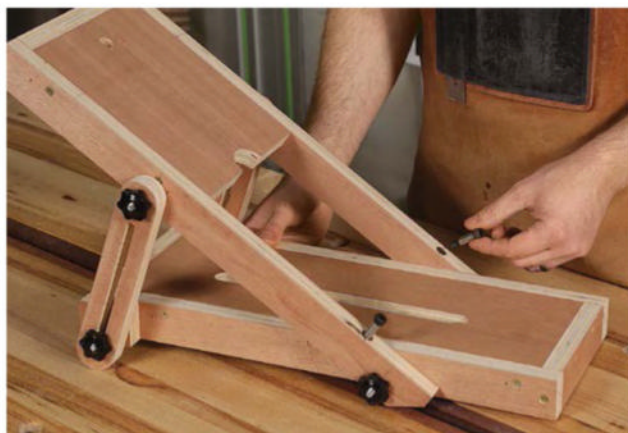
I assemble the base the same way I assembled the sled, except that the base frame wraps the bottom on just three sides. I skip dadoes in the base frame because the T-bolt heads aren't within the adjustment range of the sled. I do still drill the ¼-in. holes for the T-bolts on the drill press before I glue and screw the base together. I also cut the corners off of the open ends of the frame with the miter saw to give the frame a cleaner look and to reduce knuckle scrapes during operation.



The stars align. With all the star knobs and T-bolts installed, the jig takes its final shape.



No bearings or bushings. This jig is tailored to the Festool 1400 router. The sled is a hair wider than the router, which allows the router to glide along guided by the sled sides, with minimal slop.



Indexing pins. Creating two points of contact on the edge of a curved workpiece, the indexing pins provide a steady starting point for the beveling cuts.

Set the bevel

Adjust the plunge depth of the router and the articulation of the sled to set the desired bevel angle.

Mark the bevel's height and depth. With the table upside down, make two marks, one on the edge of the piece determining the perceived thickness on the side, the other on the bottom determining the angle and length of the bevel.

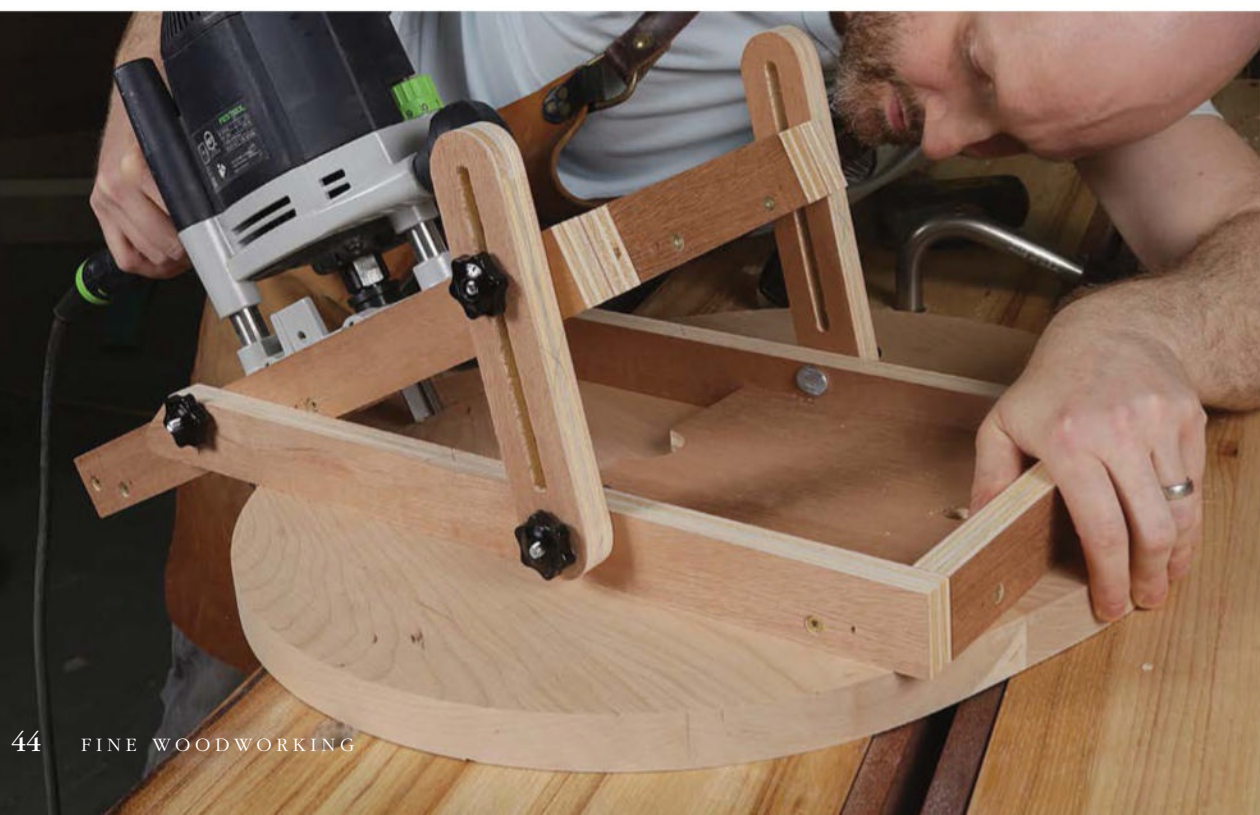


Start on the edge. With the power off, plunge the router until it meets the mark made on the edge.

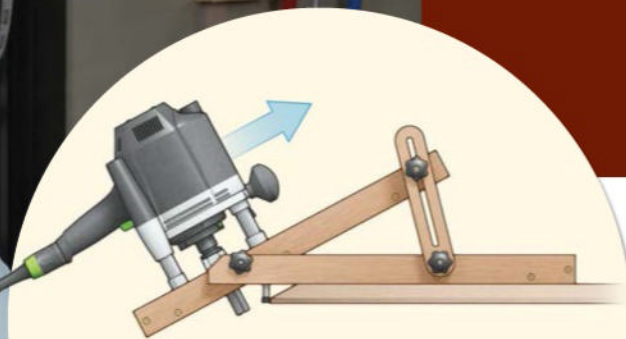
For making the slots in the adjustable arms, I have found it a little easier to use a drill press rather than a router because the pieces are too small and hard to manage with the router. After drilling multiple holes to create the slot, I follow with a rasp to clean it up for easy slide action. The bolts are $\frac{1}{4}$ -in., but I use a $\frac{5}{16}$ -in. drill bit here to let them move more freely. At this point I round the ends of each arm, cutting them on my bandsaw and then completing the job with my disk sander to get right up to the line.

Connect the parts and set the angle

I find it easiest to start by connecting the base to the sled. I line up the two $\frac{1}{4}$ -in. holes, run the T-bolts through them, and then thread on the knob



Second setup step. With the router still off and the bit plunged to the same depth, line the cutter up with the second mark, adjusting the arms to dictate the positioning.



CLIMB THE JIG, NOT THE CUT

Preventing a climb cut, which is cutting with the direction of the bit's rotation, is integral to a consistent finish with the router. To keep the bevel even, cut on the uphill stroke and move the jig clockwise around the workpiece.

Rotate the sled.
After the first cut, move the jig to the left, working around the piece clockwise. Taking overlapping passes reduces chatter and leaves a clean, tearout-free finish.

on each side. Next, I bring the adjustment arms to both sides, slide the T-bolts through, and thread all the knobs loosely to make sure the movement of the jig is fluid. Now it's time to bring it to the tabletop and start beveling.

Instead of using a gauge on the jig to set the angle, I like to do it more by eye. With the table top upside down, I make a mark on the edge showing how close the bevel will come to the top face. On this table I chose $\frac{1}{4}$ in. Then I decide how far under the table I want the bevel to go; here, I made my mark at $1\frac{1}{2}$ in. from the perimeter. Next, I set the sled to roughly the bevel angle and put the router in place. I plunge the bit until it reaches the mark on the edge of the table. Then I move the router up to the top of the sled, plunged at the same depth, and adjust the jig's arms until the lowest point of the router bit is touching the "exit" line on the underside of the table. I make sure all my knobs are tightened down before I start the router.

Cut the bevel

As always, I like to take cuts of about $\frac{1}{4}$ in. deep for each pass; that leaves me with two passes to get to my final depth. I make sure always to go clockwise around the piece and to push the router up the jig to avoid climb cuts. Pushing the router up the jig also helps keep the jig's indexing pins tight against the work surface. After my two passes around the table, I take away the milling marks with a low-angle block plane and then give it a final sand before applying the finish. □

Billy Hoysgaard is a furniture maker in Ipswich, Mass.





Marquetry Made Easy

Scrollsaw approach is versatile and accurate

BY CRAIG THIBODEAU

I started incorporating marquetry into my boxes and furniture in 2005 after taking classes with *FWW* contributors Paul Schürch and Patrick Edwards. Like its close cousin parquetry, marquetry is a form of decorative veneering. The difference between them is

that parquetry is made up mostly of geometric shapes, while marquetry is generally composed of flowing, organic shapes and curves.

There are many ways to cut marquetry, using a wide variety of tools—from knife cutting with a scalpel to double-bevel cutting on

a scrollsaw or even using a French chevalet, a machine made of wood and operated by hand or foot. After using them all, I've come to the conclusion that packet cutting on the scrollsaw is the most straightforward approach for beginners and pros alike.

After the pieces are cut from wood veneer and taped together, the pattern is pressed onto a stable substrate; this is usually plywood or MDF, but it can also be a sandwich of the two. That panel is then incorporated into a project. (The back should also be veneered to



Endless possibilities

Thibodeau's past work demonstrates the impact that nicely executed marquetry can have on furniture and boxes.



Start with the scrollsaw.

Your saw should have adjustable speed and a foot-pedal on-off switch, which can be purchased separately if needed. The pedal keeps your hands free to control the work.

help the panel remain flat and straight.)

Just as there is a range of cutting techniques, there are many ways to press (glue) the marquetry pattern onto the substrate. I use a vacuum bag almost exclusively, but small to medium-size panels can be assembled using standard woodworking clamps and shopmade cauls made from 3/4-in.-thick MDF. I've demonstrated the clamp method in previous articles in this magazine, so I'll show the bag method here.

Aside from the scrollsaw and the clamping setup, the rest of the tools are simple (see photos at right). While they aren't mandatory, I rec-

ommend a specialized set of tongs called V-Tongs. Available at schurchwoodwork.com for just \$10, plus shipping, this tool is perfect for handling the tiny pieces when you shade them in hot sand, and then when you assemble and manipulate the marquetry pattern.

An easy way to incorporate marquetry into your furniture is with a small panel for a frame-and-panel door. That's what I'll show here. Another great place for marquetry is a drawer bottom, which offers a handcrafted surprise.

A small panel can be cut and assembled relatively quickly. If it doesn't turn out as you planned, it won't take

long to try again. In many cases you can simply cut and tape a new marquetry pattern and then glue it right over the last one.

I'll also cover sand-shading, an invaluable technique for adding depth and character to a marquetry image.

The packet method

The packet method of cutting marquetry is very simple. You tape all of the veneers you plan to use into one sandwich, with a thin piece of cardstock on the top and bottom. Your drawing is spray-glued onto the top layer of cardstock.



A few basic supplies. Blue painter's tape (wide and narrow), a set of tweezers or tongs (Thibodeau likes the "V-Tongs" from schurchwoodwork.com), and a small pile of Pégas size 2/0 scrollsaw blades round out the kit.

Tools and supplies

You need a scrollsaw for this marquetry method, plus a small set of inexpensive supplies.

You can buy your veneer where Thibodeau gets his: certainlywood.com.



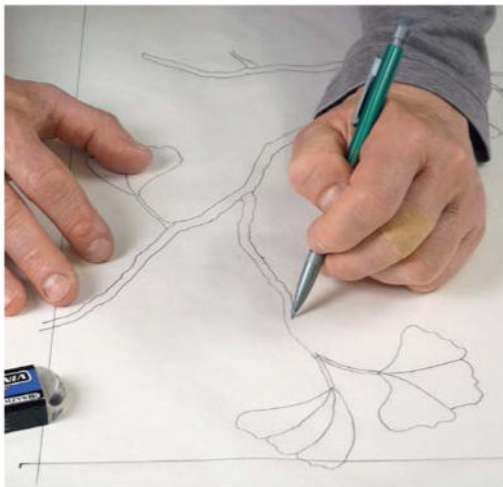
Marquetry starts with a clear, beautiful picture

Piece together your design from photos and drawings. Both are available for free on the internet.

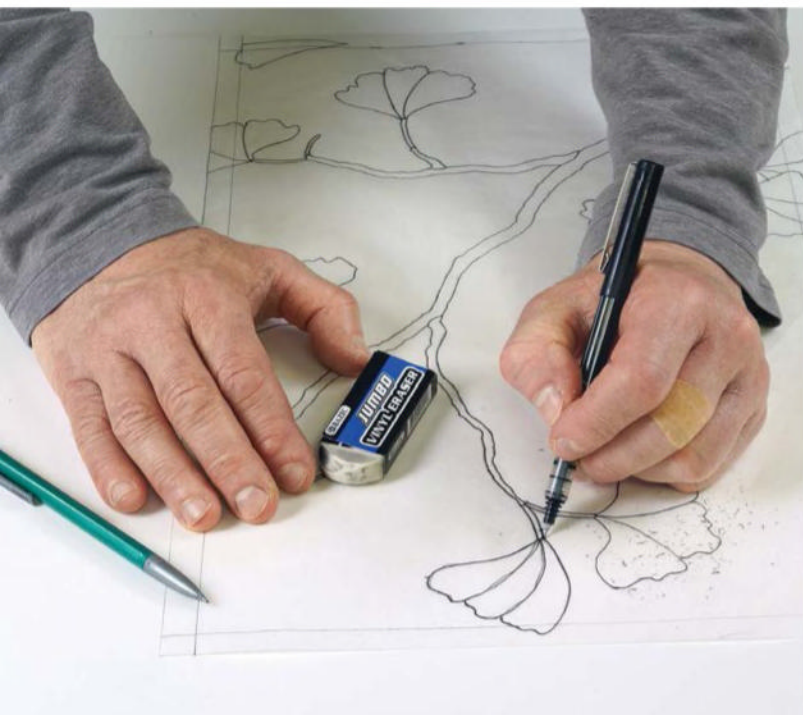


Start with tracing paper and a pencil. You can trace parts of various images to build up a flowing, organic design that pleases your eye. Take your time at this stage, and don't be afraid to erase something that isn't working—or to start over entirely.

Fill it in freehand. Sketch freehand to connect sections of the drawing and add missing parts.



Finish up in pen. Trace over the pencil sketch with a fine-tipped pen. Its crisp lines will be easier to follow with the scrollsaw. Erase the pencil lines as you go.



Packet cutting allows you to cut all of your pieces at the same time, with the scrollsaw table at 90° and no angles to keep track of. The thin blade leaves tiny gaps between the pieces, but most of those are closed when you pull the pattern together with blue tape. The remaining gaps are filled with glue. Everything ends up flush and smooth, and any tiny gaps between parts are very hard to detect.

As pieces are cut, they are set aside on another copy of the drawing, and in the end everything is assembled like a jigsaw puzzle. The process really is that simple; it just takes a little practice to get good at drawing an image and using the scrollsaw.

There's another scrollsaw method, called double-bevel cutting, which involves tilting the table and cutting pieces one by one. When the pieces go together, their beveled edges mate, closing the scrollsaw's kerf. It's a very slow process, however, and the kerf made by a scrollsaw blade is very fine to begin with.

It starts with a good drawing

For successful marquetry work, you need a clear, full-scale

drawing. The finer the lines, the better.

There are quite a few websites with free, high-quality images that you can use as the basis for marquetry designs. In some cases these are drawings, but in many cases they are photos. That's how I came up with the ginkgo leaves and branches in this design, which will become a simple door panel approximately 1/4 in. thick by 10 in. wide by 16 in. tall.

You can scale the source images as you print them out. Then you simply trace the images, combining them to create the design you're after. When you're finished, make three copies of your drawing.

Build the packet

Start by cutting two pieces of cardstock to the same size as your panel. Then spray-glue one of your drawing copies onto one of the pieces.

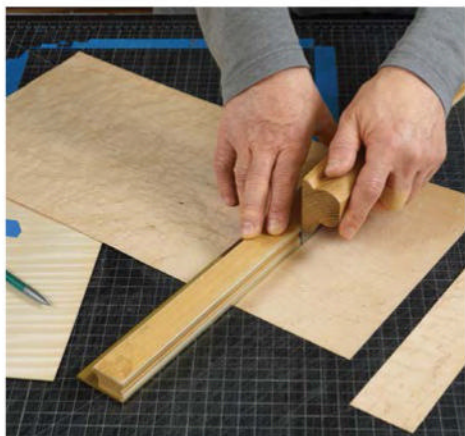
We'll be using commercial veneers here, not shop-sawn. These are only 0.020 in. to 0.025 in. thick, so go easy when sanding the panel later on. Choose the veneer for the background of your image, and make sure to put aside a piece of veneer cut for the back side of the panel as well.



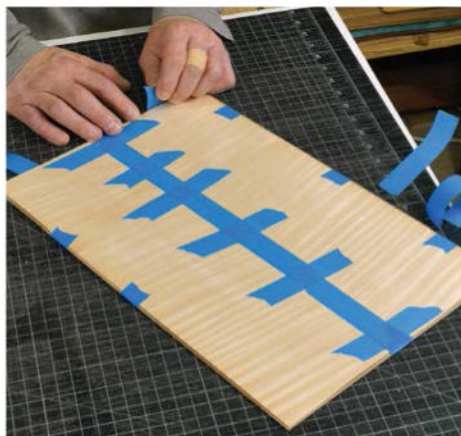
Copies needed. Make three copies of the design—one for the cutting stack, one for keeping track of parts, and one for designing the sand-shading.

Build the packet

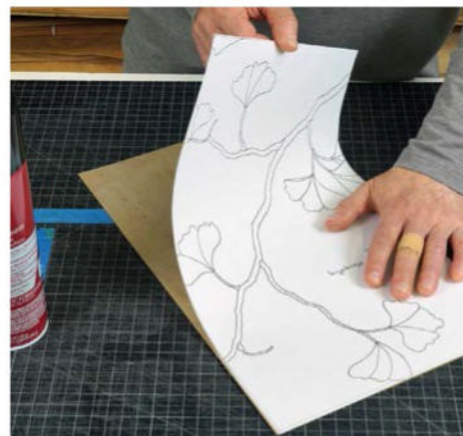
The packet is a stack of all the veneers you'll be using, with your drawing on top. Each piece of veneer is taped into position under the item it corresponds to in the drawing.



Cut out the front and back veneers for your panel. Use a straightedge and a veneer saw or razor knife to cut the pieces to size. Thibodeau made a bookmatch for the front veneer.



Front veneer goes down first. Start building the packet by taping the front veneer, or "background," onto a piece of cardstock, which will form the bottom of the stack.



Drawing goes on top. Spray-glue one of the drawing copies onto another piece of cardstock.

Now you are ready to choose colors for the image itself—in this case, for leaves and branches. Certainly Wood (certainlywood.com) is a great source for veneer. They sell all sorts of species, plus dyed veneers, and you can buy a single piece (leaf) of veneer at a time rather than having to buy a whole bundle.

The fall-colored ginkgo leaves are made from maple burl, mahogany, and poplar veneer that's been dyed green and yellow. The branches are walnut burl. I find that burl figure replicates tree trunks and branches really well.

The veneer pieces that make up the leaves and branches are cut to rough size and taped to the background veneer, one piece at a time, right under their spot in the drawing.

Cut your veneer pieces at least an inch larger than the part(s) they will create, in each direction. To accurately place the veneer on the background, use the hinged drawing as your guide, flipping it up and down to be sure the piece of veneer is in the right spot. When all the parts have



Make a tape hinge. Use strips of blue tape to join the two cardstock layers along one edge, with the drawing layer on top. Don't cover any lines with tape.



Start adding veneer pieces. Thibodeau often starts with branches when placing these parts. Cut each piece a bit larger than the part it corresponds to.



Find its position. Flip the drawing up and down to be sure the piece will lie below all of its corresponding parts in the drawing.



Secure it in place. Tape the piece down onto the background veneer (and any other veneer pieces that are already taped down).

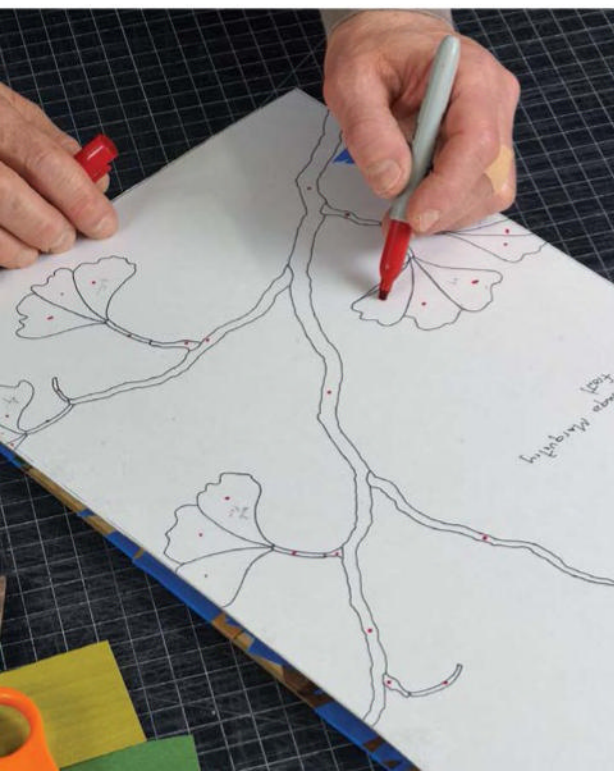
Build the packet continued



Mark the drawing. Flip the top down, and make a mark on the part you just placed veneer under to keep track of what you've done so far.



Keep going. Continue to place branches, and then leaves, using the correct veneer species and colors, until every part is accounted for.



Tape the packet together. Use lots of strips, but make sure none cover any of the cutting lines.

been taped in place, press all of the tape down firmly before closing the packet and taping all around its perimeter. You're ready now to start cutting.

Secrets of scrollsaw success

Tape a second copy of the drawing to a table or benchtop next to your scrollsaw. This is where you will place each piece as it is cut from the packet. You'll be cutting through the whole stack of veneers every time you cut out a part, so most of the layers of each piece will be waste. You might need them for repairs or a replacement, however, so keep a small box nearby and toss all of the extras into it.

Setting up your saw—

If you don't already own a scrollsaw, any decent one with a standard-size table (18 in. or larger) will do, as long as it has variable speed. If a foot pedal for starting and stopping the saw isn't included, buy one. It will keep your hands free to control the work and will help you work more efficiently in general. Scrollsaw blades break fairly often, so look for a model that has tool-less blade changes.

Set the scrollsaw at 300 rpm to 400 rpm. Slower than that will make the work tedious and also lead to mistakes. Excessive speed will also lead to mistakes.

I recommend size 2/0 blades, which offers the nice balance of a thin kerf and decent durability. I like the Pégas brand.

Cutting tips—Begin cutting where one of the lines reaches the edge of the pattern. Try to cut right down the center of your fine ink lines. If you stray a little, don't worry; the pieces will still fit tightly together. This is one of the many benefits of packet cutting.

On a panel like this one, which has branches running through from edge to edge, your packet will end up broken into sections. Each time a section comes free, wrap tape around the exposed edge to keep the layers tight. As parts of the background come free, place those on the drawing as well.

Assemble your pattern temporarily

Assembling your image and seeing it in veneer for the first time is really fun—like building a big puzzle. When all of the pieces are cut and placed on the drawing (but, most likely, not all of the background veneer), start taking the packet apart. Carefully cut the tape around the perimeter, remove all the little leftover taped bits from the background veneer, and then remove the parts of background veneer themselves. They will likely be very delicate at this point, so be careful.

Now flip the background veneer glue-face-up, and place tape over all of the openings. This is where the pattern pieces will go. Then flip it show-face-up again and start moving pattern pieces from their spots on the drawing to

Cut out the parts

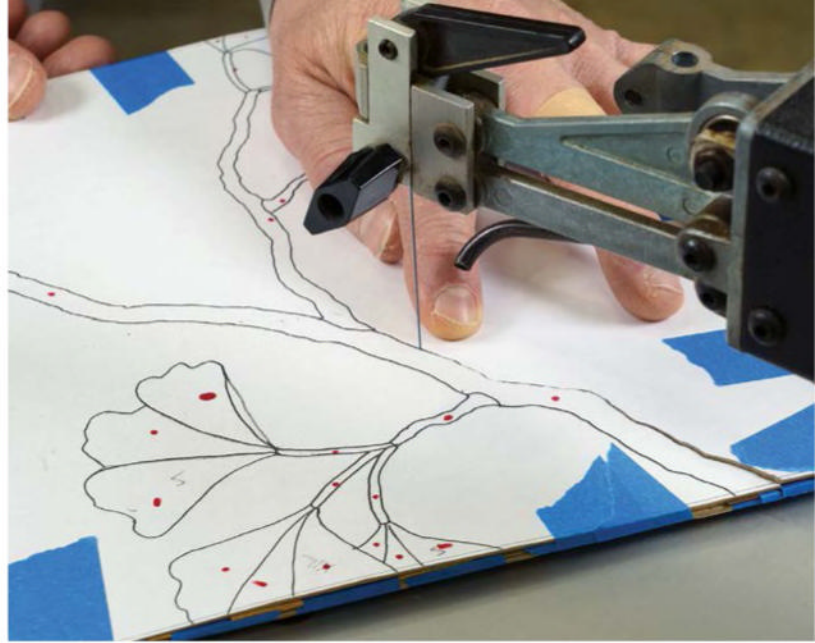
Here's how to set up the saw for success, cut accurately, and keep track of the parts in your pattern. Start by taping down one of your drawing copies near the scrollsaw.



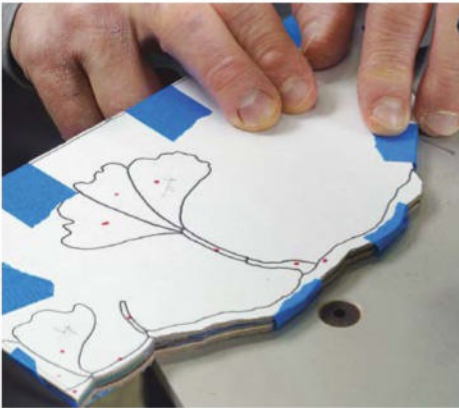
Install a fresh blade. Blades break from time to time, so it helps if your saw allows quick, tool-less blade changes.



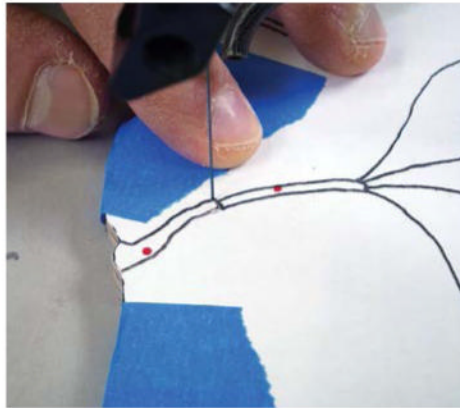
Set the speed. Shoot for a speed between 300 rpm and 400 rpm.



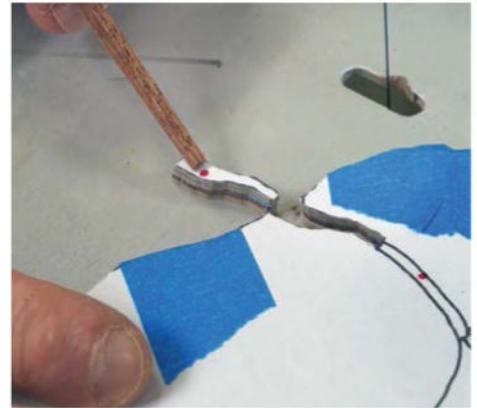
Start cutting. Begin with a line that extends to the edge of the pattern. Move the back of the packet to steer the cutting action, and try to split the line as you cut. For smoother lines, avoid stopping and starting if you can. You don't have to follow lines perfectly with the packet method.



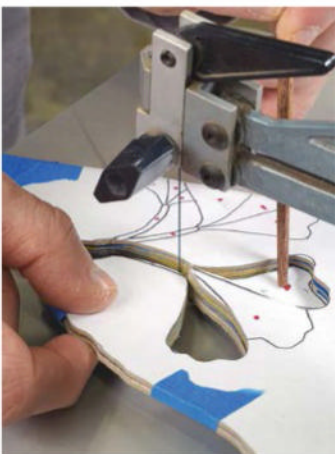
When sections fall away. If your cutting line separates a section from the overall packet, add tape strips to the cut edge to stabilize the section. Be sure that no strip obscures a line.



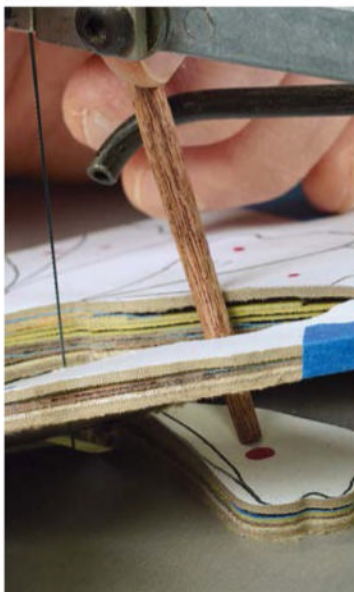
How to turn sharp corners. Slow down as you come to a corner. Then pull back slightly as you pivot the packet so the blade doesn't continue to cut. Now move forward again.



Pull the stack free and find the right piece. Inside the little stack of veneer will be the one piece you need. Place it on a copy of the drawing, and toss the unwanted layers in a box.



Push down to separate parts from the pattern. After cutting out a piece, push it down while lifting the packet.



Keep going. Cut out more parts, separate them from the packet, extract the little piece of veneer you need, place it on the drawing, and discard the waste parts.



Grab the front veneer too. As you work through the sections, separate clean pieces of the front ("background") veneer and place them on the drawing as well.

Assemble the picture temporarily

To keep track of all the parts while sand-shading, tape the whole pattern together lightly.



Tape the glue face. With the parts face down, start overlapping tape at the edges of the background sections.

Flip the pattern to add pieces.

Flip over the whole pattern, show-face-up, to start adding pieces. Add branches first to orient the background sections. Add more overlapping tape to the back side as needed, and press parts down lightly so they are easy to remove later.



their corresponding spots in the background, pressing them very lightly onto the blue tape. These delicate parts will need to be removed later for sand-shading, so don't press them down hard right now.

I typically start with the largest pieces when assembling the pattern, as they form the groundwork for aligning the smaller ones. If you have difficulty positioning certain parts, start from the perimeter and work inward, placing obvious parts first and more difficult ones last. Continue until the entire image is assembled. Then step back and admire.

Sand-shading adds depth and character

Sand-shading, the process of singeing the edge of veneer in heated sand, requires just a bit of practice to master, and it makes marquetry look amazing. The V-Tongs work great here, but if you don't have those, tweezers will also work.

Find the third copy of your marquetry drawing, and use a pencil to shade areas where shadows will look natural.

As for the sand itself, use the fine type designed for children's play, which is available at home centers and hardware stores. Don't use landscaping sand; its grains are too large.

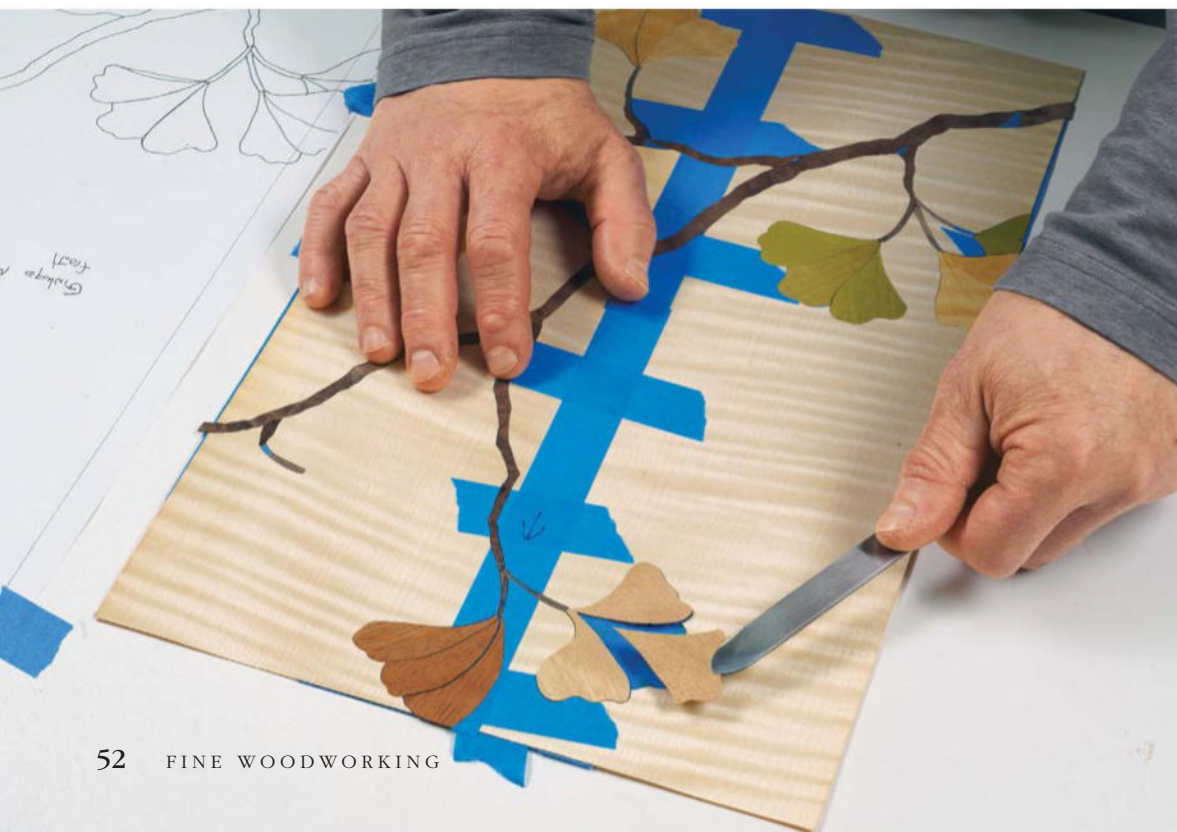
Make practice runs—It takes a bit of practice to get the shading right on various types of veneer. In general, lighter colors shade more quickly than darker ones. Use some of your leftover marquetry cuttings for practice runs.

Sand-shading tips—Consulting your shaded drawing for reference, shade one piece at a time. To add shading along a curve, gradually move the area through the hot sand.

If you burn one of your pattern pieces, find an identically shaped part in your leftovers box. Trace around it onto the right type of veneer, tape the veneer to cardstock for stability, and then recut the piece on the scrollsaw.

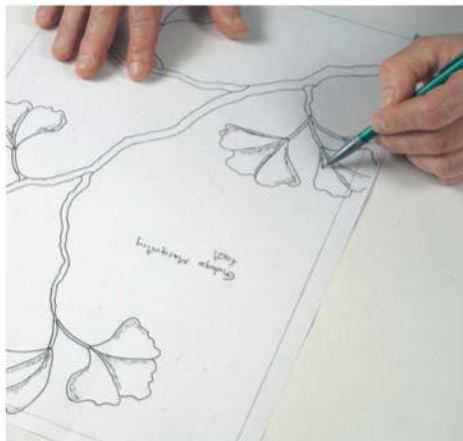
Rehydrate the shaded parts—The shading process removes moisture, causing parts to shrink slightly, so you need to rehydrate each piece right after you shade it, right before you put it back in place in the pattern. To do this, just dip your fingers into a little bit of water and press the veneer between them.

As you place pieces back onto the taped background sheet, cover them with a block of MDF or plywood to hold them flat as the moisture evaporates. The parts will likely curl if you don't. Give the completed pattern an hour or two under the blocks to finish drying before moving on to final assembly.



Sand-shading adds shadows and texture

Scorching the parts slightly in hot sand adds subtle shadows to their edges. Because the deeper sand is hotter, you should get a nice gradient toward the edge of each piece.



Shade the drawing first. Imagine the sun shining across the pattern, and mark the edges of parts to indicate where to shade them.



Easy setup. Scorched veneer can smell bad, so use a hot plate in your shop (vs. the stove). Pour an inch or so of play-grade sand into a pie tin, and set the temperature to medium.



Go for brown, not black. Try out your shading technique on discarded veneer pieces. Dip about $\frac{1}{4}$ in. of a piece into the sand, and pull it out every few seconds to check the look.



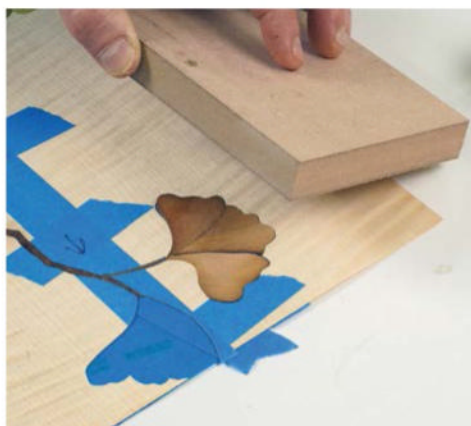
Now the real thing. Consult your drawing to see where to shade each piece. Dip a piece in the sand and pull it out to check as it darkens.



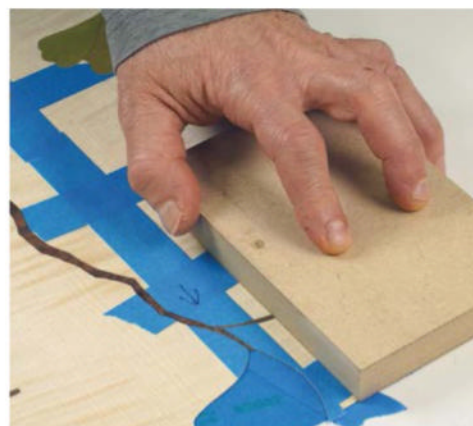
Rehydrate each piece. Shading removes moisture, which causes pieces to shrink. As soon as each piece comes out of the sand, wet your fingers a little and press them against the piece to rehydrate it. It only takes a drop or two of moisture to return a piece to its former size.



Place the piece back in the pattern. It helps to work in sections, shading small groups of parts at a time.



Weigh down each section as it dries. To keep the pieces flat while they dry, weigh down each section with a small MDF or plywood block.



Assemble your pattern permanently

A layer of tape on the show face stabilizes the whole marquetry design so it can be glued to the substrate.



Cover the show face. Cover the entire panel with overlapping pieces, pressing down only lightly at this point.



Remove tape from the glue face. Peel the tape slowly, holding down the pieces with your tongs to keep them from coming up with the tape.

Even out the gaps. The lightly bonded layer of tape on the show face allows you to move pieces around slightly so that you can even out gaps. You can also move the background parts inward if needed.



Assembly and glue-up

The next step is locking all of the parts into position, preparing your marquetry pattern to be glued onto the substrate. You'll be able to adjust gaps at this stage.

If you are using traditional clamps to press your panel, check out my article "A Chessboard Made Easy" (FWW #219) for more details.

MDF is flat and smooth, making it a great substrate for veneering. I used a 1/4-in.-thick piece for this door panel.

Vacuum-bag veneering—There is a 3/4-in.-thick melamine platen inside the vacuum bag, which acts as the bottom caul. Up top, you need nothing more than a 1/4-in.-thick MDF sheet to spread the pressure. You also need some thin plastic sheeting between the veneer and the cauls to keep one from sticking to the other, as well as a piece of breather mesh over the top to help spread the vacuum pressure evenly.

Polyurethane glue cures in about two hours. After that, remove the panel from the bag, stand it in a location where there is airflow on both

sides, and leave it overnight to fully cure. The blue tape comes off the next day. I have found that a heat gun set to its lowest temperature helps to soften the tape adhesive just enough to prevent it from tearing out grain. Keep moving the gun ahead of where you are pulling tape.

Sand carefully

Sanding marquetry is a little different from sanding a typical piece of plywood. The grain goes in all directions, so it's best to use a random-orbit sander to do the bulk of the sanding. Keep the sander level and let its weight do the work.

Make sure to connect the sander to a shop vacuum to remove as much dust as possible so that material from one veneer color isn't pressed into adjacent pieces. □

Craig Thibodeau is a professional furniture maker in Virginia.



Burnish the tape to lock it down. Use a brush with stiff bristles to burnish the tape down firmly. This will lock the pattern in place for the next step.

Online Extra

To see Thibodeau's marquetry process in motion, go to FineWoodworking.com/324.

Glue up your panel

MDF is flat and smooth, making it a great substrate for veneering. A vacuum bag makes things easier, but traditional clamps and cauls ($\frac{3}{4}$ -in.-thick MDF pieces) also work.



Glue goes on the substrate only. Roll a thin, even layer of glue onto the panel. Thibodeau prefers polyurethane glue for applying veneer.



Mist the veneer. A light mist of water helps to activate the polyurethane glue. This is the back side veneer for the panel.



Now the other side. Flip the panel, apply glue, mist the back of the marquetry pattern, and lay it down on the substrate.



Into the bag. Tape the layers together at the edges, place the assembly in the vacuum bag (Thibodeau adds Evacu-net near the outlet to help with airflow), seal the bag, and turn on the pump.

Finishing up

After removing the tape and sanding the panel, apply your favorite finish.

Peel carefully. This tape will be bonded tightly to the marquetry. To keep it from pulling up wood slivers, use a heat gun to soften the adhesive as you pull the tape up slowly.



Sanding tips. Marquetry has grain running in all directions, so a random-orbit sander works well for leveling and smoothing the pattern. Sand only as much as needed, from 180 to 320 grit, and keep the sander level.



Add a finish and a frame. The finished panel can become a door, a case panel, a drawer bottom, a box top, or a lovely piece of wall art.

Creating Coopered Lampshades

Straightforward
beveling and
assembly
techniques open
the gate to an array
of inventive designs

BY SETH ROLLAND

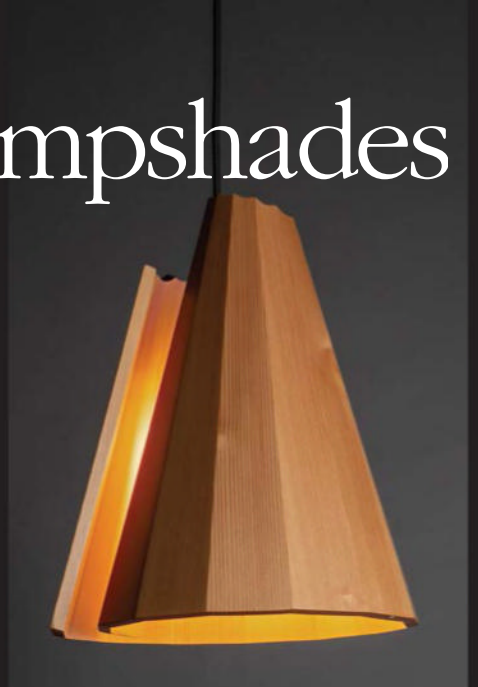
If you've never immersed yourself in coopering, making a lampshade is an excellent place to dive in—or to dive in deeper. It combines a reasonably simple technique with absolutely endless possibilities for design. I love the rhythm of facets created by the staves and how simple it is to punctuate them with pierced cutouts. Making these shades takes very little wood, and often the offcuts and extra staves can combine to become interesting pieces of their own.

I also love how playful you can be with the overall forms of the shades. Once you have the process down for creating a cone-shaped shade, it's a short step to experimenting with ovals and other shapes by using staves of different widths or different bevel angles. In this article I explain the process of laying out and cutting staves for a conical shade, the simplest kind. But the shade you'll see me assembling here is actually oval. The methods I use to cut out and assemble the staves are the same for conical and oval shades; the difference is in the layout. To learn how I lay out an oval shade, see Master Class (pp. 74–77).

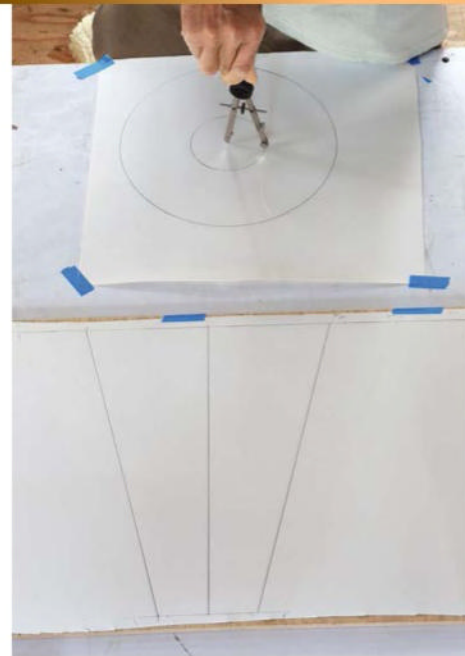
Layout for a conical shade

To start a conical lampshade design, make a full-size drawing of the profile you want it to have. All you need is a tapered trapezoid showing the shade's height and its width at the top and bottom. Next, use a compass set to half of those widths to draw two concentric circles; these represent the top and bottom of the shade as seen from above or below.

Decide the number of staves you want, divide the larger circle by that number of segments, and draw two radius lines representing the sides of one stave. Measure the distance between the two radii at the inner and outer circles to get the width of the staves at their top



SIZING THE STAVES FOR A CONICAL SHADE



Circle transfer. Start by making an elevation drawing of your cone-shaped shade. Then, using a compass set to half the width at the bottom and the top, draw two concentric circles.

CONE-SHAPED LAYOUT

1. Make a full-scale drawing of the profile you want your shade to have.

2. With a compass set to half the width of the top and the bottom, draw two concentric circles. (See drawing below.)

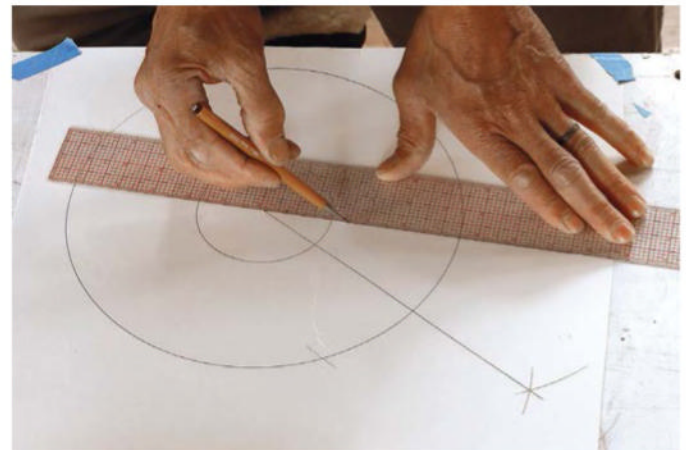
5. The length of this profile drawing's sides will be the length of the staves.

3. Divide the larger circle by the number of staves you want, and draw radii defining one stave.

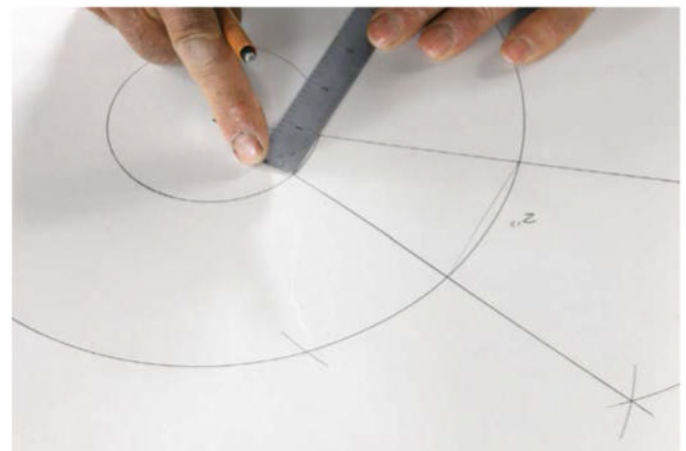
4. Measure the distance between the radii at the outer circle and the inner one; these are the bottom and top widths of your staves.

6. Determine the slope by measuring this angle.

7. Use the app to calculate the bevel angle, entering the shade's slope and number of staves.



Strike the radii. Divide the circumference of the larger circle by the number of staves you intend to use to make the shade. Then draw two neighboring radius lines representing one stave.



Stave sizes. Measure the distance between the radius lines at the smaller and larger circles to establish the top and bottom widths of the staves.

SAWING THE STAVES

Beveling app.

This compound-miter angle finder (ferobevel3.netlify.app) was created by Hector Garzon after he took Seth Rolland's coopering class. To find the bevel angle at which to cut staves, enter the shade's slope and the number of staves.

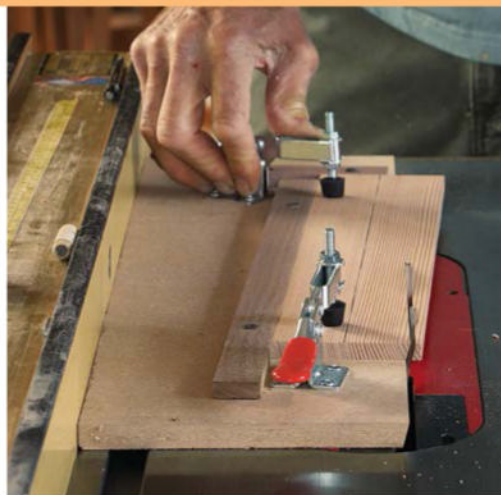


The base of the jig. To make the first of two stave-sawing jigs, start by cutting the base to width with the table-saw blade set to the bevel angle you'll use for the staves. Leave the table-saw fence in this position.

SIDE ONE

Fix the fence.

To cut the first beveled edge of the staves, screw a fence onto the base. Use layout lines on both ends of one stave to find the appropriate location for the fence.



Safe and sound.

Fix a stop block to the base to locate the stave at the rear, and toggle clamps to hold it tight during the cut.

SIDE TWO

Quick rejigging.

To saw the second side of the staves, create another jig (or repurpose the first one), giving it a fence with one edge beveled so it mates with the sawn edge of the staves.



Backward and forward.

Where the first side of the stave is cut with the wide end forward, the second is cut with the narrow end to the front.



Arcing the ends. For this shade, Rolland adds a decorative curve to the wide end of the staves.



Perforation layout. With adjacent staves pressed together, Rolland lays out the angled cutouts by eye. In various lamps, he has made piercings in a wide range of shapes.



Creating the curve. The arc at the bottom end of the stave takes just a moment to shape at the disk sander.

and bottom. The length of the staves is the same as the length of the sides of the trapezoid you drew. To see how you like the shape in 3D, use these measurements to cut a set of staves from cardboard, then tape them into a cone.

Beveling the staves

If you're happy with the design in cardboard, mill up a batch of stave blanks. I generally use relatively quiet, straight-grained wood to keep the focus on the faceted form of the finished shade. My stave blanks are usually $\frac{5}{16}$ in. to $\frac{3}{8}$ in. thick, and I always make some extras.

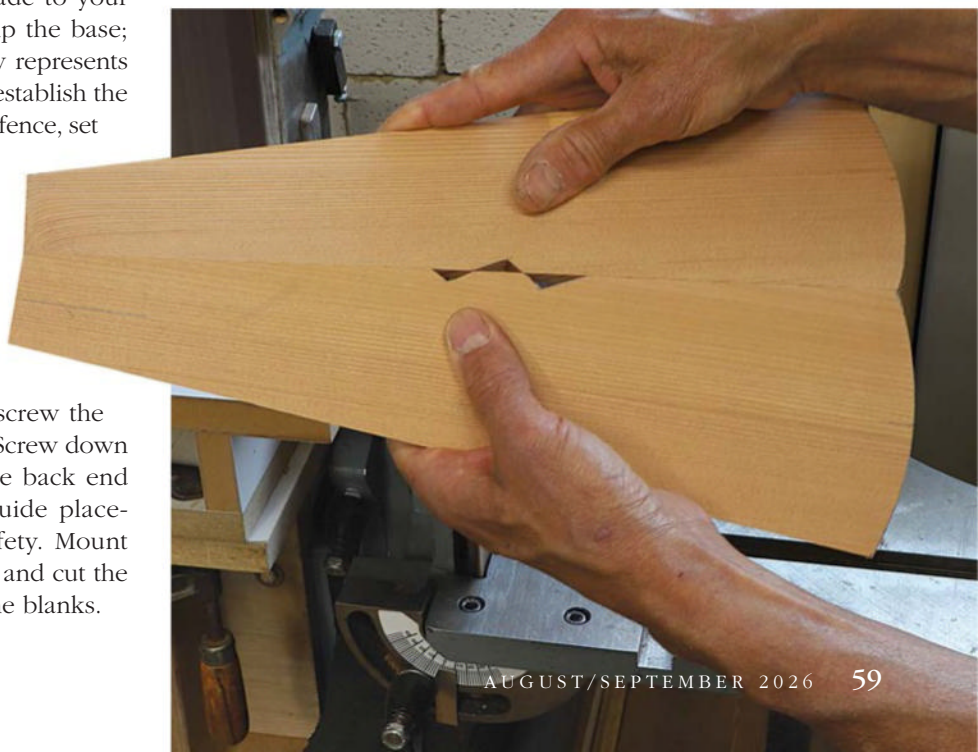
I cut the staves to shape using a couple of simple jigs on the table saw. To determine the bevel angle of the blade, you need to factor in the slope of the shade (which you can measure on your trapezoid drawing) as well as the number of staves. I use an online app that one of my students created (available at ferobevel3.netlify.app). Plug in the slope and the stave count, and it tells you the bevel angle you need.

Cut your stave blanks to length, and on the face of one of them draw lengthwise lines representing the two long edges. At both ends of the blank, with a bevel gauge set to your bevel angle, carry those lines across the end grain. Now turn to making the first beveling jig.

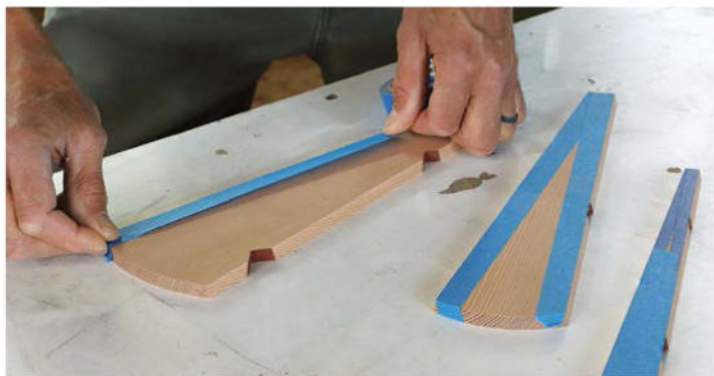
Each jig has a base, a fence, a backstop, and a couple of toggle clamps. Before mounting the fence on the first jig, set the table saw's blade to your bevel angle and rip the base; its outer edge now represents the line of cut. To establish the location of the jig's fence, set the marked stave on the base so the angled markings on the end grain match the line of cut. Press the fence against the other edge of the blank and screw the fence to the base. Screw down a stop block at the back end of the blank to guide placement and add safety. Mount the toggle clamps, and cut the first bevel on all the blanks.



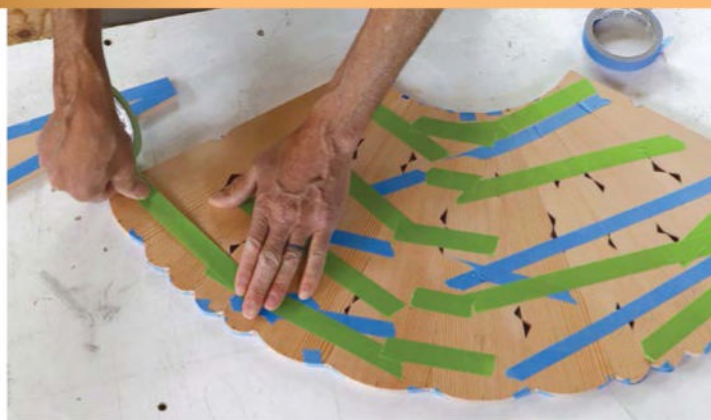
Notch with a disk. Pressing the stave against the edge of the disk makes shallow triangular notches that come together to form the finished piercing design.



TWO-STAGE ASSEMBLY



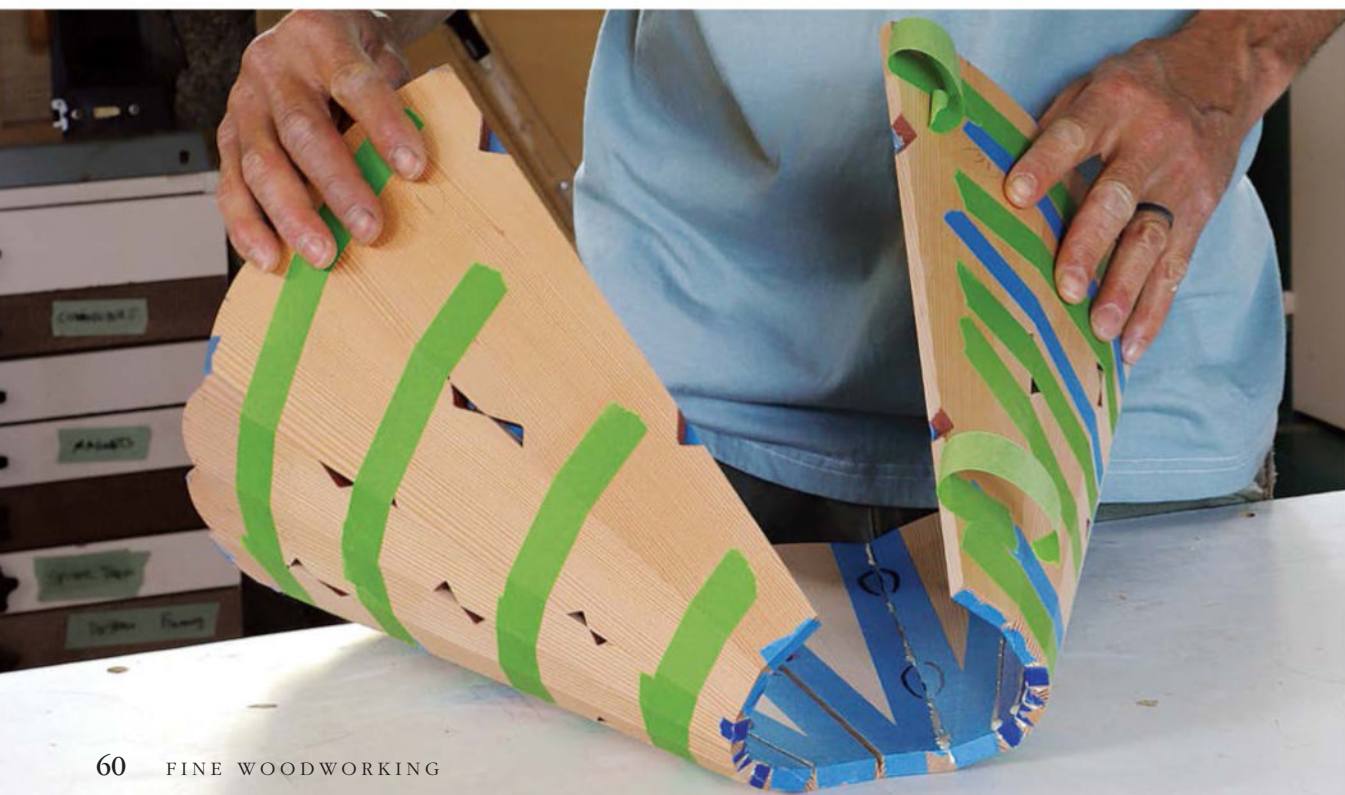
Tale of the tape. With all the staves beveled and fully shaped, apply tape along the inside face of each edge to minimize squeeze-out issues.



Outside up. Place the staves side by side with their inside face down, and stretch tape across the joints.



Flip and mark. Turn the whole assembly over and mark the notched areas, where you don't want glue. Red tape indicates seams that won't receive glue in the first stage of a two-stage assembly.



Brush and roll. Apply glue to all but two of the seams, roll the shade into shape, and clamp the last seam shut with tape. Stand the shade upright and squeeze it so all the glued joints are tight and any error accumulates in the unglued joints. Leave the shade standing while the glue cures.

Halfway home.
When the glue cures, remove all the tape to reveal the two halves of the shade. Rolland grinds a special scraper from scrap steel and uses it to clean any squeeze-out at the seams.



Make a second jig using the same base, but with a fence that is beveled so the sawn edge of the blank will nest against it. A cutoff from one of the staves works well for this fence. Again, use your marked stave to locate the fence.

Once you've beveled the second edge of all your staves, tape them up in a dry assembly. If the angles are more than slightly off, adjust the saw's bevel angle, shift the table saw's fence slightly, and use the second jig to recut the staves. This will make the finished shade just a bit smaller.

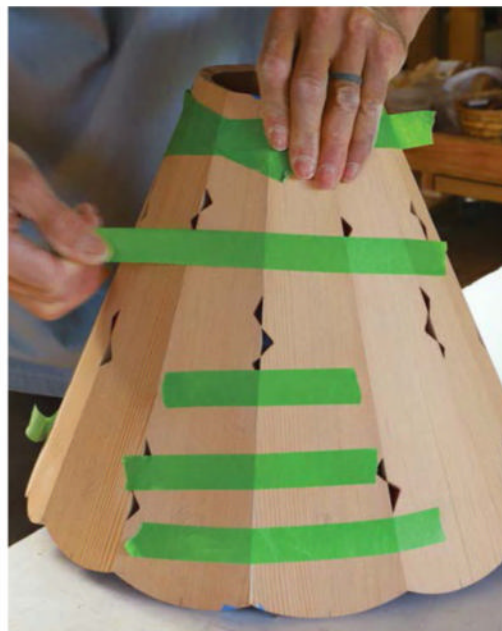
Stave shaping and assembly

Before glue-up, do any decorative work you like, shaping the ends of the staves and making cutouts along the edges. Sand the inside faces of the staves, and then apply tape beside the bevels to reduce glue cleanup.

Lay all the staves side by side with their inside face down. Stretch blue tape across the joints, then turn the whole assembly over and apply glue to the joints. Because getting perfect closure on an assembly with so many joints can be a challenge, especially on oval forms, I often glue up



Abrasive plane. When making an oval shade like this one, with staves of differing widths, Rolland does the glue-up in two stages. That way, even if all those accumulated angles are off by a smidgen, he can correct the error and achieve a perfect fit by sanding each half of the assembly on a flat surface.



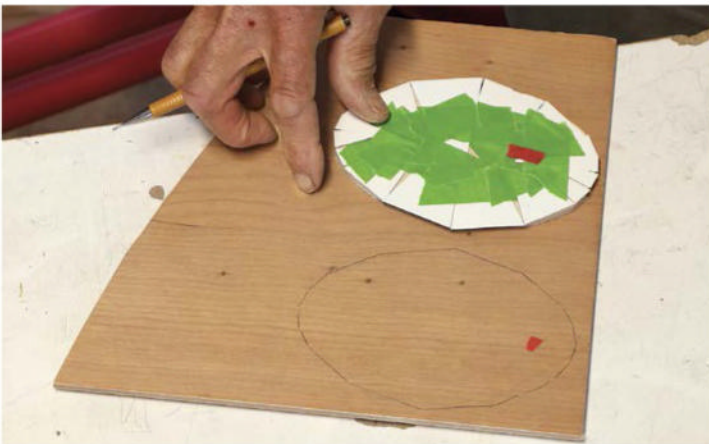
Final closure.
Once the two halves fit just right, apply glue to the last two seams and tape the shade shut.

MOUNTING THE FIXTURE

A stand for the insert. It takes some finesse to create the polygonal insert that fits tight inside the shade and holds the light fixture. Rolland begins by cutting a piece of $\frac{1}{4}$ -in. plywood to rough shape and attaching it to a stand with double-stick tape.



Paper at the perimeter. Snip paper into small trapezoidal pieces. Fit one piece against each stave, and tape it in place on the cardboard.



Segmented circumference. Trace the completed portrait of the insert's shape onto a piece of $\frac{1}{4}$ -in.-thick stock.



shades in two halves. In those cases, leave two opposite joints unglued on the first assembly, squeezing the shade to make sure the glued joints are tight and the error accumulates in the unglued ones. When the glue cures, separate the halves and finesse their joints for a second assembly. After the final glue-up, remove all the tape, sand the outside of the shade, and apply finish.

Variations on the theme

In a conical shade, all staves have the same width and bevel

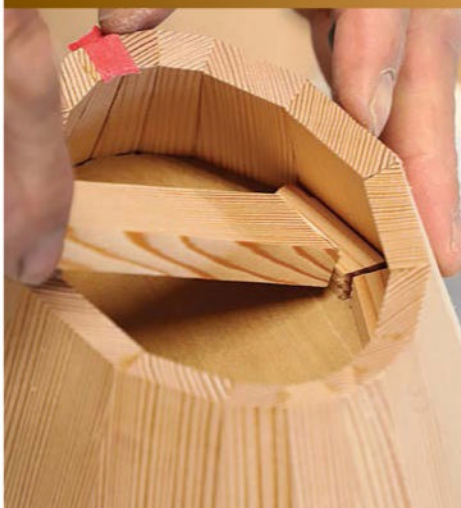
angle. But to make an elliptical shade, you either keep the bevel angle constant while changing the width of the staves, or keep the stave widths constant while changing the bevel angle from joint to joint.

Think of an elliptical shade in quadrants. If you are using 16 staves, for example, each quadrant will have four staves that differ from each other either in width or bevel angle. All four quadrants will have the same matched set of staves.

You'll need a pair of jigs for each of the four different stave



Shape the insert. Bandsaw near the perimeter line. At the disk sander, set the table to the slope of the shade, and bevel each facet.



Glue blocks. With the insert fitted and held in place from below by the stand, add glue blocks around the perimeter, gluing only to the staves at this point. You'll glue the insert to the blocks later, after drilling it for the light fixture.



Balancing act. To determine where to drill the hole in the insert for the light fixture, use a nail on top of the stand to find the shade's precise balance point. Remove the insert, and use the impression from the nail as the centerpoint of the hole.



Fixture install. With the hole drilled, insert the light fixture and dry-fit the insert again to see how it balances. If it's good, glue the insert to the blocks. Rolland uses the Standard Plug-In Pendant Light from the Color Cord Company and an LED bulb.

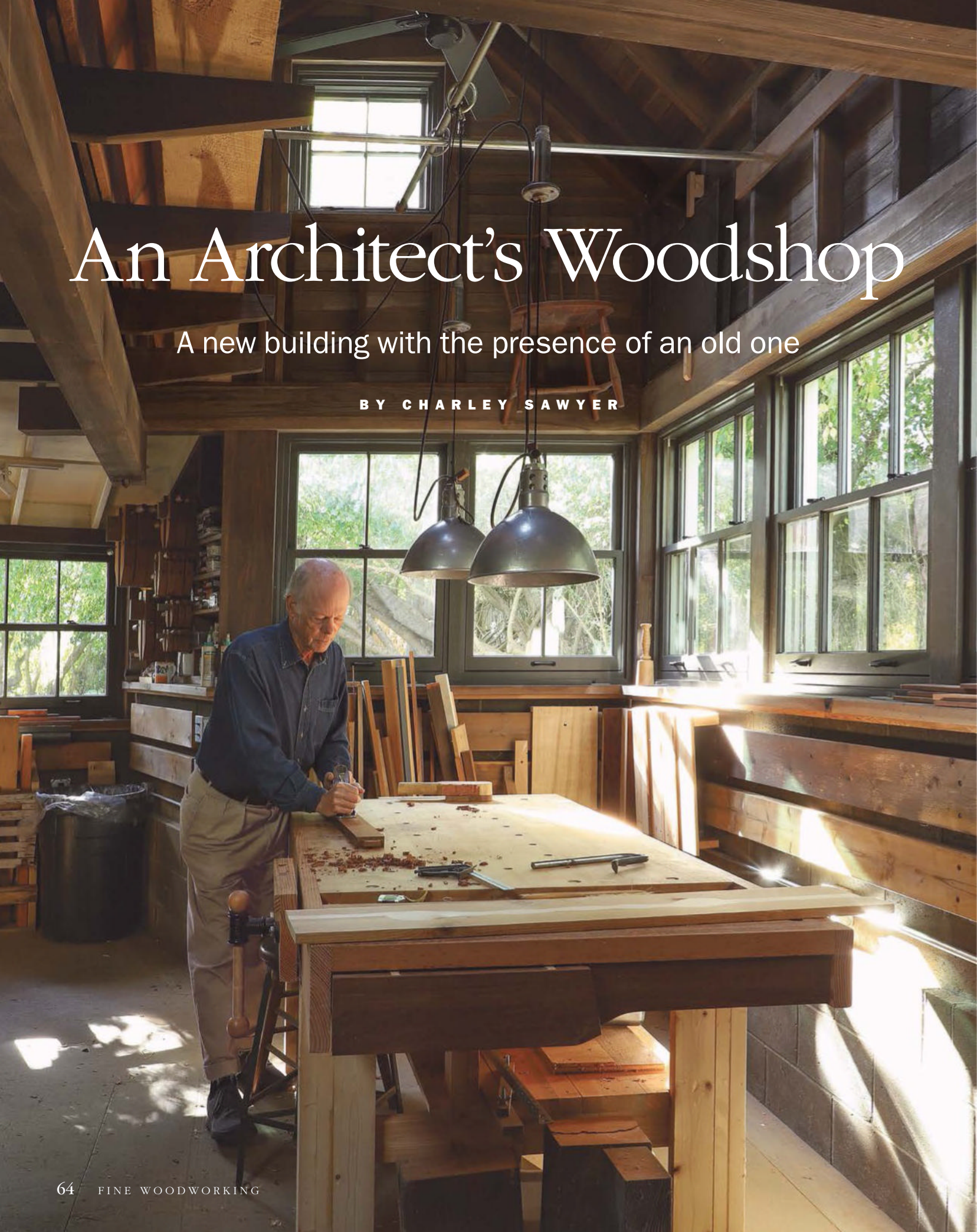
types, so in this example you would make eight beveling jigs. It sounds like a lot, but the jigs are very quick to make and to modify.

As with an oval shade, you can cooper a spiral shade either by changing the bevel angles between staves or by keeping the bevel angle constant and changing the width of the staves. This second method is easier to cut, but it can be more challenging to lay out.

I have made a number of lampshades with curved staves. The curves can be sawn at the bandsaw, bent-laminated, or steam-bent. If you steam them, it's important to dry them carefully because you need the curves to match each other closely. To do the bevel cutting on gently curved staves, I have made table-saw jigs with a shaped block on the base that provides either convex or concave support beneath the stave. □

Seth Rolland makes custom furniture and sculpture in Port Townsend, Wash.



A photograph of a man in a blue shirt and khaki pants working at a large wooden workbench in a woodshop. The shop has a high ceiling with exposed wooden beams and rafters. Large windows on the right side let in bright sunlight, creating strong shadows on the floor and workbench. Two large, dark, dome-shaped pendant lamps hang over the workbench. The man is focused on his work, using a tool on a piece of wood. The workbench is cluttered with wood shavings and various tools. In the background, there are shelves with more wood and a window looking out onto a green landscape.

An Architect's Woodshop

A new building with the presence of an old one

BY CHARLEY SAWYER

It's late winter in 2018, and raining. I'm stumbling around on the hill behind the garage with pruning shears, tape, a level, string, stakes, a hammer, and a clipboard. This is where I will build a shop. After months of designing and drawing, I'm laying out the footprint of my plan for a final check of view lines, foundation wall heights, tree issues, etc. I'm hoping that all will look good, because soon the backhoe will arrive.

How did this come about? I'd recently retired and so finally had the time to pursue postponed interests. I took a three-month intensive course in furniture making at the North Bennet Street School in Boston. This reinvigorated a fondness for woodworking that began for me as a child in my father's basement workshop. There I had a small workbench, a box of child-size tools as sharp and dangerous as my father's, and just enough paternal guidance to know how to avoid injuries—mostly. I loved it: the learning, the equipment, the smells, the organized jumble of beautiful things, and being with Dad. It was an important place. And I decided it was time for me to have it again.

This is why I was playing surveyor on that dreary day. This and the fact that I'm an architect. With what I knew of design, I would plan and shape my retirement years ahead by building on the foundations of a happy childhood memory. This was a satisfying prospect.

The old story

In addition to wanting my workplace to be functional, I had another requirement: I wanted my shop to receive the same architectural consideration I'd give to any project. What does that mean? Many things, but importantly this: that the created space would do more than satisfy a checklist of functional needs. It would have a presence that would make it special. All structures elicit an emotional response of some sort: interesting, unusual, comforting, boring, whatever. As an architect, I get to decide in advance what message or story I'd like the structure to tell, and then to figure out how to do it.

Here's the story I chose for my shop-to-be: It was built in earlier times in an economical way, responsive to the unique characteristics of its site, by a person familiar with the building's function. Why this story? It's an image that connects me to formative memories and comforting places: a mountainside shelter, an artist's studio, a boathouse in the Adirondacks, salty time-worn places known from childhood summers spent

on the New England coast, structures rooted to the land or water and built with purpose. They appeal and inspire because they accommodate simple but consequential activities well. I wanted this same clarity for my shop.

The site

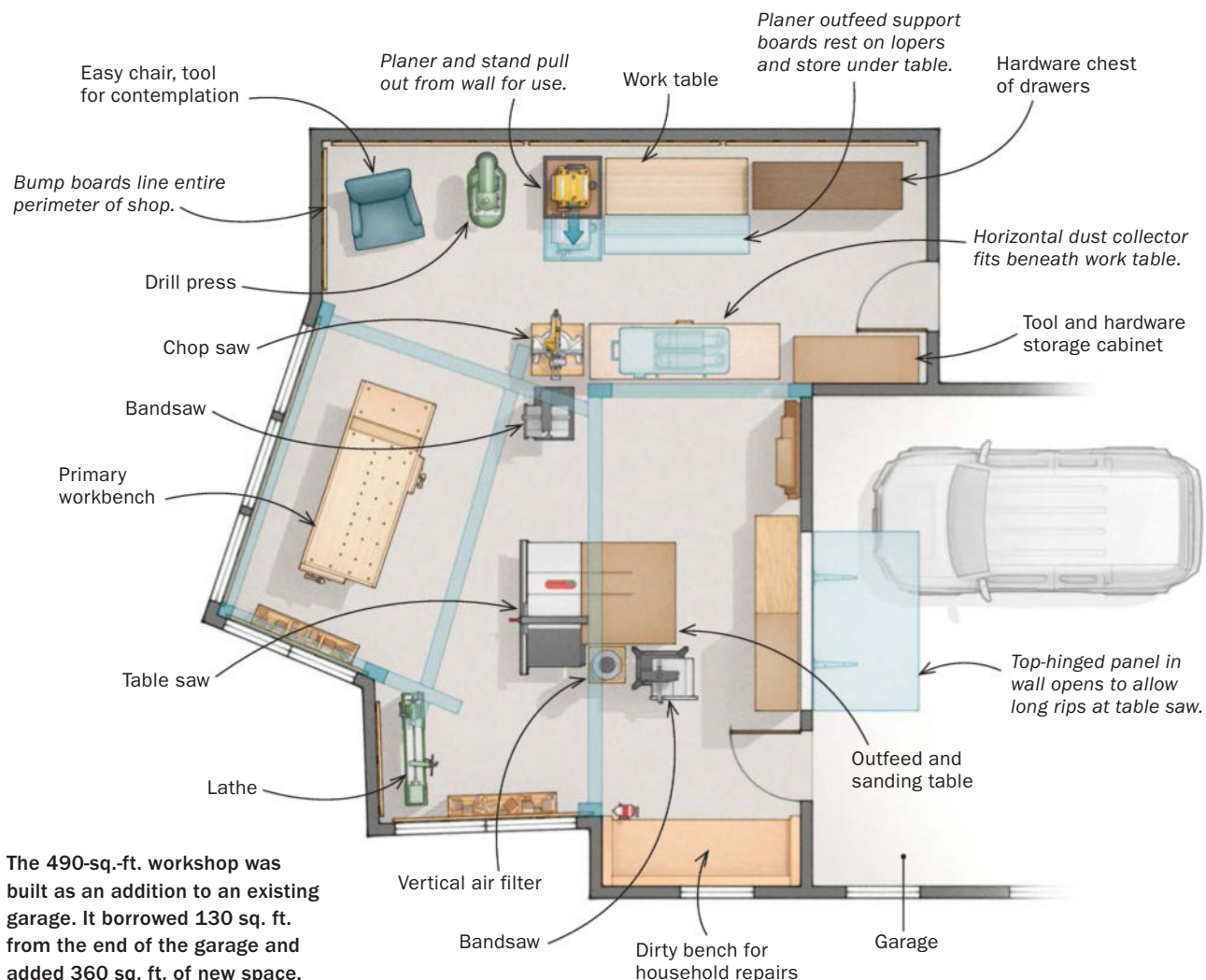
Because of zoning constraints, new construction on the property would have to be built as an addition off the back of the garage. This introduced two significant design issues. First, because the garage had been built into a hillside, the grade at the back is 5 ft. higher than at the front. A shop floor logically built somewhere close to garage-slab level would necessarily mean that



the shop space would be buried half a floor below grade. Second, on two sides the shop would border an existing garden glade of twisty-trunked spindle trees growing in a carpet of English ivy. This is a wonderful feature, and it offered an opportunity to make the shop a better, more interesting place.

Constrained by the site, the shop would be quite small. All functions would take place in an open floor layout. It would be for personal use. For equipment, the space would need to accommodate a table saw, a miter saw, two bandsaws, a planer, a lathe, and a drill press. And for shop furniture there would be a full-size workbench, outfeed tables, counter space for tabletop tools, a project assembly area, a “dirty” bench for general household repairs, an old stuffed chair for contemplation, and as much storage around the edges as possible.

There would be compromises: no separate finishing room or bench room, no jointer or woodstove. Someday I'd find space for a work sink.



WORKSHOP FLOOR PLAN

In the workshop

It's been six years since the job was completed, and the shop is now a quirky and comfortable addition to my property.

For visitors, it has its surprises. Natural light, introduced by more windows than one normally sees in a shop, brings life to the space and opens the inside to its surroundings. The two walls facing the garden are entirely windowed, bringing the garden to the workbench. And because the shop is half buried in the hillside, someone standing inside sees the garden from a height of 12 in. above the ground—viewing it through the eyes of a rabbit.

More surprises include exterior walls that angle and bend, perhaps suggestive of an early builder's difficult site conditions, casual carpentry, or changes made over time. A high gable punches through a low shed roof with a 20° twist, and the ridge droops slightly from front to back as if from a settled foundation. Inside, the structure is fully revealed. Like a roof

collapse at a silver mine, it is a crisscross of sloped timbers, hanging beams, and improbable cantilevers. There's whimsy and storytelling to this, and enough controlled chaos to keep one thinking. At the same time, each kink and every unruly timber is positioned to accommodate equipment and to serve shop functions well.

One final point: The offbeat touches of the shop were not intended to set it apart from buildings of the past, nor to mark it as contemporary. The gentle shake-up of traditional forms and expectations has been a staple of New England construction from the time of the pilgrims to the present. Done carefully, a shake-up has answers for the questions it naturally poses, and it nourishes the tradition.

I like to imagine that 100 years from now a dreamy child perched in the crook of a twisted tree will gaze on a weather-battered little building on a hillside, having spotted something there to wonder about.



It's open inside. Constrained by the site and influenced by his affection for old work buildings, Sawyer gave his shop an idiosyncratic footprint and intersecting rooflines. But he kept the interior space open and undivided.

Sanding cylinder. To augment his dust collector, Sawyer has a cylindrical air-filtration unit, seen here in the background, which sucks in airborne dust 360°. When using the nearby sanding table, he attaches a cloth with magnets around the far side of the cylinder, focusing the air intake toward the sander.



Second bench. Sawyer uses his “dirty bench” for the often greasy and gritty work of everyday household repairs and projects.



Skinny bins. Open-sided bins, roughly made with reclaimed construction lumber and affixed to the bump boards, provide storage space for cutoffs.

A few technical details

Bump boards

Concrete block is a poor wall material for a shop. In addition to being a difficult surface to fasten to, it is unforgiving in collisions with wood. To make it a shop-friendly working surface, horizontal 2x8 boards furred out $\frac{3}{4}$ in. were secured to the block wall. This creates a convenient fastening surface and cushions accidental encounters between workpieces and the concrete block.

Dust collection

As a space-saving alternative to the typical vertically oriented cyclone cone, I chose the Harvey Industries Gyro Air G-700. The advantages for me were clear: Its horizontal orientation permits a working counter to be installed above it. It is quieter than the typical cyclone, and its dust-collection specs are superior. The ducting is 4-in. Triplewall HDPE drainpipe with PVC fittings. Finally, it is inexpensive and easy to work with.

Air filtration

Effective dust collection is not sufficient for keeping the shop air free of dangerous dust particles. Air filtration picks up where the DC leaves off. I use a cylindrical filter, 12 in. dia. by 34 in. tall, paired with an 800-cfm inline fan. The fan pulls air up through the

BUMP BOARDS



Bumpers, nailers, hangers. The concrete-block walls are lined with 2x8 bump boards. They soften the impact when a workpiece hits the wall and provide a convenient nailing or screwing surface. The upper board's top edge is beveled, making it a French cleat for hanging jigs.



The corner table. When he needs an extra work surface, Sawyer slides a sheet of plywood between the bump boards at an inside corner and secures it with pairs of opposing wedges.

filter and exhausts clean air to the space. Compared to a typical box-fan air scrubber, this system provides a much greater filter surface area, higher air volume, lower noise, less frequent cleaning, and more effective air scrubbing.

Aging treatment

New wood needs help before it can be a convincing material in an “old fishing shack.” I used two solutions to achieve an aged look, each one a home-mixed concoction that darkens wood by reacting chemically with the tannin. Solution #1 is a marinade of steel wool pads and supermarket white vinegar. Solution #2 is ferrous sulfate heptahydrate (FSH) dissolved in water. Now mainly used as a plant fertilizer, in older times FSH was sometimes sipped at bedtime to aid digestion.

Both solutions are applied by rag, brush, or roller. If more darkening is desired, then tannin can be added by first painting the wood with brewed black tea. (For full-bodied tones and tasty shades, I prefer Red Rose.) I treated all the exposed wood and the concrete-block foundation wall. The mixtures are ridiculously cheap, they can be applied by unsupervised teenagers, and they are more or less safe to drink straight from the application bucket. □

Charley Sawyer's shop is on Nantucket in Massachusetts.

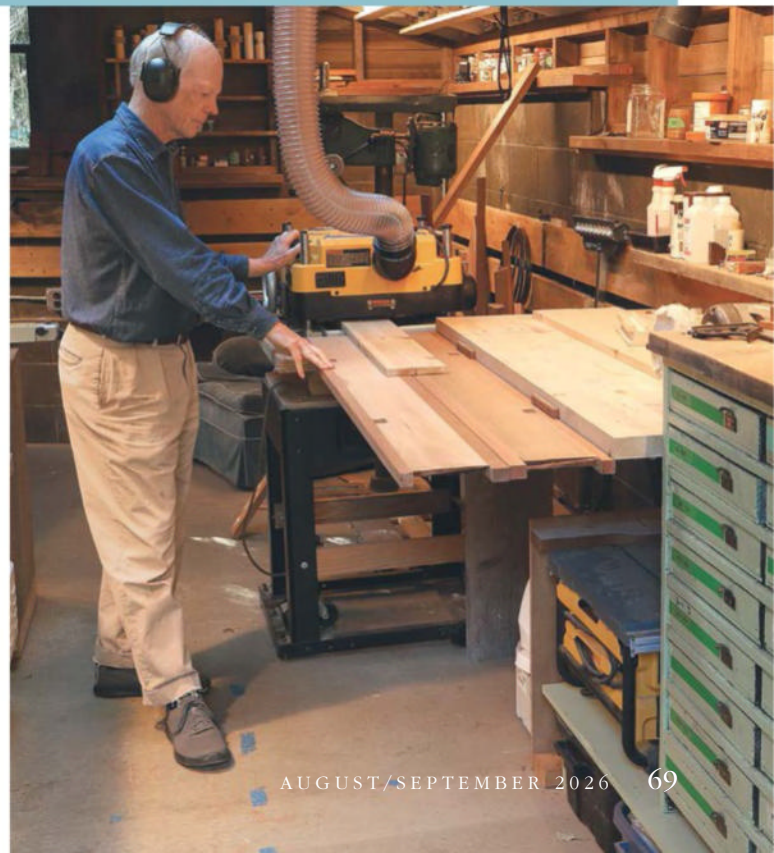


Evocative efficiency. Sawyer designed his shop to be reminiscent of old buildings shaped by the work done inside them. Slats nailed casually to the underside of rafters provide storage for hardware and supplies.

SPECIAL STORAGE



Stowaway outfeed. As an outfeed surface for his planer, Sawyer made a pair of boards that nest together when stored under the worktable (above) and lie side by side when in use (right), supported by lopers that slide out from beneath the table.



gallery

Inspiration for our readers, from our readers

TODD BRADLEE

Bishop, Calif.

This is Todd's most recent counter-height stool. The seat is a three-piece bent lamination that provides aesthetically pleasing curves and a comfortable seat without the need for upholstery.

CHERRY AND MAPLE, 15D X 17W X 25H

Photo: Benjamin Ditto



BRIAN CONDRAN

Martinez, Calif.

This cabinet is the Best of Show winner from the 2025 San Diego Woodworkers Association Design in Wood show. Brian's client had lost both her husband (an amateur woodworker) and her brother (an artist) and wanted a piece that would remind her of them and give her a sense of peace.

CURLY CHESTNUT, CURLY PECAN, PADAUK, EBONY, CAROB, CEDAR, AND BOCOTE, 16D X 20W X 34H

Photo: Andy Patterson



IAN GAUDETTE

Greenville, S.C.

Ian designed this piece after being inspired by hall tables from Tim Rousseau ("Float the Top," FWW #229) and Mike Pekovich ("Floating-Top Table," FWW #263). The octagonal legs are tapered and steam-bent. The curved stretchers are bent laminations. Additional strips of wood join with the curved stretchers to create a ripple effect while also serving as a shelf.

WHITE OAK, 16D X 46W X 34H

NOLAN WELLS

Providence, R.I.

Nolan was interested in trying out a material other than wood for the panels of sliding cabinet doors, but he didn't want the transparency of glass. In the end, he wrapped the door rails with Danish cord. The result was a nearly opaque wrap that largely conceals the interior of the cabinet.

EBONIZED ASH, 19½D X 61W X 21½H



ZANE EDGE

Johns Creek, Ga.

Zane designed and built this timepiece in honor of his uncle, a woodworker and clockmaker. Showcasing a weight-driven Hermle triple-chime movement, the clock took over 750 hours to complete. As Zane explains, "I have a very relaxed working pace on discretionary projects."

QUARTERSAWN SAPELE AND POMELLE, 15D X 17W X 82H



ED NEU

Buffalo, Minn.

Wanting to make a demilune table after watching a demonstration by Owain Harris, Ed settled on this half-demilune configuration. The four finely turned tapered legs are accented with a hand-carved, neoclassical detail just below the table apron.

WALNUT, 18D X 18W X 25H

Photo: Ramon Ramirez

RONALD WARNER

Canton, Ohio

When his daughter saw a completely marble kitchen table with a conical, tapered base, she asked Ronald to replicate it for her out of wood. The base consists of 40 staves, and the top is 1½ in. thick, with an underbevel around the perimeter to aesthetically lighten it.

RED OAK, 47⅝ DIA. X 30¾H



DANIEL SCHLATTER, TIM McCARTY, AND JASON McCARTY

Warsaw, Ind.

Designed and prototyped by Daniel and built by Tim and Jason, this piece has reduced the form of the dresser to its functional minimum—no case, just drawers. They pivot fully open on an internal center steel spine. Each pair of drawers is crafted from a single board, with the grain wrapping around the piece.

MAPLE AND WALNUT, 18D X 36W X 52H

Photo: Kelly Morrow



LILY TILTON

Columbia, N.C.

Lily was inspired by the silhouettes of Victorian chaise lounges and fainting couches. At the time, she had only a little experience with steam-bending but wanted to lean into the technique. She did that in a big way, steam-bending and clamping pieces that were 8 ft. long and 2 in. square. She achieved the ebonized finish with Mohawk Dye, Old Masters Gel Stain, and General Finishes Arm-R-Seal.

ASH, 64D X 11W X 24H



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Elliptical layout for a coopered lampshade

BY SETH ROLLAND

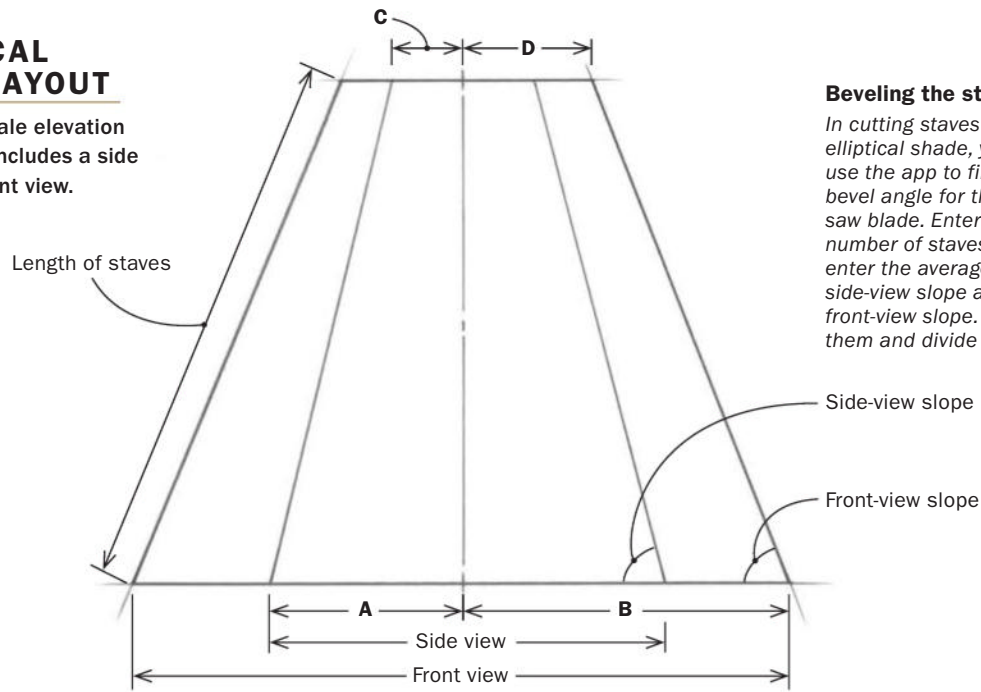


Most of the steps for making an elliptical coopered lampshade are similar to those for making a cone-shaped one (see “Creating Coopered Lampshades,” pp. 56–63). The big difference is in the layout.

In a cone-shaped shade, all the staves are the same width, and the bevel angles between them are also all the same. To

ELLIPTICAL SHADE LAYOUT

Make a full-scale elevation drawing that includes a side view and a front view.

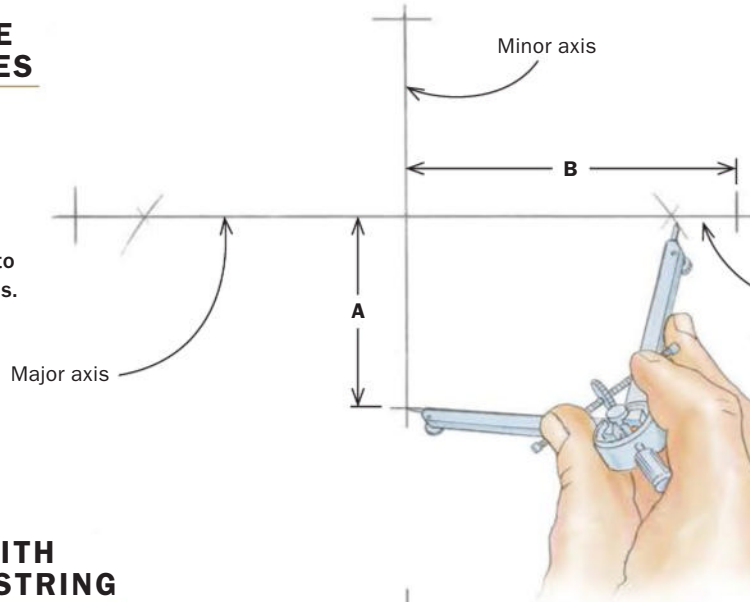


Beveling the staves

In cutting staves for an elliptical shade, you can use the app to find the bevel angle for the table-saw blade. Enter the number of staves. Then enter the average of the side-view slope and the front-view slope. (Just add them and divide by two.)

LAY OUT THE ELLIPSE AXES

Draw intersecting centerlines. Then transfer distance **A** to lay out the large ellipse's minor axis. Transfer distance **B** to lay out the major axis.



Set a compass to the radius of the major axis (length **B**), place its point at the end of the minor axis, and strike an arc across each end of the major axis.

DRAW THE ELLIPSES WITH NAILS AND STRING

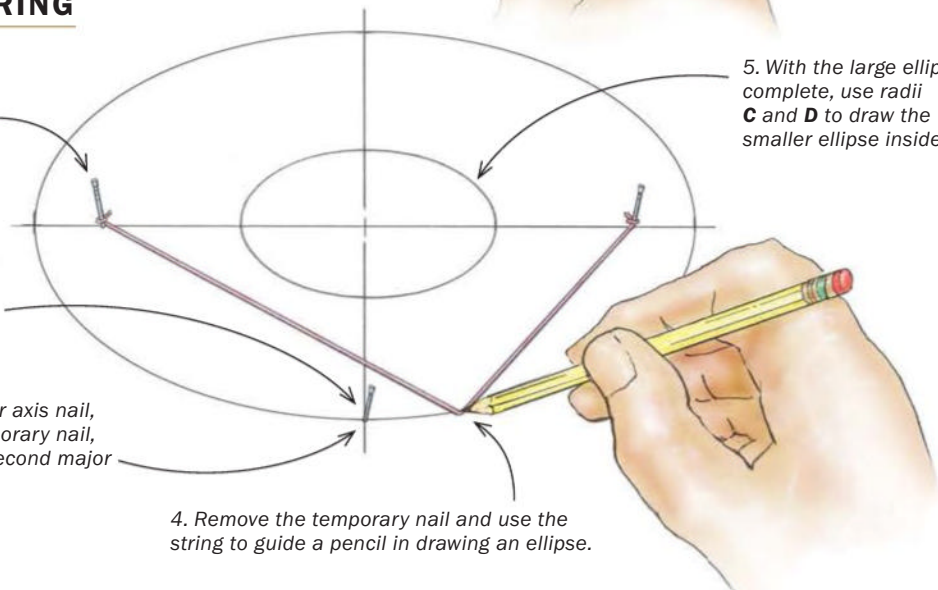
1. Place nails where the two new arcs cross the major axis.

2. Place temporary nail here.

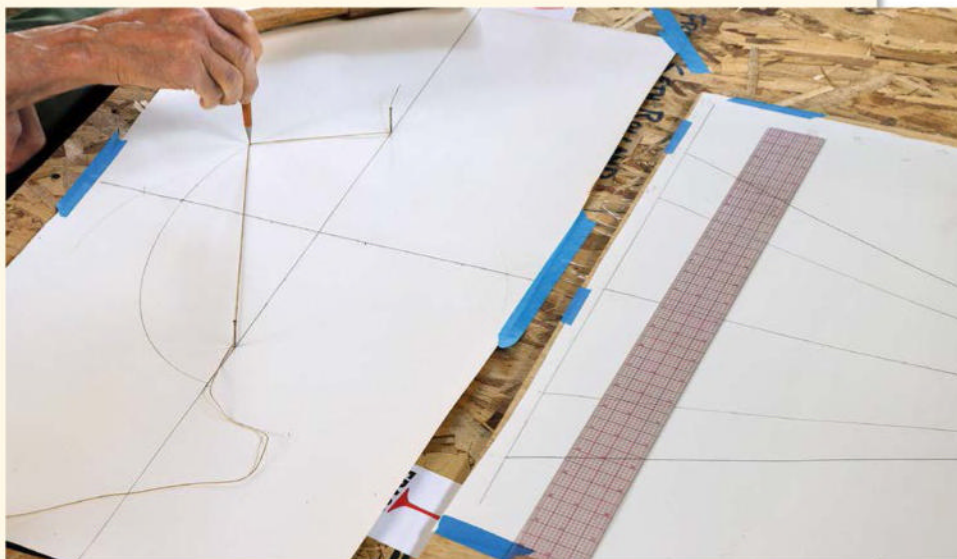
3. Tie a string to one major axis nail, stretch it around the temporary nail, and tie it off tight to the second major axis nail.

4. Remove the temporary nail and use the string to guide a pencil in drawing an ellipse.

5. With the large ellipse complete, use radii **C** and **D** to draw the smaller ellipse inside.



Drawing ellipses



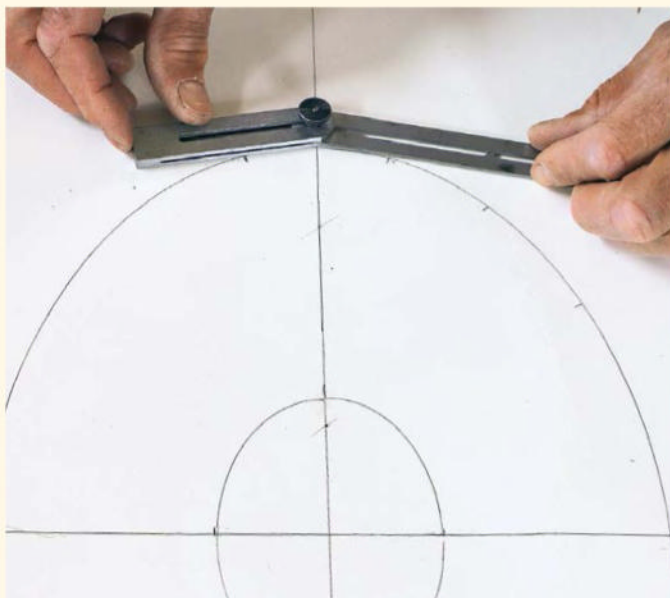
Nailing the ellipses. Two nails and a length of string guide the pencil as you draw the lamp's elliptical top and bottom openings. The author's elevation drawing (on the right in this photo), with front and side views of the shade drawn full scale, provides the radii needed to draw the ellipses.

create an elliptical shade, you can either graduate the widths of the staves or adjust their bevel angles. I've tried both options and find it simpler to alter the stave widths, keeping bevel angles constant.

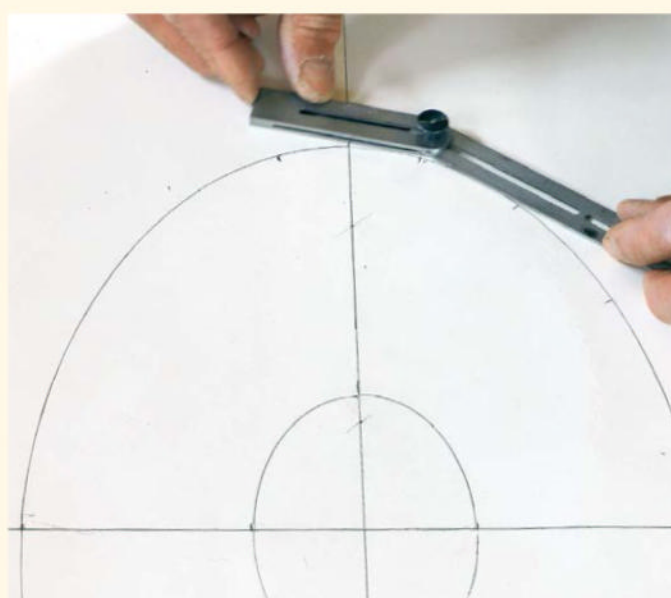
To begin the layout, make a full-size elevation drawing of your shade, as you did with the conical shade. On this one, show both the wider front view of the shade and the narrower side view. You'll transfer information from the elevation drawing to lay out the elliptical openings at the top and bottom of the shade.

Draw the two ellipses using the string method, following the steps in the drawings on p. 75. Then divide one of the quadrants of the large ellipse into segments, one for each stave. I made this shade with 16 staves, so each quadrant has four staves. The quadrants are identical, so the shade is made with four sets of these four different staves.

Segmentation



Step 1. Use a bevel gauge to divide one quadrant into four segments. To find the gauge angle, divide 360° by the number of staves you'll use. Here, with 16 staves, it is 22.5° . Lay the gauge on the drawing with its vertex where the major axis crosses the ellipse and with its two legs meeting the ellipse at points equidistant from the major axis.

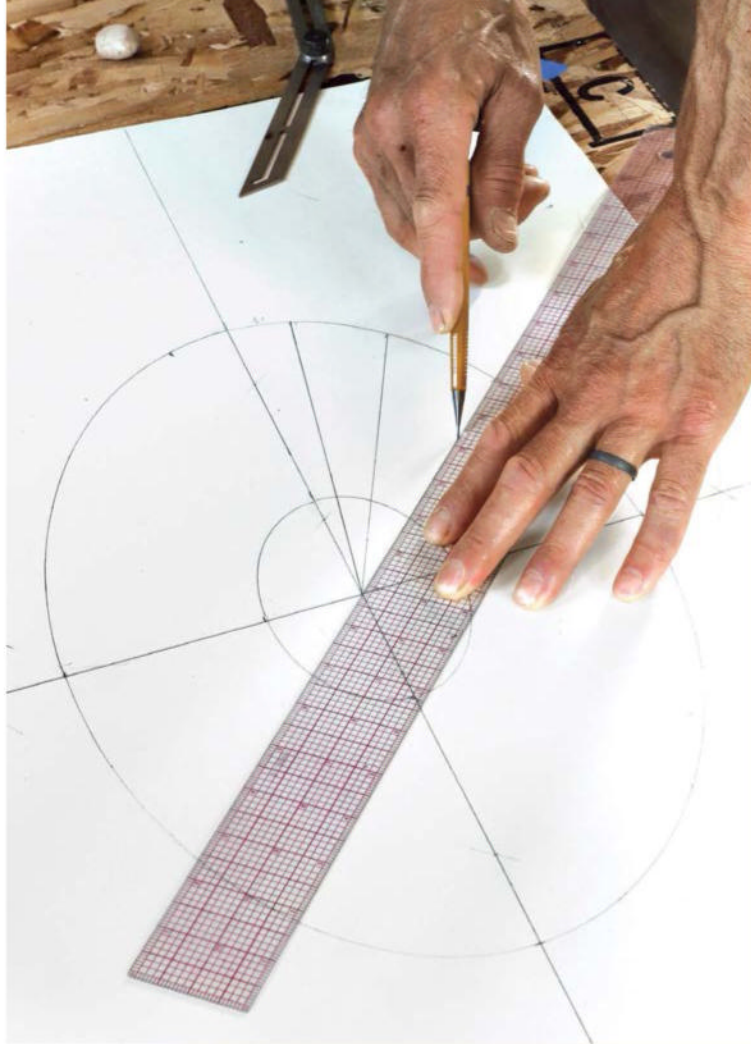


Step 2. Having marked one of the points where the leg of the gauge crosses the ellipse, move the vertex of the gauge to that mark. Place one leg where the ellipse crosses the major axis, and make a mark where the other leg contacts the ellipse. Be as accurate as possible, and repeat the process if it doesn't come out exactly right in step 3.

Use a bevel gauge to lay out the segments. Divide 360° by the number of staves (for 16 staves, the resulting angle is 22.5°), and set a bevel gauge to that angle. Use the gauge to determine the length of the segments in one quadrant, as shown in the photos below. Then draw radius lines from the centerpoint of the two ellipses out through the segment marks. These lines represent the joints between the staves. Finally, measure the distance between the radii at the inner ellipse and the outer one to find the widths of the four staves in each quadrant.

Find the bevel angle for the table-saw blade using the app at ferobevel3.netlify.app, entering slope and number of staves. This time, though, you'll need to average the slopes of the shade's front view and side view.

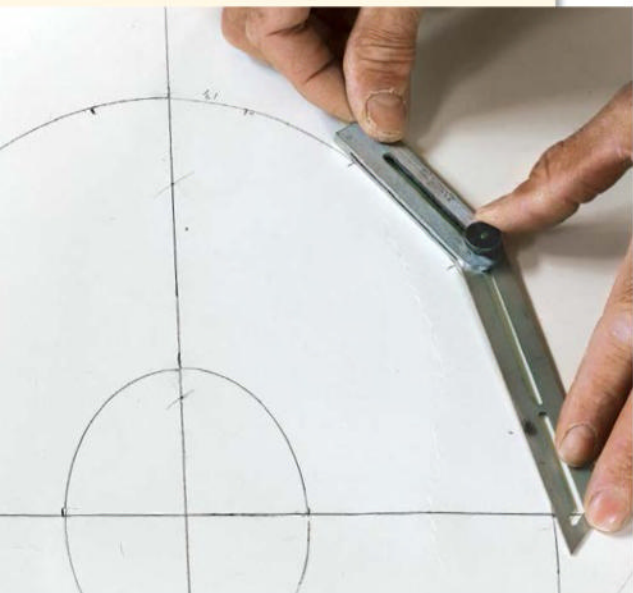
Seth Rolland works wood in Port Townsend, Wash.



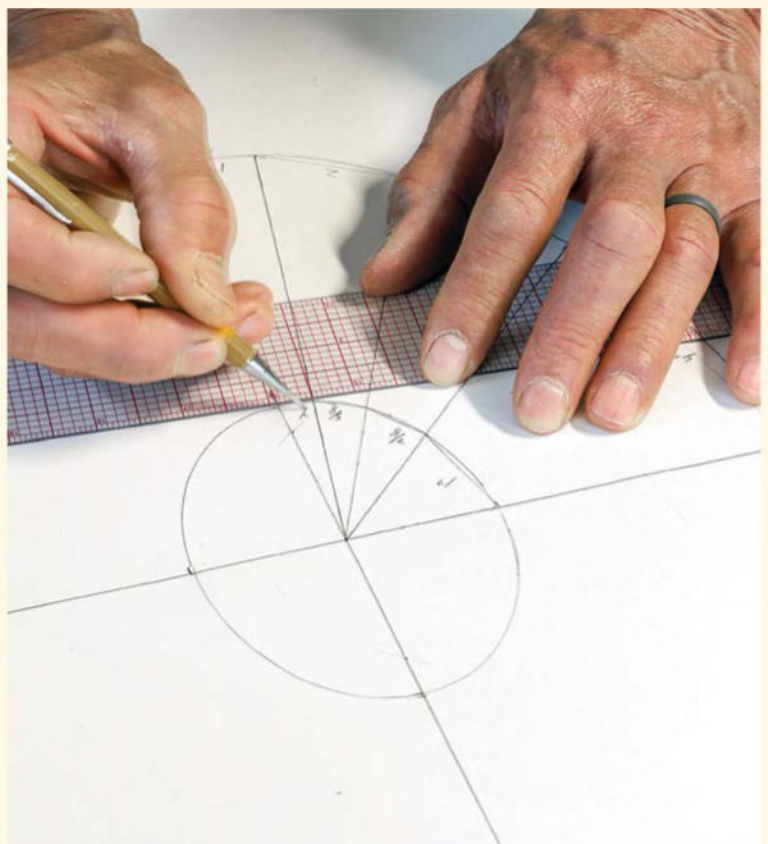
Staves

Radiating staves. Draw radius lines from the intersection of the axes to the segment marks on the outer ellipse.

Measure the spans. To find the widths of the staves, measure the distance between the radii at the inner ellipse and the outer one. These measurements together with the length of the side lines in your elevation drawing give you the dimensions of your staves. You'll need four staves in each of these four sizes to complete the shade.



Step 3. Move the gauge once again to find the third segment mark, and then move the vertex to the third mark to verify that the legs are aligned on the second mark and the minor axis, as in the photo.



Finishing walnut

A GUIDE TO SPOT STAINING
AND TOPCOATING

BY ROB HARE



I rarely stain the furniture I create, generally preferring to let the natural color of the wood develop over time. However, recently I was making a large headboard using bookmatched planks of highly figured claro walnut (see “Free-Form Coopering,” *FWW* #321). The two planks were center matched and had a beautiful canoe-shaped area of sapwood in the middle, which I hoped to feature in the finished piece.

As the headboard came together, it became clear that there were two problems. First, the sapwood was too far off center and would be a distraction. Second, as I set up the bed and mocked up a structure representing the height of the mattress, I realized the sapwood wouldn’t be seen behind the pillows. So after all my efforts I was going to have an off-center, odd shape that would be partially hidden. What to do?

I reached into the wealth of knowledge imparted by my good friend Tom Hunt, a professional finisher for 30 years who taught me and many others his finishing secrets and approaches to sealing wood. (Sadly, he died of pancreatic cancer in 2018.)

The solution, carefully matched spot stain, would significantly diminish my problems—with the bonus of emphasizing the tiger figure barely visible in the unstained sapwood.

I’m happy with the result. The color is better than I had hoped it would be, and the curly figure is emphasized. In addition, the off-center location of the sapwood no longer catches your eye. A couple attributes of the wood helped. Part of the beauty of claro walnut is the variation in its color and the strength of its grain patterns. In this case the color variation helped by deemphasizing the need for an exact color match, and the figure in the wood strengthened the connection of the stained area to the surrounding heartwood.

Color matching

The first hurdle was to test my collection of stains on similarly grained wood left over from the construction process. So I dug out scraps that had both sapwood and heartwood. From my

A sampling of finishes

collection of stains I selected all that seemed possible. After thoroughly stirring them and labeling each test area, I lightly applied them to sapwood that was adjacent to heartwood. Applying the various stains directly from the can lets me get an idea of whether I should dilute the stains and what the names mean visually. For example, what does “Special Dark Walnut” actually look like? Special to whom? Dark as opposed to almost black?

Before testing the stains, though, I applied a coat of clear varnish to the heartwood areas. That let me see the color I was trying to approximate as I applied the wet stain. *Approximate* is the right word. An exact match is impossible with the many shades of natural wood, so I aim for a close match. One of the beauties of stain is that you can build up multiple coats as long as a sealer (varnish, lacquer, shellac, etc.) isn't applied between coats. Dark Walnut was too black/gray; Special Walnut was better but still too flat. On the other hand, Mahogany was warmer (more red). I mixed equal parts Special Walnut and Mahogany and tried again. I lucked out! Sometimes I have to make many samples to get what I'm looking for. The top finish will bring more light into the stained areas, so going a little dark with the stain won't hurt.

Applying the stain

Now it was time to apply my Special Claro Walnut Sapwood stain. Although there can be a great temptation to carefully



Color matching requires patience and experimentation. Hare says, “Speaking from personal experience, testing stains on finished work is a disaster waiting to happen. I make a point of saving my scraps to test.”

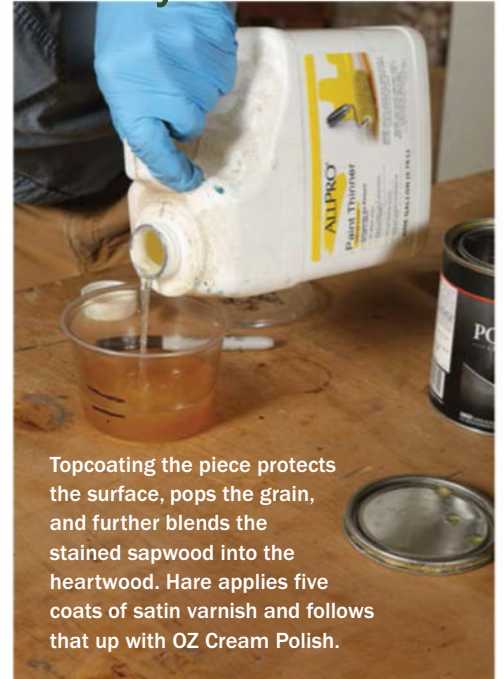


Experimenting with color. When trying to color match, seal the wood color you're trying to mimic so you can see the color with finish on it. Then be prepared to test a lot of stains with various colors and ratios. In the end, Hare settled on an equal mix of Minwax's Mahogany and Special Walnut.



Freehand application. Working on a vertical surface means there could be drips, so press blue tape underneath the section you're staining to prevent dripping onto spots you don't want stained. But don't use tape to mask off the area you're staining. The hard line created by taping off and painting to the tape will look unnatural and call attention to itself. Instead, paint the stain on with a small, soft-bristle brush. Once it's dry, rub the stain out with a tack cloth.

Clearly finished



Topcoating the piece protects the surface, pops the grain, and further blends the stained sapwood into the heartwood. Hare applies five coats of satin varnish and follows that up with OZ Cream Polish.

First four coats. Thin the first coat of varnish by 40% with paint thinner so it seeps deep into the grain. Apply it with a natural-bristle brush. The subsequent three coats get thinned less and less: 30%, 15%, 10%.



mask around an area that's being stained, this is generally a mistake. Wood is a natural material, and straight lines like those that tape will produce rarely exist in nature, so I painted on the stain with a small ½-in. watercolor brush. I wasn't striving to achieve a perfect matching edge, and if I had needed to I could have gone back and applied a bit more stain. In case some of the stain spread onto the heartwood or onto an area that was already good, I kept some paint thinner and a rag nearby. Wiping thoroughly with a heavily soaked cloth will lift out extra stain.



Between coats. After each coat except the final one, sand lightly, vacuum, and wipe the surface down with a tack cloth. With each coat use a finer grit of paper, working from 150 through 220.



Clear coat

Having experimented with the stains and sealed the heartwood, I had a reasonable idea of how the entire piece would look when I applied the final finish. All the surface preparation was done before staining, so there was no need to sand the stained areas. Although stain penetrates the wood, sanding will change its density and thereby its color. It was important not to use thinner to clean the wood at this point. Even if the stain were very dry, it could have been dissolved, thereby changing the final color.

My preferred finish is satin varnish. It is not quick to apply but is very forgiving. I learned that some of the new thinners do not work with some varnishes when I tried to clean my favorite brush and the thinner would not dissolve the varnish.

I expected to apply five coats of finish. My objective was to show and feel the grain while still providing a strong protective finish. I was not looking for wood shown behind a glossy thick finish. Regardless of the claims, all finishes will show wear over time, and thick finishes are harder to remove.

After applying each coat except the last, I lightly sanded and vacuumed the piece thoroughly and went over everything with a tack rag. For the first coat, I thinned the varnish a minimum of 40% with paint thinner to allow the finish to penetrate the wood deeply and build up real protection. After the finish was completely dry, I sanded lightly with 150-grit paper and followed with a second coat of 30% thinned varnish. I sanded lightly again, this time with 180-grit paper, and I thinned the third coat of varnish just 15%. Before applying the fourth coat, thinned 10%, I sanded lightly with 220-grit paper.

As I applied the fourth coat, I checked it carefully. Had it been any thicker, I would have thinned the fifth coat 10% as well.

The magic of OZ

A few days after applying the final coat, I rubbed it out with 0000 steel wool and Mohawk's OZ Wood Polish. OZ is sprayed on as both a lubricant and a sealer, then rubbed only enough to remove dust caught in the finish. I use OZ because it contains

no silicone. Silicone may look good for a while, but it soaks into the finish and the wood. In the future if you refinish, silicone will cause fisheyes that no amount of rubbing or even belt sanding will stop. The only hope then is to flood the surface with denatured alcohol and light it. The fumes burn, not the wood.

Rob Hare is a maker of things in Esopus, N.Y.



The final coat. The last coat of varnish should go on full strength, but it can also be thinned by 10% again if you feel it's too thick.



OZ isn't just a fairy tale. After letting the finish sit for a few days, spray on OZ Cream Polish and rub it out with 0000 steel wool. The silicone-free polish adds protection and raises the sheen. To refresh the finish, you can repeat this step, as needed, for the life of the furniture.



Scraps for a cause

BY JOHN ROCCANOVA

There's no avoiding it. Woodworking generates a lot of scrap. Here's an example: When I turn bowls and platters, which I often do, I cut square pieces of solid or laminated wood into round turning blanks. Cutting a 12-in. circle from a 12-in. square produces about 31 sq. in. of scrap—over 20% of the square! Several years ago, as my pile of scraps was outgrowing my small shop, I was using scraps as kindling in the woodstove. It made me feel guilty each time I burned a beautiful piece of wood. Why didn't I use my scraps? The problem seemed to be that most scraps were odd shapes and sizes and often were stored in cardboard boxes or on out-of-reach shelves. When I needed an extra piece for a project, it was nearly impossible to find something suitable. I finally realized that I needed a different perspective. Instead of looking at the scraps as auxiliary pieces, I should design projects using them in the main role.

My woodworking experience began in the 1960s when I was in high school and worked summers at a factory where my father was foreman. It was a production shop, so I often had to drill, cut, or sand hundreds of pieces. I learned machine use and how jigs and fixtures were important for accuracy, efficiency, and safety. After graduating college, I spent my career teaching woodworking. Now retired, I spend as much time as possible in my home shop.

In recent years most of my woodworking has been focused on raising money for education programs in Kenya. That's because in 2004 my wife, Jean, and I read about how schools were becoming free in many African countries but were overcrowded, often with 100 students in a class. In response, we started a nonprofit, Grow Against Poverty, partnering with a similar one in Kenya, to support school programs.

Some of the programs we help fund are Pedal Power for Kenyan Education, which provides bicycles for students who live five or more miles from school; Prevent Period Poverty, which supports girls who miss school when they have their periods by building bathrooms, distributing menstrual products, and adding health-education classes to the curriculum; and Green Fields, under which organic gardens tended by students produce vegetables for school lunches.

I began using my woodworking skills to raise money for the effort, making small items in batches and selling them in stores and in a holiday sale. Once I started thinking of projects I could make from scrap, they began to fill my sketchbook. My cutoff corner scraps—triangular pieces with a concave curved side—reminded me of sails, and as I was making toys for a holiday sale, I decided to produce sailboats. As it turned out, most were purchased not as toys but as display pieces for people who love to sail. Heart-shaped candleholders are another project I make out of corner castoffs. They sell so well that sometimes I run out of corners and have to glue up strips of scrap to make my usual run of 50 hearts. I also use corner scraps to make mini cars. My newest "corner project" is cell phone holders.

When I have leftover hardwood strips, I do what I often had my junior and senior high school students do: make cutting boards. Other strips I use to make spatulas, salad servers, chopsticks, hair sticks, gua sha massage tools, and jewelry.

These days, it's easy to answer when someone asks, "What are you making in your shop?" There are many projects to describe, and fewer scraps in the woodstove.

John Roccanova works wood in Ancramdale, N.Y. You can see more of his work on Instagram @woodcrafts4acause.



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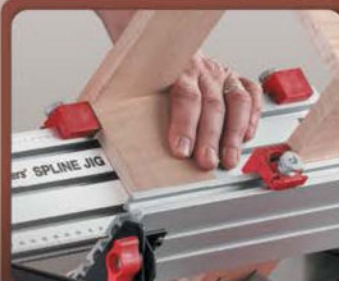
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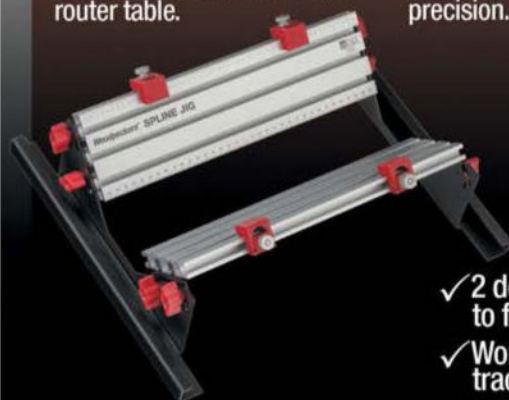
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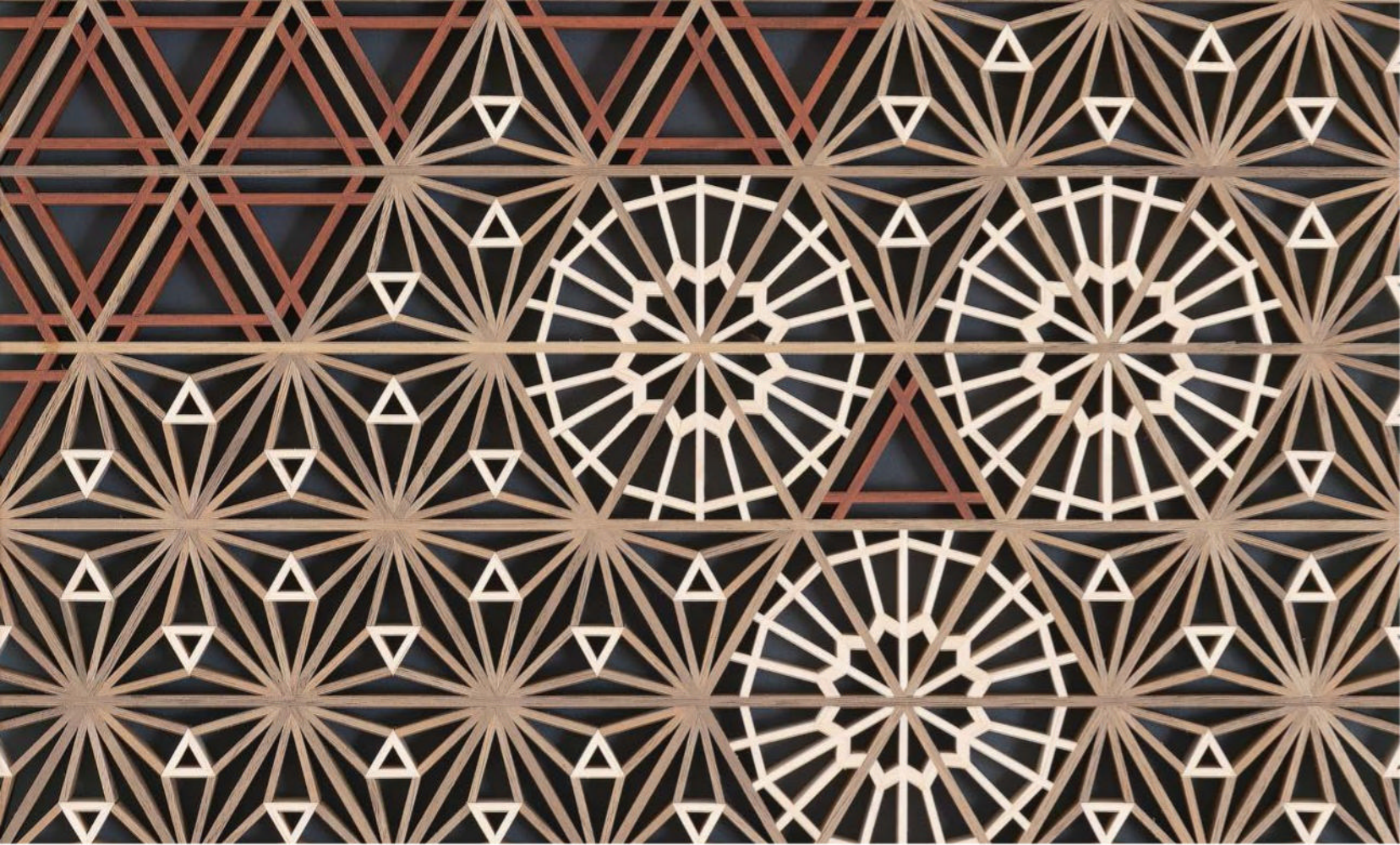
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Kumiko Landscape

When David Luckensmeyer's parents chose to leave California for Australia in 1985 to become cotton farmers, he found himself, at age 11, well out in the bush in Wee Waa, New South Wales, where the soil was astonishingly fertile and his classmates, he says, "were colorful—the police were at the school on a regular basis." For a newcomer with an unusual accent and a bookish bent, Luckensmeyer found that "the outback upbringing was brutal." But he found refuge in woodshop from bullying on the schoolyard and "fell absolutely in love with woodworking." Forty years later he lives in Brisbane far from the cotton fields, and woodworking remains a central passion. A lover of machines as well as hand tools, he cut all 3,705 pieces for these kumiko front-door panels on his table saw. Composing with a range of traditional Japanese patterns, he assembled an abstract landscape with earth below, vegetation between, and starry sky above. The five dahlias in the top frames represent him, his wife Melissa, and their three daughters.

—Jonathan Binzen

