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Shaker berry box
makes a great gift, p. 50



Quick recipe for an aged finish

Big curves and
little curves:
How to bend
wood to your will

The secrets to
the Japanese
scarf joint

Octagonal table
with graceful
curves

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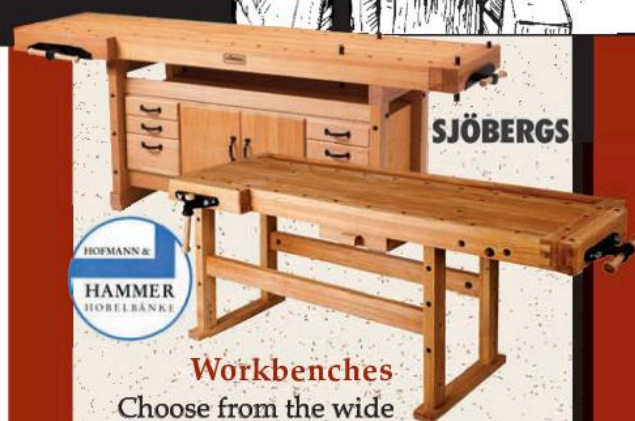


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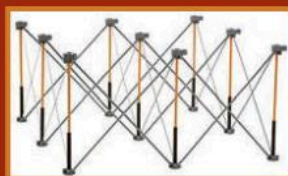
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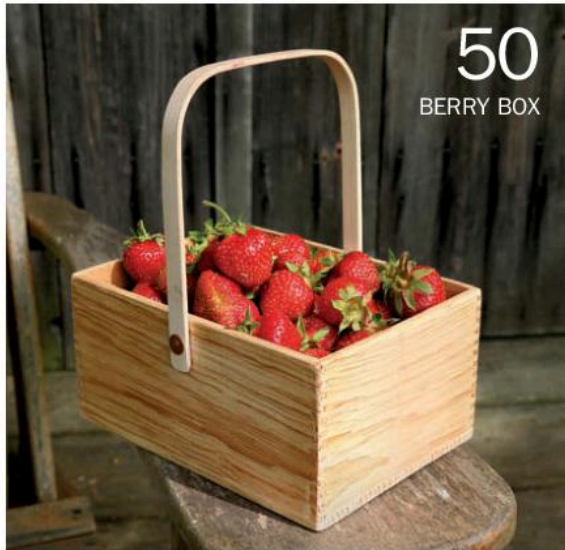
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Inspiration for hands-on living®

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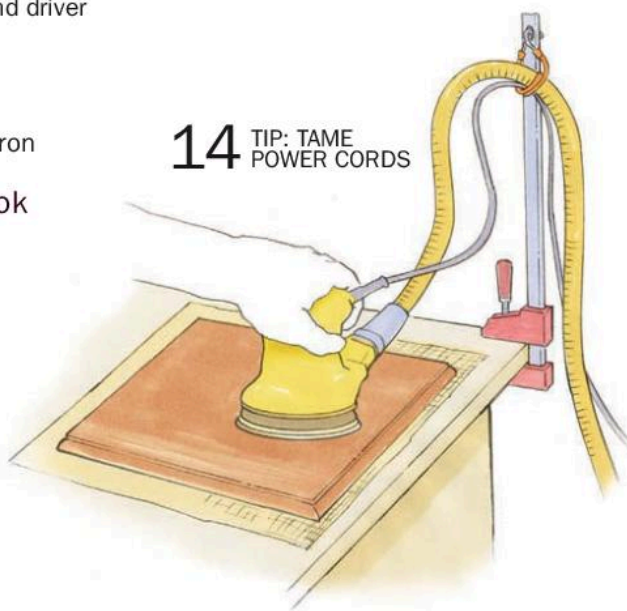
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VIDEO

Michael Fortune's design process

Contributing editor Michael Fortune demonstrates his design process step by step, sharing his tips for brainstorming and drawing furniture along the way.



VIDEO

Andrew Hunter on Japanese planes

There is more to know about Japanese planes than the fact that you pull them. Andrew Hunter, a perpetual student of Japanese tools and techniques (p. 56), discusses many of the subtleties that are often overlooked.

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VIDEO WORKSHOP

Danish Modern desk

Tim Rousseau's modern desk might look simple, but a lot goes into making such an elegant piece. While Tim tackles this project with a pro's perspective using tools found in professional shops, he also draws parallels to tools found in most hobbyist woodshops. You'll learn Tim's techniques for:

- Creating accurate templates for pattern routing
- Working with curved parts
- Cutting accurate angled mortise-and-tenon joinery



Online extras

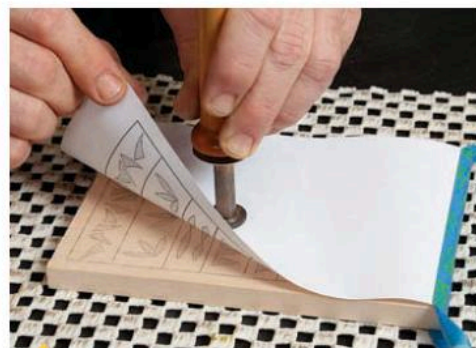
Free content at finewoodworking.com/278



VIDEO

Octagon ... two ways!

At first, laying out an octagon (p. 34) might seem like a no-brainer. It isn't. We demonstrate two methods that will make the process a lot easier.



DOWNLOAD

Daniel Clay's chip-carving pattern

Building chip-carving skills is about repetition. This free pattern, which Daniel Clay uses in *Handwork* (p. 70), provides an excellent foundation, taking you from basic cuts to more advanced ones.

VIDEO

Picking berries with Becksvoort

Associate editor Anissa Kapsales goes berry picking with Christian Becksvoort (p. 50) while they discuss Chris's early days, his new tattoos, his friendship with Nick Offerman, and what the future has in store for the Becksvoorts.

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contributors

Yuri Kobayashi (Designer's Notebook: "3-D drawing") is a New England-based sculptor and furniture maker. Born and raised in Japan, she says the essence of Japanese ethics, aesthetics, and culture was instilled in her without her noticing. Today, she strives to reflect those values in her work. Kobayashi earned a bachelor of arts degree in architecture at Musashino Art University in Tokyo and trained under Master Osamu Shoji in Japanese traditional woodworking and furniture making at Shinrin Takumi Juku in Takayama City, Japan. She also holds an MFA in furniture design from San Diego State University and has served as a part-time faculty member in the department of furniture design at Rhode Island School of Design since 2006.



Daniel Clay (Handwork: "Start chip carving") did his first chip carving while living in Maine as a way to pass the long winter days indoors. He's since incorporated the traditional technique into furniture and artwork and teaches it around the country. He's based in Knoxville, Tenn., where he shares a shop with other woodworkers and craftspeople.

Elia Bizzarri ("Eye-Catching Octagonal Table") uses the light-filled, freestanding shop he built in Hillsborough, N.C., for making chairs and tables and chairmaking tools, and for teaching chairmaking. But even when the tools are put away the space gets a regular workout: Every few months Bizzarri hosts dance parties in the shop (and spilling across the lawn) with live traditional music and regional delicacies. This January, Bizzarri will close the shop for a few days while he builds a writing arm chair on stage at Colonial Williamsburg's Woodworking in the 18th Century conference.



Andrew Hunter ("Open the Door to Japanese Joinery") is chin deep in renovating his 19th-century farmhouse, which he's as meticulous about as he is his furniture. Much of his home reflects his personal aesthetic rooted in Colonial American furniture, from the exposed white-oak beams and window sills to the hand-planed pine trim and floors. He's excited for it to be done—mainly because that means he can move into his permanent shop, which is currently his temporary home.



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From the Editor

Bill Duckworth, 1950–2019

In this issue's From the Bench column, Andy Engel writes a heartfelt tribute to his friend, Bill Duckworth, who passed away July 19, 2019. Bill was an editor at *Fine Woodworking* from 1995 to 2005.

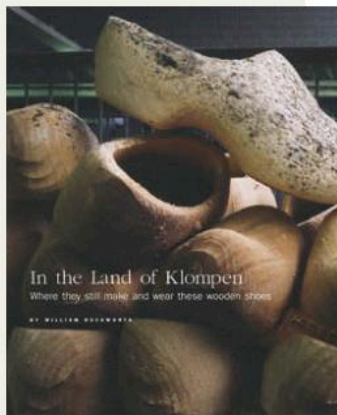
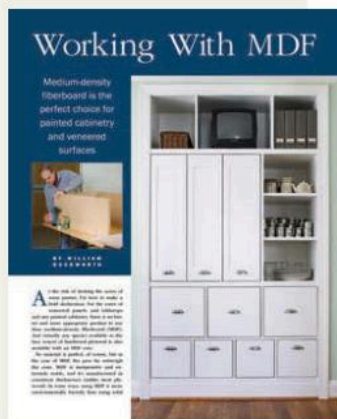
I met him in 1998 when I started at the magazine as the copy editor. He was very approachable when I had woodworking and machinery questions for him, some of which were embarrassingly inane. But he always made time to help, and he was the one who got me up to speed on the tools in the *Fine Woodworking* shop.

Bill wrote dozens of tool reviews for us, and edited the Tools & Materials, Methods of Work (now Workshop Tips), and Finish Line columns. He wrote a few articles that became legend, for different reasons. His 2004 article "Working With MDF" (*FWW* #170) created a dust storm of controversy, with subscribers telling us there was no place "in a real woodshop" for such a material. He penned an insider favorite, "In the Land of Klompen" (*FWW* #123), the last article we published on making wooden shoes. And he worked on some of our favorite articles on wood species with legendary writer Jon Arno.

As Andy says in his column (p. 86), Bill "brook'd no bull," and he approached the craft of woodworking with a practicality culled from years of being a pro. But that practicality never clouded his love of the craft, of finding unique takes on it and bringing those takes to our readers with care and clarity.

Godspeed, Bill. Rest in peace.

—Tom McKenna, editorial director



Better tools are worth the investment

I'm writing in response to a letter published in issue #275 (June 2019) in which the writer complained about a contributor reviewing an undeniably costly Blue Spruce coping saw.

I, for one, value well-made tools. I find sagacity in the advice "one generally gets what one pays for," so I've come to believe that high-end tools are always a worthwhile investment for me.

My perspective is that while a well-made tool can't compensate for a lack of skill, a poorly made one can most certainly undermine the best of skills. I won't waste money on cheap tools. This is precisely why I subscribe to *FWW* and buy better tools than I can afford—I have yet to regret either!

—DAMIEN KING, Hudson Valley, N.Y.

Improved magnetic saw vise

I tried Danny Julian's magnetic handsaw vise (*Workshop Tips*, p. 16, *FWW* #277) with pleasing results, but found that the vise works even better with one simple improvement. After a saw is attached to the tool-holder magnet, with the magnetic bar attached as close to the top edge of the MDF board as possible to minimize the distance below the teeth, apply a second magnetic bar to the exposed side of the sawblade. This provides rigid support to both sides of the blade and thus even more stability.

—QUENTIN WHEELER, Greenwich, N.J.

Corrections

Several dimensions in the illustration on pp. 34 and 35 of *FWW* #277 ("Strong, Stunning Sideboard") were wrong.

1. The door stile is 11½ in. long (including 1-in. tenons), not 9½ in. as printed.
2. The drawer back is 14⅞ in. long, not 12⅝ in. as printed.
3. The partition groove is inset ¾ in., not ⅝ in. as printed. The inset for the top, bottom, and sides is ⅝ in.

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Fine Woodworking is looking for personal stories about woodworking for our From the Bench column. We pay for what we publish. Send your story to bench@taunton.com.

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workshop tips

Best Tip



Jim Murtha started woodworking in 1982 as a way to acquire beautiful furniture he couldn't otherwise afford. Since then he has built a long list of traditional pieces—many pulled from the pages of *Fine Woodworking*—plus custom paddles for his other hobby, whitewater rafting. As this was written, he was finishing his second version of the bed that inspired this tip.

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 a Ryobi ONE+ Airstrike 23-ga. pin nailer.



Dedicated tenoning sled handles workpieces large and small

I made this jig to build Kevin Rodel's Arts and Crafts bed from *FWW* #260. To cut tenons on the rails, he used a dado set on his tablesaw and a sliding crosscut table, which I don't own.

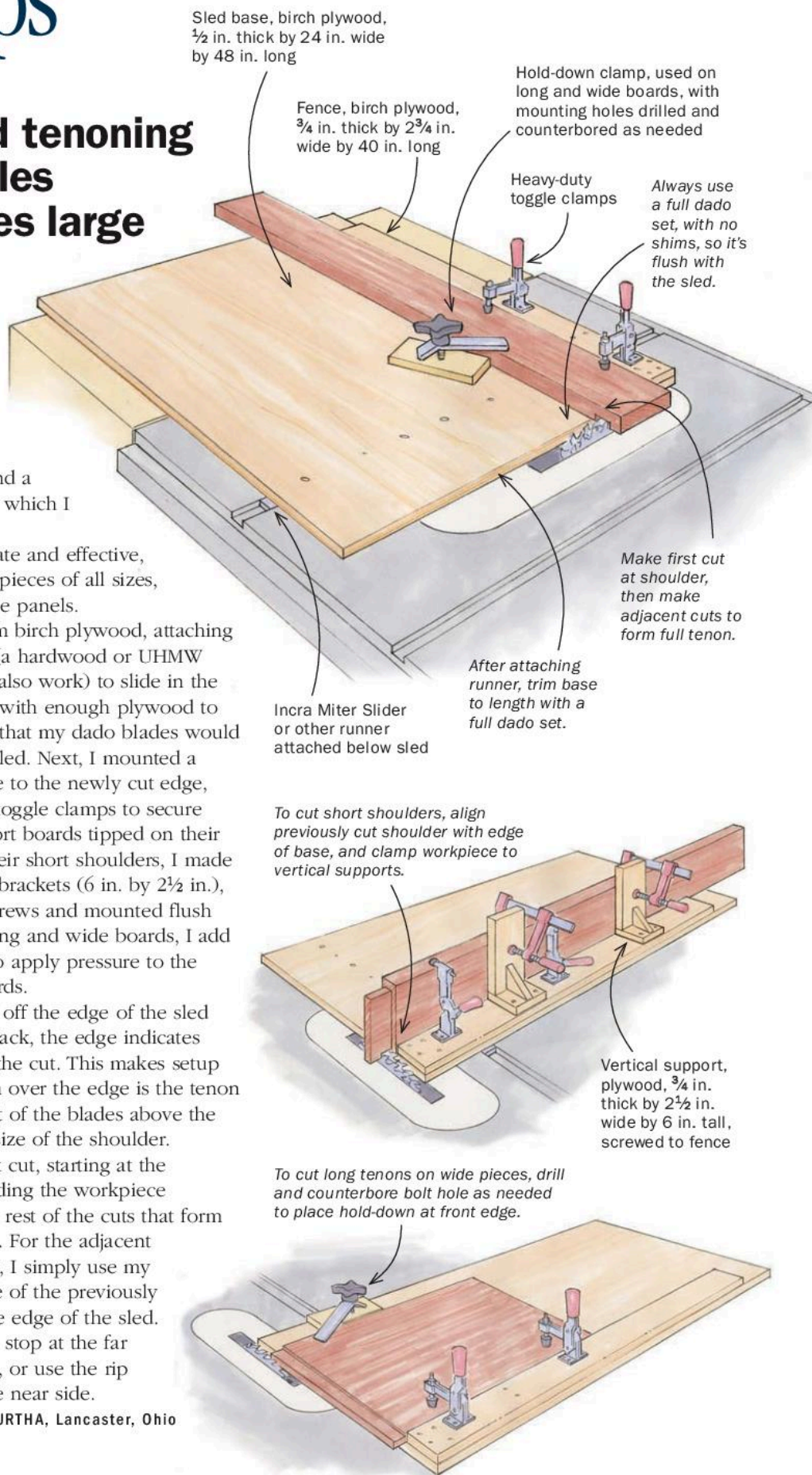
My new jig is accurate and effective, and it works on workpieces of all sizes, from long rails to wide panels.

I made the sled from birch plywood, attaching an Incra Miter Slider (a hardwood or UHMW plastic runner would also work) to slide in the right-hand miter slot, with enough plywood to the left of the runner that my dado blades would trim the edge of the sled. Next, I mounted a plywood fence square to the newly cut edge, and screwed on two toggle clamps to secure workpieces. To support boards tipped on their edge when cutting their short shoulders, I made two simple L-shaped brackets (6 in. by 2½ in.), joined with pocket screws and mounted flush with the fence. For long and wide boards, I add a hold-down clamp to apply pressure to the front edge of the boards.

Once you trim a bit off the edge of the sled with your full dado stack, the edge indicates the exact location of the cut. This makes setup simple. The extension over the edge is the tenon length, and the height of the blades above the plywood base is the size of the shoulder.

Make the first cheek cut, starting at the shoulder and then sliding the workpiece sideways to make the rest of the cuts that form that face of the tenon. For the adjacent shoulders and cheeks, I simply use my fingertips to align one of the previously cut shoulders with the edge of the sled. You can also set up a stop at the far end of the workpiece, or use the rip fence as a stop on the near side.

—JIM MURTHA, Lancaster, Ohio



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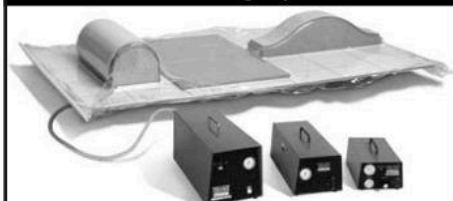
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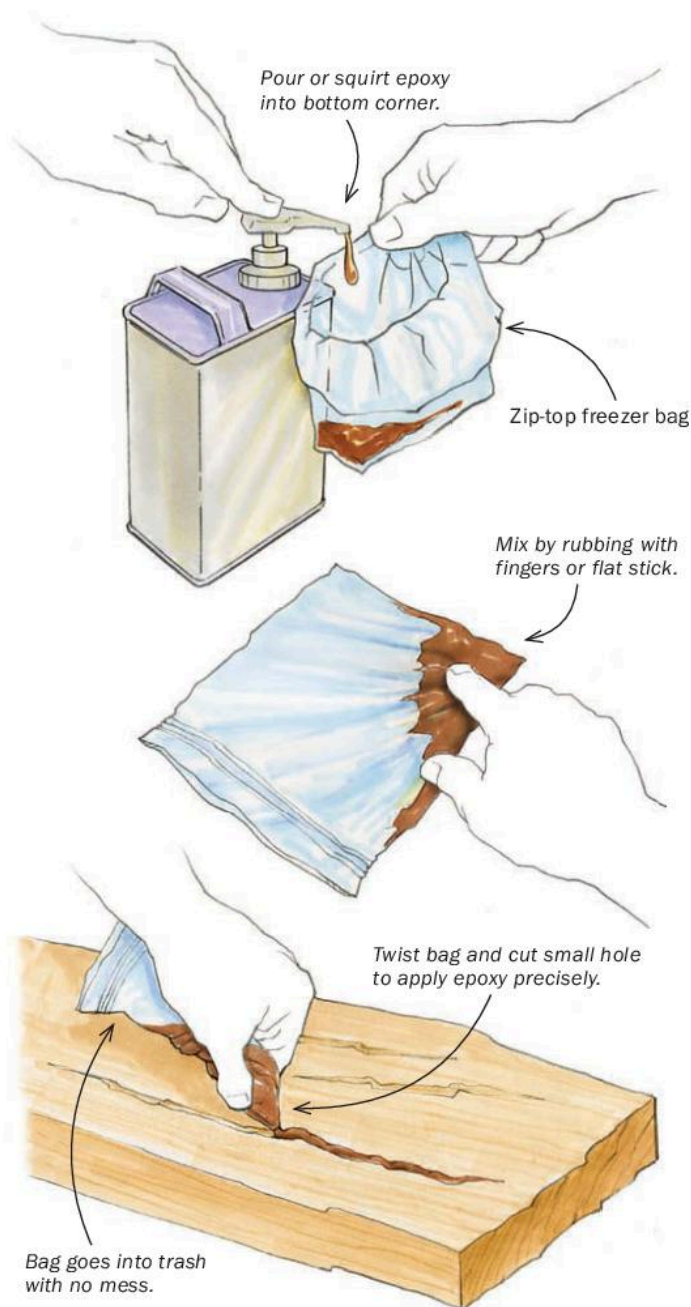
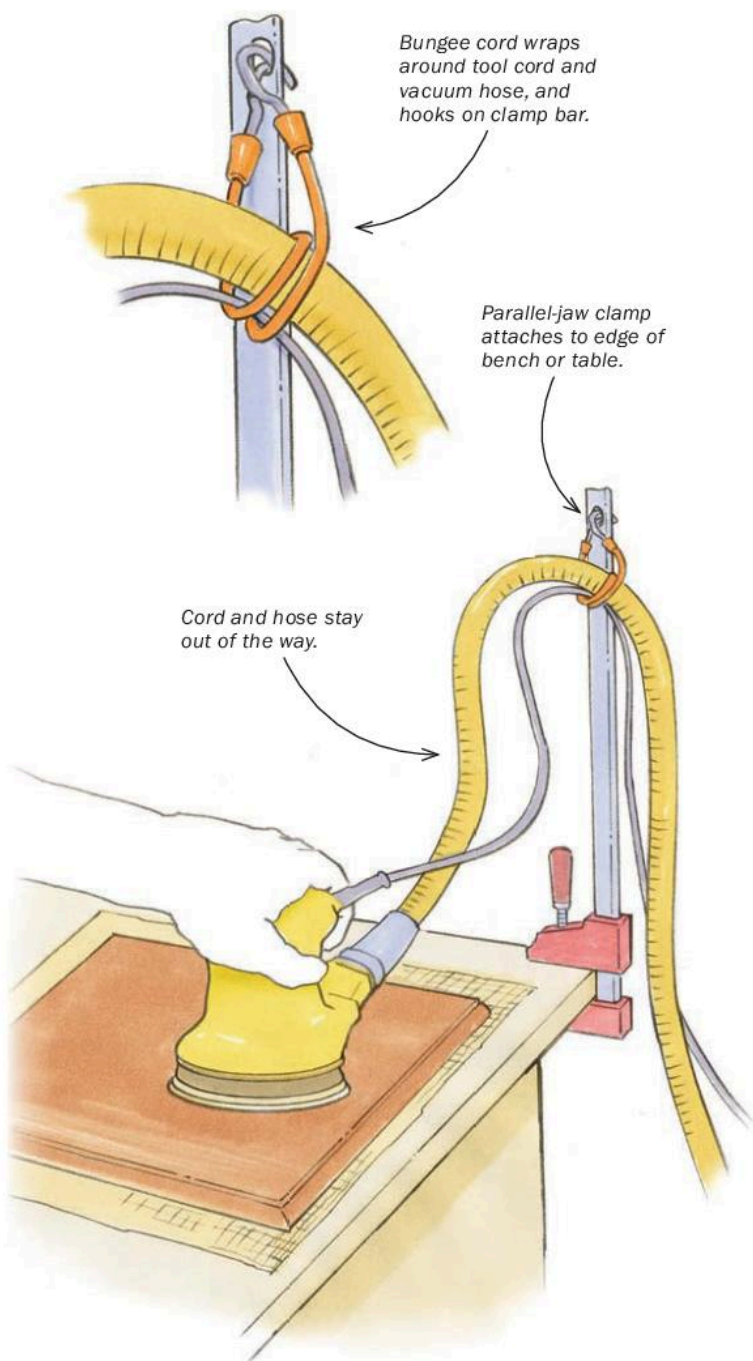
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Manage a cord and hose with a single clamp

I connect my sander (and router) to a small vacuum, which keeps dust out of the way and out of my airways. But the vacuum hose and tool cord can be cumbersome, hanging up on the edge of the bench and dragging on the tool. To solve this issue, I secure a short parallel-jaw clamp upside down on the edge of my bench, wrap a bungee cord twice around the hose and cord, and hook it through the hole at the end of the clamp bar. After that, the power tool floats easily over the workpiece, and I have both hands free.

—WILLIE SANDRY, Camas, Wash.



Mix and apply epoxy with a freezer bag

Watching my son, an avid baker, using pastry bags to apply icing got me thinking of a better way to mix and apply epoxy in the shop. I take a zip-top freezer bag (thicker and more durable than sandwich bags), roll the top down to avoid getting epoxy on the outside or in the zipper, and pour both parts of the epoxy into a corner of the bag, plus any colorant if I'm using it. Then I zip up the bag, pushing out most of the air. To mix the epoxy I simply rub the bag with my fingers, or with a flat stick on the benchtop. After twisting the corner of the bag to gather the epoxy, I cut a tiny hole in the tip, and "pipe" the epoxy right where I need it. This not only prevents all the usual mess involved in mixing epoxy, but also lets me apply it precisely and use every last bit.

—CHIP McCARTHY, Long Beach, Calif.



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Inlay kit makes curved hinges easy

Faced with installing four sewing machine hinges in a very conspicuous location, I tried using a router inlay kit, which includes a $\frac{1}{8}$ -in. router bit and a set of precisely sized guide bushings. Typically these are used with a template to create a recess and a matching inlay. Turns out, if you treat the hinge leaf as the inlay, the kit will produce perfect mortises for curved hinges.

Start by screwing the hinge both to the template material ($\frac{1}{4}$ -in. hardboard) and some sort of backer board underneath. The hinge barrel protrudes on the back side, elevating the leaves, but they lock flat and level. Now install the smaller-diameter bushing in a plunge router, as well as the $\frac{1}{8}$ -in. bit, and set the depth to go through the template material and slightly into the backer board. To level and stabilize the router, I make outriggers the thickness of the hinge and fix them to the base with double-sided tape.

Then, to make the perfect template, you just engage the bushing against the hinge, plunge the spinning bit, and press firmly against the hinge as you rout around it counterclockwise.

Next, screw a locating fence beneath the template and clamp it to the workpiece. Use the larger bushing this time, set the bit for the correct depth, and rout the hinge mortise.

These hinges require a second, deeper mortise for the hinge barrel. That one is even easier to rout: Clamp an auxiliary fence to the router base—or use the edge-guide accessory—and adjust the bit depth.

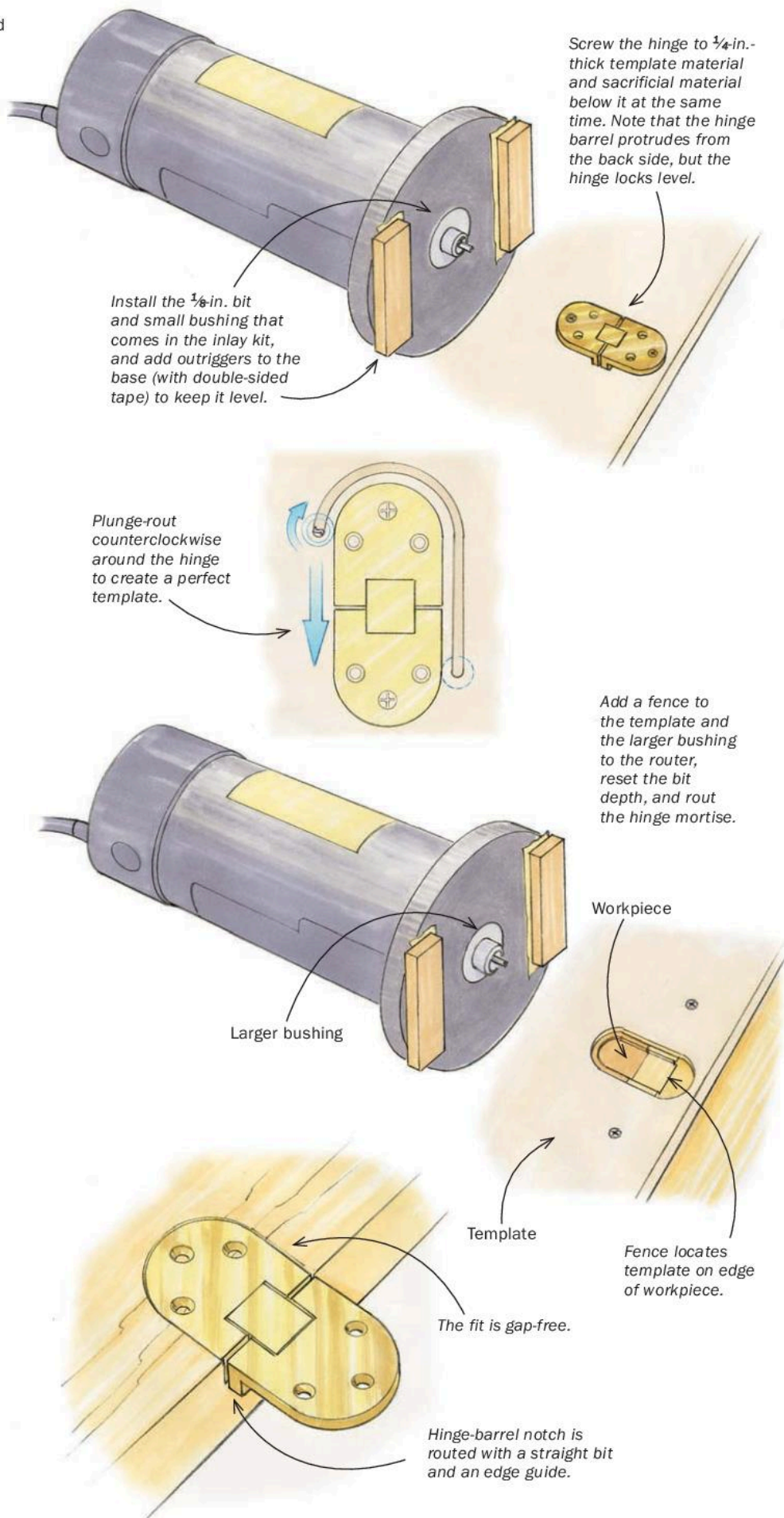
—DAVE MARSHALL, New Palestine, Ind.

Quick Tip

Fridge magnet protects sharp handplane

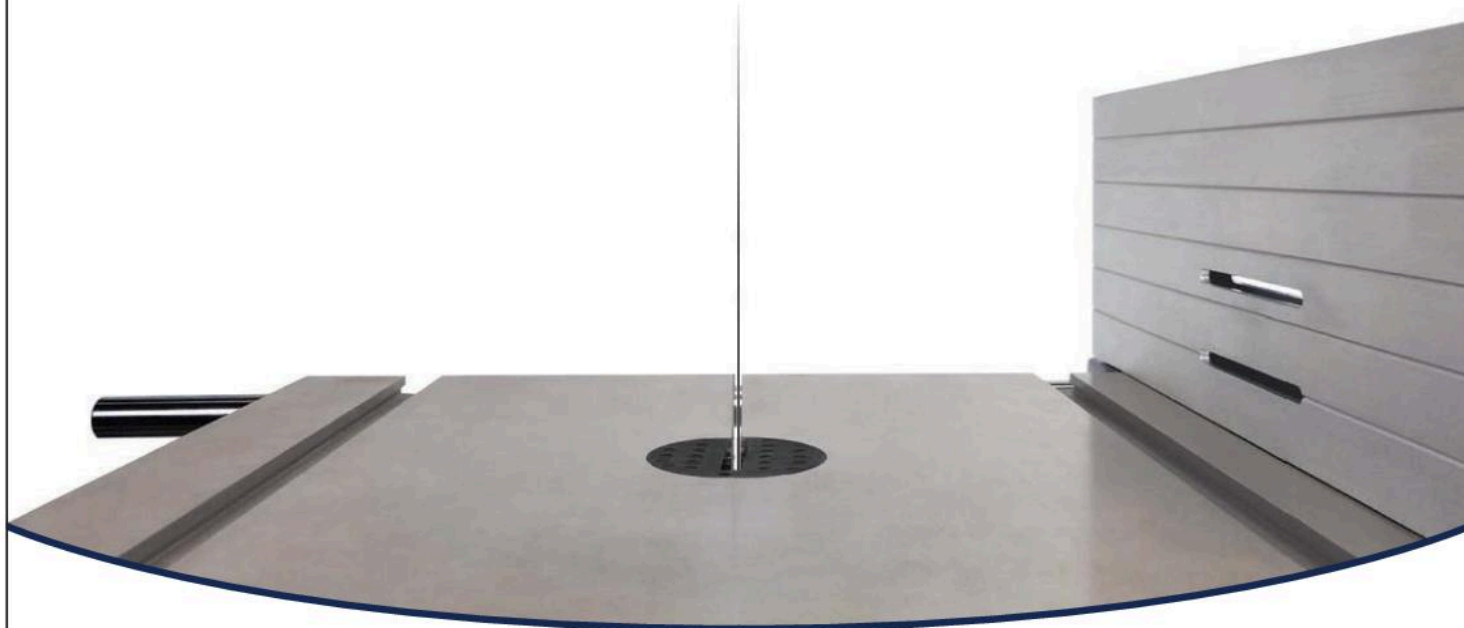
From now on feel free to accept those thin refrigerator magnets that businesses offer. They make excellent blade protectors for your handplanes. Find one that will cover the entire blade opening, trim it to size, and you've made a nice guard for a well-honed edge, letting you put the plane away quickly with no worries.

—FRANK MIKUS, Wescosville, Pa.



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■ HAND TOOLS

Rockler's new handplanes

ROCKLER HAS INTRODUCED a new line of high-end handplanes under the name Bench Dog. I tested four of their models, a No. 4 smoothing plane, a low-angle jack plane, a block plane, and a three-in-one shoulder plane.

The planes have good bones, with bodies cast from durable ductile iron and hefty blades made of good steel that is, for the most part, ground well, with the backs requiring only 5 to 10 minutes of lapping and a few more to hone. The planes were cleanly machined, although not all soles were flat or sides square. They sport nicely shaped mahogany totes and knobs, and many of the fittings are polished brass.

Once tuned up, three of the four performed well, felt solid, and adjusted tightly—performing close to the best on the market. The block plane required only a bit of sole lapping because of a crown. The No. 4's chip breaker needed some fettling to fit better to its blade. The low-angle jack's blade had a noticeable back bevel; and, when the blade was set parallel



Handplanes by Rockler

Low-angle jack: \$200

No. 4 smoother: \$140

3-in-1 shoulder plane: \$130

Block plane: \$100

to the sole, it was skewed relative to the adjustable toe. But the plane still performed quite well.

The shoulder plane was the outlier. It started with too many strikes against it to warrant the time needed to set it up. The sides were not square to the sole, the blade was narrower than the body, and the bullnose attachment lacked alignment pins.

—Chris Gochnour is a contributing editor and furniture maker in Salt Lake City.

■ POWER TOOLS

Affordable cordless drill and driver

I RECENTLY HAD THE CHANCE to try two new entries to Grizzly's Pro line, an impact driver and a hammer drill. Lucky me, since I was building a deck, where having the right drill/driver one-two punch can make a significant difference. During the build, this pair from Grizzly proved its mettle and seemed ideal for DIYers on a budget.

The driver did a solid job driving (and extracting) both 6-in. lag screws and 3½-in. wood screws through pressure-treated stock. The hammer drill features an adjustable clutch with 22 settings to accommodate a variety of fasteners. There's also a hammer setting should you need to drill into masonry (which I didn't do). There's a two-speed gearbox with low and high settings. Both tools feature a lightweight 20-volt lithium-ion battery with a battery life indicator. Each also has LED lights to illuminate hard-to-see areas. The 2 amp/hr battery life on both proved adequate, at no point impeding my workflow. Grizzly says each battery needs one hour to recharge.

—Raymond Finan is a furniture maker in Arlington, Vt.



Cordless impact driver and hammer drill by Grizzly

Model T30291, Model T30290

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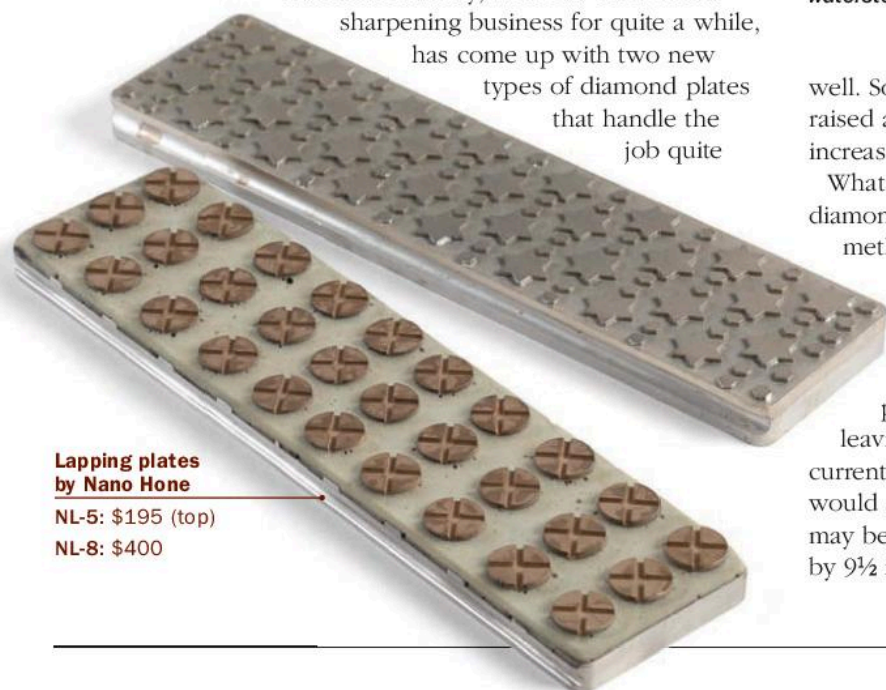
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■ SHARPENING

Speedy lapping plates

WATERSTONES ARE A GREAT WAY TO SHARPEN, but because they wear from use, you need a way to keep them flat. Sandpaper on glass is a cheap option, but most of us end up investing in a coarse diamond plate at some point.

Harrelson Stanley, who has been in the sharpening business for quite a while, has come up with two new types of diamond plates that handle the job quite



Lapping plates by Nano Hone

NL-5: \$195 (top)

NL-8: \$400



Raised abrasives cut quickly. With more edges in contact with the waterstone, these lapping plates surface the stones faster.

well. Sold under the name Nano Hone, both plates feature raised abrasive elements that speed the flattening process by increasing the edges in contact with the waterstone.

What differentiates one plate from the other is how the diamonds are incorporated. The NL-5 uses the traditional method of adhering the diamond to a nickel plating on an aluminum base. The more expensive NL-8 features buttons made from a diamond-and-steel matrix that is adhered to a stainless-steel backing plate. It is touted as having an almost unlimited lifespan. Both performed incredibly well, removing stock quickly and leaving a flat surface with fewer deep scratches than my current plate. In a home shop like mine, I think that the NL-5 would serve me well, but in a high-use environment, the NL-8 may be worth the additional investment. Both are 2½ in. wide by 9½ in. long.

—Michael Pekovich is FWW's creative director.

■ ACCESSORIES

Clean-cutting sanding nets

FESTOOL'S NEW GRANAT NET ABRASIVES are a gem.

Regardless of what I threw at them, the Granat pads were more durable, cleaner, and clogged less than conventional sanding disks.

I've always been pleased with my sander and vacuum's ability to leave a clean surface with regular sandpaper; the Festool abrasives, however, left a surface with barely a trace of dust. The difference was most pronounced at the higher grits, 220 and 320, where I expect more dust on the work surface with conventional paper. I also tried the abrasive's ability to remove finish. Again, it showed an edge. On both varnish and shellac, the 100-grit paper removed the finish quickly and didn't clog.



Sanding nets by Festool

80-400 grit

\$55 for pack of 50

Overall, the product lasts longer than any sandpaper I've used. Occasionally, I will bump disks against the inside of cabinets, a piece of scrap, or something else that shouldn't be on the bench while I'm working. This typically dents or folds the edges of conventional disks and can lead to problems. The Festool pads were unaffected by such bumps.

The mesh pattern means these disks will work with any sander. I recommend buying a protection pad (\$10 for two) to avoid wearing out the pad on the sander, though.

—Adam Godet is a woodworker in Washington, D.C.

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Add a bead to a curved apron

A STACK OF THIN VENEERS
CONFORMS
TO ANY CONTOUR

BY MIKE KORSAK

For a recent chest of drawers, I designed aprons whose bottom edge ripples in a series of asymmetrical, flowing curves. To accentuate the curves, I decided to apply thin beads of contrasting wood to the bottom edge of the aprons. The challenge was how to make beads that would conform to the sinuous profile.

I considered cutting the beads from solid stock and using a hot pipe to shape each bead to its apron. I also thought about using steam to make solid bead stock pliable, and then pressing the stock in a bending form. Either of those approaches might have worked, but I wondered how precise the fit to the apron would be. I decided instead to make the bead as a bent lamination. I built a two-part bending form and glued up six layers of thin rosewood veneer (purchased online) to yield beads that exactly matched the apron's every squiggle.

Create a template, then the apron



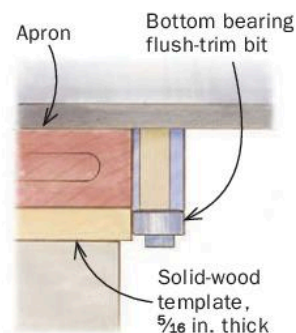
Template first. Korsak glues a full-scale drawing of the apron to a thin piece of solid wood and cuts it to shape on the bandsaw. After, he refines the curves with hand tools.



Rough-saw the real apron. Trace the template on the apron, then cut close to the line with the bandsaw. To simplify the joinery, cut the mortises in the apron while the stock is still square.



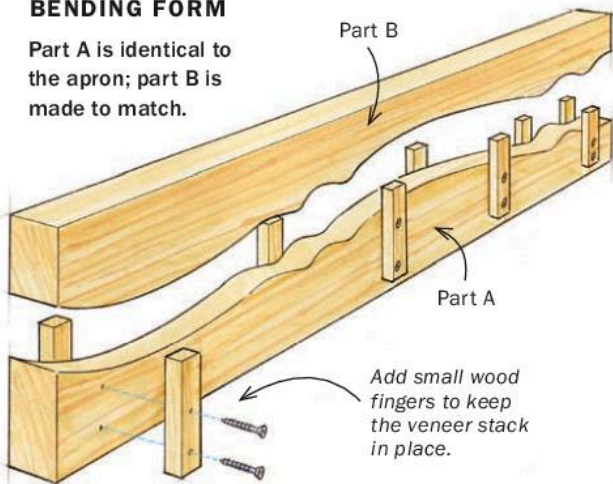
The template takes over. With the template clamped beneath the apron, Korsak flush-trims the apron to final shape.



Laminate veneer to make the bead

BENDING FORM

Part A is identical to the apron; part B is made to match.



Add small wood fingers to keep the veneer stack in place.



Laminated bead needs a two-part form. After using the apron template to generate part A of the form, Korsak traces part A onto a blank for part B. He uses a stack of veneers as a spacer to create a pencil line offset by the thickness of the bead. Then he bandsaws out part B and cleans up the curves with a sander and hand tools. Turn to p. 45 to see how you can create huge bends with a two-part form.



The bead gets bent. After coating the thin veneers with polyurethane glue, Korsak lays them into part A of the form, then adds part B.



Careful clamping. With the bending form elevated on blocks for clamp clearance, Korsak starts clamping at the middle and works outward.

Fine-tune the laminated bead

Joint the edge.

After flattening the front edge of the bead on the jointer, Korsak fine-tunes it by pulling the bead across an inverted jack plane clamped in a bench vise.



Check for flat, then rip.

Korsak uses his workbench to check that the jointed edge is flat, then rips the bead to width at the bandsaw. He'll flush the sawn edge to the inside face of the apron after glue-up.



Once the bead was made, I rounded its front edge and glued it to the apron.

Template shapes the apron and the bending form

I used a template made from my full-scale drawing to help shape the apron and the bending form. After roughing out the design of the apron's bottom edge in freehand sketches, I refined it using drawing bows, French curves, and an adjustable curve. When I had the final design, I made the template by cutting out the drawing and gluing it with spray adhesive to a $\frac{5}{16}$ -in.-thick piece of solid wood. I cut nearly to the lines of the drawing at the bandsaw, and cleaned up the curves with hand tools.

To shape the curving edge of the apron, I first traced the outline of the template onto the apron blank. Then, after bandsawing close to that line, I clamped the template to the apron and flush-cut to the template with a router.

I used the same template (and the same tracing and shaping process) to make the first part (part A) of the two-part bent-lamination form for the bead. The second part of the form (part B) had to match part A exactly—but with the thickness of the bead stock taken into account. To achieve this, I traced part A onto the blank for part B using a few pieces of thick veneer as a spacer between my pencil and the edge of part A. Then I cut close to the line with the bandsaw and faired the sawn curves with a drum sander and hand tools.



Rounding over a squiggle.
After chalking the jointed front edge of the bead, Korsak rounds it over with a spokeshave followed by a block plane, files, and sandpaper.



Prepare for attachment. Korsak countersinks the bead for screws that will keep it from shifting during glue-up. He ebonized the bead with leather dye, then applied shellac.



Bend and shape the bead

With both parts of the form made, I checked their fit by dry-clamping the six bead veneers between them. Then, for the real lamination, I brushed on polyurethane glue and clamped the veneers in the form for a minimum of two hours of cure time. Afterward, when I pulled out the bead, there was no springback at all—it mated perfectly with the apron.

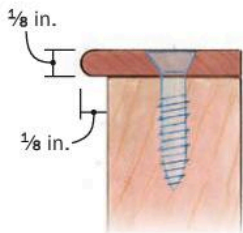
Next I needed to create a roundover on what would be the proud front edge of the bead. First I flattened that edge on the

jointer. To smooth the jointed surface further, I used my jack plane clamped sole-up in a bench vise. Then I cut the bead to width on the bandsaw.

To shape the roundover, I first rubbed chalk on the jointed edge. Then I shaped the profile, using one hand to hold the bead and the other to operate a spokeshave. I did the rounding solely by eye; as the chalk on the jointed edge disappeared, I could gauge how close I was to the centerline of the bead's thickness.

Fix the bead to the apron

The bead goes on. While drilling pilot holes for the screws, Korsak uses an adjustable square to locate the bead for an even overhang. Then he drives the screws and removes them.



Attaching a bendy bead

After the bead was shaped and sanded, I predrilled countersunk holes for the screws that would aid in positioning when the bead was glued to the apron. The final steps prior to assembly were to dye the bead black (the rosewood veneer was not as dark as I'd hoped) and apply shellac. I used shellac on the bead to provide a shiny contrast to the matte Osmo Polyx finish on the rest of the piece.

I used part B of the bending form as a caul when I glued the bead to the apron. The screws kept the bead in place while the caul provided even clamping force over the entire length of the bead. I used polyurethane glue again and applied it sparingly, as squeeze-out around the bead would have been difficult to clean up. □

Mike Korsak makes furniture in Pittsburgh, Pa.

Glue time. After applying polyurethane glue, Korsak redrives the screws, then uses part B of the lamination form as a clamping caul (above).

The tail of the bead. Once the glue cures, Korsak trims the bead flush to the end of the apron, starting with a backsaw and finishing with a chisel.



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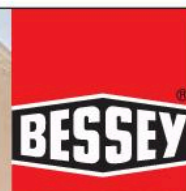
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3-D drawing

FROM THE MIND'S EYE TO THE FINISHED PRODUCT

BY YURI KOBAYASHI

I am a raw and low-tech woodworker. Even knowing that doing everything by hand can take more time, I enjoy designing and making with my hands, rather than using the aid of a computer or other technologies.

When working on designs for a functional piece of furniture, I don't use CAD or even a sketchbook and pencil. What I picture in my head is not translated well on the two-dimensional field. So I work in three dimensions, shaping or bending wood or wire to make small models. They allow me to illustrate what I see in my mind and better define the piece. This is my version of 3-D drawing, and it provides me with plenty of information.

At the model stage, I imagine objects freely and try not to think of joinery, process, or the nature of the material. Later, when I have an idea I want to pursue, I make a quick full-scale

mock-up out of cardboard, plywood, or poplar, representing the whole piece or part of it, to seek out techniques, joinery processes, and problems.

I have an architectural background, and my early designs in wood relied heavily on grids and geometry. A straight line would always be the first thing to appear, one followed by another, and then another. This habit became so apparent that halfway through my graduate study with Wendy Maruyama, she encouraged me to explore more curved shapes and forms.

I began noticing a diversity of manufactured objects as well as things in nature that are made up of curved lines and surfaces. From boats and wine barrels to seed pods and plankton, so many objects and life forms are flawlessly designed and visually appealing. Inspired by them, I focused on manipulating clay and shaping, laminating, and bending wood to familiarize

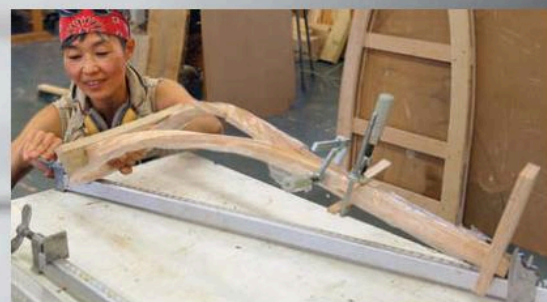


BEND, TWIST, AND CLAMP

Bend in the bag. After steaming, Kobayashi leaves the wood in a poly tubing steam bag so the wood stays pliable longer. She wraps the wood around the form, clamping as she goes.



Twist and clamp. A shopmade torque wrench helps grab and twist the length of wood that forms the legs. Stops in the bending form and clamps hold the loop in place while it dries.



Add a compound curve. Squeezing the loop of wood in a long bar clamp gives the leg its final arching curve.

myself with curvatures. I was particularly drawn to the possibilities of steam-bending techniques.

The form of this table, *Triumvirate*, came out while I was working on an installation project for a solo exhibit. For that project I aimed to use one simple bent form repeatedly to liven up the space. The looping form I used had been reoccurring in my 3-D drawing sessions and it served as a type of building block—first as a single shape, then as a repeated shape, and finally in this table. Discovering different ways to join or weave the looped forms together to create a variety of curved lines and volumes filled me with amusement. I explored winding lines, circles, spheres, and other forms.

Once in a while, I would return to a furniture maker's mind and contemplate the what ifs. That is when I thought of a basic three-legged table. To make a model, I joined three looped

parts with zip ties and made the triangular stretcher system quickly out of three thin strips of wood. Bending and twisting the thicker and longer material for the legs in the real piece was challenging. In fact, my first three trials failed. By tweaking my bending form and making a wooden wrench of sorts to hold the material and bend it, I was able to succeed. With moderate shaping, I refined the form further. Luckily, my play and experimentation with my building block parts bore fruit.

I gain such delight and benefit through my version of 3-D drawing. It is a process that connects my hand and brain without hindrance. If I had been holding a pencil to paper or flipping pages of furniture design books to look for ideas, I would not have come up with this table design. □

Yuri Kobayashi is a sculptor and furniture maker in Maine.



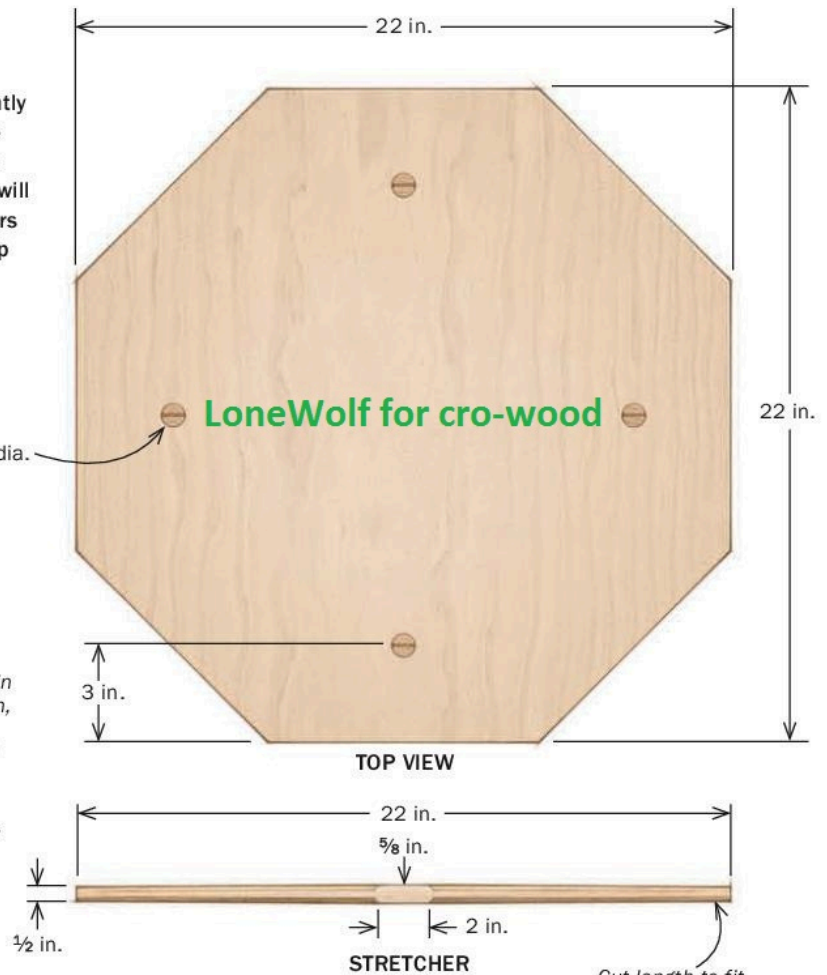
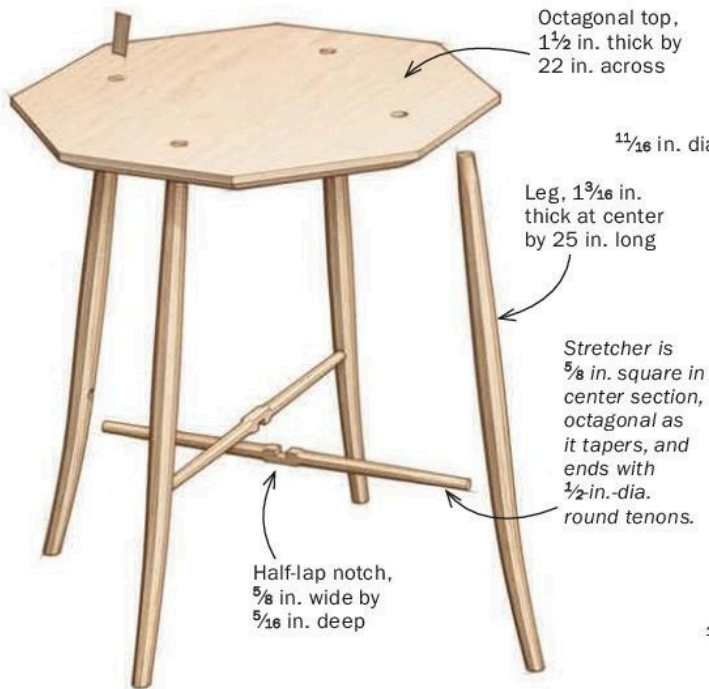
Eye-Catching Octagonal Table

Built simply, this one-of-a-kind table
is light, strong, and graceful

BY ELIA BIZZARRI

BEVELS, FACETS, AND WEDGED THROUGH-TENONS

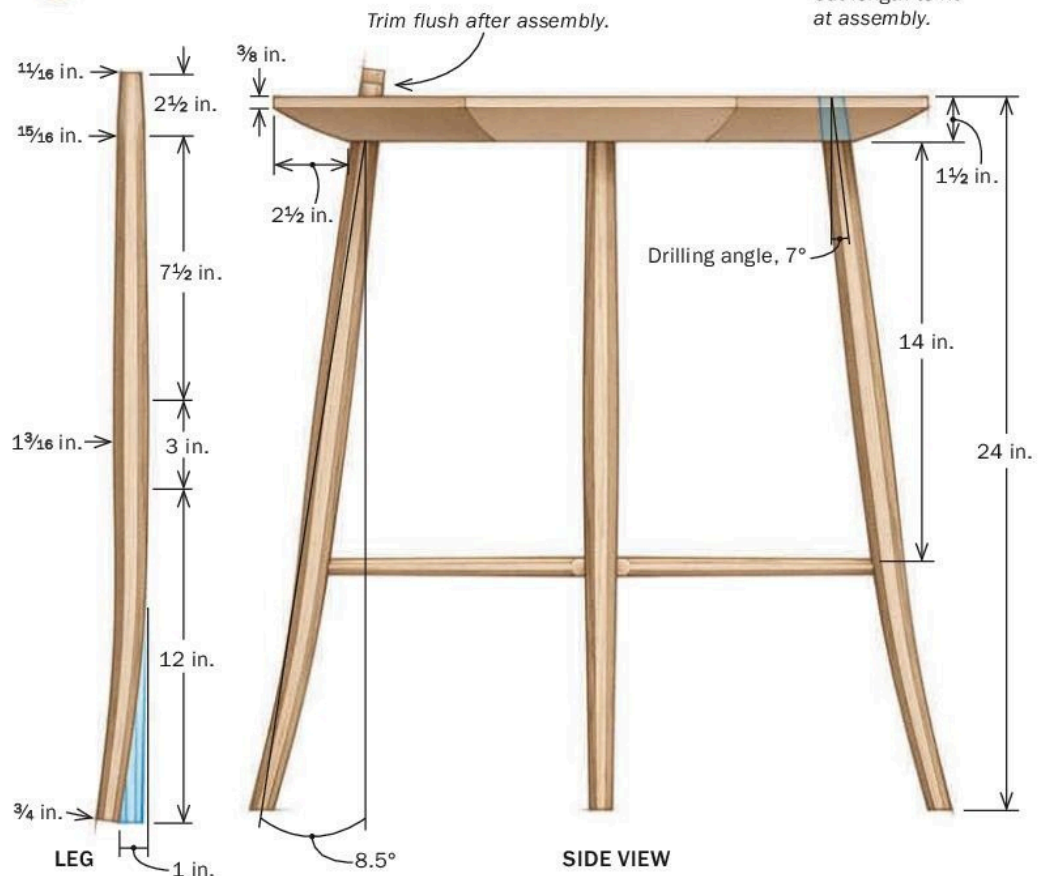
The table's tapered, octagonal legs and stretchers are shaped slightly over thickness at first. After drying in a kiln, they get shaped to the final dimensions shown here. If working green wood, $\frac{1}{8}$ in. of extra thickness should suffice; for air-dried or kiln-dried stock, a bit less will do. The legs and stretchers start out overlong as well. The stretchers are cut to fit before assembly; the legs are trimmed flush to the top after glue-up.



I designed this table to be very accessible to build. Its structure is borrowed from the bottom half of a Windsor chair, but while Windsor chairmaking can seem to require a forester's access to trees, turning skills to match Richard Raffan, and a laundry list of unusual tools, this table can be made from sawn lumber, doesn't involve a lathe, and requires only a few specialized chairmaking tools.

Riving and shaving the parts

The table's legs and stretchers are best made from ring-porous hardwoods like oak (used here), ash, or hickory, which are prized for their strength and bendability. But many other woods will work just fine. The straighter the grain, the better the bending will go (and the easier it will be to achieve smooth surfaces with a spokeshave). Splitting the parts from a log is the most accurate way to follow the grain and get parts with continuous long fibers. Don't have a log? You can split the parts from



Shaping the legs

SPLIT IT OUT



Getting long grain from lumber. If you don't have a log to split for the parts, you can use air-dried, or even kiln-dried, lumber. To be sure you get continuous grain, split the plank and pry it apart, then bandsaw out the parts parallel to the split.



a board. Using green or air-dried wood will minimize breakage during bending. But the bend is shallow enough that kiln-dried lumber might work, even without a bending strap, though the shaping will take more effort.

The drawknife is my favorite shaping tool. It is fast and precise and follows the grain—and it's fun! First, shave two adjacent faces of a leg blank so they are perpendicular with each other and parallel with the grain. When you can take a thin shaving in both directions on a given face and get minimal tearout, you are cutting parallel with the grain.

With the first two faces finished, scribe depth lines with a marking gauge on the other two faces, then use a drawknife to

SQUARE IT UP



Smooth, straight, and square. Use a drawknife to flatten one face of the leg blank from end to end, aiming to get it perfectly parallel with the grain. Then shave an adjacent face square to the first one. Use a marking gauge to scribe width lines and shave the final two faces.



TAPER IT AND CHAMFER



Two tapers. After laying out the length of the tapers and the tenon, shave both ends of the blank to a square taper (above). Once the blank is squared and tapered, shave off the corners to create the octagonal leg (right).



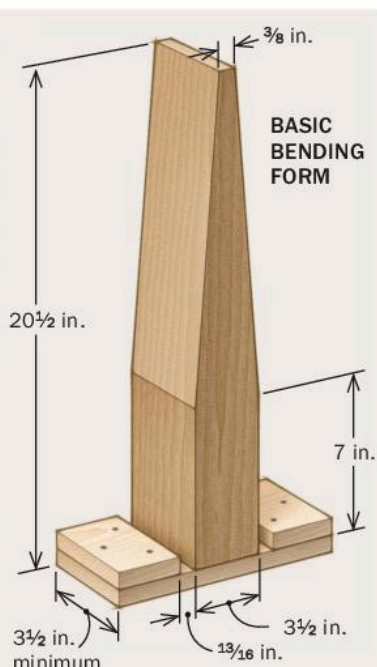
BOIL BEFORE BENDING



No need for a steambox. You can use a stockpot for these legs. After half an hour in 8 in. of boiling water, the legs are ready to bend.

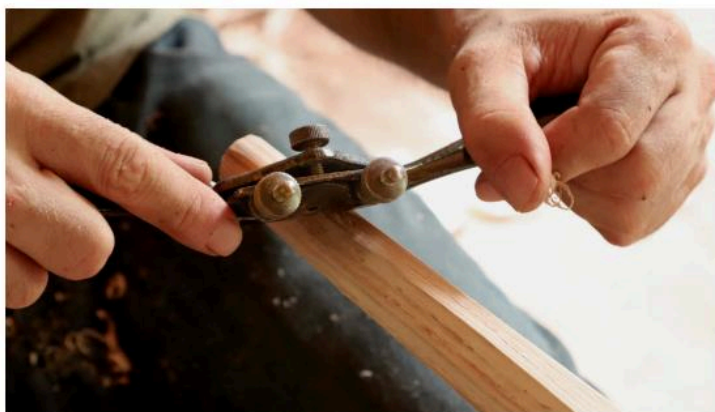


Two-sided form. Bizzarri bends four legs at once. He inserts the feet in a groove and draws the legs tight to the form with a clamp.



Drying time. After bending the legs (and after setting them aside for a month or so if they were made from green wood), place them in a low-heat kiln for several days. Here Bizzarri improvises a kiln with a trash can and an electric heater.

TAPER THE TENONS



Turn to the spokeshave. After drying the legs, use a spokeshave to refine the drawknifed facets, and then to roughly round and taper the top section to prepare for tenoning.

shave to the lines to create a blank with a square cross-section. Next, shave the leg's double taper, and once the legs are tapered, shave them to an octagonal cross-section with the drawknife. You don't need to make the surfaces perfect; you'll use a spokeshave to clean up these facets after the legs have been bent and dried. Also, leave the leg oversize at this point so that when you do final shaping, you can cope with any shrinkage (up to 10% if the wood starts out green) and slight warping. Prepare the stretcher blanks now, too. Use a drawknife or plane to bring them to a 3/4-in.-square cross section, leaving some leeway for drying.

Boil, bend, and dry the legs

When bending legs like these I find that boiling is often easier than steaming. Boiling serves exactly the same function as steaming, without the need for a bulky steambox. Only the bottom



Keep drying the tenons. Right up until assembly, whenever the legs are not being worked on, keep the tenon ends in the kiln. This ensures maximum expansion of the tenons after assembly, creating supertight joints with the tabletop.



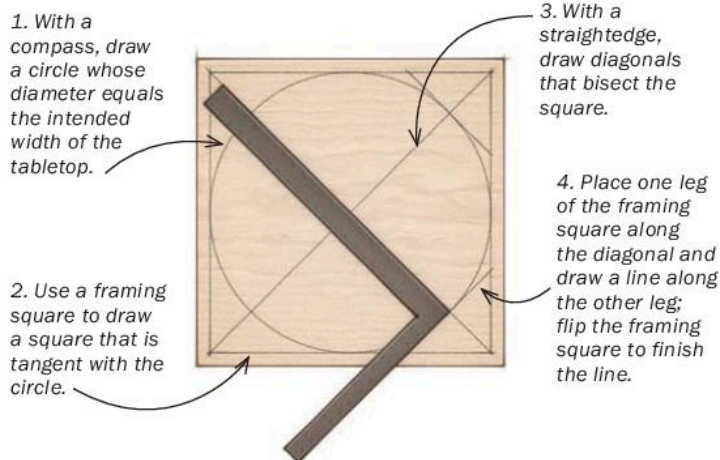
Tenon time. Bizzarri uses a tenon cutter to produce the tapered leg tenons. He sells these and other chairmaking tools, which he and a partner make in his shop (handtoolwoodworking.com).

Cut the top joinery



Octagonal layout. To lay out the octagonal top, Bizzarri uses a compass, a straightedge, and a framing square. He starts with a circle, then draws a square tangent to it. After splitting the square with diagonal lines, he lays the framing square on the diagonals to finish the octagon.

LAYING OUT THE OCTAGON



Inside circle locates the legs. Use a smaller circle swung from the same centerpoint to situate the four leg mortises. The mortises are centered where the circle crosses the diagonals.

Online Extra

To see two methods for laying out an octagon, watch the video at FineWoodworking.com/278.

third of the leg needs to be softened for the bending, and that much will fit nicely into a stockpot filled most of the way with water. To prepare for bending, build a bending form and then boil or steam the legs for about 30 minutes. Bend the legs in the form and use clamps to hold them in place.

If I've used green wood, I now set the legs aside in the bending form and let them air-dry for about a month. Drying time will vary depending on heat, humidity, and air flow. If you're working air-dried or kiln-dried stock, you can skip this step.

Next put the legs, still in the form, into a simple kiln with a small heat source inside. (Insulation board duct-taped together makes a good rudimentary kiln—or use a large trash can, as I did.) A few days in the kiln at around 140°F will help set the leg bend, reducing springback. Once the legs fall out of the form, remove them from the kiln. After that, unless I'm working on the parts, I keep the tenons dry by inserting them through holes in the top of the kiln. The dry tenons swell after assembly, locking the joints tight.

MAKE LEG MORTISES



The drilling angle. Bizzarri drills the leg mortise using a bevel gauge set at 97° to establish the inside angle and a square to keep the side angle at 90°.



Go under afterward. To avoid chipout while cutting the through-mortises, Bizzarri stops drilling when the lead screw emerges and finishes off the mortises from below.



Create the taper. Following the angle of the drilled hole, Bizzarri uses a reamer to taper the mortise.

FINE-TUNE THE FIT



Straight line on a curved leg. With the leg supported at its ends on two blocks, turn it so the bend faces downward. Then, with a straightedge resting on the same blocks, draw a reference line on the leg.



Ream to the reference line. Set the bevel gauge to 98.5°, then re-ream the mortise so the reference line matches the gauge.



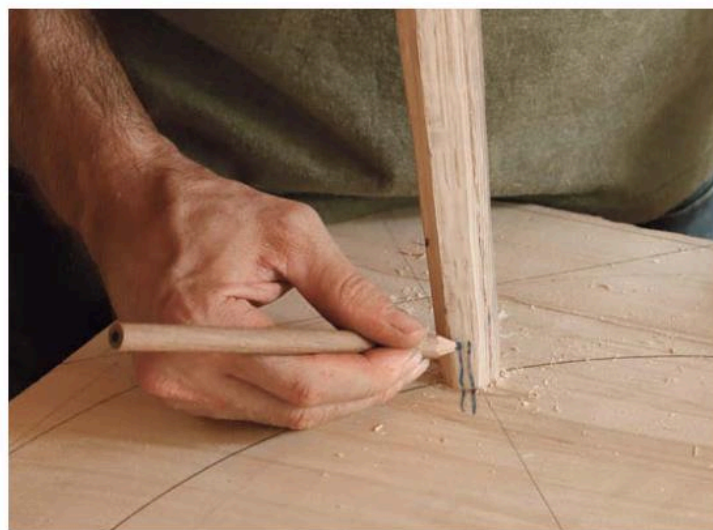
Get the right rotation. When the leg is properly oriented it should appear straight when viewed from the corner of the top.

I rough-shape the leg tenons with a spokeshave, then true them with a tenon cutter. Alternately, you can shape the tenons completely with a spokeshave and rasp, and check your progress with a tapered test hole: Drill and ream a block of wood, coat the inside of the hole with pencil lead, rub the tenon in the hole, and remove high spots until the fit is right.

Time for the top

The tabletop can be made of most any kind of wood. I like light-weight tables so I use woods such as pine, tulip poplar, and basswood; for this table I used buckeye. Once you've flattened the blank, lay out the octagon. But don't saw it out yet. The corners will be useful for clamping the top to the bench while you cut the leg joinery.

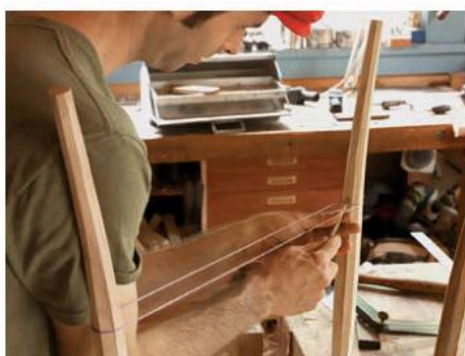
On a table like this, the angled legs usually look best when the tips of the feet are roughly even with the edge of the top. If the legs were straight, determining the drilling angle would be easy.



Make your mark. Once each leg is fitted, mark it to record which mortise it belongs to and how it should be rotated at assembly.

Leg and stretcher work

MORTISE THE LEGS



Two-step layout. A compass works nicely to strike height lines for the stretcher mortises. And a rubber band looped around the opposite leg makes it easier to center vertical cross marks accurately by eye on the octagonal leg.



Scrap support. To be sure his bit stays level, Bizzarri drills a hole through a scrap at stretcher height and puts an extension rod through it. And to control side-to-side swing, he sights over the rod as he drills, keeping it parallel with the diagonal layout line on the underside of the top.

MAKE THE STRETCHERS



Stretcher session. After straightening and squaring up the stretcher blank, and then drying it, Bizzarri shapes all but the center 2 in. of it into an octagon.



Unturned tenons. Once the ends of the stretchers have been roughly rounded, a dowel plate and a little pounding make quick work of producing nice round tenons. Afterward, use a spokeshave to fair the facets to the tenon and transition the arrises to it as well.

HALF-LAP WHERE THE STRETCHERS MEET



Start with a subassembly. To lay out the lap joints, first glue each stretcher to its pair of legs.



Clamp and scribe. With one subassembly fully dry-fitted into the tabletop and the other lowered in until the stretchers make contact, use a knife to mark where the stretchers cross. Remove the subassemblies and finish the layout with a square and a marking gauge.



Hand tool half-lap. Cut to your knife lines with a handsaw, then chisel out the waste between the sawkerfs.

But since the legs are bent and the bends will likely vary from leg to leg, the initial angle for boring the leg mortises is an approximation. During the reaming process, you'll correct for any variations in boring, tenoning, or bending. Bore the through-holes 7° off vertical with a 1¹/₁₆-in. bit. I use an auger bit in a bit brace, but a brad-point bit in a power drill will also work.

Now start reaming. When the tenon seats in the hole without wobbling, check the leg angles. Use a bevel gauge set at 98.5° to assess the interior angle and a square to check the side angle. For the interior angle you'll need a reference line on the leg (see top photos, p. 35). Let's say the leg needs to go to the right. Remove it and continue reaming. Push the reamer straight into the hole, but put some extra pressure diagonally back and right. Ream a few turns, then reinsert the leg and check the angles again. Keep reaming and checking until the angles are right and about 1/4 in. of tenon protrudes from the top.

Stretcher mortises and shaping

Next, with the legs fitted, bore the mortises for the stretchers. Then it's on to shaping the stretchers. To make a clean half-lap joint, the stretchers need to be straight and square. I use a block plane to straighten the faces and bring the piece to 5/8 in. square. Next, use a drawknife to turn the stretchers into a tapered octagon, leaving a 2 1/2-in.-long section square at the middle of each stretcher.



Test time. To dial in the width of the half-lap, test it on the un-notched section of the other stretcher. Adjust the cheeks with a chisel if necessary.

Shape the top and assemble the parts

OCTAGON WITH AN UNDERBEVEL

Saw out eight sides. Bizzarri uses the bandsaw to cut out the octagonal top.



Rough out the underbevel. With the bandsaw table tilted to 45° or so, Bizzarri cuts the big bevels by eye, being sure to leave an uncut band at the top about $\frac{7}{16}$ in. wide.



Hand tools follow the bandsaw. A drawknife and spokeshave smooth the bevels and pillow them slightly, leaving crisp tool marks behind.



The stretcher tenons can be cut in a variety of ways. I usually roughly round the tenons with a spokeshave, then use a steel dowel plate with a $\frac{1}{2}$ -in. hole drilled in it. Relieving the underside of the hole with a larger bit or a file can help reduce drag and unpleasantness. Try a test joint to make sure your dowel plate and mortise bit match. As an alternative to the dowel plate, you can carefully shape the tenons with a spokeshave, file, and sandpaper. Tenon shoulders don't appeal to me, so once the tenons are cut, I use a spokeshave to flush the octagonal facets to the tenon, and to transition the arrises down to the tenon as well.

Subassembly required

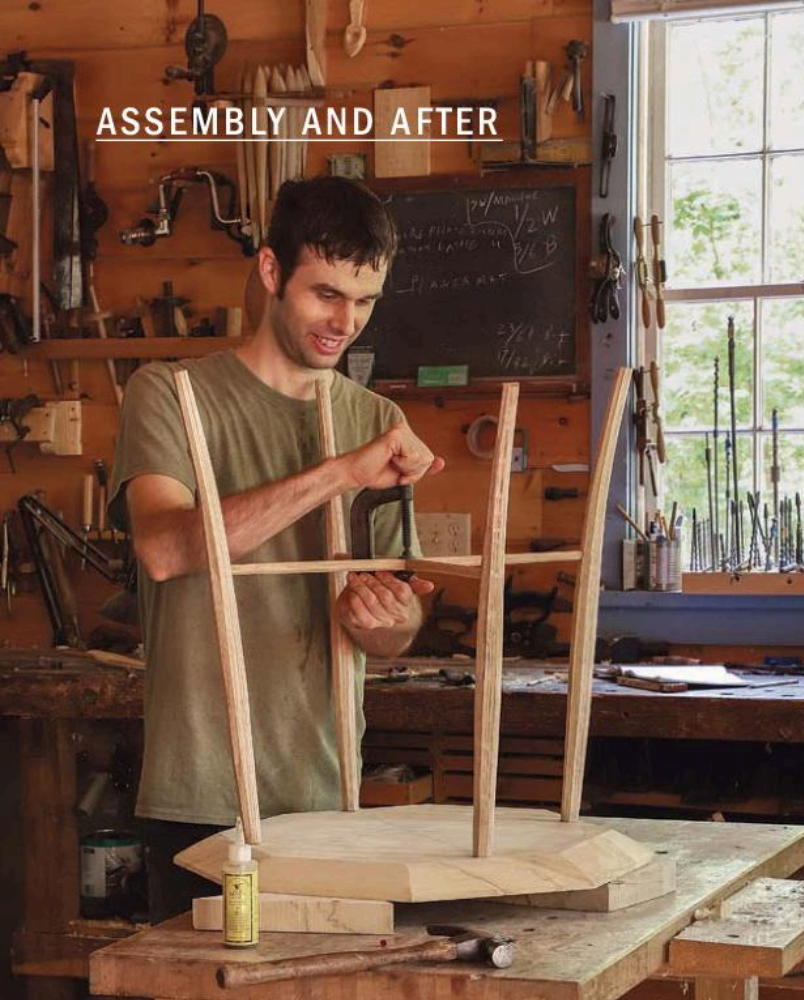
To lay out the half-lap that joins the stretchers, first glue each stretcher to its pair of legs. With the tabletop upside down, dry-fit one leg assembly into its tapered mortises and then carefully insert the other assembly until its stretcher rests on the first one. Rotate the assemblies a bit if need be so that the stretchers line up with the diagonal lines on the underside of the top. Then clamp the two stretchers together. Scribe two lines onto each stretcher where they cross each other, and use a marking gauge to mark half the thickness of the stretcher. Then use a square to connect the scribe lines to the marking-gauge lines.

Saw the sides of the notch, chisel out the waste, and pare the sides until they fit over the other stretcher. Chisel the bottoms of the notches until the two stretchers are almost flush—you will plane them perfectly flush after glue-up. Now test the fit of the leg assemblies into the tabletop and mark the leg tenons for wedges oriented perpendicular to the grain of the top. Then remove the legs, cut kerfs in the tenons, and make some 8° hardwood wedges.

Glue up and finish up

Now at last you get to saw out the top. At the bandsaw I cut the octagon and then bevel the underside to make the top look thin and light. I clean up the bevels and give them a slightly pillowed surface using a drawknife and a spokeshave. When the top is ready, glue in both subassemblies and clamp the stretchers together at the half-lap. Then turn the table right side up, glue and drive the wedges, and smile a smug smile of success.

ASSEMBLY AND AFTER



Final assembly. With the tabletop inverted and elevated on blocks, Bizzarri uses a few hammer blows to knock the two subassemblies home. Then he clamps the half-lap joint.



Make it level without a wobble. When trimming a leg to length, aim the saw handle and the saw plate at the ends of the adjacent legs. To mark the legs for cutting, Bizzarri first set the table on a flat surface and wedged beneath the feet until the tabletop was level and didn't wobble.



Fine-tuning the feet. A flat bench with an inverted handplane in the vise is a fine setup for flattening the feet. Before and after trimming, chamfer the perimeter with a spokeshave to prevent the feet from splintering.



Wedge and trim the tenons. With the table fully assembled, drive the tenon wedges, saw the tenons nearly flush, and finish up with a shallow gouge and a handplane.

But wait—only three legs touch the ground. Maybe the top is sloped, too! On a flat surface, shim the legs to get the top level left to right and front to back. Find which leg is farthest off the surface and mark all four legs at that height; use a handsaw to cut the legs to your lines. Saw the leg tenons protruding through the top, then use a gouge and plane to trim the tenons flush. While you have a plane in your hands, you can add a chamfer to the perimeter of the top. I finished the table with milk paint in a black-over-red combination often used on Windsor chairs. □

Elia Bizzarri makes chairs, tables, and tools in Hillsborough, N.C.



Homing in on the halving joint. The half-lap is a focal point of the piece, and Bizzarri flushes it off with a block plane.



Create Curves with Bent Lamination

A virtuoso of this powerful technique explains the basics and far beyond

BY BRIAN BOGGS



Bent lamination—gluing up thin layers of wood to create a curve—allows you to generate curved parts that wouldn't be possible by sawing or steaming. It lets you make sharp curves and reverse curves, enables you to make wide parts, and delivers uniform results for multiple parts. Lamination produces a workpiece whose grain follows the curve completely, which, combined with all the face-grain glue joints, gives a bent-laminated part great strength. Achieving a successful bend requires accurately machined laminates, careful attention to glue, and uniform clamping pressure throughout the bend. I'll discuss all of these in detail.

Make solid stock into laminates

Let's start with sawing. Slicing laminates is the work of a well-tuned bandsaw. Tablesaws can be used, but you lose lots of material in the kerf. This is expensive, and it reduces grain continuity on the edge of the glued-up part.

Bent lamination works with virtually any species of wood, even tropical ones that typically don't respond well to steam-bending. Air-dried stock is best, if you can get it. Kiln-dried wood can contain a significant amount of stress, and if it does it won't resaw well. If the stock is bowing and twisting as you saw it, use a different board.

How thin the laminates need to be depends on the wood choice and the degree of the curve. The brittler the wood and the tighter the curve, the thinner you'll need to make the laminates. For each new curve, cut a test laminate, guessing how thick it might need to be ($\frac{3}{8}$ in. to $\frac{3}{16}$ in. is a good place to start). Bend it over the form. If it's too stiff to make the curve, make thinner ones until you have a laminate that bends to shape easily. Keep in mind that you'll be bending a stack of laminates, so any resistance to taking the bend will be multiplied.

I always make the laminates at least 6 in. longer than the part I'll be creating. It's hard to pull the stack of laminates tightly against the bending form without these few inches of extra leverage, and while you might get there with great force, great force is not good for glue bonding. If the end of your part has a really tight radius, add even more extra length. Make your laminates long enough that you can trim off any planer snipe and still have those extra inches. I make laminates $\frac{1}{2}$ in. wider than the finished part to allow for slippage during glue-up and for jointing and trimming the part afterward.

While it's possible to cut laminates with glue-ready surfaces right off the bandsaw, don't plan on it. I almost always smooth my laminates after sawing. If you don't have a thickness sander, find a local shop that will sand the laminates for you. Alternatively, you could build a vacuum box for your planer. I made one that allows me to plane laminates down to $\frac{1}{16}$ in. It's a hollow box with a hole underneath for a vacuum hose and slots through the top to exert suction and hold the stock down. If your laminates come off the saw with much twist or cup, the

MAKING THE LAMINATES

Bent lamination involves slicing up solid stock and then gluing it back together against a bending form. Boggs does the slicing on a bandsaw, then smooths the sawn surfaces with a planer or thickness sander.



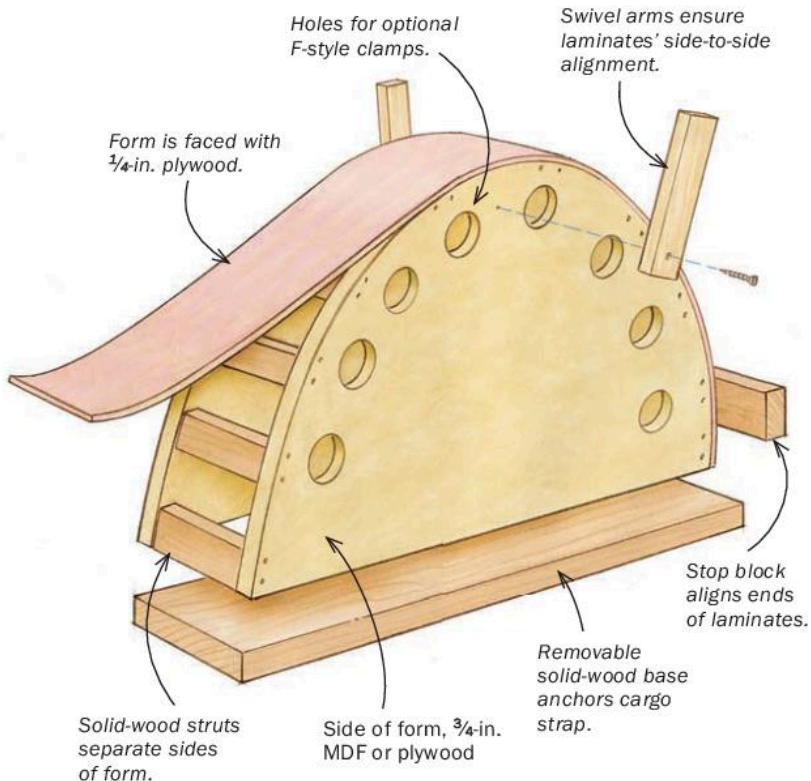
First build a fence. Boggs uses a high fence on the bandsaw when slicing laminates for bending.



Suction table for the planer ensures smooth results. With a port on the bottom for the shop vacuum and slots on the top to suck down the laminates, Boggs's hollow suction table lets him plane very thin laminates.

BUILD A BENDING FORM

To make the first side of the bending form, Boggs trims a piece of sheet material to shape, using a curved stick as a guide. Then he saws out the second side of the form and flush-trims it to the shape of the first side.



Bend a stick to determine the curve. Having drawn his curve on a sheet of MDF, Boggs bends a thin stick to match it. To fix the bend he clamps the stick to blocks at the ends and middle of the curve; each block has just one screw at this point, so they swivel.



Screw and glue. When he has the curve he wants, Boggs drives the second screws through the blocks, adheres the stick to the MDF with hot glue, and screws through the stick into the end blocks. If the stick won't conform to the drawn curve, Boggs revises the design, deferring to the curve of the stick.

planer might not be the tool for thickening them even with a vacuum box. Don't sweat it, just find a mill shop to sand them, ideally one with a vacuum table on their sander.

Get the glue right

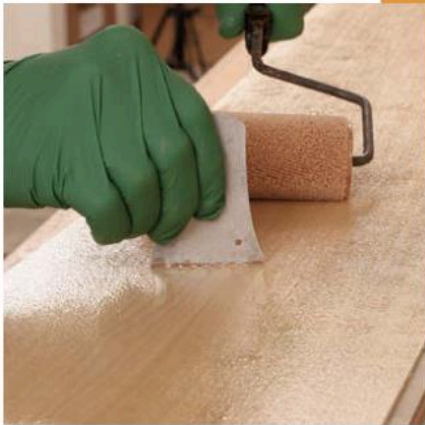
Bent lamination depends entirely on glue bonds for its structural integrity, so choosing the right glue is vital. There are various factors, but the rigidity of the glue is key. With so many laminates being glued up, you'll get springback if the glue is not rigid. Depending on the application, I use either Unibond 800 or epoxy.

Epoxy is strongest and penetrates the wood rather than simply bonding to the surface, which is particularly beneficial in those cases where the laminates are used straight off the saw. Epoxy is also great in outdoor applications. I have long used All Wood Epoxy Glue from Rot Doctor, but it is no longer available. They recommend substituting System 3 T-88; West Systems Epoxy is also very good.

As much as I like epoxy, in my shop we use Unibond 800 for most bent lamination. It has less open time than epoxy, but it still allows plenty of time to get most bends pulled together. It rolls out more easily, cleans up more easily, and is a lot less expensive, so we use it for everything that does not require epoxy. Be sure



Flush to the stick. After bandsawing the MDF close to the curve, Boggs trims it flush to the stick on the router table.



Just enough glue. With a stack of laminates it's important not to overglue or the package will be gushy and the laminates will slide around. A painter's wet film gauge helps ascertain how much glue is just enough.

USE A STRAP FOR THE BENDING

A heavy-duty cargo strap is an excellent clamping tool to bend a thick stack of laminates. It applies pressure evenly to produce excellent glue joints.



Preparing the package. After applying the glue, stack flexible cauls on top of the laminates. Here a kerfed plank of solid wood spreads pressure evenly across the laminates. The glue used for this leg of an indoor table was Unibond 800.



Strap time. Using a cargo strap, Jay Hallinan (left) and Brandon Light bend a hefty stack of laminates to the form. A stop at one end of the form keeps the laminates aligned end to end, and the swivel arms at the top of the form keep them from sliding side to side.

to wear a mask when mixing the Unibond 800 powder with the liquid resin.

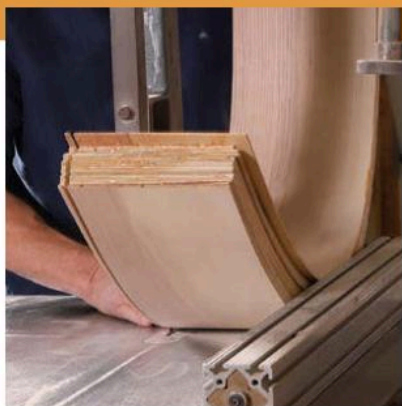
It's important to apply the perfect amount of glue. This gets you minimal squeeze-out, making it easier to see what is going on at the glue lines. More importantly, you get less squish than with excessively glued laminates. Thick glue lines make it harder to get even clamping pressure and to avoid clamp impressions. They also allow the laminates to slip all over the place. Worst of all, if you apply more glue than needed you risk weakening the part (unless you are using epoxy). Evenness of application is important, too; when you have multiple glue joints stacked up, no clamping system will even out irregular glue application.

So get a painter's wet film gauge and measure the glue thickness until your eye gets good enough to judge the right amount. For Unibond 800 we aim for a 0.006-in.-thick glue line (6 mil). The gauge and a roller make it fairly easy. It's a little trickier to judge the thickness of epoxy. Epoxy absorbs into the wood unevenly, much like an oil finish. After applying a generous thickness



CLEAN UP THE CURVE

After glue-up, Boggs saws the stack of laminates to width, joints the sawn edges, cuts the curve to length, and applies edging.



Clever overlap. The lamination includes one laminate, on the inside face, that is $\frac{1}{2}$ in. wider than the others. After glue-up it rides the fence so the opposite edge can be bandsawn cleanly. Boggs then perfects the first bandsawn edge at the jointer.



Sawing side two. The jointed edge then goes against the bandsaw fence so a parallel edge can be ripped.



Coming to the end. To crosscut the ends of the lamination, Boggs uses a simple sled on the bandsaw that holds the curved part in place and runs against an auxiliary fence.



Cover the lines with a curved lip. Solid-wood edging gets glued to both curved edges, creating the illusion of a solid curved piece. PVA glue works fine here. Curved cauls distribute the clamping pressure.

(about $\frac{1}{64}$ in.), wait 15 minutes to give it time to absorb. Then roll it out again to get an even 0.012 in. as measured with your gauge and stack your laminates right away. While the manufacturer recommends a thicker epoxy layer, more epoxy just seems to make a mess, and the strength of these thinner bonds tests very well.

A good roller with an adhesive cover works well for applying either glue, and using a paint tray helps get an even load on the cover, making it easier and faster to get the right amount of glue on the wood. Don't underestimate the skill required for good glue application. Draw upon your inner painter and really focus on applying a perfect layer. It won't slow you down much, if at all.

The array of bending forms

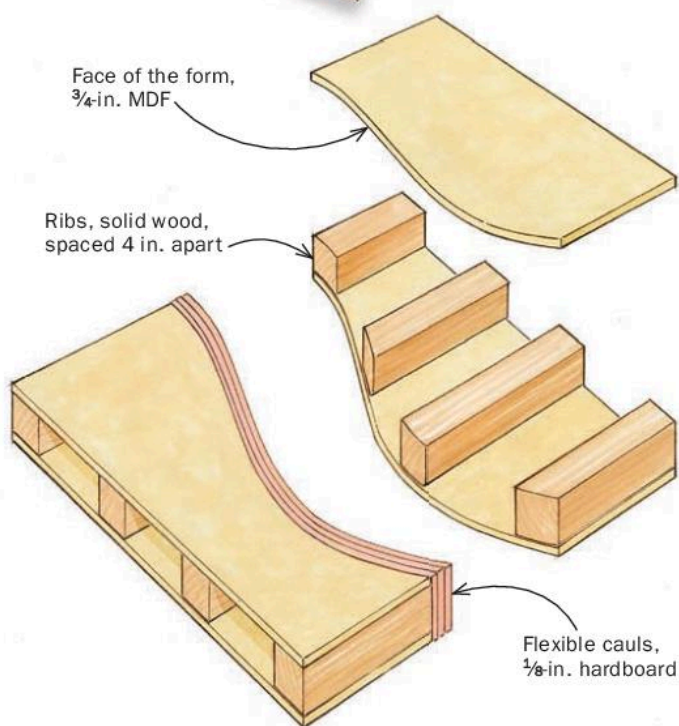
With the laminates and glue worked out, you just need a form to get bending. There are many kinds of bending forms and clamping systems; I'll describe the ones I find most useful.

Bending over a male form with straps—One of the most widely used techniques—a male form with an array of clamps—is workable, and I sometimes use it, but it doesn't make my list of favorites. When you use a single form and a lot of clamps it's difficult to get even pressure across and along the part. Instead you get areas of higher and lower pressure. Of all the processes I've used, this is the most cumbersome and time-consuming. I tend to avoid it.

Instead, when the curve calls for a single form, in my shop we typically use a vacuum bag or, if the part is too big for the bag, we bring out cargo straps. A cargo strap is a great way to distribute pressure evenly onto laminates on a male form. A heavy cargo strap can press a hefty stack of laminates to a fairly tight curve.

HOW TO MAKE A TWO-PART FORM

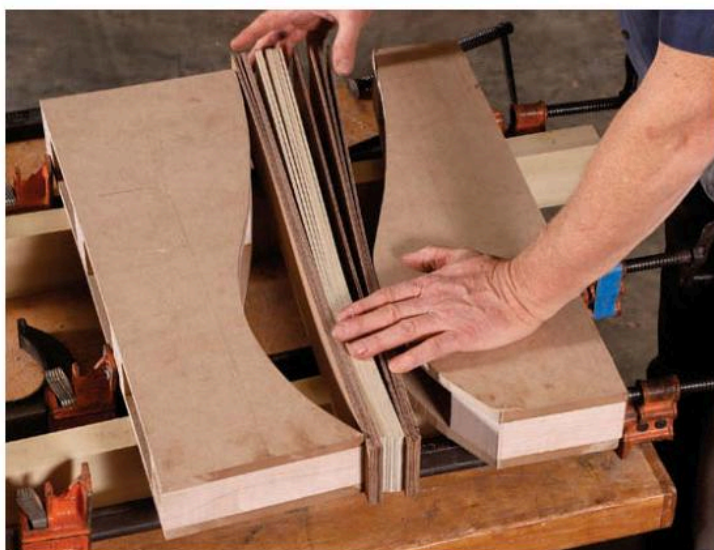
The halves of a curved, two-part bending form are designed to mate exactly only after the laminates and cauls are in place; if they match with nothing between them, the fit will be imperfect once the laminates and cauls are loaded. Boggs starts by gluing up a large rectangular blank made with two sheets of $\frac{3}{4}$ -in. MDF that sandwich solid-wood ribs. Next he makes a two-part template by drawing the centerline of the curved part he wants on a piece of MDF and sawing down the line. Then, to draw the lines along which he'll cut the form apart, he uses both halves of the template, one after the other—along with a washer that creates an offset. You can see an alternative two-part form for smaller bends in Skills Spotlight on p. 23.



Washer wizardry.

Boggs first traces one half of the template, using a shopmade washer to create an offset equal to half the thickness of the bending package: the stack of laminates plus the flexible cauls.

Then he pushes the second half of the template right up against the first and removes the first one. Again using the washer, he traces the second template. Then he saws carefully along the two curved lines.



Cauls perfect the curves. With the laminates in place but unglued, Boggs epoxies bendable cauls to each other and to both halves of the form. The epoxy allows the cauls to bridge minor irregularities in the forms. Once the cauls have been glued to the form and cured, you can apply glue to the laminates and begin producing parts.



LAMINATION WITH A VACUUM BAG

Vacuum bags are an ideal match for bent lamination. They provide perfectly even clamping pressure along a curve and across a wide surface. Typically, the bending form goes inside the bag with the laminates; but in some cases the form stays outside the bag.

BEND WITH THE FORM IN THE BAG...



Gentle bend. Creating a mild curve with a male form is a snap in the vacuum bag. Boggs applies Unibond 800 to the laminates and wraps them in polyethylene sheet for bending.



The laminates and form go into the bag. A modest bend like this requires no cauls; the vacuum bag easily pulls the laminates tight to the form.



Dual-purpose form. The bending form serves as a sled while Boggs rips one overhanging edge of the laminated workpiece. Because the vacuum bag works so well for pressing wide workpieces, Boggs often makes narrow parts by bending a wide workpiece and ripping it into strips afterward (right).



A clamp might be needed to tighten the laminates to the end of the curve, but the strap does the bulk of the bending very nicely. Do a dry run to see how the strap and the laminates behave. If the laminates get pulled toward one end, add an end block to the form to solve the problem. It's important to note that cargo straps work for continuous curves, but not for S-curved parts or parts that have flat sections.

Vacuum pressing with the form inside the bag—

A vacuum bag is a powerful tool for bent lamination, and a versatile one. When you want to bend a part with a shallow curve, just slide the male form and the laminates into a vacuum bag and presto—perfect clamping. You don't even need cauls; just tape the laminates in position and add a sheet of cardboard on top to protect the bag from tears. A thin layer of packing foam between the cardboard and the wood keeps the cardboard from sticking to the laminates.

The vacuum bag has no problem with wide parts; it exerts even pressure right across the surface. Since wide curving parts are so easy to laminate in the bag, I often bend multiple narrow parts as one wide blank, then rip them to width after they've been laminated.

Two-part molds—If you're after a more complicated curve—say an S-curve or one with straight sections—a two-part mold is a great way to go. But it will require more time to make the mold halves as they need to mate accurately in order to apply pressure evenly.

To make a two-part form, I start by building one big form blank and cut it in two along the lines of the curve. The trick to making mating forms is accounting for the thickness of the laminates and the cauls that you'll be squeezing between the halves of the form. If you don't account for that space, the two halves

...OR BEND WITH THE FORM OUTSIDE THE BAG



Three points of contact make a form. For one-of-a-kind curves, Boggs will sometimes bend laminates over a plank with a riser block on top. The angled ends of the plank and the top of the block represent three points on the curve he's after. He glues the angled cutoffs underneath the ends of the plank for clamp purchase.

won't mate properly. I create a two-part template of the curve I want and use it as a guide.

Simple bending over a block—When we are making a one-of-a-kind bend and have some leeway as to its exact shape, we'll sometimes use a technique I call bag and block. Instead of going to the trouble of building a form for a single bend, we'll use a plank and small blocks of wood to represent points along the desired curve; then we clamp the laminates to them. To make this work, we first wrap the laminates in the vacuum bag and start the pump. The vacuum pulls the laminates together in a stack and holds them tight while the whole thing, bag and all, is clamped to the blocks. There is hardly a faster or more freeing approach to bent lamination than bag and block.

Stop-cut lamination—In making outdoor chairs with curved back slats, I ran into an issue: The end grain of the slats faced straight up, exposing the most vulnerable part of the slat to the weather. I didn't want to subject gluelines to these extremes, so I developed what I call stop-cut lamination, which creates a component that is part solid and part bent-laminated. You might use the same technique for legs that bend only at the bottom, or for other parts that are part straight and part curved.

To create the part, we start with a blank just a bit longer and wider than finished size. Instead of cutting the blank all the way from end to end to generate laminates as with other bends, we stop the cuts, staggering the end points of the kerfs so they don't create a weakness in the part. Once the kerfs are cut we fill them with veneers we've milled to just the right thickness. A measured amount of epoxy on both sides of a veneer makes for a good bond.

We bend these slats in a two-part form, but depending on what you are building, you could use a different approach. When using stop-cut lamination, be sure



Wrap the laminates. Putting the laminates into a vacuum bag with moderate suction pulls them together but leaves them somewhat flexible.



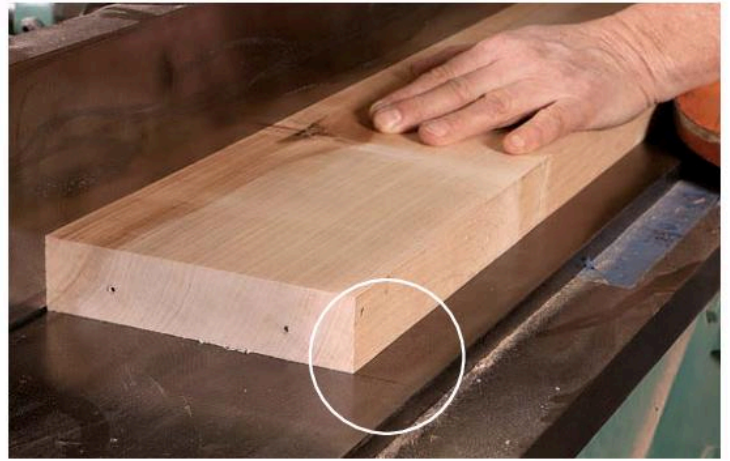
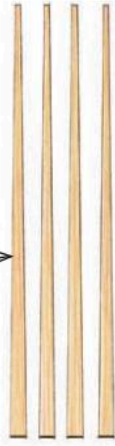
Clamps create the curve. A couple of C-clamps at each end bend the bagged laminate package to the desired curve.

TAPERED BENT LAMINATION

If you want to make a curved part that's also tapered, simply taper the laminates. Boggs tapers laminates with a tapering jig that works both on the bandsaw and in the planer.



Create variable width parts using tapered laminations.



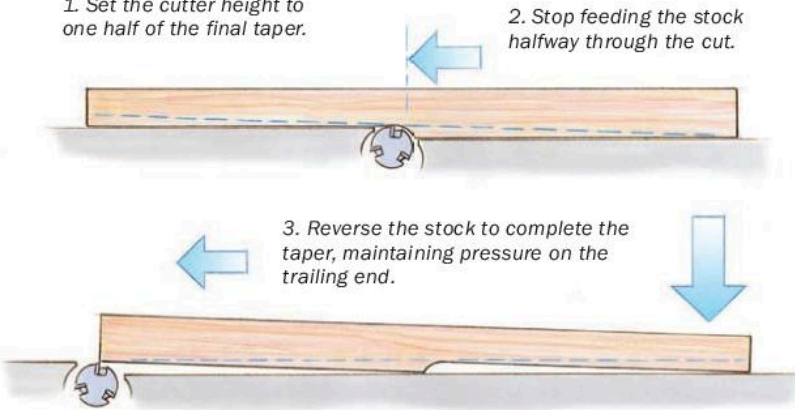
Jointer makes the sloped sled. To create a sled that's tapered in thickness from end to end, Boggs first joints to halfway along the board and stops (above). Then he lifts the board and makes a full pass (below).

MAKE A TAPERING JIG ON THE JOINTER

1. Set the cutter height to one half of the final taper.

2. Stop feeding the stock halfway through the cut.

3. Reverse the stock to complete the taper, maintaining pressure on the trailing end.



Taper jig on the bandsaw. After a stop block is added at the end, the taper jig is ready for use. Push it and the laminate blank through together, with the jig riding against the bandsaw's fence.



Taper jig becomes a taper sled. The same tapered plank can be used as a sled to smooth the laminates in the planer or drum sander.

STOP-CUT LAMINATION

When he wanted to make workpieces that were partially bent laminated and partially straight and solid, Boggs devised a system of stopped kerfs filled with veneer.



Incomplete kerfs. Boggs makes the stopped cuts on the bandsaw, locating the kerfs by inserting a series of shims between the workpiece and a short fence. He stops the cuts in a staggered pattern to avoid creating a weak spot in the workpiece.



Veneers slide in to fill the kerfs. Having produced veneers just thick enough to fit the bandsaw kerfs, Boggs glues them up and slides them home. He uses epoxy here since the sawcuts can't be smoothed. For bent-laminated workpieces with a reverse curve, a two-part mold is best, ensuring pressure all along the piece.

the kerfs go past the end of the curved section of the workpiece. Otherwise the solid section will cause a kink in the curve, and the form won't press the veneers evenly.

Tapered curves—With bent lamination you can make a curved part that is also tapered: just taper the individual laminates before bending them. A simple taper sled can serve for both bandsawing and smoothing. At the bandsaw you hold the laminate blank against the sled and slide the sled against the fence. Then use the same sled in a planer or sander. If need be, use double-sided tape to hold the laminates to the sled. □

Brian Boggs makes furniture in Asheville, N.C.

Shaker Berry Box

Shakers made these little, clear white pine carriers for gathering raspberries, strawberries, blueberries, and blackberries. When you're not hunting berries, you can use them around the house to hold mail, trinkets, or any small treasures. The design really lends itself to making multiples. They are fantastic gifts whether they are used to hold treasures or are the treasures themselves.

A basic box

Since the sides are all $\frac{1}{8}$ in. thick, you can easily resaw them from thicker stock, using either the bandsaw or tablesaw with a thin-kerf blade. All four corners of the box are finger-jointed, which can be tricky to set up, but once you get the hang of it you'll love how easy it is and how nice it looks.

First, to make nice-fitting finger joints you should have a flat-top blade (Forrest WW10401125). Regular alternate-top-bevel blades will leave tiny cat ears on each edge of the cut. Clamp a plywood auxiliary fence

to your miter gauge, extending about 4 in. past the blade. Set the blade height to $\frac{5}{64}$ in., which will make your finger joints about $\frac{1}{64}$ in. proud. Make one cut through the fence, and remove it. Cut a piece of hardwood exactly $\frac{1}{8}$ in. thick by $\frac{5}{64}$ in. wide by $1\frac{1}{4}$ to $1\frac{1}{2}$ in. long. This will be your registra-

tion pin. Glue it into the sawkerf you just made in the fence, positioning it flush in the back and extending forward toward the sawblade. To establish the spacing between the finger-joint cuts, I place a $\frac{1}{8}$ -in. chisel between the registration pin and the right side of the sawblade tooth.

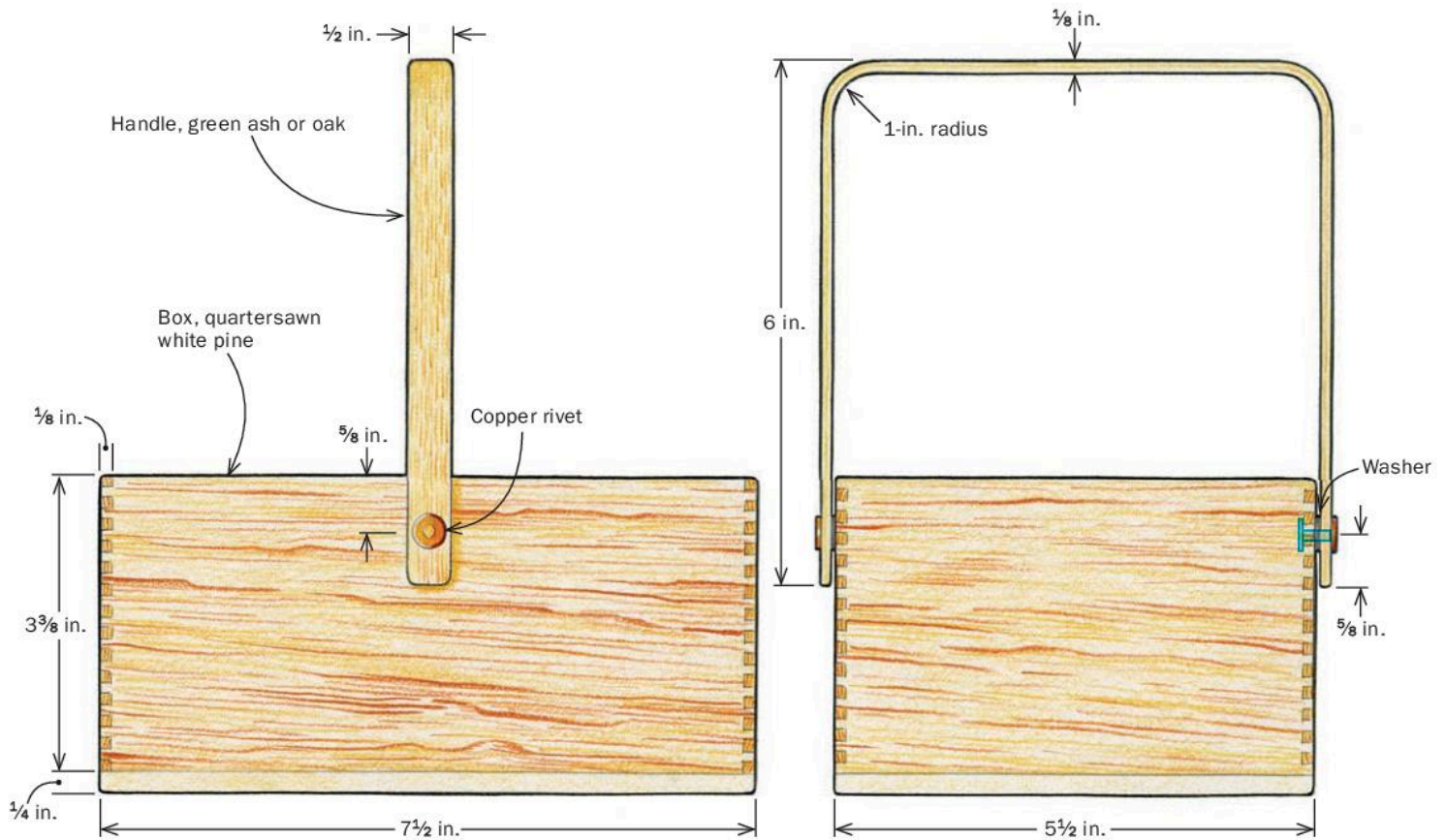
Next take two test pieces, with the grain going vertically, and tape them together. Hold them upright against the fence, slide them over to the pin, and make the first sawkerf.

Now fit the sawkerf over the pin. It should fit snugly, with no play. Make the second cut, and repeat until you reach the other end of the scrap pieces. Remove the tape and see if the finger joints interlock properly. If the fingers are too loose, move the pin away from the blade a slight amount and re-clamp. If the fingers are too tight, move the pin slightly closer to the blade. Once you have it set up, you can make finger joints all day long.

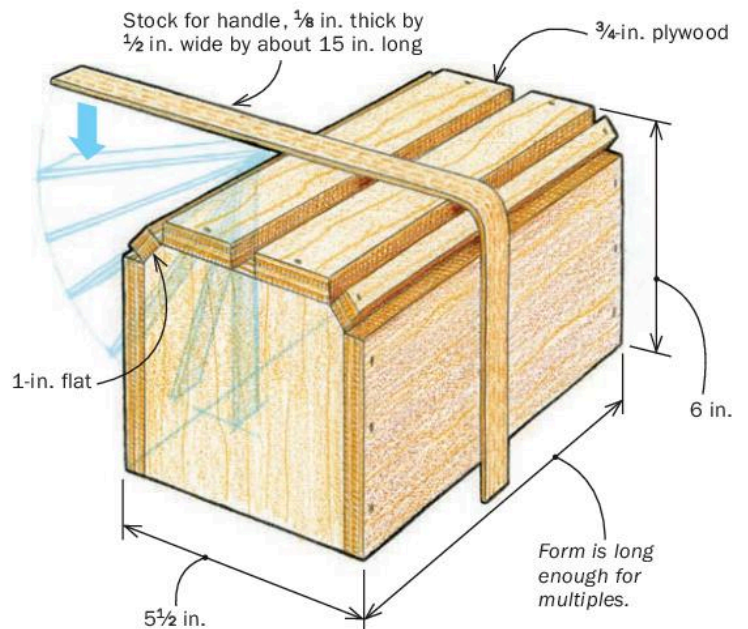


A small project with minimal materials but a big payoff

BY CHRISTIAN BECKSVOORT



BUILD A BENDING FORM

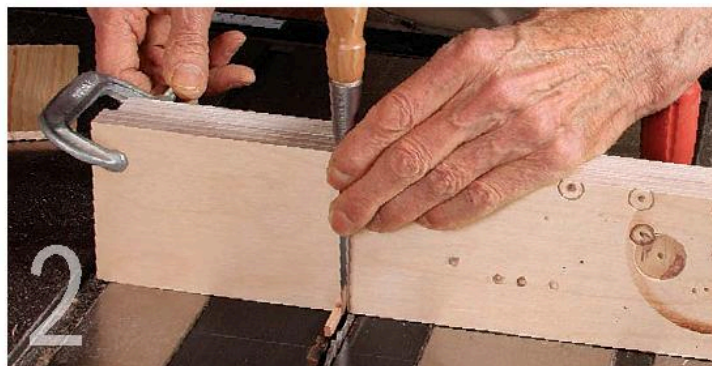


Small-scale finger joints for a diminutive box

Though this box looks delicate because of its thin elements, it is quite sturdy. The finger joints create dozens of long-grain to long-grain glue surfaces, and the proportions of the tiny fingers add a beautiful and subtle detail to a spare design.



1 **Make an auxiliary finger-joint fence.** Clamp a piece of $\frac{3}{4}$ -in. plywood to the miter gauge, and use a flat-top blade to make one cut through the plywood. Glue in a hardwood pin the thickness of the sawkerf, locating it flush in the back and extending about $1\frac{1}{2}$ in. at the front.



2 **Position pin fence on the miter gauge.** Becksvoort uses a $\frac{1}{8}$ -in. chisel to align the auxiliary fence on the miter gauge. He sandwiches the chisel between the right side of the blade tooth and the registration pin in the fence. Then he clamps the auxiliary fence to the miter gauge.



3 **Do a test run.** Tape two pieces of scrap together. To make the first cut, hold the pieces vertically against the fence, butted up to the registration pin. After the first cut, slide the pieces to the right so the first cut straddles the pin. Make the next cut and repeat across the ends of the workpieces. Pull them apart and make sure everything fits correctly. There will be a $\frac{1}{8}$ -in. offset on the top and bottom.



4 **Stack and cut.** With the spacing figured out, you can quickly cut all the parts. You can do them one at a time, but for speed and efficiency Becksvoort stacks and tapes all four sides for one box together and cuts them all at once, one end at a time.

Glue the box



Glue and clamp. Run a thin bead of glue along the edges, and use a wide brush to get the glue between all the little fingers. Check for square and clamp until dry. Becksvoort applies pressure vertically rather than along the sides of the box.

You can cut each end of each side individually, but I gang all four pieces with one end flush and tape them together. Cut the kerfs in all four at once, flip, re-tape, and repeat with the other ends. If your cuts were precisely $\frac{1}{8}$ in. and if your stock was precisely $3\frac{1}{2}$ in. wide, then you'll end up with a finger at both ends. You can either glue the parts together, offset by one finger, and plane, joint, or saw off the $\frac{1}{8}$ -in. strips afterward, or you can trim the sides before you glue them.

A simple bottom

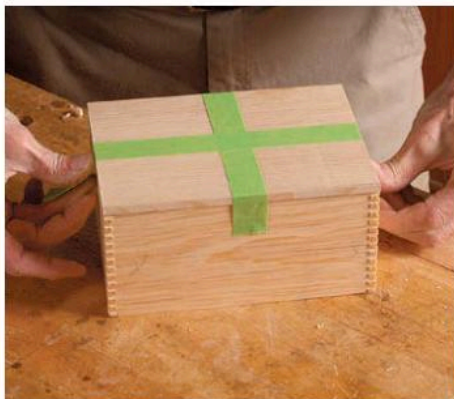
Quartersawn white pine is the most well behaved of all native American woods. The Shakers used it for most all their oval box bottoms and lids, as well as the bottoms of lap desks, which were up to 12 in. wide. And I use it for this kind of work. I glue the thin, quartersawn bottoms directly onto the bottom of the box without worrying about movement.

It's easiest to go to the lumberyard and search through the stacks for quartersawn planks, looking for pieces where the growth rings on the end are perfectly perpendicular to the face of the board. Or you can make your own. Start with a piece of $8\frac{1}{4}$ flatsawn white pine, and make marks at both ends where the growth rings are most perfectly parallel to the face. Connect those points with a straight-edge and bandsaw along that line. Plane or joint the bandsawn edge and saw off whatever

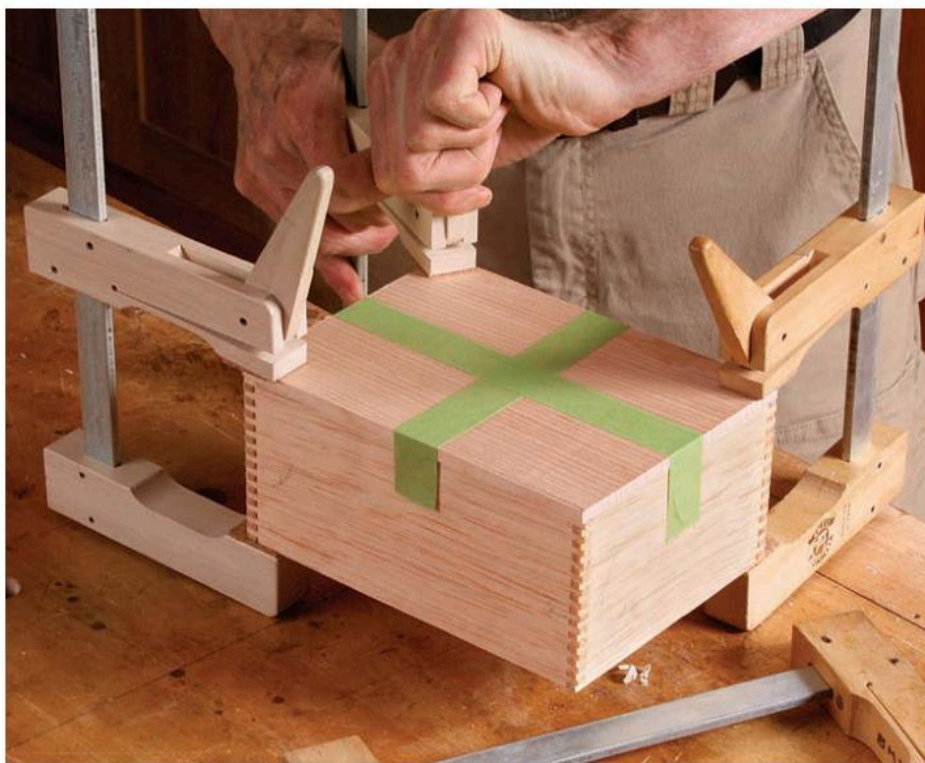


Plane away the offset. Once the box is glued together, Becksvoort planes the top and bottom so all the sides are flush.

Add the bottom



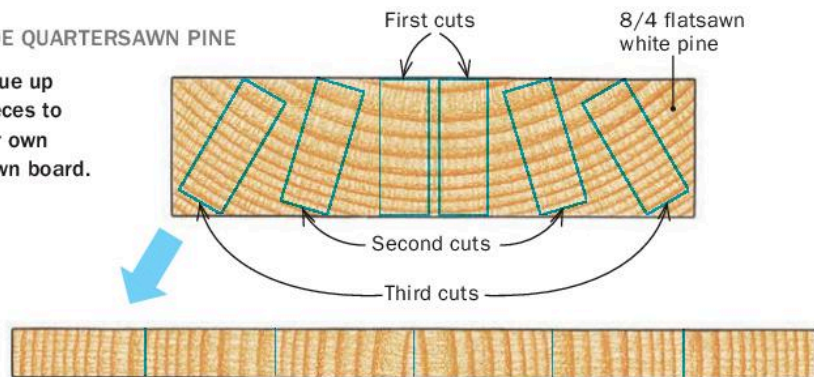
Add a bottom. Because perfectly quartersawn white pine will hardly move, you can glue and clamp the $\frac{1}{4}$ -in.-thick bottom directly to the box. Be sure that the bottom edges of the box are flush all around. Tape the bottom in place so it doesn't slide when you apply clamping pressure.



DIY quartersawn pine. Quartersawn white pine is commonly used in smaller Shaker pieces. If you don't have a good source you can make your own by selectively cutting and gluing pieces of an 8/4 board back together.

SHOPMADE QUARTERSAWN PINE

You can glue up narrow pieces to make your own quartersawn board.



thickness you're looking for. Repeat this process, and as the grain in the blank begins to curve, joint at an angle to produce another quartersawn strip. When you have four, six, or eight pieces, edge-glue them. Voila! Quartersawn white pine at minimal cost.

Now glue on the bottom. Flush all the edges. Place a thin bead of glue along the edges and clamp or tape it into place.

Bend it like Becksvoort

To make the handle, first make a bending form from scrapwood or plywood. The length of the form depends on how many box handles you plan to make at once. I batch small projects like this to have on hand, so my form is long enough to bend multiple handles.

If you have access to green ash or oak for the handle, that's great. You can cut a small sapling or branch. First, split the branch to follow the grain, then joint the face and one edge, and cut to size on the tablesaw or bandsaw.

Or you can use kiln-dried wood, soaking it in warm water for about 15 minutes to make it more pliable. Clamp one end of the handle strip to one side of the drying block, pull it tightly over the top and down the other side, and clamp there as well. You can air-dry it for a few days, place it near a heat source, or use a hair drier to speed drying. Once the handle is dry, drill $\frac{5}{64}$ -in. holes centered in each side of the box and about $\frac{1}{2}$ in. from each end of the handle. Test the fit to see that the handle clears the corners of the box at both ends. Smooth the edges of the handle and round the ends slightly. Get two washers and a pair of copper or brass rivets, $\frac{1}{8}$ in. by $\frac{1}{2}$ in., from the hardware store or Lee Valley (no. 33K62.01). Place the rivet head through the basket from the inside, then add a washer, the handle, and the other end of the rivet. Place the inside of the basket over the corner of the tablesaw, jointer, or a good anvil and tap the end of the copper rivet with a hammer to peen it over. Don't make it too tight; it should swing freely. Do the same thing to the other side.

You can leave the box unfinished, apply wax only, or use your favorite food-safe finish or even your favorite furniture finish. □

Christian Becksvoort is a furniture maker in New Gloucester, Maine.

Online Extra

Come along with Anissa Kapsales and Chris Becksvoort as they pick berries and discuss a wide range of topics. FineWoodworking.com/278.

Bend and attach the handle

Soak and form the handle. Green wood is ready to go, but kiln-dried wood should be soaked in warm water beforehand. Bend the strip over the bending form and clamp it in place to dry for a few days.



Attach the handle. Drill holes in the box and handle. Place the rivet through the side from the inside. Add a washer, the handle, and the other end of the rivet. Place the inside of the basket over the corner of the tablesaw, jointer, or anvil, and tap the end of the copper rivet to peen it over.





Open the Door to Japanese Joinery

Cut a scarf joint to learn the basics

BY ANDREW HUNTER



Lock with a wedge. A tapered pin drives the two halves together, creating a rigid connection that can also be knocked apart later.

Traditional Japanese joinery, with its intricacy, precision, and strength, is awe-inspiring, and very enticing to any woodworker. But learning how to cut these joints can be a challenge regardless of your skill level. Layout doesn't rely on straight and square reference faces, and determining the order in which to cut things can be tricky.

The joint in this article, the kanawa tsugi, translated as a half-blind tenoned, dadoed, and rabbeted scarf joint, is an excellent place to start. Used in Japan for centuries to splice two members together end to end, it creates a single longer one capable of sustaining multidirectional forces.

Layout is the hardest and most important part of the joint. Instead of working off two straight and square reference faces adjacent to each other, everything works off a centerline. You'll also use an ingenious story stick that, with five layout lines and a precise width, contains the keys to the whole joint.

I prefer to cut this joint by hand, as I've found no advantage in using power tools. But don't feel limited to using Japanese tools, as I do. This scarf joint can just as well be made with Western tools and work-holding methods.

Story stick tells the whole tale

Many of the dimensions in this joint are $\frac{5}{8}$ in., especially around the T-notches, so my story stick is $\frac{5}{8}$ in. wide and has a $\frac{5}{8}$ -in. square in its middle. It also has marks showing the total length of



AN EXCEPTIONAL PAIR

Like other scarf joints, the kanawa tsugi lets you join two pieces of wood end to end, with its T-shaped notches providing exceptional strength. In the article, I'll be cutting only one half of the kanawa, but to complete the joint, you'll have to cut both halves. The two are identical.

LAYOUT BASED ON CENTERLINES AND A STORY STICK



Draw the centerlines. After laying out the centerlines on the ends, Hunter uses a straightedge to connect them along all four faces. This lets him deal with stock that may be warped or out of square.

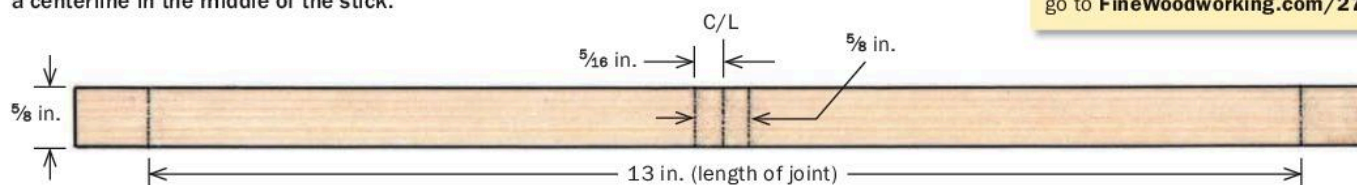


Draw layout marks on a story stick. The story stick is overlong, letting you draw the length of the joint. The stick is $\frac{5}{8}$ in. wide, and it has a centerline with marks $\frac{5}{16}$ in. away on either side, giving you a $\frac{5}{8}$ -in. square in the middle. Square these lines down the stick's edges.

the joint, in this case 13 in., so make the story stick slightly longer than the joint. To make the joint shown here, I used stock that was $3\frac{1}{2}$ in. square, but don't feel limited to this. The members can certainly go bigger—in traditional Japanese house construction, posts are often about 5 in. square—in which case $\frac{5}{8}$ in. remains a viable standard. In fact, this dimension is the width of a Japanese framing square, which is used in Japan to lay out this joint. If you use smaller stock, though, I recommend reducing this dimension. At 3 in. square, drop to $\frac{1}{2}$ in.; at 2 in. square, try $\frac{1}{2}$ in. or $\frac{3}{8}$ in.—whichever looks better to your eye. The size of the stock dictates the joint's length, too, which is generally three to four times the width of the workpiece.

STORY STICK FOR SPEEDY LAYOUT

The stick is $\frac{5}{8}$ in. wide, a dimension that appears a lot in the joint, especially around the T-notches. Making the stick this width expedites layout. To help even more, mark the overall length of the joint and draw a $\frac{5}{8}$ -in. square and a centerline in the middle of the stick.

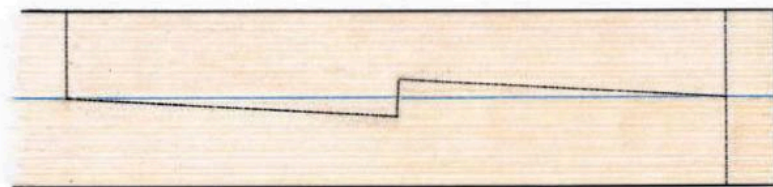


Online Extra

For more on using centerlines, including how to lay them out on irregular stock, go to FineWoodworking.com/278.

Laying out the kanawa joint

1. BEGIN WITH THE SCARF



SIDE VIEW

1) Angle the story stick so that the end marks on opposite edges of the story stick align with the center line.

3) Mark the length.

2) Trace the scarf faces.

4) Mark the step.

Step is square to the scarf. Lay a flat square along the scarf face and use it to connect the two step marks. This is the only line that runs perpendicular to the scarf faces.



Square the length marks around the workpiece. Reference off the centerline now and for the rest of the layout.



Angle the story stick across the centerline and transfer the layout marks. Trace the two sloping scarf faces and transfer the length marks. Be sure to leave waste at the butt end of the joint. Do the layout on both sides of the workpiece.

Centerlines guarantee mirror images

The simplest and most accurate way to lay out this joint, and many others like it, is using centerlines on each face—essentially X-Y axes. During layout, all measurements and angles originate from these centerlines, not the outside edges. It may be confusing at first, but it's ultimately quite liberating. It lets you seamlessly join any two pieces whether they're milled square and true, as they are here, or irregularly shaped from a log. (Another reason I prefer hand tools here: I'm not limited to flat and square reference surfaces.)

There are many ways to establish these centerline axes, which must be coplanar and square to each other. I start by leveling the workpiece before marking the center point on each end. Next I use a level to draw level and plumb lines intersecting these points. To double-check the layout, I use long winding sticks tacked to the lines. I finish by using a straightedge to connect these axes along the workpiece's faces.

Lay out one side at a time

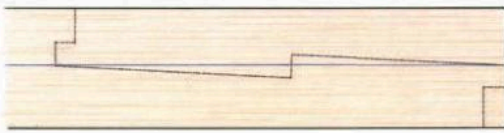
The two halves of the joint are nearly mirror images, so if you can lay out (and cut) one half, you can handle the other.

I recommend laying out one side entirely before the other. Begin by angling the story stick so its end marks

2. ADD THE NOTCHES



TOP VIEW



SIDE VIEW



BOTTOM VIEW

on two opposite edges touch the centerline. Hold the stick down tight and transfer the sloping scarf faces and the end points. The two scarf faces are parallel and $\frac{5}{8}$ in. apart, so lay them out by tracing on either side of the stick. Take into account any flaws in the stock, placing them in the waste.

Without moving the stick, draw the two ticks for the step, which is one wall for the wedge that will lock the joint.

Now you can extend those marks. The step is square to the scarf faces, so register the square on one of the scarf lines when drawing the step line.

To draw the length of the joint, wrap the end marks around the stock. These lines need to be perpendicular to the centerline, so register a flat square off of the centerline when drawing the lines around the beam. If you don't have a flat square, a piece of MDF or plywood with a square corner will do the job.



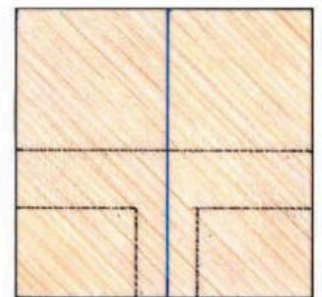
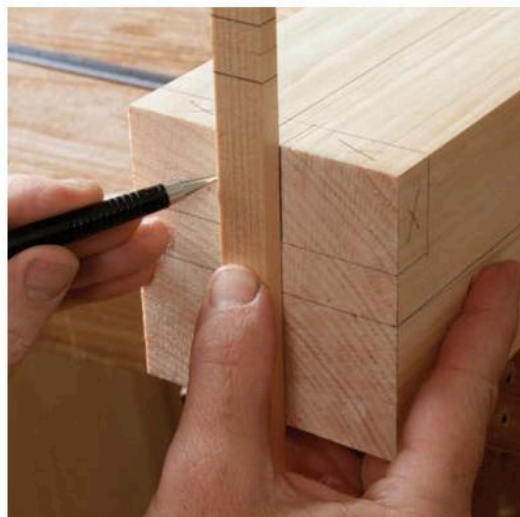
Begin with the interior T-notch. To establish the depth of the notch, use the full width of the stick. For the centered square, align the stick's centerline with the workpiece's and transfer the $\frac{5}{16}$ -in. marks (top) before tracing the stick's width to connect them (left). You'll finish laying out this notch after making preliminary cuts.



Work on the end T-notch. Use the story stick the same way as for the interior notch, this time drawing the joint on the sides and bottom of the workpiece.



Square up the end of the joint. Saw carefully around the stock, staying as close to the layout lines as you feel comfortable. End grain is hard to clean up.

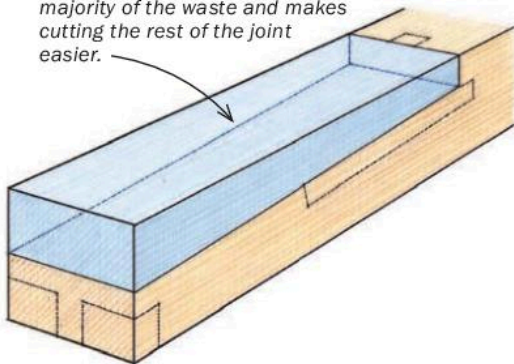


Complete T-notch layout on the end of the workpiece. With the workpiece cut to length, use the story stick to connect the lines for the end notch. Mark the waste as well.

Make the scarf

1. SAW OUT THE BULK OF THE WASTE

A pair of sawcuts removes the majority of the waste and makes cutting the rest of the joint easier.



Long angled rip is the first cut. Saw as close to the scarf line as you feel comfortable. Since this is long grain and can easily be planed to the line afterward, Hunter plays it safe, staying about $\frac{1}{16}$ in. away.



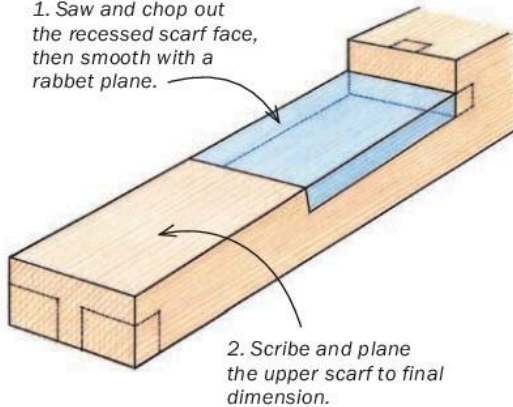
Wedge keeps kerf from closing as you saw. This is a long rip, and the farther you go, the more likely it is the kerf will pinch shut and bind your saw. A long, thin wedge prevents this from happening.



Crosscut frees the waste. Don't stop when you reach the angled rip, but saw down to the lower scarf face.

2. CLEAN UP THE FACES

1. Saw and chop out the recessed scarf face, then smooth with a rabbet plane.



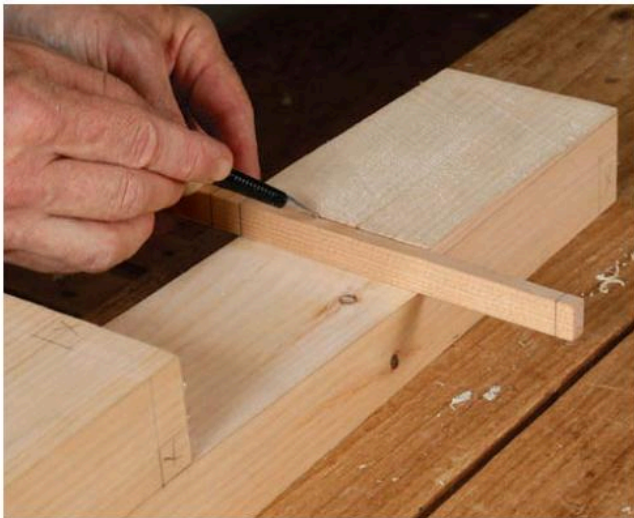
Crosscuts down to the lower scarf. Since you'll remove the majority of the waste here with a chisel, start with a series of crosscuts to sever the fibers, stopping short of the layout line.



Chisel out the bulk of the waste. Start with heavy chops away from the line before switching to controlled paring cuts as you approach it. Work in from both sides to prevent blowout. Avoid undercutting this surface, as that will make future layout more difficult.



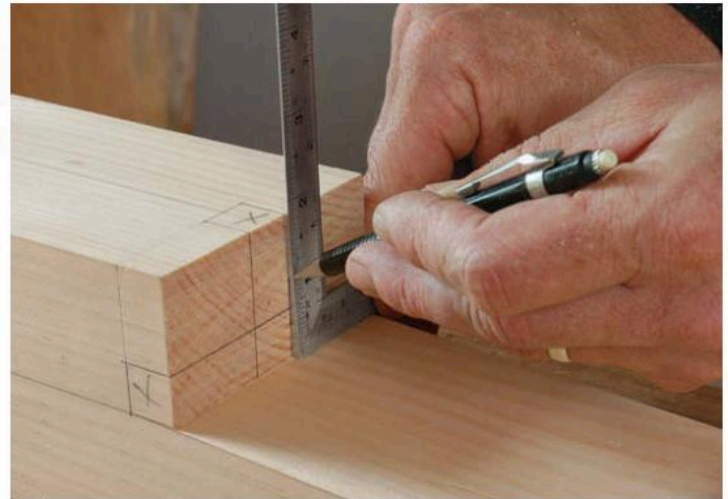
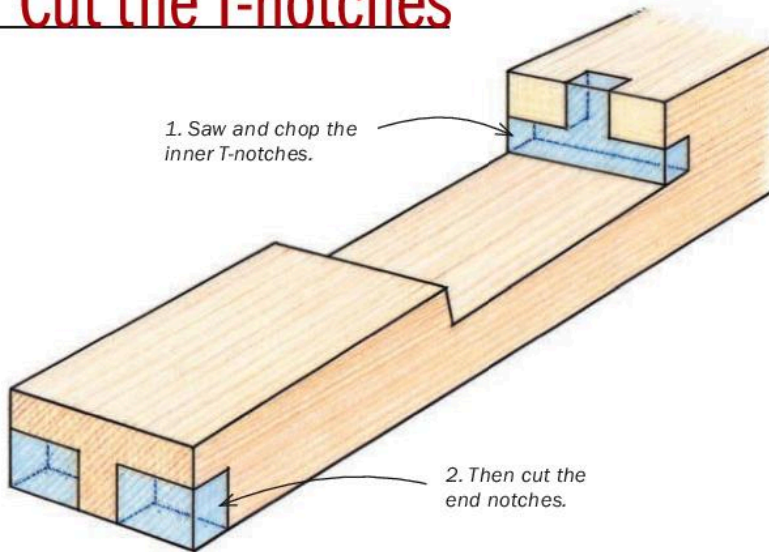
Plane to the layout line. Hunter uses a rabbet plane so he can plane right up to the joint's shoulders.



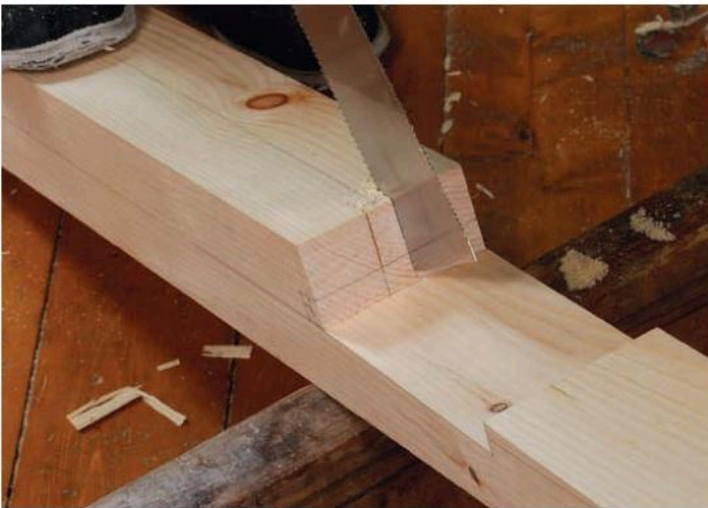
Draw a layout line across the step before planing the upper scarf. Use a straightedge to connect the upper scarf's side layout lines. This way, you have layout lines on all four sides of the upper scarf, letting you monitor your planing much more carefully.



Cut the T-notches



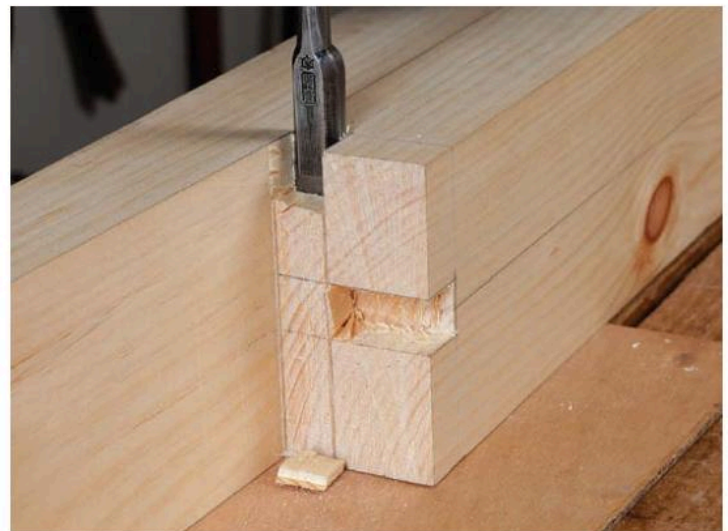
Bring layout lines onto the end grain. Use a flat square for this layout. If you undercut the lower scarf, place a straightedge across the joint so you can reliably register the square.



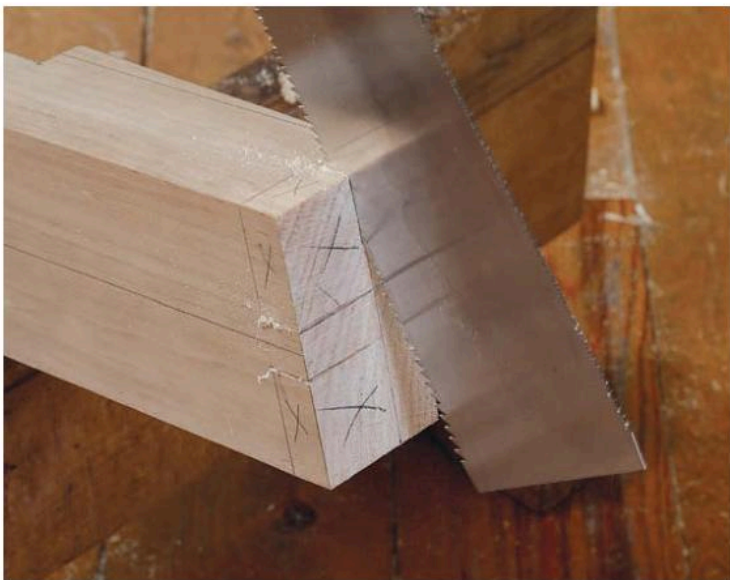
Start with rips. Saw the side walls of the vertical slot (above) and the upper wall of the horizontal slot (right).



Use a shim for the lower wall of the horizontal slot. The shim elevates the saw just above the layout lines, leaving a bit of waste to pare with a chisel.



Chisel out the T-notch. The slot is $\frac{5}{8}$ in. wide, so use a $\frac{5}{8}$ -in. chisel. To prevent blowout, work in toward the middle from all ends of the notch.



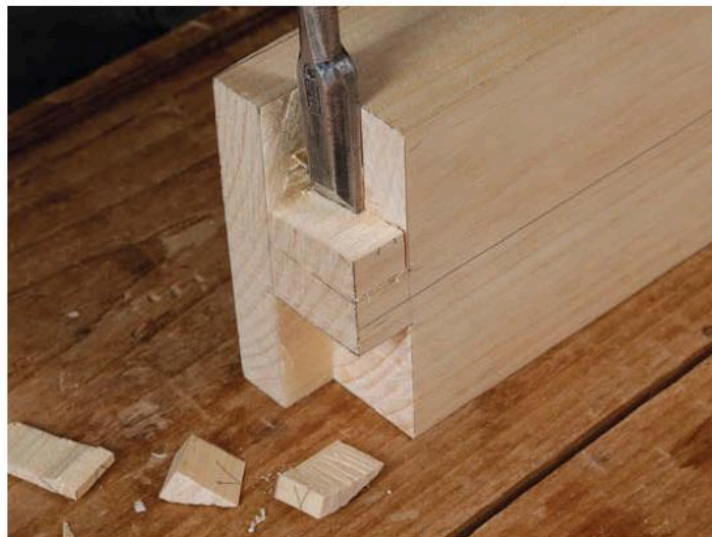
Start sawing the end T-notch. Cut the rips before the crosscuts. Hunter uses an offcut to support the workpiece.

With the length lines drawn, you can start laying out the T-notches. You'll continue laying these out as you make cuts, since right now there's waste in the way. Making preliminary marks now lets you connect the lines later.

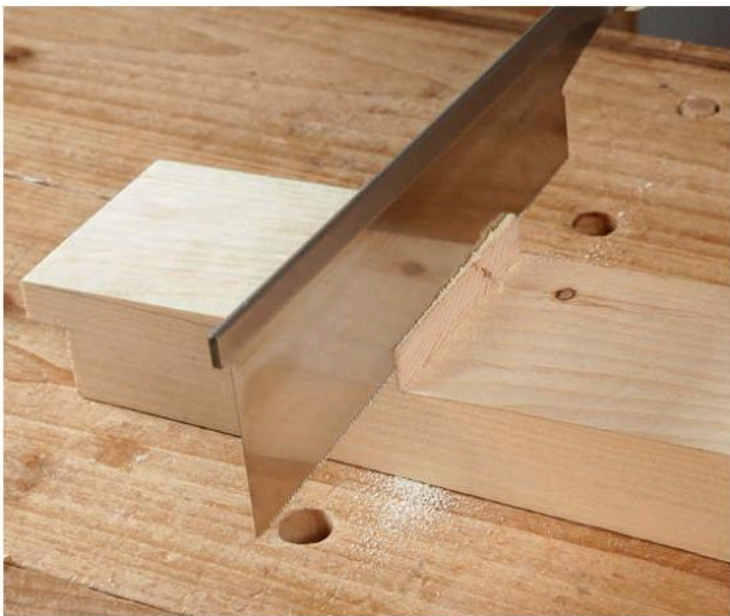
This preliminary layout for the notches is done almost entirely with the story stick. Depending on which section of the notches you're laying out, you'll use either the width of the story stick or, if it's the part of the notch centered on the workpiece, the $\frac{5}{16}$ -in. marks in the middle of the story stick. For this, just align the stick's centerline with the centerline on the workpiece.

Cutting the joint

I am careful to not go over my layout lines when sawing. Rips are easy to clean up, so I tend to give myself extra room there. Conversely, when making crosscuts, I try to saw to the line, since end grain is a lot harder to pare. Still, it's more important not to go over the line, so if you're less confident in your

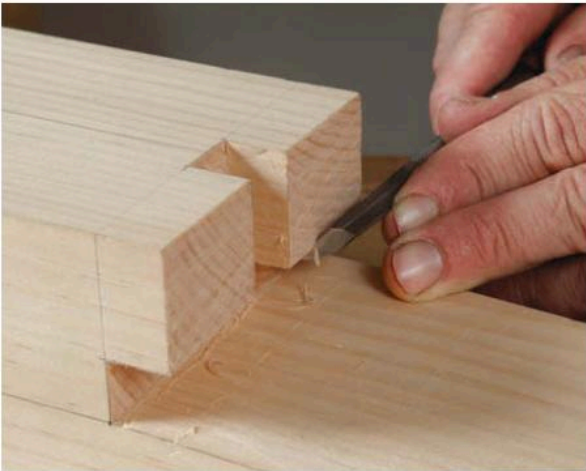


Chisel to the line. Start with rough chops to remove much of the waste before lightly paring to the line.



Wedge needs a taper. For the wedge to work, saw a $\frac{1}{16}$ -in. taper on the step of one half of the joint (left). Then make a hardwood pin to fit (above). Make the pin overlong so you can trim it flush later.

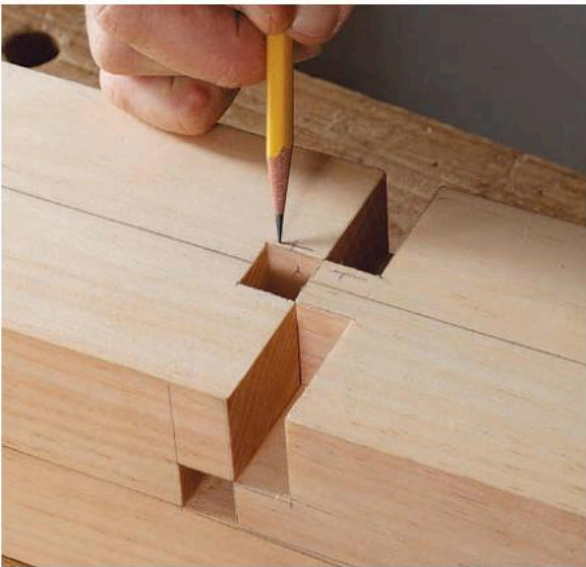
Fine-tune the fit



Chamfer unseen corners. This lets the joint slide together more easily and prevents splitting.



Give it a squeeze. Place one half on top of the other and press the joint together with a few light hammer taps to test the fit.



Mark the high spots. Look for areas where the joint compresses too much, and check to see whether there's still waste beyond your line. After taking the joint apart, carefully pare back these areas.



Don't hesitate to bang it apart. While you are fitting the *kanawa tsugi*, it can be difficult to take apart. This joint has a lot of mating surfaces, and there can be a lot of compression. To separate the two parts without marring them, Hunter clamps a scrap to one half and hammers on it.

sawing, cut away from the line and carefully pare to it.

First cut the workpiece to length. With it trimmed to size, complete laying out the T-notch on the end. Next, make the long ripcut for the upper scarf, and free the waste piece with a crosscut.

To begin clearing out the lower scarf, make a series of crosscuts down to the sloped line. Then use a wide chisel to remove the bulk of the waste. As I get close to the line, I switch to a paring chisel, then finish with a rabbet plane.

While you can undercut the face of the lower scarf, I don't recommend it. The next step is to lay out the T-notch on the inside of the joint by transferring the initial layout marks down the end grain. To do this, I register a flat square on the lower scarf. If you undercut this face, you lose your reference surface. If you do undercut it, however, lay a thin straightedge across the face and

reference your square off that. Cutting out the notches is pretty straightforward: Saw out at much as you can and chisel to the lines. Having a $\frac{5}{8}$ -in. chisel here—the same width as your story stick—expedites things.

The two halves of the joint are identical and made the same way, but you'll likely need to test the fit a few times to find and correct any high spots. Pay close attention to the T-notches, as high spots here can act as wedges and split the stock.

When both sides fit, taper one step to accept a hardwood wedge. This taper is $\frac{1}{16}$ in. over the joint's width. Prepare the wedge blank oversize and plane it to fit. Drive the wedge home and trim it to length. Flush the two halves of the joint with a handplane. □

Andrew Hunter is a furniture maker in Accord, N.Y.



Inspiration for our readers, from our readers

JOHN KRUIS

Columbia, Pa.

Kruis saw this serpentine chest of drawers in a book he borrowed from Steve Latta, who was one of his teachers in the Cabinetry and Wood Technology Program at Thaddeus Stevens College in Lancaster, Pa. "My absolute favorite part of the piece, and what first caught my eye, is the way the serpentine flows into the cant of the corners and back into the case sides." This was one of the student pieces featured at Fine Woodworking Live 2019.

MAHOGANY WITH SATINWOOD INLAY, 29D X 41W X 38H

Photo: Andrea Marti



JOHN BARFIELD

Toledo, Ohio

When designing this shelf, Barfield's goal was to create an open space to display studio art glass. It needed to be heavy enough to provide solid, stable support for the glass without overwhelming the art. "The minimalist design offers shelter, but the art remains accessible," Barfield says, adding a favorite Einstein quote: "Everything should be made as simple as possible, but not simpler."

WHITE OAK, 21D X 30½W X 68H

ROBERT CHERRY

Pipersville, Pa.

To go with a table he built, Cherry made 15 of these Greene and Greene dining chairs, based on a design for the Gamble House adapted by Darrell Peart and Bob Lang. Here are a few stats on this huge project: 315 board feet of sapele, 405 square ebony plugs, 120 ebony splines, and nearly 600 hours of work.

SAPELE AND EBONY
21D X 22W X 43H





MILTON MIZELL

Miami Shores, Fla.

The patterns in Mizell's box were inspired by African fabrics, designs, and colors. The ribbed posts were meant to evoke impala antlers, hence its name, "Impala Box."

SAPELE, WENGE, CURLY MAPLE,
ZEBRAWOOD, AND WALNUT
10D X 13½W X 4½H

ALEXANDER TOLINI

Asheville, N.C.

When designing his "solarium lounger," Tolini says he wanted to create a piece that looked somewhat fragile and slender yet invited relaxation. The sleek appearance of the Shaker tape seat and the negative spaces in the frame help contribute to that overall feeling.

SAPELE, 28W X 84L X 48H

Photo: Michael Traister



LUCIEN GARAND

Northfield, Vt.

This is Garand's take on the *kaidan dansu*, a Japanese stair cabinet. In keeping with the old traditions of Tansu cabinets, it has a number of secret compartments. About halfway through building this piece, Garand decided to add "another level of complexity to the project," and installed a kumiko grid in the doors with a design called *asa-no-ha* (hemp leaf). Shoji paper behind the kumiko finishes the doors.

CHERRY WITH BASSWOOD KUMIKO
17D X 86½W X 66¾H

EBEN LOVEJOY

Oakland, Maine

After making several cabinets in a similar vein, Lovejoy made this sideboard as the culmination of his designs in the rustic style. "I had been saving these beautiful 1890s circular sawn hemlock boards, along with ash bark I had peeled earlier in the spring," he says. "This piece was a lesson in shapes, composition, and embellishment that I don't get to experiment with in my everyday pieces."

HEMLOCK, SPRUCE, ASH BARK, AND TWIGS
20D X 70W X 36H



DYLAN GREEN

Portland, Ore.

The Vidar chair has a rich tradition at The Krenov School and this year Green was the student in his class who got to make it. "While this chair was difficult to build, it was pivotal in me becoming the woodworker I am today," Green says. The chair was designed by Vidar Malmsten and the original was built in James Krenov's basement workshop in Sweden.

WHITE OAK, 17D X 20W X 32H

Photo: Todd Sorenson

PHILIP A. GRUPPUSO

Seekonk, Mass.

This stand of figured maple, which can be adjusted for tilt and height, expands to hold five sheets of music. Detachable extensions click into place using dowels and magnets along the edges. Gruppuso designed it for a violinist who wanted to avoid page turning.

CURLY AND BIRD'S-EYE MAPLE
14D X 44W (WITH EXTENSIONS) X
38-60H



DESIGN IN WOOD 2019

Each year, the San Diego Fine Woodworkers Association (sdfwa.org) puts on this juried exhibition in association with the San Diego County Fair. It's always a fertile place to spot excellent furniture and other woodcraft. Here are three pieces from the collection of furniture at the 2019 show that we especially liked.



DAVID NORGARD

Cardiff, Calif.

The walnut for Norgard's cabinet came from an urban salvage tree, and he designed the piece originally as a wedding present for a friend. Inspiration for its concealed drop-front hardware came from Michael Pekovich's Chelsea writing desk. George Nakashima's Odakyu Cabinet inspired its kumiko panel.

QUARTERSAWN BLACK WALNUT AND BASSWOOD KUMIKO
12D X 30W X 45H

PAUL DUFFIELD

San Diego, Calif.

When Duffield's wife asked for a cabinet with adjustable shelves to hold her sheet-music books and musical accessories, he looked to English gothic church architecture and the Arts and Crafts movement for inspiration. The black iron strap hinges were also requested by his wife, and the cabinet was sized to fit under the window in her music room.

CHERRY, 16D X 30W X 32H



FRANKIE McWHIRT

Riverside, Calif.

This dresser was the Fine Woodworking Best of Show winner at the fair. It has eight drawers, but the curved front is definitely the star of the show. "I wanted to take something very simple in design and make it a little less simple," McWhirt says. "I suffered a few breaks while steam bending, which led to more bending, but I'm happy with the way the grain curves with the overall shape."

ASH, OLIVE (ASH VENEER), BUBINGA, AND CURLY MAPLE
18D X 72W X 31H



Start chip carving

STRAIGHTFORWARD TECHNIQUES
AND BASIC SHAPES OPEN THE WAY
TO ENDLESS PATTERNS

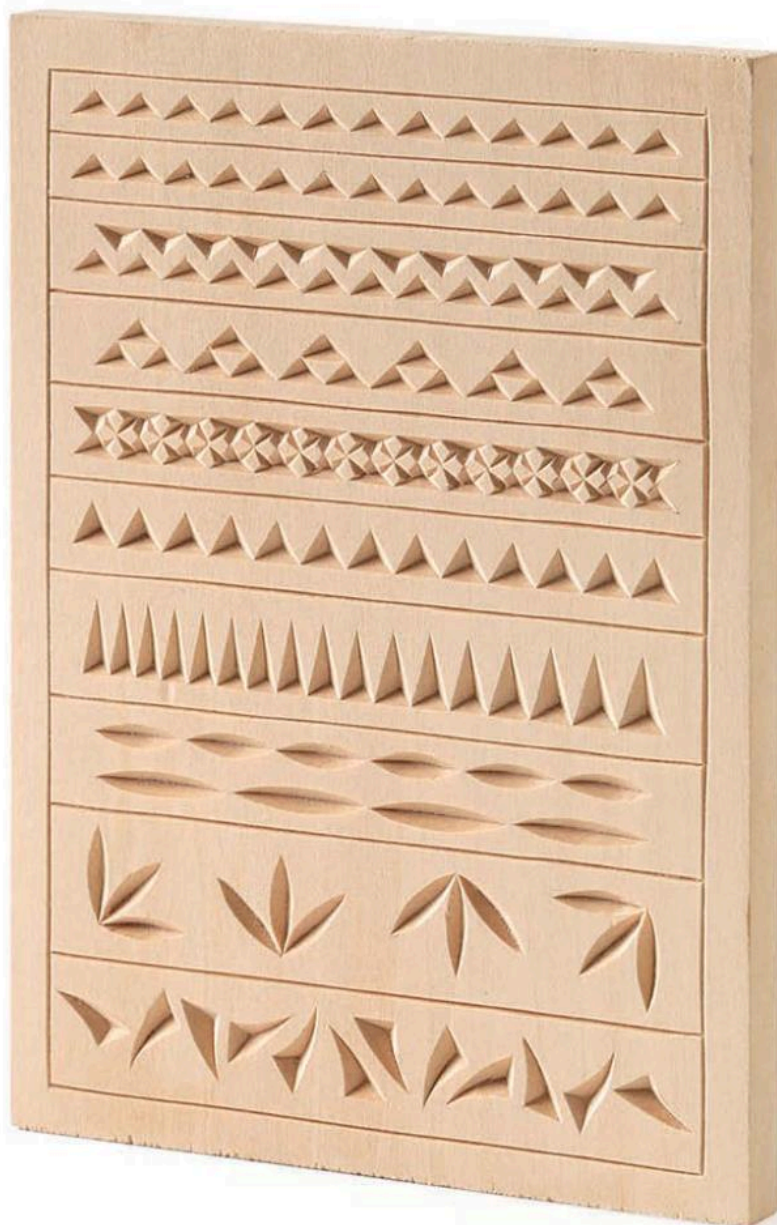
BY DANIEL CLAY

The type of chip carving I do has its roots in decorative patterns from medieval Europe, but examples of wooden objects decorated with incised geometric carving can be found all over the world. Why is this so? My intuition is that it is simply

because humans are mark-makers and tool users, and wood is a material common to virtually every culture. Given these basic conditions, the technique is just waiting to be found.

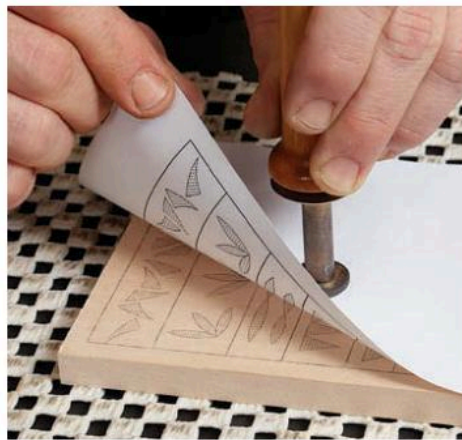
Sit long enough with a piece of wood and a sharp knife, and you might very well invent

some form of chip carving. If you've ever carved your initials or an image into a wooden surface, congratulations—you are, in effect, a chip carver. Now let's refine that ancient impulse by applying



Transfer the pattern

Use heat to transfer a printed pattern to the board. To do this, Clay places the pattern facedown on the wood and runs a transfer tool, similar to a wood-burning pen and available from art-supply stores, all over it. The pattern must be printed with toner, such as that used in laser jet printers.



Spot check as you remove the pattern. Starting at a corner, lift off the pattern slowly, reheating areas that didn't transfer sufficiently.

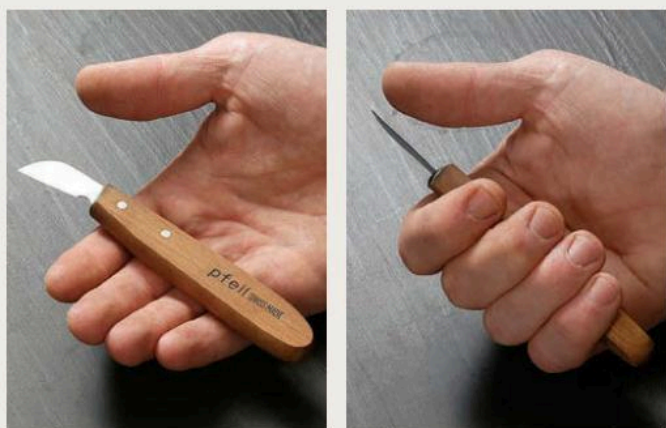


Online Extra

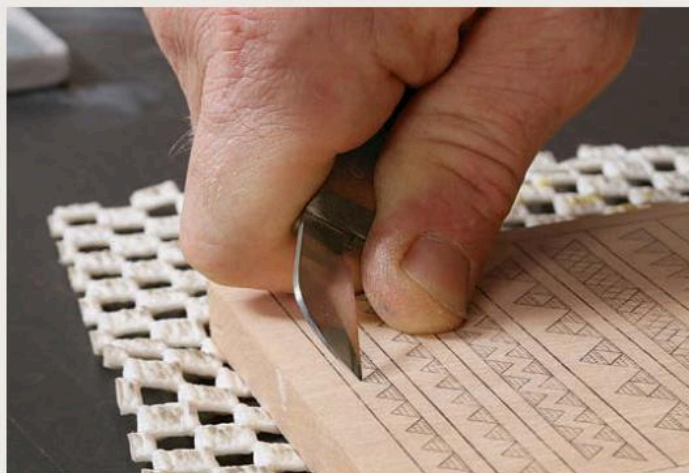
To download a PDF of this pattern, go to FineWoodworking.com/278.

Two grips

FIRST POSITION

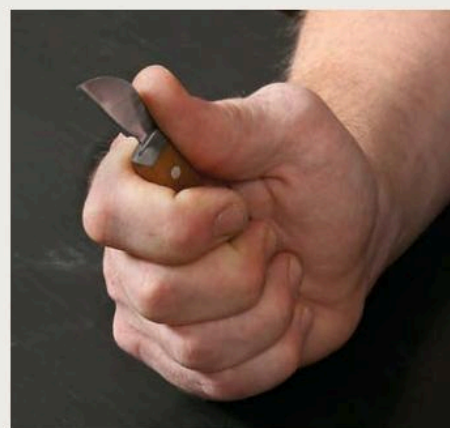


Grip the knife for first position. Open your dominant hand. Cradle the knife at the bottom of your fingers with its blade pointing away from your body. Then curl your fingers around the handle so its spine nestles into the joint where your fingers meet your palm.

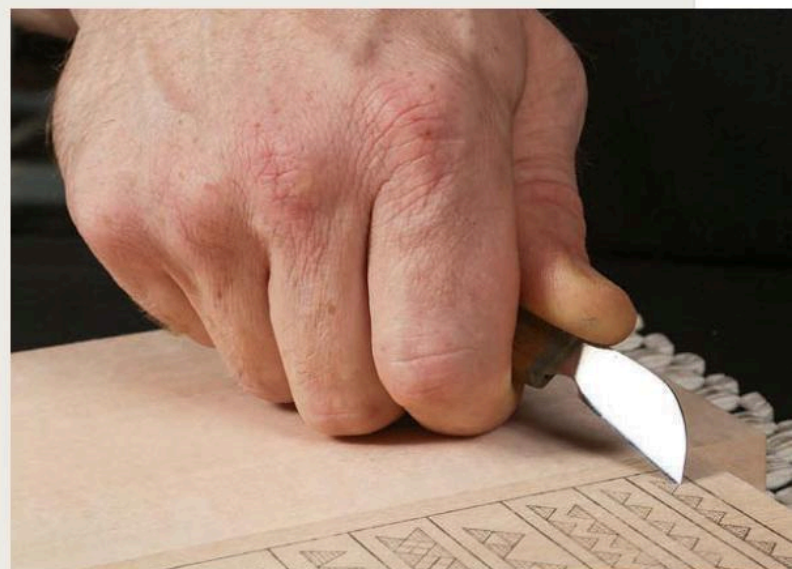


Thumb is the anchor. With the proper grip, plant the tip of your thumb on the workpiece. The angle of cut should be consistent and between 45° and 65°, and the blade and your thumbnail should be roughly parallel to one another.

SECOND POSITION



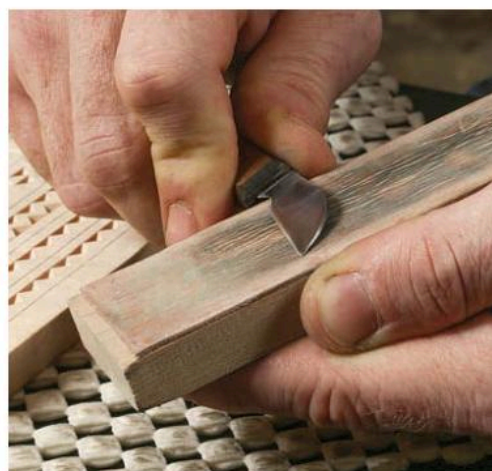
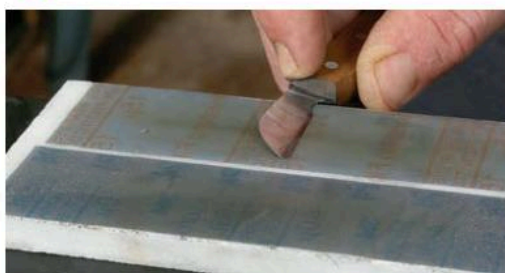
Thumb behind the blade for second position. This position, where you cut away from yourself, reverses and precisely mirrors first position. Grasp the knife as before, but have it rotated so your thumb presses against the back of the blade when you close your grip.



Knuckles are the anchor. Your angle of cut should be the same as in first position. For clean chips, it's important these mirror each other as much as possible. For cuts at the ends and edges of a board, Clay rests his knife hand on a piece of scrap that's the same thickness as the workpiece.

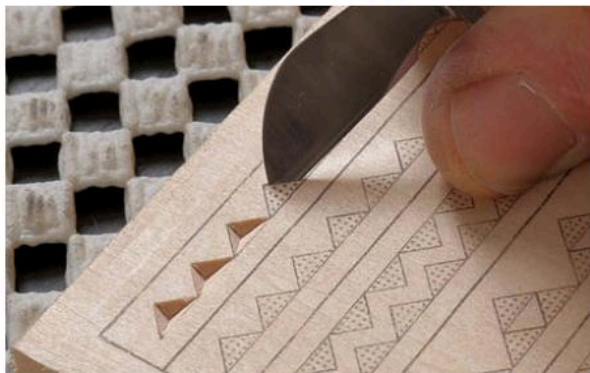
Sharpening the knife

Flatten and polish both faces. When he gets a new knife, Clay ensures both faces are flat by working them from 40-micron to 0.3-micron sandpaper. It's imperative the blade's edge remains straight.



Establish and hone bevels. Aim for 8° to 10°, raising the back of the blade about the thickness of a dime. After forming the bevels on coarse grits, hone them slightly convex, so they burnish the surface as they cut. While carving, strop regularly on a piece of leather charged with yellow compound.

Three-corner chips



Start in first position, and cut from tip to baseline. Place the knife's tip at the top of the triangle and plunge it deeper into the wood as you approach the triangle's base. To guide the cut, use your thumb as a fulcrum and your arm and shoulder as the lever.

a few standardized techniques and concepts that will allow precise, repeatable results whether you're making a decorative panel or adding accents to a piece of furniture.

This article covers two- and three-corner chips, which comprise the bulk of chip carving's design vocabulary. While my demonstrations and practice board show only a few patterns, these basic examples can appear in a wide variety of shapes and sizes, which can be assembled and combined into an infinite number of designs. Once you become familiar with these simplest forms, you'll begin to recognize them in virtually every chip carving you encounter.

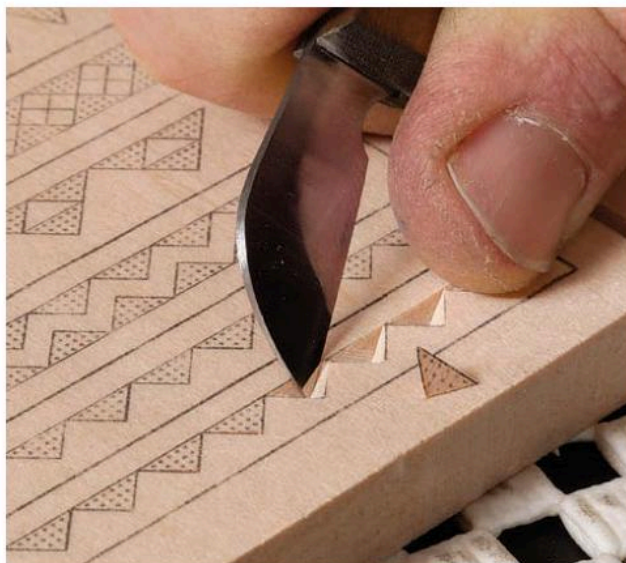
The Swiss method

There are several schools of chip carving, each with its own particular tools and approach. The method I'll outline here is commonly known as the Swiss method, or sometimes as the Barton method, after prolific chip carver, educator, and author Wayne Barton.

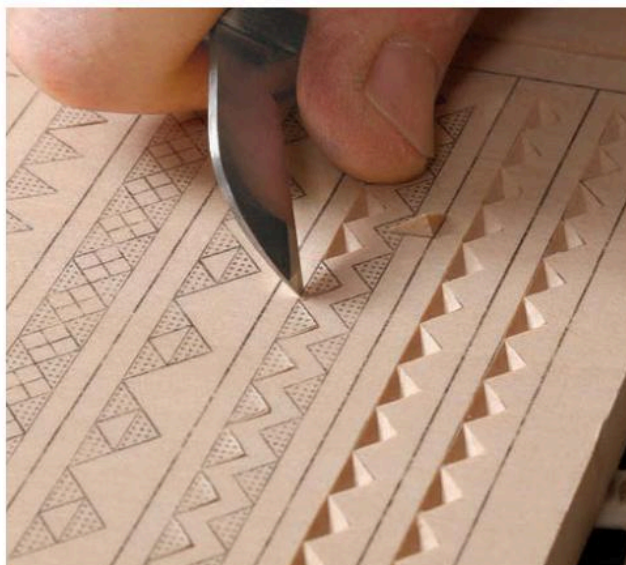
The knife—The Swiss method offers several advantages to the beginning chip carver: The vast majority of the work can be accomplished with a single tool. This knife, though simple in the extreme, employs some special geometry that makes it a versatile tool for removing faceted chips of varying shapes and sizes. The blade, cocked forward at a slight angle to the handle, is typically about 1½ in. long and very thin with a curved back edge. The cutting edge must be perfectly straight to produce the flat facets that make up the recess left by a properly carved chip. The blade's point should



Second position cuts the other side of the triangle. Rotate the board 120° and, with your knuckles contacting the board, plunge the blade into the board along the layout line. Like before, transmit power from your arm and shoulder, but this time pivot on your knuckles.



Return to first position to cut the baseline. Don't rotate the board. Whereas the first two cuts are plunge cuts, this relief cut involves drawing the knife across the base of the triangle as you lower its tip into the wood.



Batch cuts can speed things up. After you get comfortable doing all three cuts in succession, you can expedite matters by doing all the first cuts, then second, and then third.



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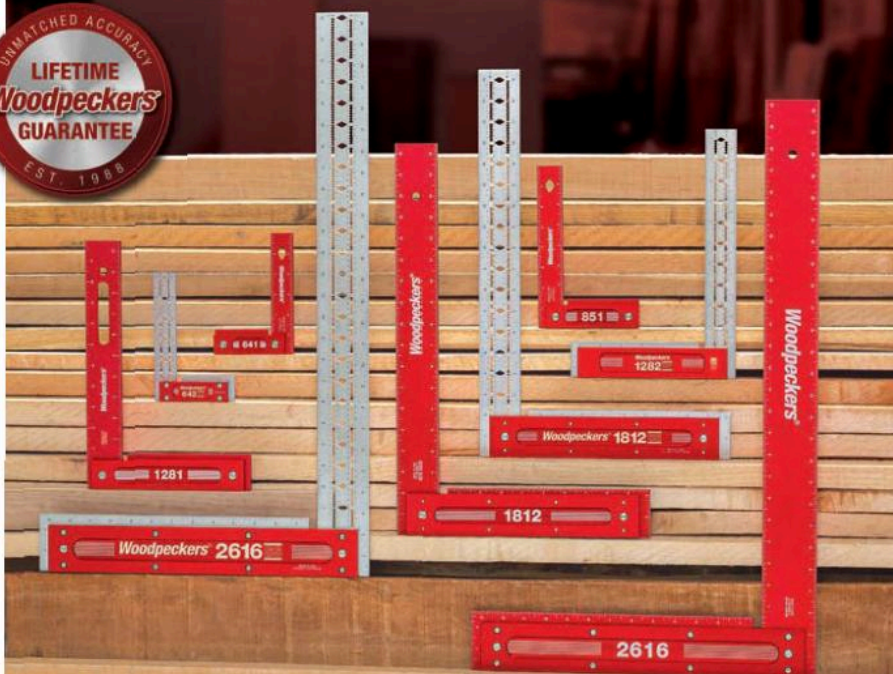
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Two-corner chips



Two cuts. Two-cornered chips are made up of a pair of opposing cuts and are typically cut entirely in first position. Start shallow (above), deepen toward the middle (right), and then pull out toward the end of the cut (below). After cutting the first side, rotate the board 180° for the second.



be needle-sharp to allow all the incisions to meet precisely at crisp corners. The sides of the blade should be polished to a mirror finish to reduce friction as the knife cuts, and to lightly burnish the facets left behind as chips are carved away. The edge is sharpened symmetrically at a very shallow angle, about 8° to 10° on both sides. The bevel is very slightly bellied.

The technique— The Swiss method's technique is just as straightforward and versatile as the knife. It is codified into two knife grips, called first and second position. These two positions are used to make cuts that mirror one another as closely as possible, as the key to chip carving is consistency. All cuts, regardless of position, should be made at the same angle between 45° and 65°.

Many patterns and shapes can be carved entirely in first position by merely rotating the board to line up the cuts. However, you'll inevitably have to use second position, so it's imperative to learn it from the very beginning. These second-position cuts must match the angle of your first-position cuts.

The best cuts are controlled cuts. To achieve them, it's important to remain anchored to the workpiece. In first position, the tip of your thumb stays on the board, and in second position, it's your knuckles. These anchors provide tactile feedback and let you apply pressure at the tip of knife with a great deal of control. The power for controlled cuts originates from your shoulder and arm, not from your wrists or by squeezing your fingers like you're peeling potatoes. Keep your hand locked in position and your wrist straight.



Tip blade up to keep from cutting into adjacent chip. While much of chip carving necessitates maintaining the same cutting angle, sometimes Clay angles the knife more toward vertical. This helps him to avoid slicing into a nearby chip, such as at the bottom of these three-point petals.



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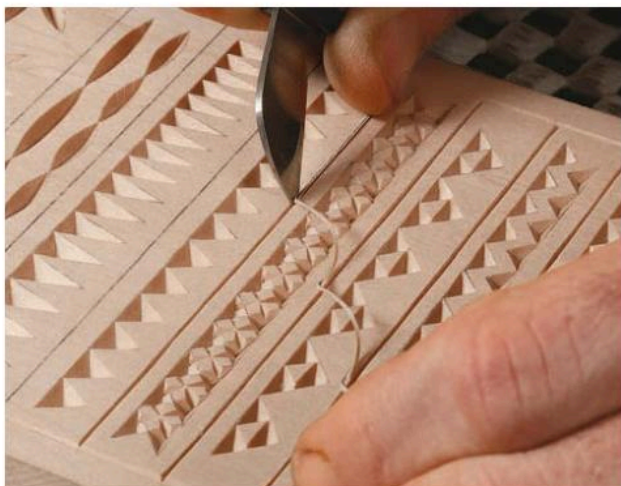
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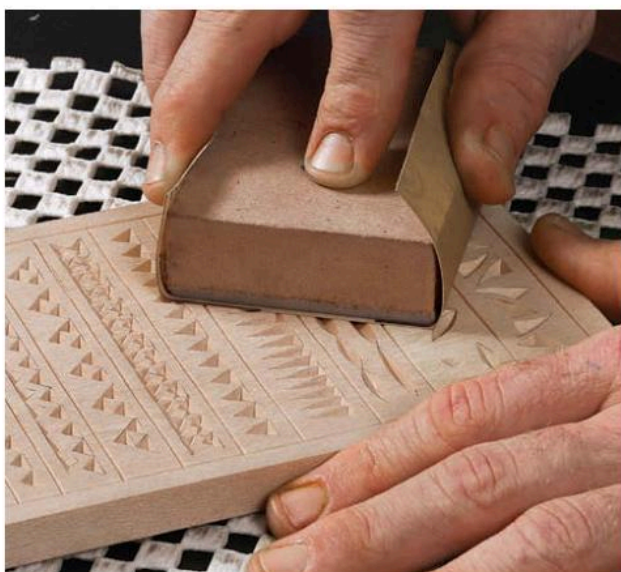
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Finish up

Carve the borderlines. Place the tip of the knife on the outside of the layout line's thickness. Use the tip to sever the fibers at one end, make the long cuts on either side of the line, and finish by severing the fibers to free the other end.



Sanding removes layout lines and smooths surface. Clay uses fine-grit paper wrapped around a sanding block, which ensures the sandpaper remains flat. Don't sand more than you have to, as this step can make the facets shallower and less dramatic.



The anchors and relatively narrow range of motion translate to a high degree of safety, too. Because the blade and hand remain in a fixed relation to one another, performing each cut as a single locked unit, the blade doesn't have the opportunity to cut the hand or fingers.

Begin with basswood

There are a number of woods that can be carved using the Swiss method, but the most popular is undoubtedly tilia, a genus of deciduous trees and bushes commonly known as basswood, linden, or lime. Basswood's fine, straight grain, virtually homogenous creamy color, and, above all, softness



Erase trouble spots. Sometimes during the carving process, layout lines get pressed below the surface of the board. At these times, Clay uses a sand eraser, which is like a pencil eraser with grit in it, available at art-supply stores.

CLEAN UP LEFTOVER WASTE



Deepen facets within layout lines when cuts don't meet. If the whole chip doesn't release, don't pry the chip or dig it out. Instead, repeat your cuts until they meet, severing the fibers that are holding onto the chip. Stay within the layout lines, using them as guides.

HIDE THE OVERCUTS



Zip up cuts that go too far. Sometimes a cut slices into a finished facet (left). To conceal this, Clay puts the spine of the knife in the chip and, while pressing, pulls up (right). He calls this fix zippering up, which takes advantage of basswood's compressibility.

Carved beauty

and workability make it the ideal wood for chip carving. Other workable woods include butternut, Spanish cedar, eastern white pine, catalpa, and paulownia. Though it is possible to carve harder, denser woods such as walnut, I strongly recommend that you begin with basswood. It's easy to carve, easy to find, and very affordable. I particularly prefer basswood that has tighter grain.

Moisture content is also an important consideration. Wood that has been dried to about 10% to 12% moisture content is best, as it will carve easily and take detail well. Dry, brittle wood is much harder to carve. It will crunch and crush under the knife and is more likely to split.

I find spray film finishes, such as polyurethane or lacquer, work well, and they're easy to apply. I avoid oil finishes because they diminish the crisp detail I strive for.

Two- and three-corner chips

Many motifs in chip carving comprise two- and three-cornered chips, so getting the techniques down from the start is a good idea. I recommend starting with small, straight-lined, three-cornered chips on a basswood practice board. Removing the chip involves three cuts, starting with first position, moving to second, and then returning to first, so with each chip you get to practice both positions.

Two-cornered chips, typically done only in first position, require a bit more finesse. They involve two opposing cuts along a shared centerline. With curved cuts, the knife is more likely to chatter, producing haggard surfaces. To reduce this tendency, tip the handle up—effectively reducing the width of the blade—as you pull through the cut.

Fixing mistakes

When you successfully carve out a chip, you'll hear a satisfying little pop when you sever the final fibers. But things don't always go smoothly. If the chip does not release, that means that your cuts do not fully intersect and the chip is still attached by unsevered wood fibers. Resist the urge to pry or dig it out with the tip of the knife; this can break the tip of the knife or chew up the facets and split out wood that you don't want to remove. Instead, make each cut again until the chip's walls meet. Stay within the layout lines, and register the knife against the carving's existing walls. □

Daniel Clay is a woodworker in Knoxville, Tenn.

With chip carving, patterns can form quickly, letting you test ideas at a fast clip. Clay often uses the interplay of light and shadow to highlight symmetry in his carvings, relying on both clean three-corner geometric shapes and flowing two-corner curves.



Flower on fire. This disk is made up of deep two-corner chips only, producing a repeating fractal-like pattern reminiscent of petals and flames.

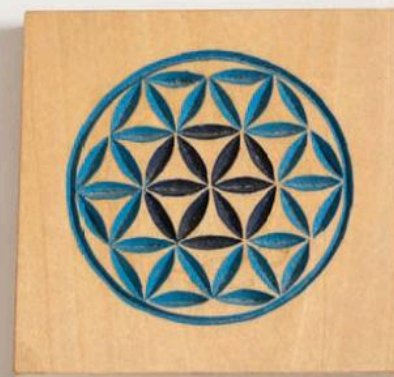


Sparse and dense. One winter, Clay designed and carved snowflake patterns, letting him explore how the size of facets affected the overall carving.



Opposites attract. Clay nested the positive and negative versions of a carving here, which creates the sense of a regular pattern while lending a subtly different visual interest.

Add color. Whether you paint the whole surface or just the facets, adding color to a carving can help the overall pattern pop without muddying the effect of shadows.



A man with grey hair, wearing a dark blue long-sleeved shirt, is working in a well-lit workshop. He is applying a finish to the back of a wooden chair with a white cloth. The chair is made of dark wood and has a high back with vertical slats. The workshop background is filled with various tools, including clamps and saws, hanging on the walls and shelves. The lighting is warm and natural, coming from a window in the background.

finish line

Arts and Crafts finish

TIME-TESTED RECIPE RE-CREATES THE STYLE'S
CLASSIC WARMTH

BY TOM McLAUGHLIN



It's hard to overstate how well an Arts and Crafts finish ages on white oak. With time and use, the rich browns, soft ambers, and dark highlights are all deepened and warmed. But you don't need the passage of decades to capture this patina. While it's admittedly nearly impossible to re-create the honest effects of time on a finish, it is possible to come surprisingly close to the same beauty and complexity.

A traditional method is to fume the oak with ammonia, but this can be hazardous to your health and give uneven results. So I take a different route, instead applying thin layers of dye, glazes, and sealers to create the signature depth and character. This article explains what products to use, when to use them, and in what proportions. While it's a time-tested method, it's still susceptible to the usual variables of finishing. So I recommend making a sample board to preview your results—another time-tested method. Because you'll be mixing and applying the finish in stages, checking each step on a sample board before using it on your actual piece of furniture is an easy way to ensure you get the finish you want.

Aniline dye sets the tone

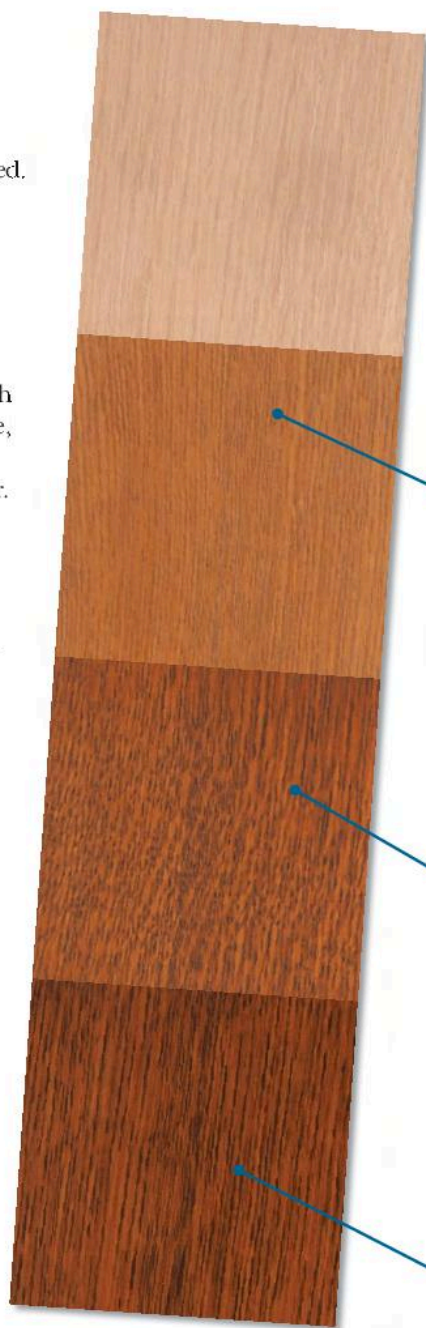
Simulating the natural effects of time and use on white oak means starting from the bottom, beginning with a dye to darken the wood.

To prep the stock, sand to 220 grit. Then, since the dye is water-based, you'll need to raise the grain. For this, simply dampen the surface with a rag, no need to soak it. When the piece is dry, lightly sand it with fine-grit paper to remove the raised wood fibers.

Next is a walnut-colored dye, which darkens the wood without leaving muddy pigments on the surface. I prefer a light concentration—½ teaspoon of dye powder stirred into 16 oz. of hot water—since it's easier to control. For a darker Craftsman finish, though, use 1 teaspoon of powder.

Apply the dye stain with a rag. Work up from the bottom of the piece and keep the surface wet as you go. Rub on two coats. Let it dry for several hours or, even better, overnight. Then sand lightly with 320-grit paper, taking care not to cut away the color on the edges.

Don't worry if the wood looks flat and unappealing at this point. This is just something that happens as dyes dry on bare wood. The next step, shellac, will bring back the dye's original richness. The shellac, one of the main traditional Arts and Crafts finishes, separates and protects the dye from the subsequent layers of finish.



LAYERING IS THE KEY TO A GREAT FINISH

A proper Arts and Crafts finish doesn't come from a single bottle. Instead, it builds up, becoming richer and more complex with each layer.



1. Dye deepens the color of the wood without sacrificing its figure.



2. Glazes work into the grain, adding character and patina.



3. Protective topcoat and wax are the final layer.

SOURCES OF SUPPLY

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GLAZE

Mohawk Shading & Glazing Stain:
Burnt umber (M504-14356)
Jet black (M504-2246)

TOPCOAT AND WAX

Waterlox Original Satin Finish
Briwax, antique mahogany



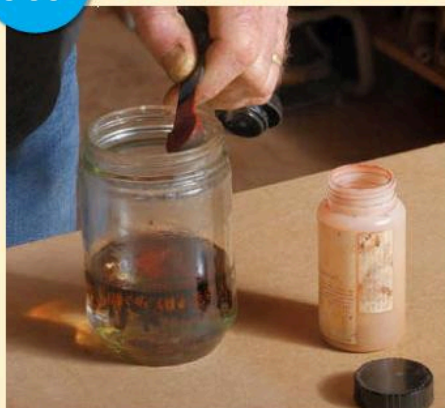
1. CREATE A BASE COLOR WITH DYE

Raise the grain and knock it back. After sanding to 220 grit, rub down the wood with a damp rag to raise the grain. When the workpiece is dry, lightly sand it with 220-grit or 320-grit paper, removing the raised fibers until the surface feels smooth.



TIP

MIX THE DYE IN STAGES



To expedite mixing and prevent clumping, dissolve the dye powder in a few ounces of hot water before adding the rest of the water to achieve the final ratio.



Two coats of dye. Wearing gloves, apply the dye stain with a rag, keeping the surface wet as you go. After the surface appears dry, apply another coat to even and deepen the color. Let the piece dry thoroughly for several hours, or overnight, before lightly sanding with 320-grit paper.



Seal the dye with shellac. McLaughlin uses Zinsser amber shellac, which he dilutes to a 1½-lb. cut with denatured alcohol. Apply two coats, allowing at least two hours between them. Afterward, sand the surface smooth with 320- or 400-grit sandpaper.

I like Zinsser Bulls Eye amber shellac, which has the appropriate orange cast found in many Arts and Crafts finishes. But it needs to be thinned since shellac works best when applied in several thin layers. I prefer a 1½-lb. cut—meaning 1½ lb. of shellac flakes per gallon of denatured alcohol. Since the Zinsser is about a 3-lb. cut, I simply dilute it by adding an equal measure of alcohol.

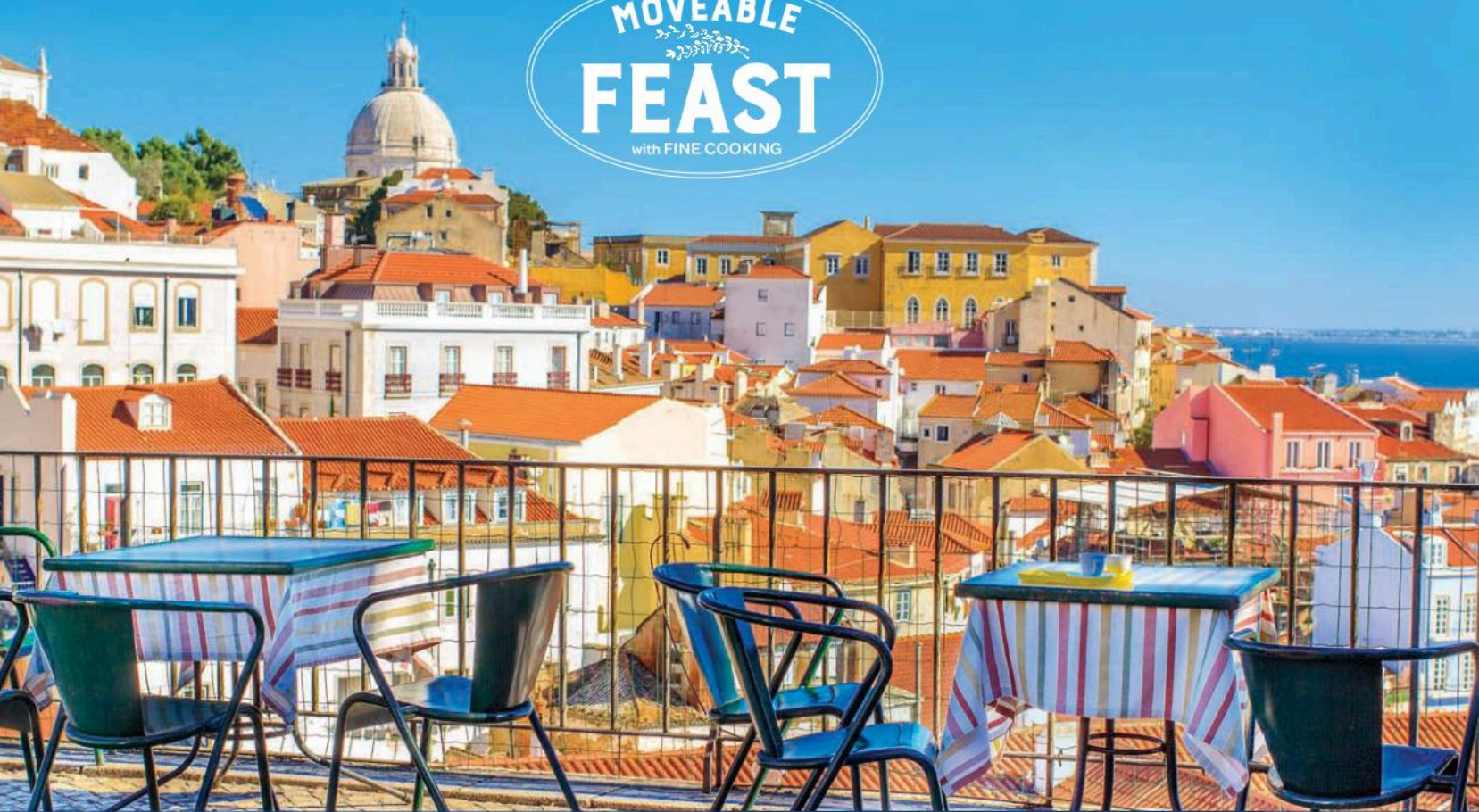
To seal the walnut dye, apply two coats of shellac, allowing at least two hours between coats. After the second coat dries, sand the surface smooth with worn 320-grit or 400-grit sandpaper. You should raise a white, powdery residue.

Glazes add depth, character, and age

To deepen the finish, I work a series of different color glazes into the oak's open grain. I start with a brown layer, seal it with

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2. FOLLOW WITH GLAZES

a coat of shellac, and then add a coat of black. The first layer creates the classic reddish-browns so common to Arts and Crafts furniture, while the black adds the impression of age.

Glazing stain is easy to apply. And if it's water based, it dries almost as fast as shellac. Rub it on, let it sit for a little, then wipe it off. The key is to work the glaze into the grain with a circular motion before finishing with strokes along the grain. The glaze left in the grain emphasizes the wood's character and figure.

There are no hard-and-fast rules to this step, so be creative and experiment. Leaving some glaze on the surface here and there, especially near joinery, enhances the patina and appearance of age. Just don't go too far, or your furniture can look hokey.

Seal each color of glaze with a 1½-lb. cut of blond shellac. Lightly sand after each coat with 320-grit paper. If you want more amber tones, use the same cut of amber shellac.

Topcoat for protection

With all the layers of color applied and sealed, it's time for a topcoat. For surfaces not likely to hold a drinking glass, shellac is an excellent choice. One or two layers, again clear or amber, at a 2-lb. cut will do the job.

For a more durable topcoat, shellac isn't enough. On surfaces like tabletops, I recommend varnish, such as Waterlox or General Finishes Arm-R-Seal, or lacquer. If you go this route, the final sealing coat after the black glaze should be wax-free blond shellac to ensure adhesion. You can mix your own or buy premixed, namely Zinsser SealCoat.



Apply the first glaze, then seal. Rub the burnt umber glaze onto the surface, let it sit briefly, and then wipe it off with a cotton cloth. Be sure to first wipe in a circular motion to work the glaze into the grain (above). Finish with strokes parallel to the grain. McLaughlin seals the glaze with a blond, wax-free shellac (left).



Black glaze enriches the finish. Work this into the wood the same way as the brown glaze, rubbing it into the grain before wiping off the excess. Seal this layer with shellac as well.

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3. FINISH WITH A TOPCOAT AND WAX



Topcoat protects surface. While merely applying more shellac as a topcoat is fine for surfaces that won't get much use, McLaughlin recommends something more durable, like Waterlox, for surfaces such as tabletops.

Rub out and wax

After applying the topcoat, rub out the finish to a fine, silky sheen. First, very lightly use 600- to 1,200-grit wet-or-dry paper to knock off any dust bumps or nibs. Then rub out the finish with fine steel wool until the surface has an even, dull matte appearance. Finish off with paper towels.

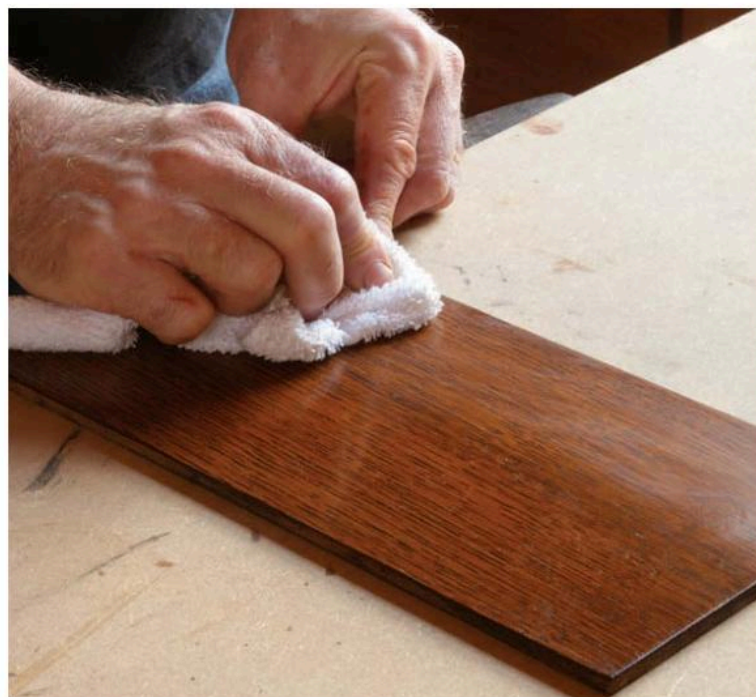
The last layer of finish is a dark paste wax because it dries dark, enhancing the antiqued effect. On tabletops, I prefer liquid polish because it's easy to apply on horizontal surfaces and is streak-free. □

New Hampshire furniture maker Tom McLaughlin teaches woodworking via epicwoodworking.com.

Prep for wax. First, use very fine wet-or-dry paper to remove any dust bumps or nibs from the topcoat. Then rub out the finish with 0000 steel wool until you have a uniform, dull matte surface. Last, use paper towels to dust and burnish the surface.



Dark-tinted wax brings back soft sheen. Using a cotton rag, apply the wax to the workpiece before buffing it out with a soft towel. Avoid a light-color wax here, which could show up as white spots in the oak's pores.



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In memory of a friend

BY ANDY ENGEL



In 1996 Kevin Ireton interviewed me for a job as an assistant editor at *Fine Homebuilding*. The day of the interview sticks in my memory. I felt like an acolyte getting a glimpse of the inner sanctum. I didn't expect to be hired, figuring I was more than likely to comport myself like the kid at The School for the Gifted in the Far Side cartoon who was pushing mightily on a door that was clearly marked, "Pull."

But The Taunton Press surprised me. Where I had expected the offices to reside within a wood-paneled library replete with Nakashima and Krenov furniture, I found an ordinary building with cubicles and a front door jammed open with a garbage can because the security system had gone wonky. The editors,

whom I had imagined clad in tweed and wandering the halls to the sound of Bach concertos, were wearing jeans and scuffed boots while Chuck Miller riffed Grateful Dead tunes on his guitar. I was the only person in tweed.

Once hired, I found my colleagues to be smart, talented, kind, and friendly. Most importantly, there was nothing academic about their interest in making things. They shared a sense of craft and of how craft should intertwine with life. That sense permeates Taunton's staff, authors,

and readers, and those people make the company. I came to view Taunton itself as merely the cave wall upon which those ideas of craft were reflected.

Which brings me to Bill Duckworth. An editor at *Fine Woodworking*, he and I met when he checked me out on the machines in the magazine's shop to be sure I was competent to use them. In time, we bonded over interests outside of work—Boy Scouts, cooking, our families (and the importance of the proper use of commas). We went to dinner parties at each other's houses. We helped each other build those houses. Bill was one of the most skilled woodworkers and designers I've known.

He brooked no bull, and yet he was a humble and gracious man who bore an abiding respect for the authors whose work he elevated in the magazine.

After we both left Taunton, we stayed in touch through a semi-regular breakfast club of old editors on a mission to find the best diner in western Connecticut. Less regularly, we had dinner together, but still regularly enough that it was no surprise to be invited to his house one evening last winter.

My wife Pat and I joined former editors Kevin Ireton, Strother Purdy, and Vinnie Laurence at Bill's table. He'd made the table of course. And I think the chairs. And he'd built the kitchen. A woodstove, fueled with logs he'd cut and split, warmed us. The meal was chili, which Bill had made with a mélange of meat that included bear and venison. It was the best chili I've ever eaten. There was corn bread, and beer, and bourbon, and Bill told the story of another dinner, hosted by a close friend of his. His friend didn't eat, but rather served a few special friends a traditional Japanese meal. A few months later, Bill found out that his friend had died from cancer.

Bill said he thought the friend, knowing he was sick, had served that meal as way to say goodbye to people who had an important place in his life, without burdening them with the knowledge of his illness.

I didn't see Bill after that dinner, and I didn't think of that story again until recently.

A few weeks ago, I learned that Bill had died of cancer. I hadn't even known he was sick. A week later, while working on an 18th-century house, fitting jack-mitered casing to the frame of a door I'd made from 200-year-old boards, it hit me that Bill had done the same thing as his friend.

Or maybe he hadn't. Maybe he hadn't known then that he was dying. But at that, he had the wisdom to leave the moment alone, and it will stand with me forever as memento of him and how he would have wanted to leave his friends. □

Andy Engel was an editor at both *Fine Woodworking* and *Fine Homebuilding* magazines.





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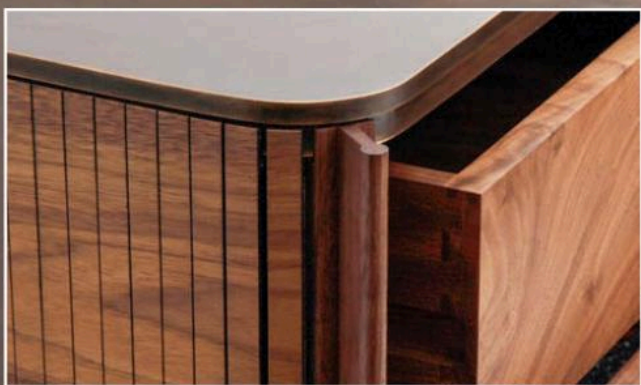
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Tambours Take a Turn



Open a typical tambour door and as you slide it aside, the slats disappear into the cabinet. You can only wonder where they go. Furniture designer Aaron Poritz wanted to keep the magic of the tambour out in the open. So he's been designing cabinets with no fixed outer shell. The structure is on the inside and the tambours are on the outside. Open a door on one of his cabinets and the tambours ripple right around the corner, fully visible; they slide along the side and turn the corner to the back. Poritz's collaborator, craftsman Karol Cylwik, who works with him in the Brooklyn Navy Yard, glues figured veneer to sheets of Baltic-birch plywood, slices the plywood into slats with a thin-kerf tablesaw blade, and glues the slats to canvas backing. The slats are slotted on the ends to fit over a narrow track, and once the tambours are in place the track is concealed, the action is smooth, and the visual effect is mesmerizing. To see the tambours in action, go to FineWoodworking.com/278.

—Jonathan Binzen

