

TAUNTON'S

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June 2021 No. 289

- Custom pulls
- Stylish deck chair
- Block-plane skills
- Brush-on varnish



Arts & Crafts coffee table, p. 30



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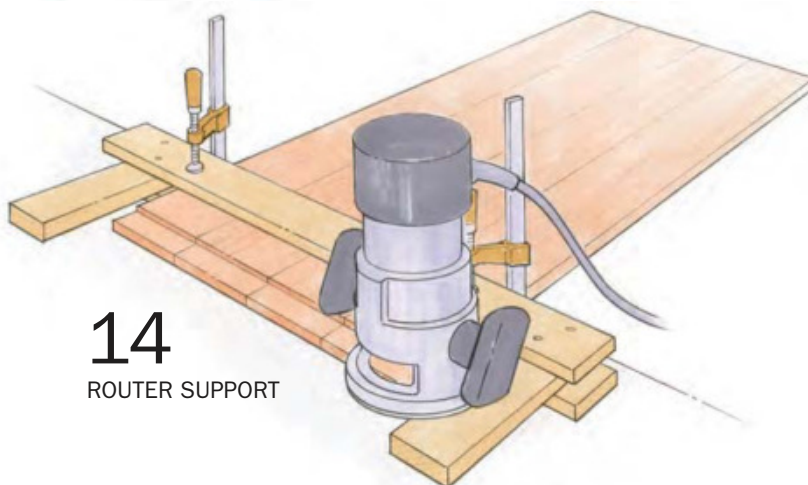
A long loose end

Back Cover

The Bird is a Bowl



GALLERY: SHELF WITH MIRROR **72**



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VIDEO

A marquetry master

Look over Craig Thibodeau's shoulder, and watch him assemble a marquetry panel. He makes it look easy.



VIDEO

Block plane tune-up

Contributing editor Roland Johnson was refurbishing handplanes long before it was cool. In this video, he demonstrates his techniques for tuning up this woodshop workhorse.

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VIDEO WORKSHOP

Graceful curves for your garden

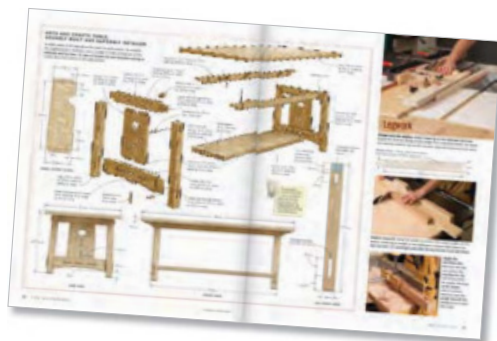
Wood-bending wizard Michael Fortune deconstructs the classic Adirondack chair to deliver an updated design full of beautiful curves. In this eight-part series, Fortune demonstrates a variety of techniques, including how to:

- Build strong forms for bent laminations
- Resaw thin plies for bending
- Trim and shape tricky curved components.



Online extras

Free content at finewoodworking.com/289



The illustrious illustrator

This may be John Hartman's first time writing an article for *Fine Woodworking* (p. 30), but you've seen his work many times before. He's one of the talented illustrators who make our projects easier to understand. Here, we show off some favorite illustrations John has done for us over the years.



A jig for angled mortises

Rob Hare's chairs (p. 54) come together with angled mortise-and-tenon joints, which can be intimidating. Thankfully Rob has a jig that makes the process simple.

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Demonstration on red oak



contributors

In 2016, **Larissa Huff and Rob Spiece** (“Contemporary Door and Drawer Pulls”) took over Lohr School of Woodworking from founder Jeff Lohr. Turns out, fate and Craigslist ads had brought them both to Schwenksville, Pa., to work with Lohr. The school was established in 2001; Spiece began his apprenticeship there in 2006 while Huff started hers in 2012. Together they make custom furniture and teach woodworking to students from around the world. Check out their piece in the Gallery, too (p. 74).



Huff on Spiece: “Rob is hilarious, incredibly talented, and cultivates a collaboration process full of conversation and questions. He also makes killer shop playlists. He works so much faster than me! In the time it takes me to finesse small details just the way I want, he has built an entire section of the piece we are working on. I tell myself it is not competition, but I am always so jealous of his speed.”

Spiece on Huff: “She drives us to make interesting work and isn’t afraid of challenging me or herself. She’s also simply an easy person to work with and a good friend. In all honesty, we do have disagreements, even arguments from time to time. I see that as healthy and necessary for a real collaboration.”



Rob Hare (“Deck Chair with Flair”) is a woodworker and metalworker. Long before he received his MFA in sculpture, he was making things. In 1960, his parents bought a three-acre island from a fisherman in Maine. Rob spent every summer there growing up, and still does. Seeing other people meant crossing water, so he and his father rebuilt an abandoned wood skiff. “We made pretty much everything we needed from driftwood. Chairs, tables, beds, you name it.”

John Hartman (“Arts and Crafts Coffee Table”) has been a vital contributor to *Fine Woodworking* for years, yet this is the first time he has written an article. John produces beautiful illustrations for nearly every issue. He has also drawn illustrations for a wide array of other publications, including scientific journals, medical texts, and children’s books. As to the origin of the impressive woodworking skill evident in his article, he and his wife, Christine, ran a piano repair and restoration business for many years in Beacon, N.Y. They live in West Springfield, Mass.



We are a reader-written magazine. To learn how to propose an article, go to [FineWoodworking.com/submissions](https://www.finewoodworking.com/submissions).

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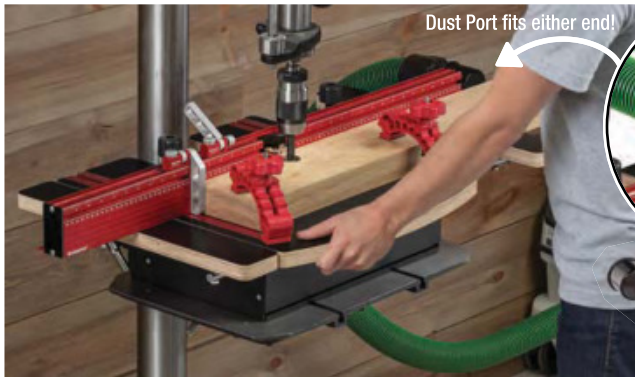
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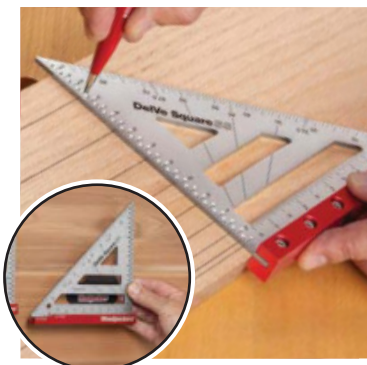
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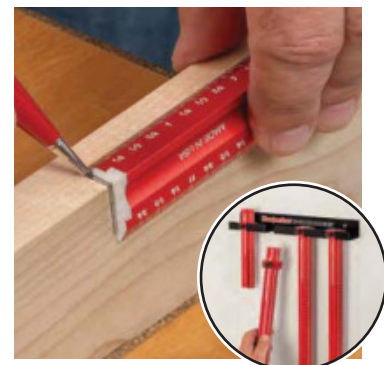
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Spotlight

ISSUE NO. 288
March/April 2021
p. 40



Mike Korsak's article, "How to Drive a Screw," was right on the money! While this may be considered basic by some woodworkers, bridging or "jacking" happens all too often. Screw threads will bite into both pieces if a clear hole is not made and the parts will not be drawn together. Here at the Wood Technology Center, this is considered so important that all first-quarter students must complete a "Clear Hole" project for submission.

With the advent of high-torque impact drivers, most incoming students don't see the need to drill any kind of pilot hole. And while my cabinetmaking and boatbuilding students get the concept of a pilot hole pretty quickly, the carpenters who work mostly in softwoods tend to think it's overkill; that is, until their Interior and Exterior Finish Quarter where hardwood trim comes into play!

The article shows brass screws being driven and I'd like to offer a suggestion I learned many years ago from this very magazine: Buy one or two steel screws of the same type as the brass ones and drive them first. A steel screw's head is much harder than its brass counterpart so you won't cam out the drive as easily and can actually pre-cut the threads, making lubrication unnecessary.

—DAVE BORGATTI, Wood Technology Center, Seattle Central College

Mike Korsak replies: *I agree that the proper use of screws is an important topic, one that is often overlooked or ignored. I can imagine the dismay of your carpentry students when they move from framing lumber and sheet goods to hardwood trim and realize that there's more to it than letting loose with an impact driver.*

I also appreciate your suggestion of using a steel screw to cut threads before switching to a brass screw. I decided not to include this method in the article because I no longer use it for one reason: It has been my experience that finding a steel screw whose thread pitch exactly matches the pitch of a brass screw of the same size is nearly impossible. If the pitches of the steel and brass screws don't match, you end up cutting two different sets of threads into the wood, which weakens the screw-holding ability of the wood. If I could reliably find steel screws that matched brass, then I'd probably use this method. The high-quality hinges I typically use are often supplied with a steel screw along with the required brass screws to allow for pre-tapping the holes. I used to appreciate the manufacturer's thoughtfulness, until I realized the steel screws differed from the brass in thread pitch. I still use the hinges, but I ignore the steel screw now.



On prison voices

I'm writing to thank you for publishing LaShawn Long's article, both in print and on your website (From the Bench: "Woodworking changed my life," *FWW* #288). The voices of incarcerated Americans—and those formerly incarcerated—are too often ignored. You did the right thing, and I appreciate it.

—NAME WITHHELD BY REQUEST

The article by LaShawn Long is a touching and heartwarming story. Recently, I read a similar story about another incarcerated young man, Christopher Jackson, in the book *Mathematics for Human Flourishing* by Francis Su (2021, Yale University Press). In Christopher's case, it was mathematics. To me, woodworking and mathematics are related through three-dimensional geometry. I wish both of them well with the pursuit of their passion.

—HIDEFUMI KATSUURA, Berkeley, Calif.

Another use for the Sharpie

In the Skills Spotlight: "Make Custom Hardware With Basic Tools" (*FWW* #287) the list of required tools showed layout fluid or Dykem. An alternative is using a wide Sharpie pen to mark the metal. Alcohol can easily remove Sharpie ink when done. (Credit for this idea goes to Keith Fenner, machinist on YouTube.)

—BRIAN LITTLE, Marion, Iowa

Wouldn't hang nailers this way

"Smart way to hang nailers" doesn't seem so smart to me (Workshop Tips, *FWW* #288). To hang air tools by the coupler at 90° from the wall would put a lot of stress on a weak point of the tool. A better way to hang air tools would be to add an elbow to the coupler so the tool hangs vertically. My wife and I were mobile tool distributors and hung many air tools from the ceiling of our truck without incident. Hanging the tool this way also would position the tool closer to the wall, making it less likely to be bumped into. Hanging it under a shelf would be even better.

—JIM NICHOLSON, Lake Villa, Ill.

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workshop tips

Simple splitter for an old tablesaw

Like many older tablesaws, mine lacks a functional splitter, so I made my own by extending the blade slot in a shopmade throat plate and inserting a small hardwood tab at the back of the slot. This isn't a new idea, but I've refined the process to make it faster and more foolproof. I start by lowering the blade and bringing it up through a blank plate as usual. This creates a zero-clearance slot that prevents tearout on the bottom side of cuts.

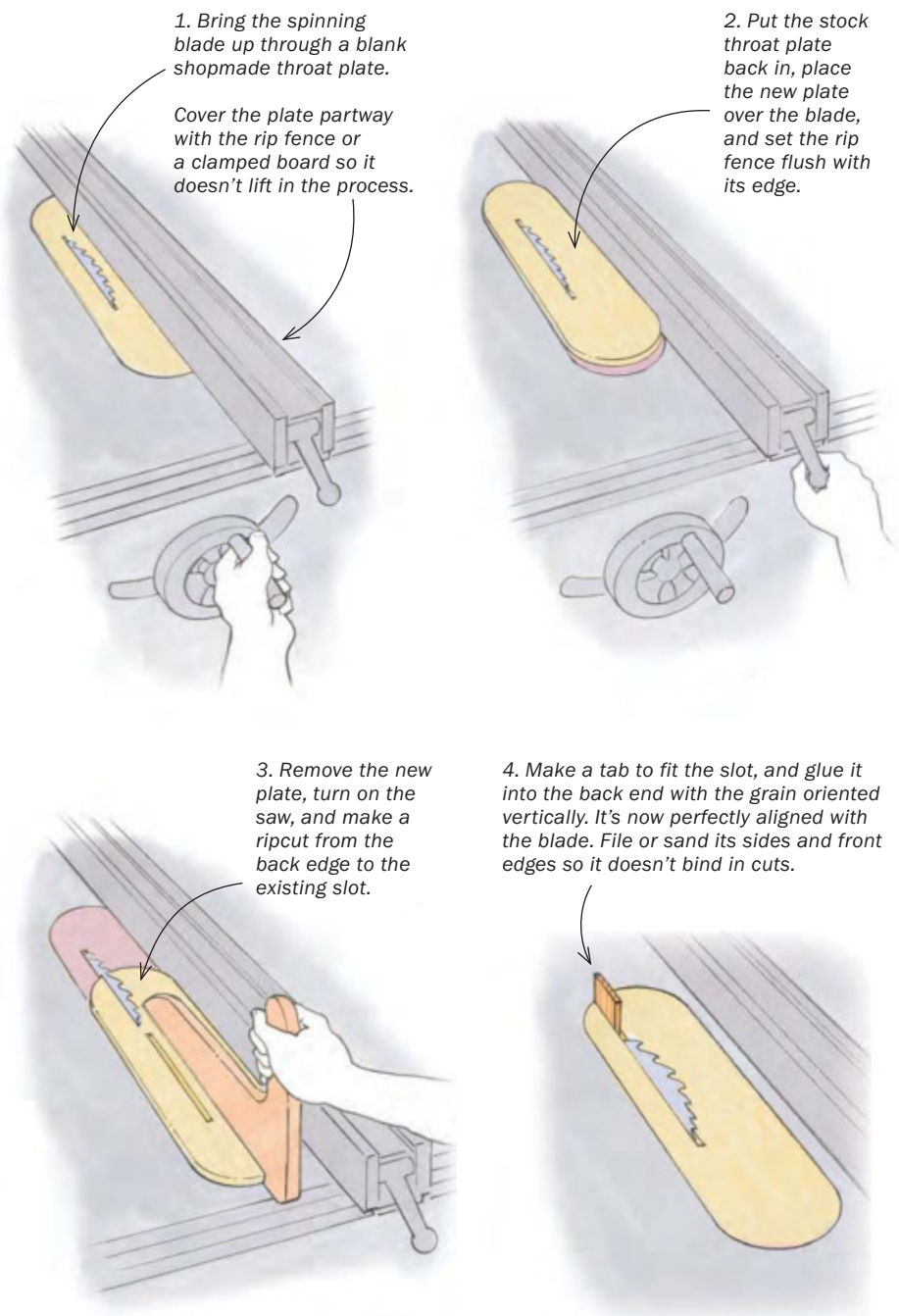
The tricky part is extending the slot safely and also accurately, so the tab will be aligned perfectly with the blade. I do this by putting the stock throat plate back in the table, fitting the new one over the raised blade (with the saw turned off!), and then adjusting the rip fence to meet the edge of the new plate. Then I just pop the plate off the blade and make a ripcut from the back end up to the existing slot. That guarantees perfect alignment.

Next I glue the tab into place, which closes the back of the slot and restores the plate's strength. You can locate the tab as close as you like to the blade for improved safety. It's really that simple.

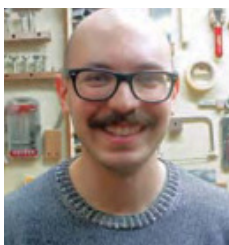
A few important notes on the splitter tab: Start by ripping a strip—using the bandsaw or tablesaw—that fits the blade kerf. Then cut off a piece and orient the grain vertically when gluing it into place, clamping across the plate for a strong joint. If you make multiple throat plates, you can have one tab that sticks up higher and another that sits down low, for cuts that don't go through the board.

Last, I use a rasp, file, or sanding stick to take a touch off the sides of the tab so it doesn't bind in the cut, and round and taper the front edge.

—BEN KERNES, Chicago, Ill.



Best Tip



When he's not making traditional furniture and experimental instruments, Ben Kernes supplements his income by walking dogs. With so many people working from home these days, however, woodworking has become his main source of income. One of his specialties is custom musical bows, inspired by the "Kobo" bows of musician Tatsuya Nakatani, which are used on gongs and a variety of odd, amplified objects.

A Reward for the Best Tip

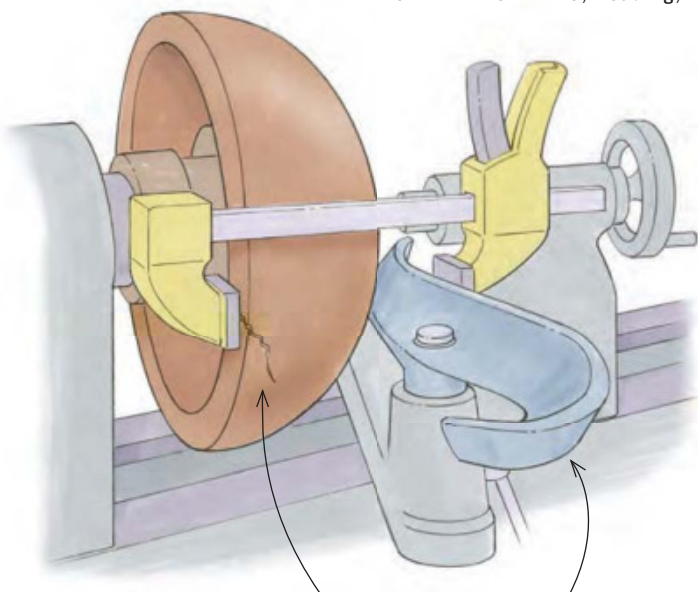
Send your original tips to fwtips@taunton.com. We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was a Veritas Low-angle Block Plane.



Repair a bowl without taking it off the lathe

I turn bowls from figured, irregular material, and sometimes I break a piece out of the rim. If the piece is intact I have a method to glue it back on without removing the bowl from the lathe. I adjust the tool rest so it acts as a clamping caul. I use cyanoacrylate glue for a quick, strong repair. If the bowl is mounted bottom-out, as shown, I position the tool rest against the bottom of the bowl, and clamp between the repair and the rest. If the bowl is mounted rim-out, I try to insert the tool rest between the headstock and blank, or I use the headstock itself as the clamping point.

—DONALD H. STEVENS, Reading, Pa.



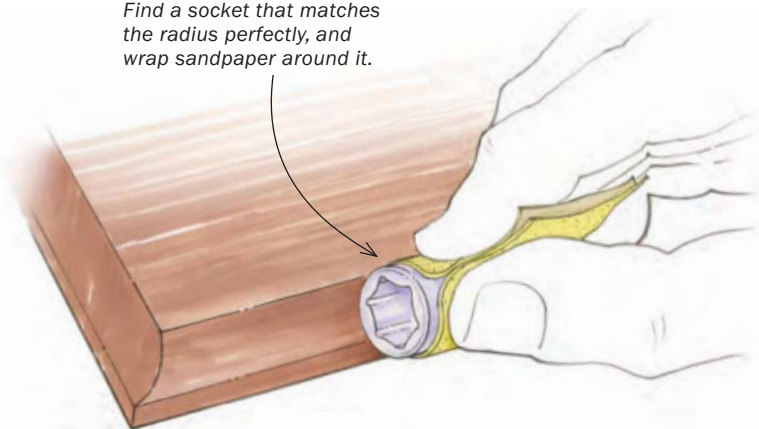
To re-attach a chunk broken off when roughing a bowl, use the tool rest as a clamping caul.

Sand moldings with sockets

I sometimes have a hard time finding the right-size dowel for sanding edge profiles and other tight curves. When that happens, I reach for my set of sockets to find one that matches the radius perfectly. It works the same as using a dowel, but there are many more diameters to choose from.

—MICHAEL DIXON, Williamsburg, Va.

Find a socket that matches the radius perfectly, and wrap sandpaper around it.





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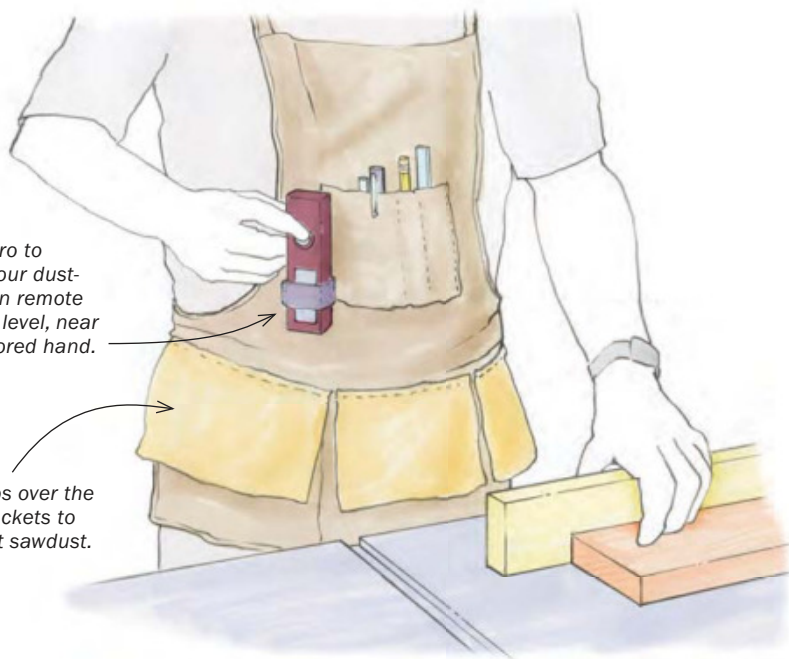
Soup up your shop apron

I wear a shop apron because it puts so much at my fingertips, but I make two changes to mine. Both require very basic sewing. First, I mount the remote control for my dust-collection system at chest level, so I never have to hunt for it as I move around the shop. I use Velcro to secure it so it can come off when I wash the apron. Mounting the remote at chest level prevents unintentional starts and stops when you lean into objects at waist height. I also sew little flaps over the pockets to prevent sawdust from filling them up and making it impossible to find those last few screws hiding at the bottom.

—STEVE FIKAR, Shalimar, Fla.

Use Velcro to attach your dust-collection remote at chest level, near your favored hand.

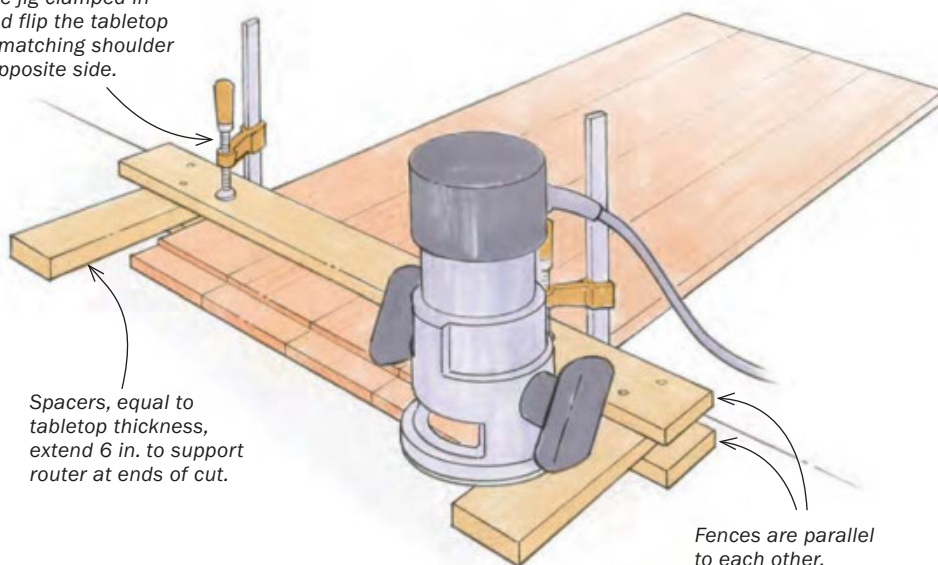
Sew flaps over the lower pockets to keep out sawdust.



Leave the jig clamped in place and flip the tabletop to cut a matching shoulder on the opposite side.

Spacers, equal to tabletop thickness, extend 6 in. to support router at ends of cut.

Fences are parallel to each other.



Improve a breadboard jig for better router support

Like other woodworkers, I use a two-sided fence to mill long tenons for breadboard ends, ensuring that the shoulders on both sides are aligned. But I make a slight modification to the usual jig to keep the router from tipping and digging into the tenon near the end of the cut. I extend the spacer boards so they support the router perfectly at the start and end of cuts.

—GARY BESSETTE, Rochester, N.Y.

Work backward with wandering hand tools

A common problem with cutting tools such as marking gauges and plow planes is that the cutter sometimes wanders with the grain. To prevent this, try working in sections starting near the end of the cut and moving your starting point back each time. This way, if the tool wanders on any one pass, you'll realign it for another short pass and the error will be very small. With a plow plane, start at the far end of the board, getting more and more of the run close to its final dimension before taking full cuts front to back. With a marking gauge, start at the near end and work backward.

—JOHN COFFEY, Locust Valley, N.Y.

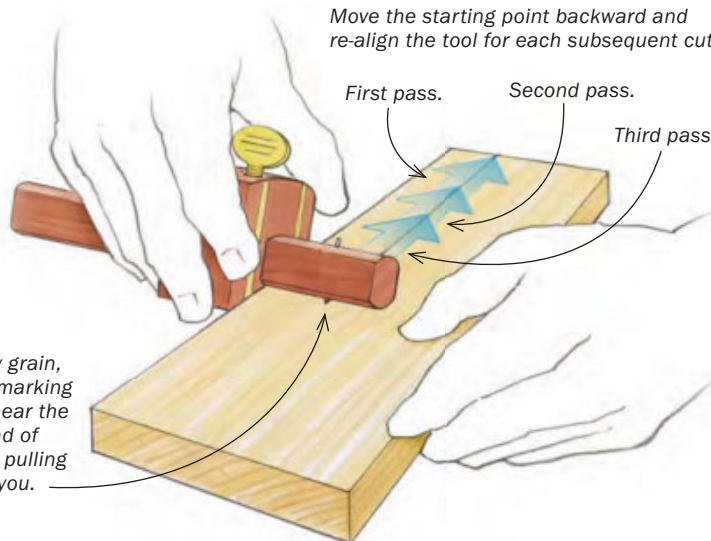
Move the starting point backward and re-align the tool for each subsequent cut.

First pass.

Second pass.

Third pass.

In tricky grain, start a marking gauge near the front end of the cut, pulling toward you.

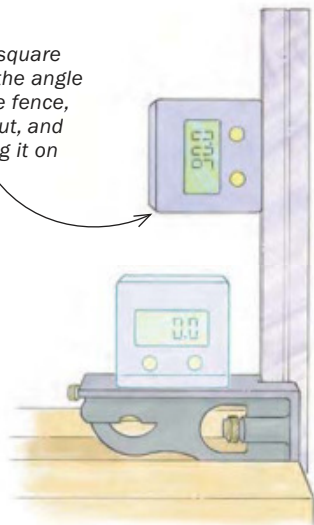


Check and set hand tools with an angle finder

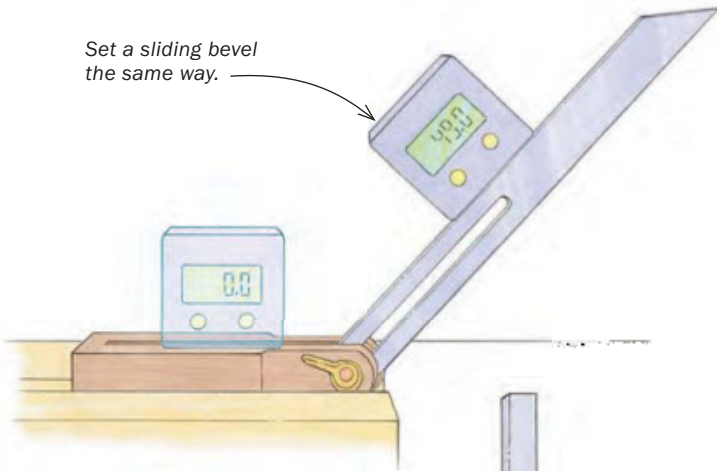
Most people use their little digital angle finders to set blade and table angles, but it also works amazingly for a variety of angle gauges, including a sliding bevel and a miter gauge. It's a great tool for checking the accuracy of squares, too.

—MICHAEL BOSSIN, Sharon, Mass.

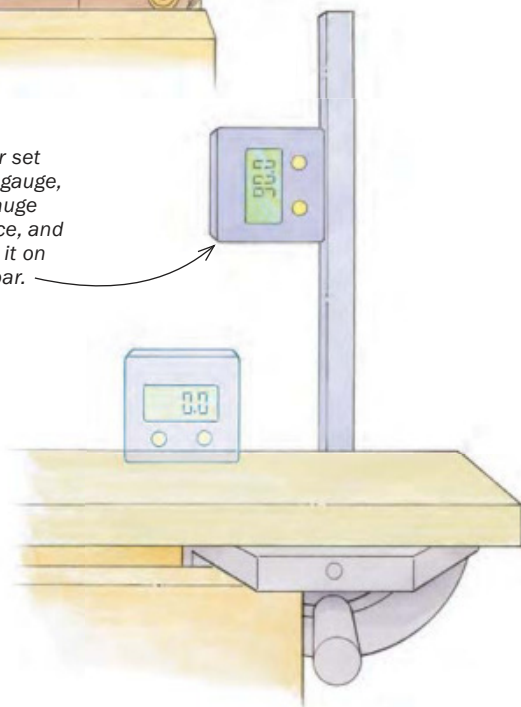
Check any square by placing the angle cube on the fence, zeroing it out, and then placing it on the blade.



Set a sliding bevel the same way.



To check or set your miter gauge, zero the gauge on the fence, and then place it on the miter bar.



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■ ACCESSORIES

Turn your circular saw into a track saw

THE NGX CLAMP EDGE SYSTEM from Bora promises to deliver all the functionality of a proper track saw using the garden-variety circular saw you already own. I tried out the five-piece Deluxe set, which includes the sliding saw plate, the 50-in. Clamp Edge track (with built-in edge clamp), a 50-in. extension track, two specialty clamps for angled cuts, and zero-clearance plastic strips for both tracks. Every element worked as intended, on plywood of all sizes, delivering the key functions of a full-featured track saw at a fraction of the price.

Because your saw is elevated on the plate and track, you lose 1 in. of cutting capacity, leaving a 7¼-in. saw with about 1⅜ in. of cutting depth. That's plenty for sheet goods but a potential issue for thick slabs. The minimal instruction sheets packed with the kit are the only other downside. But after I did a bit of digging for info on YouTube, setup was a cinch. The



clamps on the saw plate were easy to adjust for my saw, as they will be for most on the market (check the Q&A section of the online product page to be sure your saw is compatible). Once positioned, the clamps lock the saw in the same place every time, so it always lines up with the zero-clearance strip on the track. To locate a cut you simply line up the trimmed edge of the strip with any two layout marks.

The plate slides on the track with no slop at all, creating cuts as smooth as those I get on my \$3,000 tablesaw, including crosscuts with zero chipout. The saw's stability once clamped in place also made plunge cuts safe, easy, and accurate.

The "50-in." track designation represents cutting capacity, not overall length. The track is actually 56 in. long, so there is plenty of extra track at the front edge of a 48-in. workpiece, letting you stabilize the saw plate before cutting.

The Deluxe kit comes with two extras. One's a 50-in. track extension that allows you to rip 8-ft.-long strips off a full sheet of plywood. The other is a pair of clamps that lock the track at any angle—the normal edge clamps only work at 90°—opening up another world of plywood construction.

—Asa Christiana is a woodworker, teacher, and freelance writer in Portland, Ore.



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5pc NGX Deluxe Set
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Built-in edge clamp. The built-in clamp slides easily under the track, and locks quickly and solidly onto any workpiece.



Alignment is easy. Once locked in position to suit your saw, the three toggle clamps let you attach the plate in seconds, returning the saw to the same position each time.



Angled cuts too. Two auxiliary clamps lock the track at angles other than 90°, expanding the capability of this excellent system.



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■ MACHINES

Benchtop dust collection

ONEIDA AIR SYSTEMS has introduced a portable dust collector, the Bench Top DC, designed to sit on your workbench and collect dust as you sand. When I power-carve a bowl, I usually remove 90% of the block of wood I started with, and keeping dust from piling up in my shop and entering my lungs are concerns. So I was eager to give the Bench Top DC a try. It proved to be a winner, so much so that I bought one myself.

I wore a white N95 sanding mask while using the Bench Top DC, and proof of the machine's effectiveness was clearly visible. I spent 28½ hours using all my handheld sanding machines—a palm sander, a random-orbit sander, a flex shaft with coarse-to-fine-grit sanding sleeves, and a 2-in. rotary sander; then I hand-sanded for a couple of hours too. Through it all my mask never got very dirty. In comparison, another mask became caked with dust after just two hours of sanding when I relied on my normal setup, a shopmade downdraft table with a 4-in. dust port connected to a standard 1-hp dust collector.

I recommend wearing hearing protection while the tool's on.

To clear the dust from the machine, I simply shook the blue pre-filter clean. I used compressed air for the main filter behind it, and replacements are available from hardware stores, big box retailers, and Oneida.

The unit proved easy to use as well. It weighs just 20 lb. and has a wide rubber strap on the top for easy and comfortable carrying. Out of the box, the only assembly required was to



Dust collector
by Oneida
\$599

fit three steel vanes that concentrate the airflow, and insert the power cord. Everything snapped together and no tools were needed.

The dust collector works via six small fans controlled by a rheostat and is designed to catch only sanding dust. It should not be used for heavy grinding. It is also not intended as a spray booth or an ambient dust collector. It also should not be used to filter toxic fumes.

—Danny Kameranath is a carver, furniture maker, and sculptor in Llano, Texas.



Dust collection at the source. When placed 20 in. from the source, as Oneida recommends, the machine does a great job protecting your work, your shop, and your lungs from fine dust.



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Tune up your block plane

BY MIKE KORSAK

The humble block plane, though often overlooked, is an extremely versatile tool, and I definitely wouldn't want to work without one (for more, see my article "Seven Tasks for a Block Plane," p. 40). If you would like to get your brand-new or decades-old block plane tuned and

running at full capacity, here is a series of steps that will help.

The first thing to do is check the flatness of the sole. I do this with a quality straightedge, like the steel rule of a Starrett combination square. With the plane's cap iron and blade in place (but with the blade retracted) hold the plane up to a light source and put the

straightedge along the sole, looking for gaps between the sole and straightedge. Start with the straightedge running parallel to the plane's length, at about the center of the sole. Then check for flatness at both edges of the sole, and check the diagonals. Any gaps, visible as slivers of light, indicate low spots. I use a black marker to identify these.

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START WITH THE **Body**

Holding the plane up to a light source, check with a straightedge to see if the sole is flat. Check down the middle, at the sides, and on the diagonals as well. If you see any glint of light, mark the location.



I flatten plane soles using 320-grit PSA sandpaper stuck to a known flat surface, such as the cast iron top of my tablesaw or a piece of float glass. When flattening the sole, again be sure to have the blade and cap iron installed (to introduce any stress put on the block plane when in use), but retract the blade so that it does not project beyond the sole. Sanding will work fine for minor flatness issues; but if the sole of a new block plane is significantly out of flat, I'd return it to the manufacturer.

Next I check the plane's other critical machined surface, the angled bed where the blade rests. I use a straightedge again to assess flatness.

Because of the confined nature of the bed, it can be extremely difficult to do any major reshaping of it with sandpaper or files, so I'd recommend returning a new plane if the bed is significantly out of flat. But assuming the bed is flat, I'd use a small diamond hone to remove any burrs created during machining.

The next task is cleaning up the leading edge of the plane's mouth. Any nicks or burrs on the edge of the mouth could catch shavings as they pass through, so make sure this surface is flat and smooth. I do this by removing the adjustable shoe at the front of the sole and working its back edge on sandpaper adhered to a flat surface. If your block plane doesn't



Rubbing the plane over 320-grit sandpaper adhered to a flat surface makes quick work of minor imperfections. To simulate the stresses on the plane when in use, be sure to have the blade in place (though retracted) and the cap iron on while flattening.



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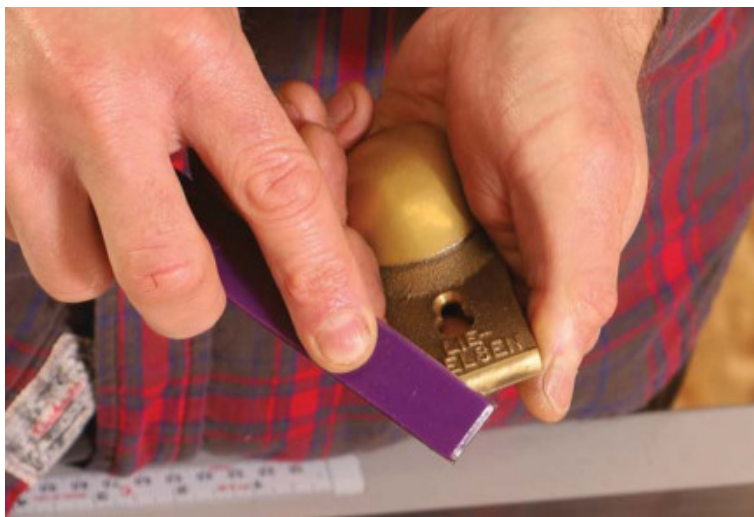
STRAIGHTEN THE Shoe

If your block plane has an adjustable shoe, remove it and sand its rear edge smooth. Any burrs there could slow the passage of shavings through the mouth.



TUNE-UP THE Cap iron

Use sandpaper to flatten the underside of the cap iron where it will contact the blade. With a file and diamond hones, smooth and polish the cap iron's rounded front edge to ease the flow of shavings over it.



have an adjustable mouth (and thus no removable shoe), use a fine file to clean up the mouth's leading edge.

It's important that the cap iron makes complete contact with the blade, so flatten the contact area beneath the front edge of the cap iron. Again you can use sandpaper on a flat surface.

The nose of the cap iron, which the shavings ride against as they're curling off the cut, is another surface that can cause shavings to clog if it is not cleaned and polished. To eliminate any irregularities that could snag shavings, I first use a file to shape the nose so that it is rounded over completely, with no flat spots. Then I switch to small diamond hones and progress through three different grits (400, 600, 1200) until the surface is polished.

The last thing I do to the plane's body is to remove all sharp edges from the sole. This makes the plane feel a little nicer in your hand and also eliminates the possibility of sharp edges or burrs making drag marks on your work. You can do this work with sandpaper, a fine file, or hones.

With the body of the plane now in good working condition, I switch my focus to the plane's blade. Or, in my case, blades.

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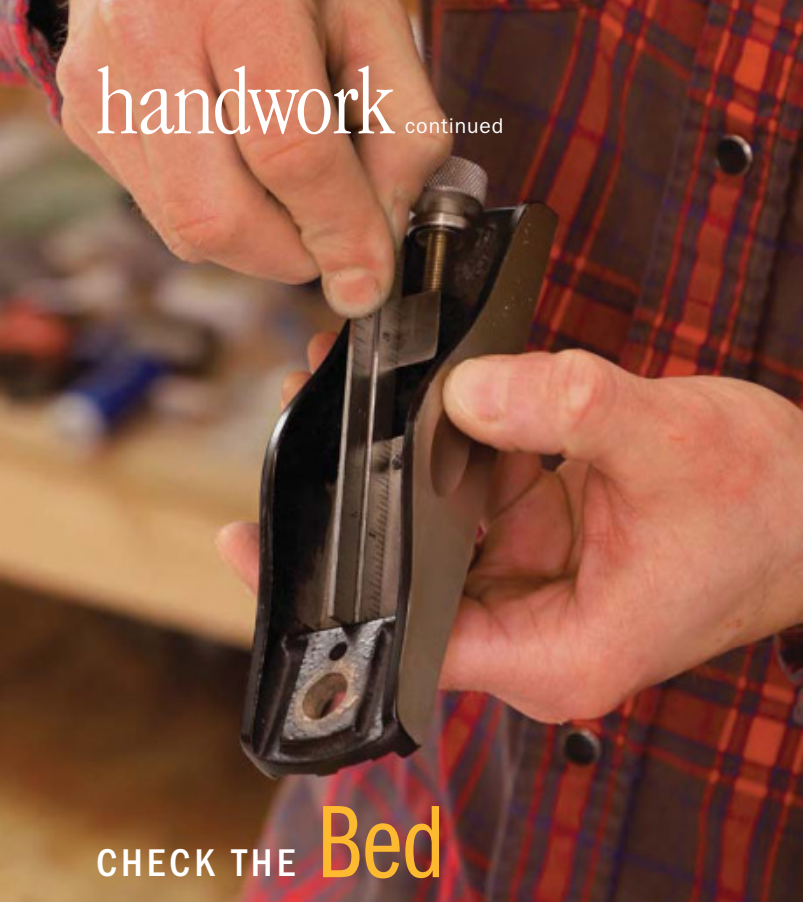
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CHECK THE Bed

Korsak uses a straightedge to assess the flatness of the bed. If it is badly out of flat—and the plane is new—it's best to return the plane. If it's flat, use diamond hones to smooth any burrs or dings.



EASE THE Edges



Rounding over any sharp edges around the perimeter of the sole makes the plane friendlier to handle and prevents scratches to the workpiece.

I have multiple block-plane blades, which I use for different tasks. I have one blade whose bevel is ground to a fairly low angle, somewhere around 25°, with a straight cutting edge. I also use two other blades, ground to slightly higher angles—30° or so—and their cutting edges are cambered. Having multiple blades with slightly different cutting geometries

adds to the versatility of the tool.

When preparing a blade for use, the first thing I do is to flatten the back. I generally do this on waterstones, but if the blade is way out of flat I'd start with 320-grit sandpaper before moving to waterstones. Don't worry about getting the entire back flat; only the ½ in. to ¾ in. of the back closest to the cutting

edge needs to be flattened. Once I have the back flat, I hollow-grind the bevel using a 6-in. grinder with an 80-grit CBN wheel. Then I move to honing and polishing the bevel on waterstones. Now the blade is ready to make shavings.

With blades that I'll be using for the finest smoothing and to prepare surfaces for finishing, I hone the edge to a very

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HONE THE Blade

After hollow-grinding the bevel, Korsak uses a waterstone to flatten the back of the blade. Then he hones the bevel.

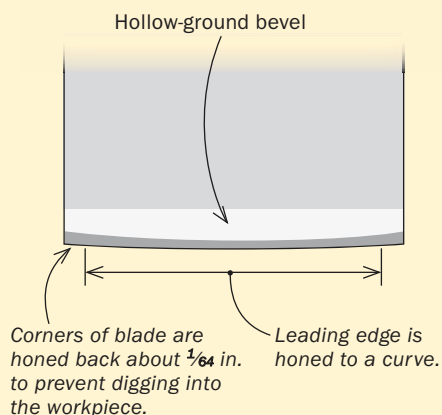


slight curve, or camber. Cambering the cutting edge eliminates the possibility of lines or ridges in the work caused by the protruding corners of blades. The amount of curvature is minimal—the corners of the blade are swept back only about $\frac{1}{64}$ in. compared with the center of the blade.

I shape the camber while honing with waterstones, focusing light pressure with a finger first on one corner of the blade and then the other. This removes just slightly more steel from the corners and creates a nice, fair camber. The next time I need to regrind the bevel, I just follow the shape of the camber with the grinding wheel.

Mike Korsak makes custom furniture in Pittsburgh, Pa.

CREATE A CAMBER



Cambering the blade slightly keeps the corners from digging into the wood and leaving tracks. To produce the camber, hone the blade as usual, then take a few strokes while focusing pressure first on one corner, then the other.



ADJUST THE Shoe



AND Blade

Set the mouth opening with the movable shoe. Base the setting on the work you'll do—wider for coarse shavings, tighter for finer ones. Then set the blade, checking its projection with your thumb.

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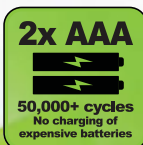


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Arts and Crafts Coffee Table

Fresh work in a familiar style

BY JOHN HARTMAN

My artist wife and I love Arts and Crafts furniture, and our recent move to a new home motivated us to design and build pieces in this classic style. We both liked Kevin Rodel's Limbert-inspired coffee table (*FWW* #252) with its theme of gridwork and square cutouts, but we felt that the design was a bit too bold to live well with the other furnishings in our living room. We adopted the rough format of his table and the tilt of the legs, but our design diverged in most other details. With an understated shelf, beveled through-tenons, and stretchers shaped at the ends to corbel-like curves, we aimed to develop a traditional look that felt true to the style without directly referencing a specific maker. The split panel and its curving cutouts bring a bit of whimsy to an otherwise simple form and invite the viewer to notice the negative shapes.

I started designing the table by making a rough mockup out of 1-in.-thick foam board. I adjusted the dimensions until the size and height of the table felt right in the room and in relation to the sofa. Since our living room is entered from the side, I knew the end view of the table would be the dominant one. So I focused on that as I developed the design. After sketching several versions on paper, I moved the design into SketchUp for further refinement.

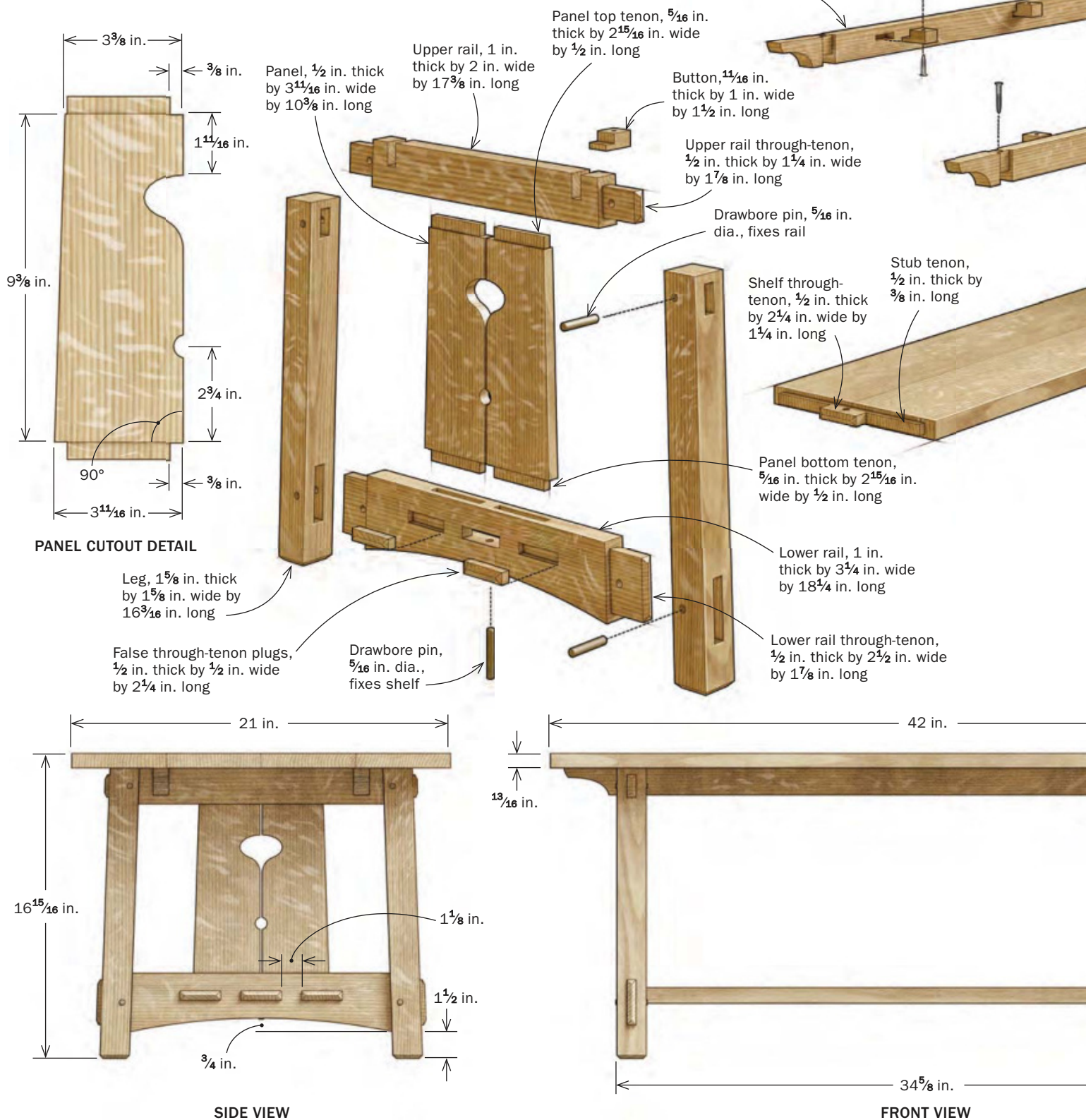
All went smoothly until I woke up suddenly one night to the realization that I had made a mistake. In my drawings, the shelf was connected to the lower rail with three through-tenons—a clear example of cross-grain construction. How had I missed it? I had forgotten about wood movement. Struggling to find a solution, I consulted with an experienced woodworking friend. He suggested a way to solve the problem while keeping the look unchanged. The answer was to retain the center through-tenon but to cut the outer two tenons back, creating stub tenons. I could glue and pin the center tenon but let the stub tenons move in the joint. And I would add faux ends on the outside of the lower rail to give the appearance that there were three through-tenons. Perfect—a solution that didn't change the appearance of the table.

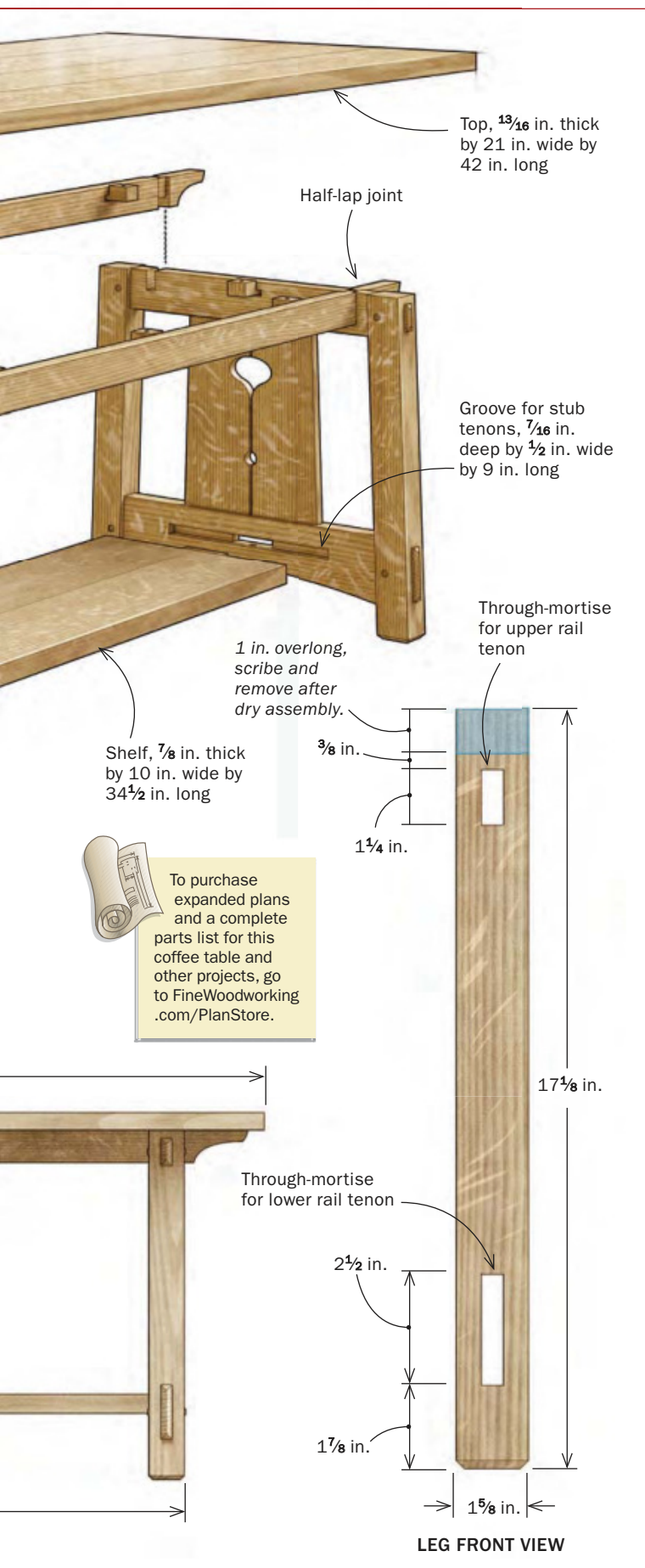
One important wedge

The biggest challenge in this project is cutting accurate angles on the ends and shoulders of the rail tenons and machining the mortises in the legs to match. There is a trick I have found to make this easier. I use a wedge to hold the workpieces at the correct angle on the tablesaw and the mortiser. To make the wedge, I

ARTS AND CRAFTS TABLE, SOUNDLY BUILT AND SUPERBLY DETAILED

A slight splay of the legs gives the table its solid stance. To simplify the angled joinery, Hartman uses a wedge to hold workpieces at the tablesaw and mortiser. He uses a Forstner bit and template routing to create the crisp cutouts in the split panels.





Wedge sets the angles. Using a taper jig on the tablesaw, Hartman begins the build by slicing a long wedge from a plywood blank. He keeps the tapered cutoff to use on the mortiser when bit clearance is an issue.

Wedge blank, 1 $\frac{1}{2}$ in. thick, laminated from two pieces of $\frac{3}{4}$ -in. plywood



Angled crosscut. Using the wedge to produce the proper angle, cut the bottom of the leg to length on the tablesaw's crosscut sled. Leave the leg's top end 1 in. overlength until after the top mortise is cut and fitted.



Angle the mortises too. Because the legs are canted, the mortises for the rail tenons must be angled. Working at the hollow-chisel mortiser, Hartman puts the wedge beneath the workpiece to create that angle.



Build the ends

Lower rail first. Using the wedge again on the crosscut sled, make the angled end cuts on the lower rail.



Crosscut layout. Cut both ends of the lower rail and one end of the top rail. Clamp the lower rail between the legs, and set the angled end of the top rail against one leg. Then mark the length by tracing the other leg.



Easy angles. With a dado blade in the tablesaw and the wedge against the miter gauge, cut the lower rail's tenon cheek in several passes. Use the rip fence as an end stop to control the location of the tenon's shoulder. Flip the wedge end-for-end to cut the tenon's other cheek.

first laminate two pieces of $\frac{3}{4}$ -in. Baltic-birch plywood to make a blank $1\frac{1}{2}$ in. thick. Then, using a tapering jig on the tablesaw, I cut the rectangular blank to a wedge shape. I face the wedge with sandpaper so workpieces will not slip.

Doing the legwork

Now I put the wedge to use. With a crosscut sled at the tablesaw, hold the leg against the wedge and cut the bottom end of the leg to length. Leave about 1 in. of extra length on the top end of the leg to prevent splitting during the mortising and fitting process.

The wedge comes in handy again for mortising the legs. After laying out the through-mortises on both faces, place the wedge on the mortiser's table and put the leg on top of the wedge. To make it easier to align the edge of the hollow chisel to the top and bottom layout lines, I use a little setup block with one end cut to match the 2.2° angle of the legs. I stand it on the leg beside the layout line and shift the leg until the hollow chisel kisses the setup block. I set the hollow chisel's cutting depth at a little over



More mortising. After completing the single through-mortise at the center of the lower rail, Hartman cuts the shallow outer mortises that will hold the caps of the faux through-tenons.

halfway through the leg and cut the mortises from both faces. If the layout is accurate, the mortises should meet up nicely.

Working the rails

Next cut both lower rails to length on the crosscut sled using the wedge as before. For the upper rails, I cut just one end now. Because the legs are tilted, I don't rely on the plans to get the correct length of the upper rails; instead, I cut one end and then make a field measurement to determine final length.

To do this I place a lower rail between two legs and clamp it in place. Then I lay an upper rail in position with the end that's been cut registered against the inside face of one leg and the other end resting on the other leg. I mark the rail where it meets the leg and then cut it to length; I cut the second upper rail to the same length.



Smart layout.

To find the exact location of the end panel's upper shoulder, Hartman first cuts the tenon on the bottom of the panel. Then he sets the shoulder of that tenon on the lower rail and traces along the upper rail.



First the Forstner. To make the panel's small half-circle cutout, use a fence and a Forstner bit at the drill press.



Upper cutout. After rough bandsawing the upper cutout, Hartman fixes a template to the workpiece with double-sided tape, then trims to final shape with a double-bearing bit.



Smooth trimming. To avoid cutting against the grain, trim half the shape with the workpiece riding on the table and the other half with the template on the table.



Fair the taper.

After tapering the outside edge of the panel on the bandsaw, smooth it with a handplane.

Shelf and stretchers



Mark the stretchers from the shelf. After milling the long tenons on both ends of the shelf with a dado blade at the tablesaw, lay the stretcher on the shelf and transfer the shoulder locations. This will determine where you cut the half-lap notches.

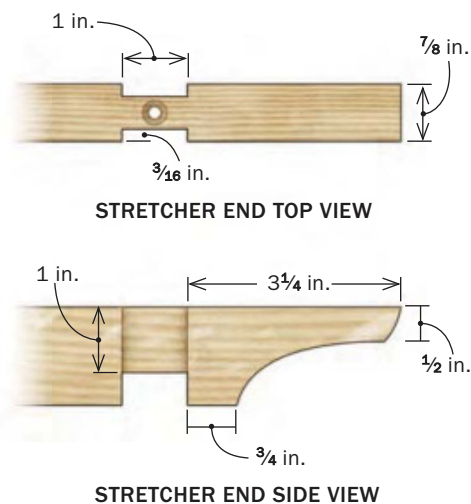
Notching the stretcher. Using the miter gauge and a dado blade, with the fence serving as an end stop, Hartman cuts the stretcher's half-lap notches. He used the same arrangement, with the blade set lower, to cut the shallower notches on the faces of the stretcher.



Test the fit. Gentle taps with a rubber mallet should be sufficient to send the half-lap home.



Rough shape the end. Hartman bandsaws the curves at the end of the stretcher. Afterward, he'll template-route them to final shape. You could also do the final fairing by hand.



bit in the drill press, bore through the legs. Then dry-assemble and clamp up the legs and rails. Inserting a $\frac{1}{4}$ -in. transfer punch in the holes you've drilled in the legs, mark the tenons. Hold the punch tight toward the shoulder of the joint. This will make a mark offset by $\frac{1}{32}$ in. toward the shoulder. Disassemble the legs and rails and drill $\frac{5}{16}$ -in. holes in the tenons at the points you've just marked. Lightly chamfer the holes with a countersink bit. Re-assemble the legs and rails and drive the pins through the holes. The slight offset ensures that the pin will draw the joint tight.

Fit and shape the panels

With the end frames dry-assembled and pinned, you can fit the panels. At the tablesaw, use a dado blade to cut the tenon on the lower end of the panels. To lay out the location of the shoulder for the panel's upper tenon, hold the panel in place in the frame



Trim the long tenon to width. With the shelf tenon still full length, establish the end shoulders with handsaw cuts followed by chisel work.



Fit the tenon and mark through the mortise. After cutting the through-mortise and the long groove in the lower rail, Hartman fits the thickness of the shelf tenon with a shoulder plane (left). With the shelf tenon dry-fitted partway into the lower rail, mark the width of the through-tenon using the center mortise as a guide (above).

with its lower tenon shoulder resting on the lower rail. Then scribe along the upper rail to mark the shoulder of the upper tenon. Make any adjustments to the tenoning setup and cut the upper tenon of the panel. After all the panels are machined, disassemble the end frames and hand-fit the panels to the rails.

To shape the lower cutout in the panels, I make half-circles on the drill press with a $\frac{9}{16}$ -in. Forstner bit. Use a fence with a stop to securely register the panels. To shape the flower motif, I use a template and a double-bearing compression bit on the shaper or router table. First, I trace the template onto the panel and trim close to the lines on the bandsaw. Then I use double-sided tape to attach the template to the panel. To avoid climb cutting, I make the trim cut in two passes, one starting from each end of the opening, so the bit is cutting with the grain at all times. To make the second pass I turn the assembly over and raise or lower the bit so the bearing still rides on the template.

Fit the shelf and stretchers

With the shelf cut to length and width, machine $1\frac{1}{4}$ -in. tenons on both ends, making them the full width of the shelf. Next cut



Cut back the tenons. After making careful handsawn kerfs to define the width of the through-tenon, bandsaw the stub tenons to length.

Assembly

Rails and panels.

Having dry-assembled the frames to mark out and then drill holes for drawbore pins, Hartman here inserts the end panels. When he does final assembly he'll apply glue to the panel tenons only at their inside corners to allow for expansion.



On with the legs.

Once the panels are in place, the legs are knocked on and then the pins driven through the tenons to tighten the assembly.



Fitting faux tenons. Having three through-tenons would constrain the movement of the shelf, so only the middle is a true through-tenon. The outer two are false ends glued into shallow mortises.



the tenon's end shoulders with a handsaw or bandsaw. To accommodate expansion of the shelf, make the total width of the tenon $\frac{1}{4}$ in. less than the length of the groove it will fit into. After marking out the width of the through-tenon at the center, trim away the waste on either side of it, leaving stub tenons flanking the through-tenon. Then hand-fit the joint. The pyramidal bevels on the end of the through-tenon can be cut with a sharp block plane. To make matching pyramidal caps for the faux tenons, cut a workpiece to the same width and thickness as the real through-tenon; bevel its end, and crosscut off a $\frac{1}{2}$ -in. slice.

I use the shelf to determine the precise location of the stretcher's half-lap joints. First mark the midpoint in the length of the shelf and the stretcher. Lay the stretcher on the shelf with the center lines matched up. Then mark the stretcher at the shoulder of the shelf tenons. Lay out the half laps using those lines, and then machine the joints.

Finish and assembly

I made the table of white oak and fumed it to relate to its Arts and Crafts predecessors. I did the fuming and other finishing before final assembly to simplify the processes and to minimize problems with squeeze-out. For the fuming, I made a tent with scrap wood and plastic sheeting. I dry-assembled the table and placed it in the tent with a bowl of janitorial strength ammonia. After fuming, I wiped on a washcoat of garnet shellac and lightly scuff-sanded once it was dry. I used gel stains to get the color and value I wanted and topcoated with a wipe-on finish.

I glued the end assemblies first and drove home their drawbore pins. The panel tenons needed just a little glue on their inner corners. With the end assemblies cured, I applied glue to the shelf's through-tenon and about an inch of the stub tenon on either side of it. Then I glued in the shelf and drove a pin into each through-tenon. I inserted the stretchers and checked for square, and then I screwed the stretchers to the upper rails. Last, I placed the top upside down on the bench, centered the base on the top, and attached the two with buttons and screws. □

John Hartman works wood in a converted garage in West Springfield, Mass.





Insert the shelf. With the ends assembled, fit the shelf in place. A drawbore pin driven from the bottom edge of the lower rail will pull the shelf tight. When the base is fully dry-assembled, Hartman will fume it and apply finish. Then he'll disassemble all the parts and proceed with the final, glued assembly.



Slide in the stretchers. To complete the base, fit the stretchers' half-lap joints to the upper rails.



Screw on the top. Using buttons fitted into slots on the inside face of the stretcher, screw the base to the tabletop.



Seven Tasks for a Block Plane

Ramp up the range and impact of this familiar tool

BY MIKE KORSAK

Some woodworkers think of the block plane as a lowly tool unfit for furniture making. Not me. The block plane may be one of the most versatile tools in my shop, and I use one almost every day. Just about every individual part in a piece of furniture I build gets kissed by this extraordinarily useful tool. Like others, I use the block plane to chamfer edges, creating light-catching facets that are soft on hands. But that's just the beginning. I'll outline seven other ways I rely on block planes to produce accurate and precise work. Perhaps next time you're about to tackle a process for which you'd never considered using a block plane, you'll give it a try. It might just be the best tool for the job.

Mike Korsak makes furniture in Pittsburgh, Pa.

1 Getting it flush

When I need to flush one surface to another, I typically reach for my block plane.

Unlike flushing methods that use a tablesaw or router, it requires no setup or preparation. My plane rack is next to my bench, so it's a matter of seconds to have plane in hand and flushing underway. You can use a smoothing plane for this, but I prefer the greater precision of the block plane, with its narrower blade.

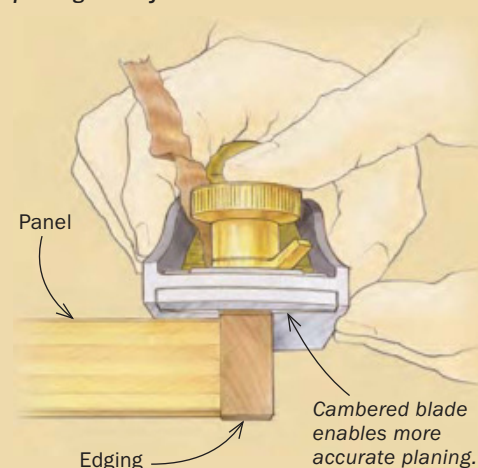
One trick to using a block plane when flushing surfaces is to use a cambered iron (see Handwork, p. 28). With the iron slightly cambered, just the middle two thirds or so will project below the sole. This lets you more accurately control just where you're cutting; for example, when planing edging flush to adjacent veneer, you'll be sure that only the edging is being cut.



Flushing in two steps. Korsak uses two block planes to flush solid edging to a veneered panel. Here he takes a series of coarse shavings with the first block plane, stopping when the edging is about $\frac{1}{64}$ in. proud of the panel.



Final flushing. Using a second block plane, Korsak sets the cambered blade to take a very light cut (above) and finishes flushing the edging with several passes (left). The cambered blade lets him precisely focus the cut and avoid planing the adjacent veneer.



2 Sizing parts



Unplugged planer.

For accurate sizing of thin parts like splines, Korsak brings stock to rough thickness with a planer or bandsaw, then finishes with a block plane. He checks progress often with dial calipers. The plane is easily wielded with one hand, leaving his other hand free to pin the workpiece in place.



The block plane is very handy for milling small parts to accurate thickness. I use this technique when I'm making splines, for example. I cut the grooves first, and then mill the splines to fit. Instead of trying to hit the exact thickness on the planer, I leave the splines oversize and do final thicknessing with a block plane. If the spline stock is too thin to survive in the planer, I rip the stock to rough size on the bandsaw and then mill to final thickness with a block plane.

To plane the stock to final dimension, I work right on my bench or on a planing stop, holding the stock with my left hand while planing with my right. As I'm planing, I check the stock's thickness and parallelism in multiple places along its length with dial calipers to ensure that I'm working it consistently. The beauty in using a block plane for this task is that it's small enough to be comfortably held and easily controlled with only one hand—something that would be awkward or difficult with a larger plane.

You can even mill strips to width with a block plane. It can be a challenge to keep the plane balanced on narrow pieces, but that can easily be overcome by planing multiple pieces at once to give a wider bearing for the sole of the plane.



A bridge for balance. If one workpiece is too narrow to provide adequate support, Korsak planes two at once.

3

Smoothing

I often use my block plane as a smoothing plane. It is just as capable of making fine, fluffy shavings as a dedicated smoother. Because it can be operated with just one hand, the block plane is useful when smoothing parts that may be hard to hold down, or hard to reach. But even if parts can be easily held or clamped, I often reach for a block plane. I just prefer its smaller size and greater maneuverability.

I'm not relying on it here to eliminate major high spots or large discrepancies between surfaces, just preparing the surfaces for finish. A very sharp iron is key. This is the last time a tool will touch the wood, and the iron has to be as sharp as I can get it so there's absolutely no tearout. The iron should be cambered and set so just the middle two-thirds of the iron does the cutting.



A little smoother. With a razor-sharp cambered blade set for a fine cut, a block plane can prepare a surface for finishing every bit as well as a smoothing plane. Korsak uses a block plane for smaller surfaces and a smoothing plane for larger ones.



Fine tool for odd jobs. With its small size making one-handed operation easy, the block plane is handy for smoothing parts that are hard to clamp (left) and areas that are delicate or hard to reach (above).



Block plane fairs a curve. To smooth a convex curve, continuously adjust the angle of the sole so the area just ahead of the blade rides the workpiece during the whole cut. Some very shallow concave curves can also be smoothed with the block plane, provided it is held askew.

4

Working curves

The block plane is not often thought of as a tool used for shaping curved parts, but I find that it can be used to work convex surfaces and even slightly concave ones. The trick to working convex surfaces is to keep two points on the plane in contact with the curving stock: the iron itself (because if it's not making contact, nothing is being cut) and the area of the sole just in front of the iron. As the cut proceeds, the angle of the block plane must constantly change to maintain that contact. It takes some practice to be able to do this consistently, but when you have it down it works quite well. To work slightly concave shapes, I skew the plane significantly, shortening its effective length and allowing the sole to ride the curve of the stock while still taking a shaving.



Swap out the iron. Korsak likes a freshly sharpened high-angle iron for end grain.



Wax up. Unless the surface he's smoothing will be glued (like some miters), Korsak waxes the sole of his block plane before planing end grain to minimize friction.



Use a vise for a wide board. When planing the end grain of wide boards like this one, Korsak fixes them in a vise.

5 Planing end grain

The block plane is widely thought of as a tool used to work end grain, and I definitely use my block plane to do so. One way in which my approach differs from common practice is that I rarely use a shooting board. For most stock, I simply stand the board on edge on my bench, use my left hand to steady the stock, and plane the end grain in a downward motion. Sometimes I boost myself a bit higher by standing on the lower rung of a stool, but that's only necessary when planing the end of a wide board. If we're talking a really wide board, then I may stand it up vertically, clamp it in a bench vise, and work the end grain horizontally.

I also tend to follow this approach for mitered parts. As long as the end of the stock provides enough surface area for the sole of the block plane to bear on without being tippy, I skip jigs and fixtures and just hold the work on my bench. If I'm planing very small parts, however, I'll use a bench hook to make steadying the work easier.



Fairing a miter. Rather than using a clamp to hold a mitered workpiece, Korsak holds it on edge with one hand and planes with the other. He does the same to plane end grain on most square-cut boards, steadying them on one edge with one hand while planing in a downstroke with the other.



A hook helps with tiny parts. To smooth the end grain of very small workpieces, Korsak cradles the part in a bench hook and uses his block plane on its side.

Block plane a glue joint. With a thick sheet of shopsawn veneer elevated on a planing stop, Korsak joints the edge with a few swipes of his block plane.



Support for a sunburst. To joint the vulnerable point of a wedge-shaped piece of veneer, Korsak uses his left hand both to hold the veneer flat and to add support behind it with an MDF backer.



6 Edge-jointing veneer

When I'm joining pieces of veneer edge-to-edge, whether to make wider sheets of veneer or to create a composition, I generally use a block plane to joint the edges. I always use thick veneer, whether shopsawn or purchased, and the block plane does a great job of jointing it. Since I can very comfortably control a block plane with only one hand, my left is freed up to hold the veneer. This is especially helpful when jointing delicate pieces that need to be backed up to prevent flexing.

When jointing long edges of veneer I'll sometimes use a longer plane (like a No. 62 jack plane), but it's not essential. I find that I can joint long veneer edges with a block plane and easily achieve glue-ready joints.

7 Making tiny wedges

When I make door and drawer pulls, I secure them with a wedge. The wedges are strong, but tiny. They are an inch or so long, and their thickness tapers from about $\frac{1}{16}$ in. down to $\frac{1}{64}$ in. at the tip. I suppose they could be made (very carefully) by machine, but I find that they're easily and safely made by hand, using a block plane.

I start at the bandsaw with a scrap 4 in. or 5 in. long, and I slice off strips that are a bit over $\frac{1}{16}$ in. thick. To create the taper, I hold the block plane sole up and pull just the very end of the strip across the blade. After a few passes, a noticeable taper has developed. I gradually increase the length of the cut until I've achieved the taper I want. Then I cut off the tapered portion and repeat the process to make the next wedge.



Wedge work. After cutting a strip $\frac{1}{16}$ in. thick at the bandsaw, Korsak tapers one end of it by pulling it across the block plane's blade in a series of lengthening cuts.



Fitting the wedge. Test the fit of the wedge, then cut it to length and taper the next section of the strip. With the drawer pull in place, Korsak glues in the wedge (below).



Brush on a High-Style Finish

A wiping varnish goes on easily and creates a tough surface ready for rubbing out

BY BOB VAN DYKE



When *Fine Woodworking's* editor, Mike Pekovich, asked me to write about the finishing process I used on a recent cherry chest of drawers, I told him I wasn't a finisher and didn't know much at all about the process. He answered, "Yes, that's the point. You are not a finisher, but you got a result that looks great, is durable, and, most importantly, is completely doable for most people."

Like he said, it's completely doable. I used easy-to-apply wiping varnish, specifically Waterlox, which is thinner, and therefore more user-friendly, than traditional varnish. But just as with traditional varnish (and other film finishes), I had to build it up to a level, uniform thickness to achieve a tougher, more sophisticated-looking finish. This contrasts with how some woodworkers, myself included, often apply wiping varnish: Flood the surface, then wipe off the excess until we reach a satin sheen. This is the "open-pore" look, with the varnish in the pores sitting lower than that on the surface. For a more durable, high-style finish, you need to fill the pores to the level of the surrounding finish. To do this efficiently, I ditch the rag and instead brush on several coats, then sand on and wipe off one or two more coats at the end. This buildup improves durability and, more importantly, lays the foundation for the rubbing-out process, which yields a glasslike surface.

Surface preparation

SCRAPE AND SAND THE SURFACE

After handplaning, follow up by scraping any tearout or imperfections left by the handplane. Finish with 320-grit sandpaper wrapped around a cork or felt block. This smooths the roughness left from the card scraper, and removes any other minor surface defects. Also, the fine dust will settle in any remaining tearout, revealing spots you need to re-address.



PROFILES REQUIRE MORE CARE

Start with a curved scraper on the concave curves, then sand with 220-grit paper wrapped around a contoured block (right). Coarser grits are usually unnecessary and run the risk of damaging the profile. Use a shoe-shine motion when sanding a convex curve (far right). To ensure the sandpaper doesn't rip, Van Dyke backs it with packing tape. If the profile has a fillet, as this one does, use sandpaper adhered to a strip of MDF as a sanding stick to sand into the corners without rounding the edges (below).



Surface prep is vital

A smooth finish starts with a smooth surface, so don't slack on the surface prep. On a high-style finish like this, even minor defects will tarnish the results. I'll take you quickly through my process here, but for an in-depth look, check out my article "Foolproof Surface Prep" (FWW #279).

Start by using a handplane to smooth the surface. Diagonal plane strokes will show any irregularities, which can be fixed with a sharp smoothing plane or card scraper. Next, carefully sand with 320-grit sandpaper wrapped around a cork or felt block. This step consolidates the surface and, more importantly, shows any remaining surface defects. The fine dust produced by 320-grit paper fills the divots in any tearout, making it readily visible.

Don't sand to higher grits. The film finish negates any benefit of finer sanding. It is also not necessary to raise the grain, as the grain on a hand-planed surface does not lift with water.

Seal the surface



SEAL WITH SHELLAC

Brush the surface clean to remove dust and grit. Then apply a washcoat of shellac. Zinsser SealCoat cut 50/50 with denatured alcohol makes a great washcoat, but any 1-lb.-cut dewaxed shellac will do. After letting the shellac dry for 30 minutes, lightly scuff-sand with 320 grit and remove the sanding dust with a heavy-duty paper towel slightly moistened with Windex.

Move on to any profiled edges. These are especially common on period furniture, and they're easily ruined by overaggressive or careless scraping or sanding. Take special care to maintain the crisp transition between convex and concave curves, and use extreme care when addressing fillets and beads. Most molded edges require a profiled sanding block and a curved scraper. Both are available commercially, but they're also easily made.

Clean off the panel thoroughly before applying finish.



Building the finish

This finishing regimen involves sealing the surface, brushing on four to five coats, and sanding on one or two more using a fine abrasive. Sometimes I brush on one more coat at the end. Throughout the whole process, I let my eyes be the judge.

To seal the raw wood surface, I use a thin washcoat of shellac. After letting it dry for 30 minutes, lightly scuff-sand the panel and remove the sanding dust.

For the first layer of varnish, brush on a heavy coat thinned approximately 25% with naphtha or mineral spirits. Four to five brushed-on coats will usually suffice. Each coat needs 24 hours to dry. Carefully scuff-sand and remove the sanding dust between coats.

It's crucial that you work with raking light. By shining a light across the surface, you'll quickly see whether you're applying the finish evenly or if there are holidays (spots you missed).



Apply the finish



BEGIN WITH BRUSHING

Thin the first coat of wiping varnish 25% with naphtha. Most of this thinned coat will soak into the surface, providing a foundation for the following three to four full-strength coats. Use overlapping strokes brushing with the grain. After letting the varnish flow out for a minute or two, while it's still wet, make one more pass with long, light strokes using just the tip of the brush. Use the same technique on the edges and ends.

Most finishers recommend a quality badger-hair brush for varnish work. That being said, a professional finisher friend told me years ago that he keeps the expensive badger-hair brushes hanging up on view for his customers, but the foam brushes he uses daily are hidden away in a drawer. I've also used a foam brush for years, and they work fine. Be aware though, the solvents will break down the foam over time.

Regardless of the brush, good brushing technique yields superior results. Starting a few inches in from the far end, brush away from you with the grain, and continue right off the end. Then, starting in the same place, reverse direction and brush toward yourself, overlapping strokes until you reach the end closer to you. Complete the entire area and let the varnish flow out for a minute or two. Finish by "tipping off" the whole surface while it's still wet: taking one more pass with just the tip of the brush and long, light strokes. Don't overwork the surface. Slight irregularities will either resolve themselves or can be dealt with in the next coat.

After the last of these brushed-on coats has dried, I begin to smooth the finish by sanding on one or two very thin coats, wiping off most of the excess with a clean cotton rag. I use 0000 steel wool or a 1,500-grit Mirlon pad as the applicator.

Last, inspect the surface. If you see flaws that another coat will fix, brush on one more thinned layer.

TIP RAKING LIGHT REVEALS YOUR PROGRESS



Good overall lighting is important, but working with a raking light is critical. Without one, you cannot see how evenly the finish is being applied or if you missed any spots when brushing.

Apply the finish continued

SAND BETWEEN COATS

Scuff-sand and clean before the next coat. Each layer of varnish needs 24 hours to dry before it's ready for light sanding and the next coat. Like before, use 320-grit sandpaper wrapped around a block for the face. Your finger works well enough for curvy profiles. Remove dust with a paper towel moistened with Windex.



If all looks good when the last coat is dry, walk away and let the film harden. The last step is to rub out the surface, and that should not even be considered without at least two weeks of drying. Three is better. Otherwise, the soft, uncured varnish will move and shift under the pressure of rubbing out.

Conditions matter

No matter how well you perform these steps, the results can be disappointing if you don't have suitable conditions in your shop. Low humidity and 65° to 70° is the ideal, but it's not always pos-

sible. With high humidity, ambient moisture can get trapped under the varnish, causing blushing. This can be very hard to remove if the varnish has cured, so choose drier days or run a dehumidifier. In the cold, varnish will take longer to dry, so extend the time between applications and rubbing out. If your shop is cold, at least try to keep the surface of the wood warm. To help the varnish flow better, warm it slightly by putting a small amount in a glass jar and then putting the jar in a pan of warm water.

Bob Van Dyke is a contributing editor.



SAND ON THE FINAL COATS

Sand on and wipe off a very thin coat or two. To apply the varnish, use 0000 steel wool (above) or a 1,500-grit Mirlon pad. Then wipe off most of the excess (right) with a cotton rag. When the final sanded-on coat is dry, determine if the surface looks good or if it has flaws that prompt another coat. If it needs one more layer, thin the varnish about 25% with naphtha and brush it on.



Rub out varnish to a mirror shine

Rubbing out allows you to adjust the sheen of the finish while removing imperfections like dust nibs, runs, sags, or bumps. While these can be minimized by careful application, they are inevitable. In the process of removing them, the sheen is affected, so take advantage of the opportunity and adjust it as you like. As long as the film of finish is thick enough and the finish is hard enough, any luster from dead flat to ultra-high gloss is possible.

A low sheen is easy enough with 0000 steel wool after the finish cures. For a silky satin sheen or a high-style gloss, the process is more in depth, but the results speak for themselves.

The most successful rubouts are done on extremely hard finishes like shellac or lacquer, but many varnishes eventually dry

WORKING A FLAT SURFACE



Tape off the perimeter. Apply blue painter's tape to about ¼ in. of the panel's edges and ends. The varnish is likely thin in these areas, and the tape prevents you from rubbing through it.



600-grit sandpaper wrapped around a paint roller cover levels the surface. Use moderate pressure and straight strokes with the grain that just barely overlap. The roller cover helps distribute pressure evenly. Do not apply pressure over the blue tape.



Wrap a blue shop towel around a felt block and clean off the surface. You want to remove all of the sanding dust after each step, since any dust left on the surface can create additional, unwanted scratches with the next step.



Mirlon abrasive pads further polish the finish. To refine the scratch pattern, use a red, 360-grit Mirlon pad followed by a 1,500-grit pad. Back both with a paint roller cover, and rub with even, straight strokes along the grain.

Rub out varnish continued

ADDRESS THE EDGES

Remove the tape before using a 2,500-grit Mirlon wrapped around a block. This step consolidates the gloss of the area under the tape. Starting about 5 in. from an edge, land the pad lightly, and work back toward that edge, finishing with even, firm strokes.



Creative solutions for profiles. A folded-over, almost-finished paper towel roll works well as a backer for sanding curves and dusting them off with a blue shop towel afterward. Its soft surface conforms well to profiles. To work into fillets' small 90° corners, Van Dyke uses a hotel key card or a credit card.



hard enough that they respond well to the process. Drying time is the key. Don't even think of rubbing out a varnish without at least a week and a half of drying time. Two to three weeks is better.

Unlike traditional methods, this process does not involve lubricants, like paraffin oil. I find liquids add uncertainty because you cannot see if you have rubbed too much until it is too late.

Start leveling the finish by sanding with 400- or 600-grit sandpaper. This important step removes the dust nibs and, done with care, levels out runs in the finish. For more targeted removal, use a card scraper. Protect the perimeter of the workpiece with blue tape, since the varnish will likely be thin there.

Check your progress with raking light. When level, the whole surface will have an evenly dull sheen. Low spots in the finish will be shinier. Carefully resolve these for the best results.

After leveling, remove all traces of sanding dust using a blue shop towel wrapped around a felt block. Keep rewinding the block, exposing fresh towel, until you no longer see white dust residue on the towel.

Next, I move to Mirlon, a superior synthetic pad, in increasingly finer grits, 360; 1,500; and 2,500. Take firm, even

strokes as you cover the whole surface. Again, clean the surface completely between grits with a shop towel. You'll notice the inherent abrasiveness of the towel will bring up the shine slightly when all the surface dust is gone.

Before using the finest-grit Mirlon, remove the blue tape that protects the edges. I then use firm, even strokes with the Mirlon wrapped around a felt block. It is especially important to rub out the surface completely and firmly using the blue towel and felt block afterward.

When you are happy with the flat surface turn to molded edges. Use the same Mirlon pads, this time wrapped around a shaped sanding block. I use a folded-over paper towel tube here, but builder's insulation foam or a dowel wrapped in paper towel work too. To work into corners, back the Mirlon with a stiff card.

At this point you can stand back and admire your work, or you can decide to add a coat of paste wax. The wax does not add much protection other than making the surface slippery and scratch resistant, but it will sometimes even out an uneven sheen or even raise the sheen slightly. You can always remove the wax with a naphtha-soaked rag if you do not like it. You can also rub back the sheen with 1,500-grit Mirlon.

—B.V.D.

ADD PASTE WAX IF DESIRED



Dust off the surface. Especially at this high level of polish, stray dust particles could cause noticeable scratches in the panel.



Apply the wax. Add wax to the center of cheesecloth. By wrapping cheesecloth around a ball of wax, you can apply it evenly. The wax heats up and seeps out with the friction of rubbing it onto the panel. Apply the wax with a small, circular motion that travels along the grain.



Buff and polish. Use a clean cloth to buff the surface out by beginning with the same circular motion, and finishing with long, straight strokes. A lamb's wool buffing pad brings the panel to its final polish. Again, travel with the grain. Use moderate, even pressure.

Deck Chair with Flair

Tapers, curves, and angles converge in a sleek, durable outdoor chair

BY ROB HARE

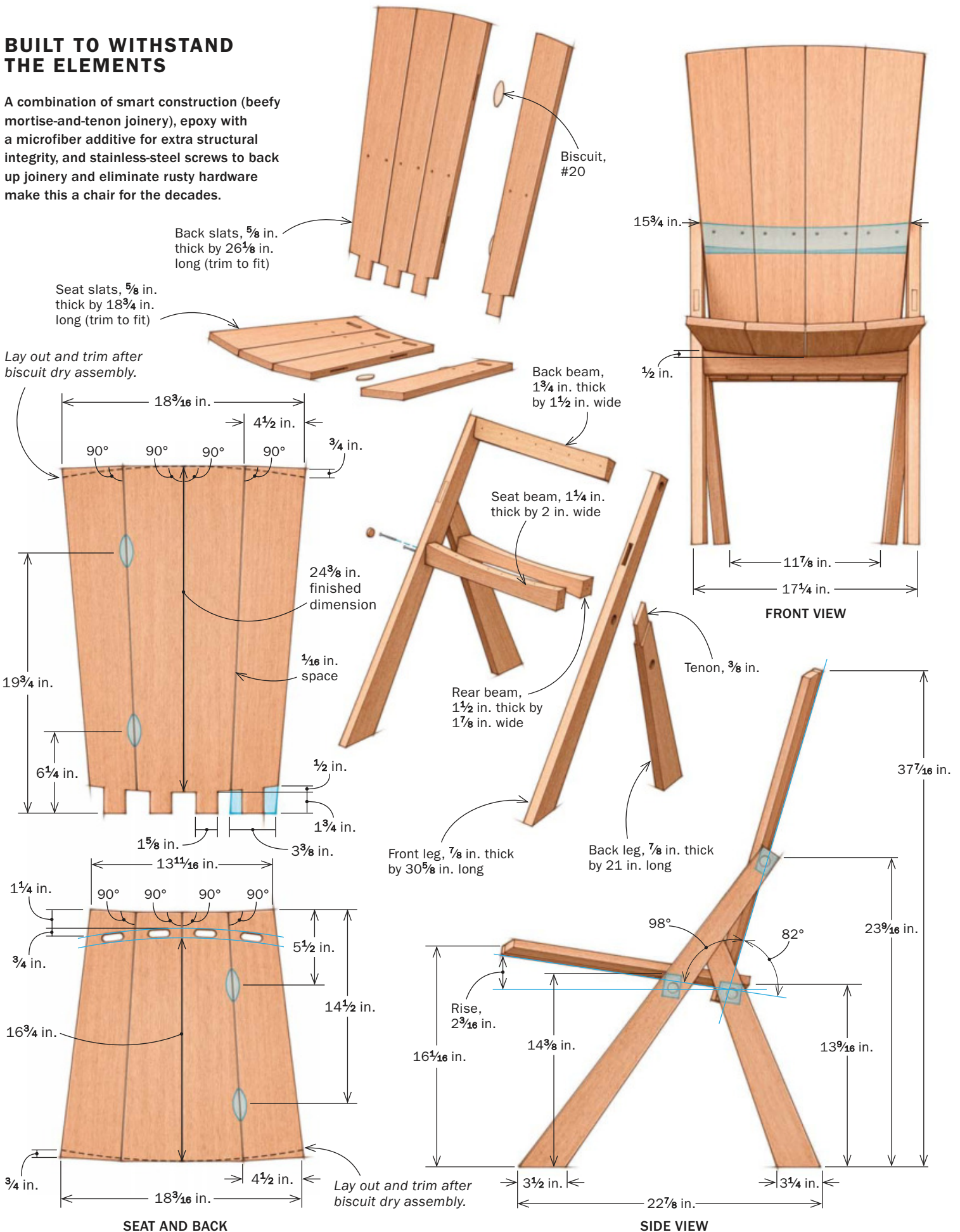
In 1984 I built a gazebo from green white oak. I had a 3-by-4-ft. stone slab table for it, but I needed some comfortable chairs that would do well outdoors. I came up with this design, influenced in part by Adirondack chairs, and used scrap oak from the gazebo, knots and all, to make a set of them. Thirty-seven years later, with zero maintenance and never having been stored indoors, one of those original chairs is still in use.



Time tested. Without finish, this 10-plus-year-old redwood chair has weathered to a gorgeous gray and the construction is still holding strong.

BUILT TO WITHSTAND THE ELEMENTS

A combination of smart construction (beefy mortise-and-tenon joinery), epoxy with a microfiber additive for extra structural integrity, and stainless-steel screws to back up joinery and eliminate rusty hardware make this a chair for the decades.



Seat and back slats

Hare treats the four back slats and four seat slats as separate mini-assemblies. Other than the difference of mortises in the seat and tenons on the back, they get moved along in the same way.



Start with a single-sided taper. An angled plywood jig holds the workpiece in place as Hare rips the taper on one side of each slat.



Biscuits do triple duty. The biscuits locate the seat and back slats front to back. They also lock all four slats into one assembly. Finally, by cutting a #10 slot and using a #20 biscuit, they create a consistent gap between the slats. Adjust the #10 setting so the resulting gap is $\frac{1}{16}$ in.

Mortise the seat slats. With the seat-slat assembly dry-fitted flat and clamped together, Hare uses a router template to cut the mortises. With the template clamped in place, he first drills a clearance hole for the router bit (right). Then he uses a bearing-guided straight bit to cut the mortises (far right). Blocking under one edge of the template creates a slope so the mortises are cut at an 8° angle.



Draw the curve. With the seat slats still dry-fitted, Hare uses a framing square and a template to draw the curve at the front of the seat. He'll do the same with the curve at the top of the back slats.



Online Extra

To download plans for Hare's angled mortising jig (above) and curved cauls used in slat assembly (opposite page), go to FineWoodworking.com/289.

Since then I've built sets in various woods. Because no part longer than 32 in. is needed to build these chairs, cutoffs are a good source of wood. The Honduran mahogany I'm using for a current run of them is all cutoffs from another project.

Taper the slats and legs

I start by getting all the tapering behind me. I use four simple jigs to taper the seat slats, back slats, front legs, and back legs.

There is an optical illusion in this chair. The slats appear to have been tapered on both edges, but I taper just one edge. The two center slats are set up straight edge to straight edge. The outside slats have their straight edge toward the center.



Mortising jig helps lay out tenons. While the back slats are dry-fitted and clamped, use the mortising jig from the seat slats to transfer layout lines for the tenons onto the back slats.

Start by cutting the pieces to the basic width and length, with the ends square. Joint one long edge, set it into the jig, tape it in place, and then rip the taper. The tapered front and back legs are cut in the same manner with similar jigs.

Seat slat and back slat biscuits

Once the seat and back slats are tapered, you can start getting them ready to assemble. The first step is to cut the biscuit joints. I use #20 biscuits here but I cut the slots for them at a #10 setting. Doing so creates a consistent gap between the slats. I fine tune the #10 depth-of-cut setting to produce $\frac{1}{16}$ -in. gaps. The biscuits keep the slats aligned while also letting the slats flex in unison when you sit back in the chair.



Cut the tenons. Hare cuts the tenons on the bandsaw, but they can easily be cut by hand. Once they're cut, use a rasp and file to round them.

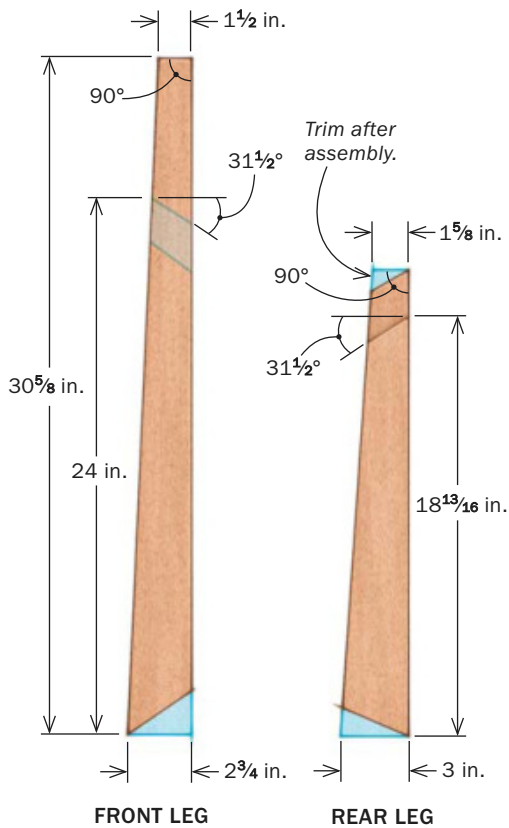


Separate slat assemblies for the seat and back. Using biscuits and epoxy with a microfiber additive to increase structural integrity, Hare glues up the back slats. He clamps the assembly using curved cauls so the back has a curved shape when the epoxy dries. He'll do the same with the seat slats.



Leg joinery

Typical chairs have two front legs and two back legs that don't intersect. But in this Adirondack-inspired chair, the tapered front leg gets a mortise to accept the back leg's tapered tenon.



Cut the mortises. Hare sets the front leg in a fixture with an end stop and tilts the bed of his hollow-chisel mortiser to chop the mortises (right). He transfers the tenon lines to the edge (below) and cleans up the angle by hand with a chisel. Instead, you could rough out the mortise by hand with a drill and clean up with a chisel.



Marking mortise location. Once the legs are tapered with the same type of jig used to taper the seat and back slats, mark the location of the mortise on the front leg. Position the back leg on the front and pencil its location onto the front leg.



Although the biscuit slots have now been cut, they're not yet ready to be glued. Instead, move to cutting the mortise-and-tenon joints that connect the seat and back.

Mortise-and-tenons in the slats

Dry-assemble the seat slats with the biscuits in place, and clamp them up. When you cut the mortises in the seat, the curve of the back and the angle of the seat to the back have to be accounted for. To do so, I make a plywood router template with the four mortises laid out on a curve. I block up one edge of the template so it holds the router at 8° while I'm cutting the mortises.

With the back slats dry-clamped, transfer layout marks from the mortising template to set the spacing of the back tenons. The shoulders of the tenons must match the scoop of the seat. I use a framing square and a template to lay them out. These joints don't have to be perfect, since the seat and back get screwed to the rear beam.

While the slat assemblies are still clamped, lay out the curve at the top of the back slats and the curve at the front of the seat slats. Then take both slat assemblies apart and cut the curves and the tenons on the bandsaw.

Next glue up the two slat assemblies. For adhesive I use a mixture of epoxy and microfiber additive. Mix the epoxy and add some microfiber until it resembles yogurt in thickness. Then glue the biscuits and slats together and clamp them up. I make curved cauls to hold the slats to the correct curve while the epoxy sets.

Leg joinery and assembly

The leg joints can be cut by hand or machine. Decide based on how many chairs you are making and how proficient you



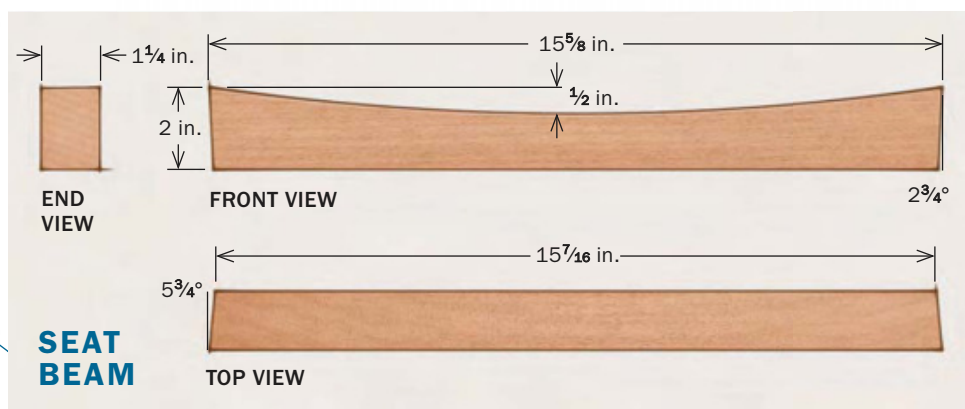
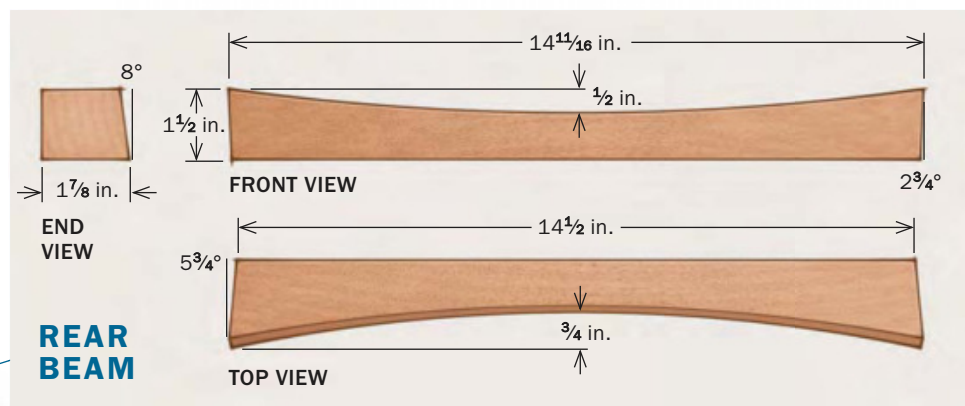
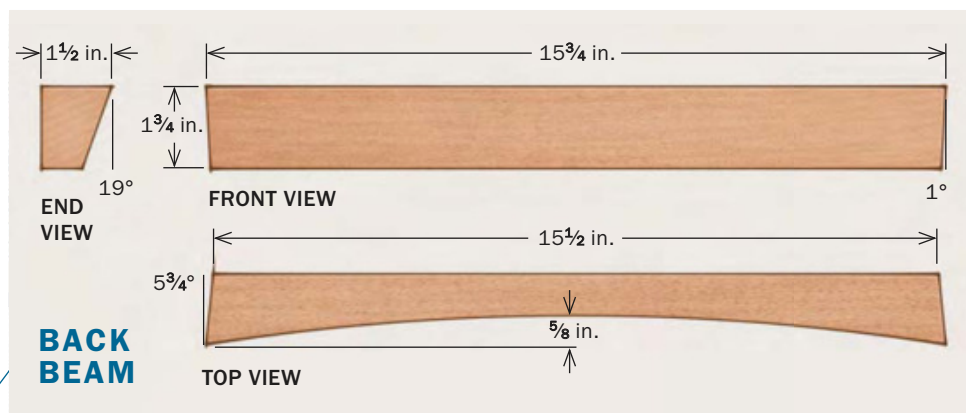
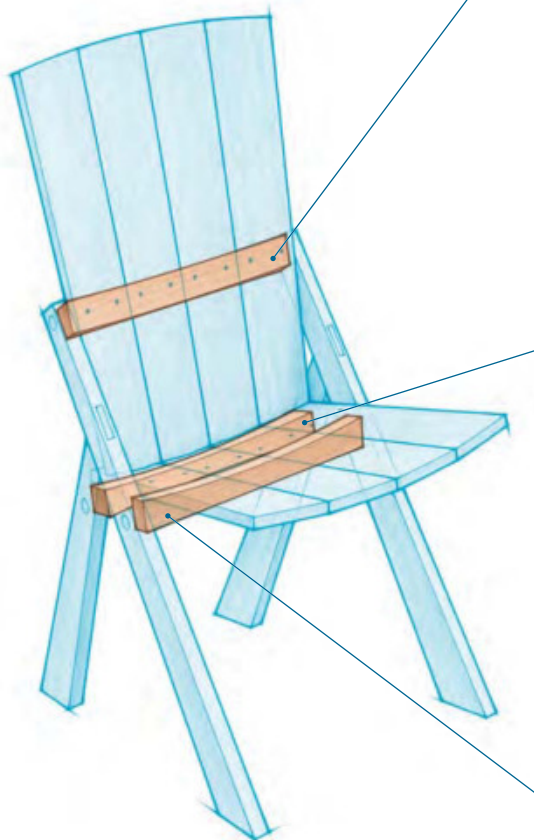
Tablesaw tenons. Hare uses another simple jig with his miter gauge to cut the tenons on the back legs. With the jig screwed to the angled miter gauge, he cuts the first side of the tenon with a dado blade. Then he unscrews the jig, flips it end for end, angles the miter gauge in the opposite direction, and cuts the other side of the tenon. He always sets the 90° corner of the leg into the 90° stop on the jig.



Glue and clamp. This is an outdoor chair, so Hare uses epoxy for his glue-up. Because the leg joint is so visible, he tints the epoxy there with mahogany sanding dust to more closely match the chair. He sizes the joint with a straight epoxy mixture and then adds the tinted epoxy. The mahogany dust, like the microfiber, adds strength.

Three curved, angled crossbeams

The beams are glued and screwed between the two leg assemblies, and the slats are screwed to the beams. The back beam stabilizes the back-slat assembly. The seat beam supports the cantilever of the seat. The rear beam, which fits under the seat slats and behind the back slats, works with the mortises and tenons to lock the back-slat assembly to the seat-slat assembly.



COMPOUND CROSSCUTS, THEN CURVES



Because the two leg assemblies are not parallel, the ends of the beams are cut at compound angles. Make those cuts on the compound miter saw; set one angle by rotating the bed of the saw and the other by tilting the blade (1). The three beams have different curves. Their depth varies and so does their tilt in relation to the face they are cut into. For those curves that are tilted, start by marking the tilt angle with a bevel gauge (2). Then draw the appropriate curve with a template, lining up its ends with the tilt marks (3). Then set your bandsaw table to the tilt angle to cut the curve (4).

Glue and screw two crossbeams in place

This ties the two leg assemblies together to create a frame, and establishes the angles and curves for the back and seat to rest on.



are at handwork. If I had only one or two chairs to make, I would use hand tools and skip the setup time required for machines. But however you cut the joint, the layout needs to be precise, because in addition to coming together at an angle, the joint is tapered. To cut the mortises, I use a hollow-chisel mortiser with the bed angled. The tenons are cut with a dado set on the tablesaw.

Check the fit of the back leg to the front one, tape off any areas where you don't want epoxy, and then lightly butter both parts of the joint with epoxy and assemble them. Trim the end of the through-tenon flush after the glue has set.

Crossbeam curves

There are three crossbeams that tie the legs together and support the seat and back: the back beam, which supports the back slats; the seat beam, which supports the cantilevered seat; and the rear beam, which supports the back of the seat slats and is screwed both to the back slats and the seat slats.



Microfiber additive strengthens screwed butt joints. Hare mixes straight epoxy to seep into the pores and pretreats the joint. Then he adds microfiber to the epoxy before applying a second coat on top of the straight epoxy.



Glue two of the three beams in place. First, do a dry-fit and clamp all three beams in place. While they are still in clamps, tape off around all the joints to keep glue exactly where you want it. Unclamp only the two beams that get glued, the back beam and the seat beam. Leave the rear beam dry-fitted and clamped. Then apply epoxy to the back and seat beams and clamp them in place.



Reinforce the joint. With a $\frac{3}{4}$ -in. dia. Forstner bit, drill a recess in the front leg where the beam intersects it. Then predrill and countersink for two (#6 x 2-in. square drive, deep thread, stainless steel) screws in each recess. Finally, use waterproof yellow glue to fix a plug in the recess.

The final crossbeam

This beam gets screwed to the seat slats first and then into the back slats, turning them all into one L-shaped unit that then gets tied into the leg/beam framework.

Screw the rear beam to the seat slat assembly.

To position the rear beam, Hare fits the back tenons into the seat mortises and sets the inside angle between them to 98° with a bevel gauge. Then he clamps the rear beam to the seat assembly, removes the back, and predrills and countersinks two #6 by 1½ in. screws per slat into the top of the beam.



The ends of the beams need to be cut to compound angles. This is because the two leg assemblies are not in parallel planes; instead, they follow the tapers of the seat and back. I make those end cuts at the compound miter saw.

The beams also have curves cut into them to cradle the seat and back assemblies. The biggest obstacle here is that the curves are not all cut square to the faces of the beams. To cut these canted curves, either set your bandsaw's table to the appropriate angle or make an angled fixture to clamp to the bandsaw table. If you take care and cut a nice curve, the surface doesn't need to be sanded smooth because the slats will cover the cut.

Crossbeam to leg assembly

I start this glue-up by dry-fitting the beams and clamping them between the legs. After taping off around all the joints, I remove the back beam and the seat beam. I apply glue for those two beams, clamp them in place, and let the epoxy set up overnight. Before screwing those two beams to the legs, I drill a recess for the screws that will be capped afterward. I use two screws for each joint and drill pilot holes so that the end grain doesn't



Fit the back tenons into the seat mortises.

Check the fit, and use a file to adjust the tenon shoulders so that all the back slats sit perfectly on the seat assembly. Lay the unit on the bench so the seat is vertical and you can see the front side of the tenons (above). Predrill and countersink two screws per tenon into the front of the beam, working from the center out. Use #6 by 1½ in. screws.



Install the chair into the frame. Hare clamps small ledger strips to the inside of the legs to support the rear beam while he glues and clamps it in place. After the epoxy is set, he reinforces the beam with two screws, recessed and plugged.

split. The rear beam doesn't get glued and screwed in place yet.

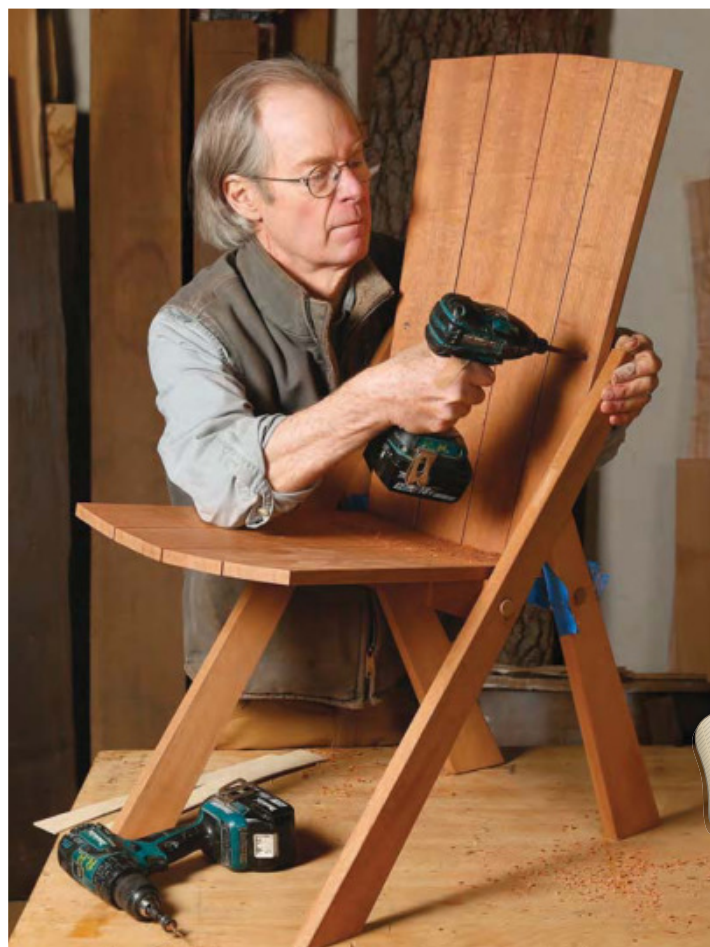
Attaching the seat to the frame

Dry-assemble the seat and back. Check the angle at which they meet and the fit of the tenons. Snug the rear beam into place against the seat and back and clamp it to the seat slats. Remove the back and screw the beam to the seat. Then reinsert the back and screw through the tenons into the beam. Use a handsaw and/or a belt sander to flush the ends of the slats to the rear beam.

The last step is attaching the seat and back to the frame. Apply glue to the ends of the rear beam (now screwed to the seat and back), clamp it between the legs, and add screws. Then screw the back slats to the back beam and the seat slats to the seat beam. Finally, sand the curves at the front of the seat and the top of the back.

I don't apply finish to these chairs. I have yet to find a finish that withstands years of direct weather without maintenance, and I like the gray. I just sit and enjoy. □

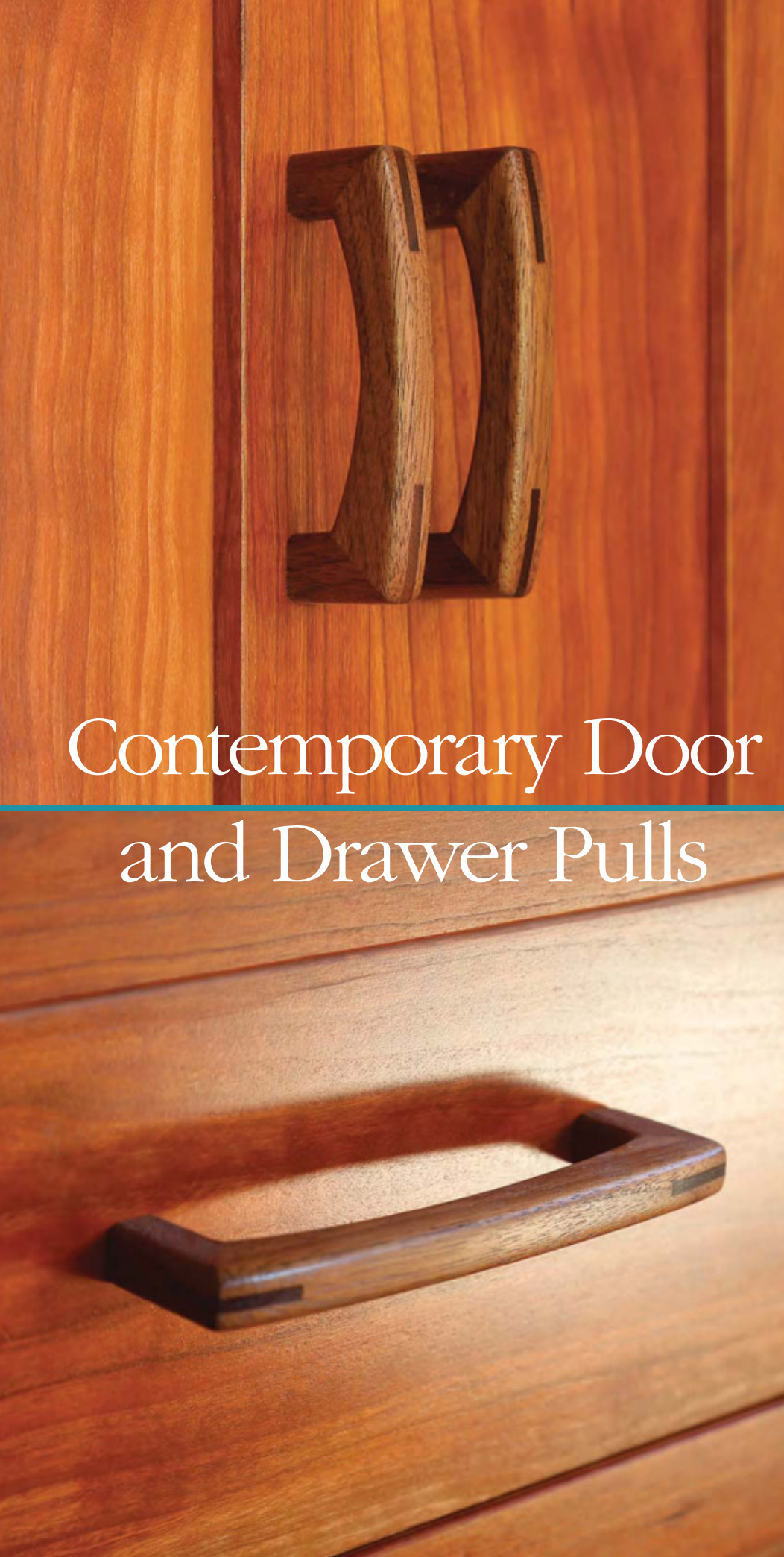
Rob Hare is a wood and metal worker in Rifton, N.Y.



Secure all the slats to the beams. Hare predrills and countersinks two screws per slat, one row across the seat into the seat beam, and one row across the back into the back beam.



To purchase expanded plans and a complete parts list for this outdoor chair and other projects, go to FineWoodworking.com/PlanStore.



Contemporary Door and Drawer Pulls

When we design and make custom furniture, we also design and make the pulls. We often leave pull design until deep into the building process so that we can use the physical piece for inspiration. Making those final details is exciting because they can be what brings the whole piece together—the icing on the cake, if you will.

Our pull designs vary, but one common denominator is batch production. We always need multiple pulls (which are typically made with tiny parts) and we want making them to be a safe, efficient process that yields consistent results. For us, that means designing good procedures and building good jigs. We'll explain how we made these particular splined and mitered pulls, but the thinking behind the jigs and processes can be applied to other designs.

Marking and cutting the miters

We made the pulls in two sizes, shorter for doors and longer for drawers. To create a

Smart construction
makes fashioning
their small parts
safe and repeatable

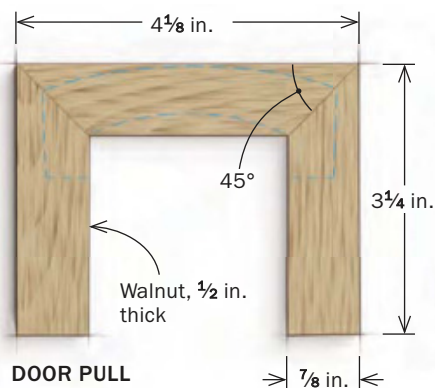
**BY LARISSA HUFF
AND ROBERT SPIECE**

continuous grain match, we cut the three parts for each pull from a single blank. After milling all the blanks, we accurately laid out the parts for one short pull on a short blank and one long pull on a long blank. The blanks for the rest of the pulls were just quickly marked with chalk to indicate the direction of the miters. Using a different color marker for each blank, we also drew an offset line along the outer facing edge of the blank to keep track of the continuous grain after the parts had been cut.

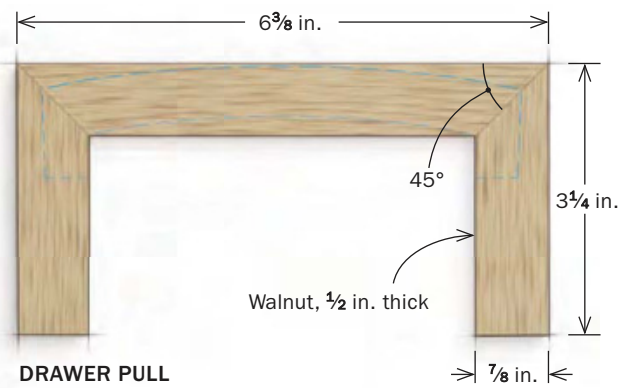
To miter the tiny parts safely, we made a small sled with an angled fence and a toggle clamp. We fixed a stop block to the

GRAIN WRAPS AROUND MITERED PULLS

To make continuous-grain pulls, cut the three parts for each pull from a single blank. Blanks for door pulls are $\frac{1}{2}$ in. by $\frac{7}{8}$ in. by $11\frac{1}{4}$ in. For drawer pulls, blanks are $\frac{1}{2}$ in. by $\frac{7}{8}$ in. by $13\frac{5}{8}$ in.



DOOR PULL



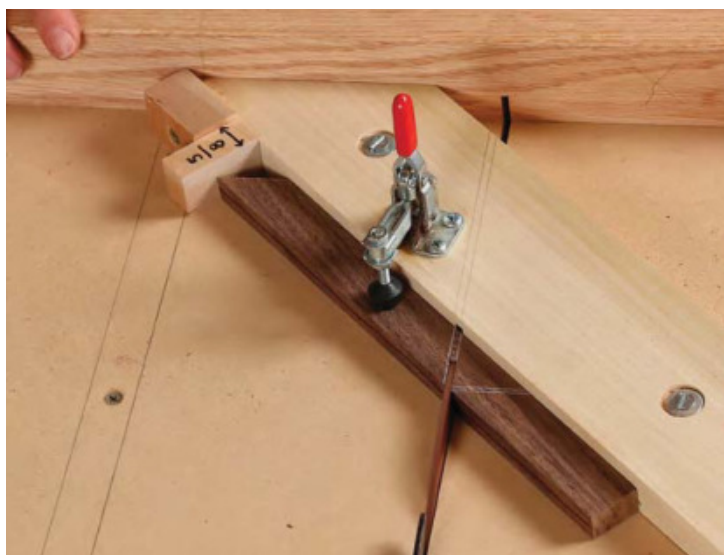
DRAWER PULL

A SLED TO MITER THE PARTS

A tablesaw sled with a 45° fence, a stop block, spacers, and a toggle clamp makes cutting the miters on small parts accurate, repeatable, and safe.



First leg first. To cut the first leg, place the longest spacer against the fence and the stop block. Then slide the blank up to the spacer and engage the toggle clamp. The chalk layout lines remind you which way the miters go. After cutting the leg miter (right), turn the blank over to cut the first miter for the pull's crosspiece, trimming as little off the end as possible.



Cut the crosspiece. After cutting the first miter on the crosspiece, flip the blank again, insert the short spacer, and make the second miter cut on the crosspiece (above).

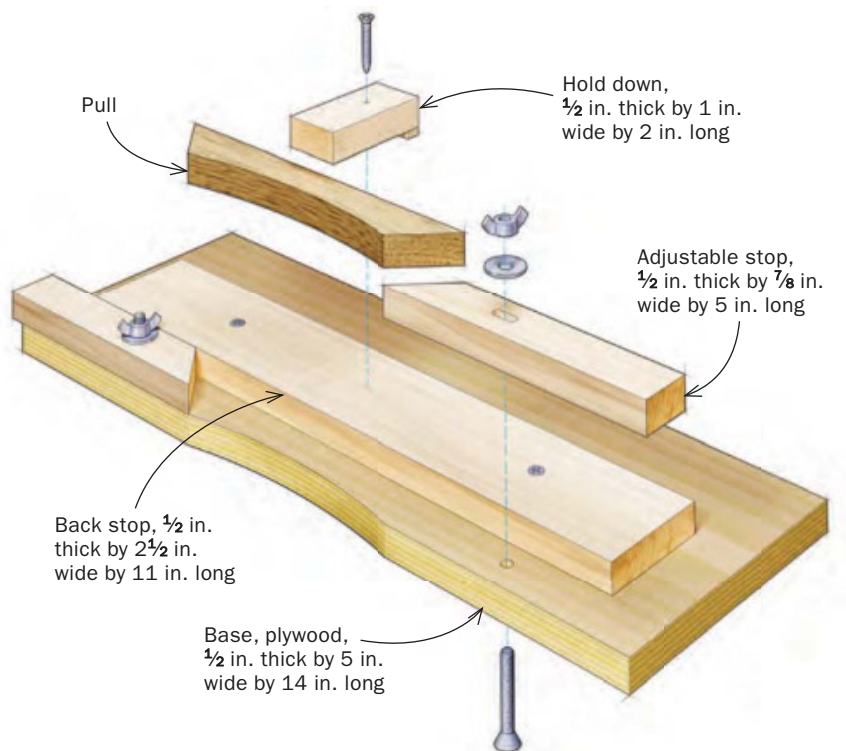


Second leg finishes up the miter cuts. With the leg spacer back in place, cut the final leg miter.

TACKLE THE INSIDE CURVE

Before gluing up the pull, you need to cut and finish the inside curve on the crosspiece.

Make a simple fixture. On the bandsaw, cut the curve of the pull into a piece of plywood. Add stops and a hold down to keep the blank in place during routing.



Shape and sand the inside curve. With the blank in the jig, take multiple shallow passes with a bearing-guided straight bit to cut the curve. You can easily sand the inside curve with a sanding drum on the drill press.



fence 6 in. to the right of the line of cut. Then we made spacer blocks that register against the fixed stop to control the length of the various parts being mitered. We used the accurately laid-out blanks to determine the correct length for the different spacers. Our spacer block for the legs of both pulls was $3\frac{3}{4}$ in., but you could vary this based on your sled. Our spacer block for the longer pull's crosspiece was $\frac{5}{8}$ in., and for the shorter pull's crosspiece it was $2\frac{3}{4}$ in. Once the spacers are made, you can cut all the miters.

Shaping the inside curves

Before the miters are glued together, you'll shape the inside curve of the crosspieces. A template routing jig helps shape the small pieces safely. We made one



ASSEMBLE THE THREE PARTS



Fine-tune the joint. Prior to glue-up, Huff uses a handplane on a shooting board to clean up the miters.



Rub joint gets the job done. Use a dab of glue and rub the joints back and forth against each other until the glue grabs. Hold the joint firmly in place for about 30 seconds and leave the pulls to dry overnight.



Cut the legs to length. After glue-up, use another simple jig to hold the pull in place while cutting the legs to length on the tablesaw.



End run around end grain. Because screws into end grain can weaken over time, add threaded inserts to the legs. Bore holes for them on the drill press. Use a fence, a stop block, and a toggle clamp to keep the piece firmly against the fence. But don't glue the inserts in place yet.

AFTER THE GLUE DRIES

Two final construction details are adding the keys to the miters and shaping the outside of the pulls.



Kerf the pulls and install the keys.

With an over-the-fence sled cradling the pull at 45°, cut a kerf (with a thin-kerf rip blade) in the center of the miters and glue in the keys. The keys should be longer and wider than the key slot to make gluing them in easier.



The outer shape. Use a template to trace the final shape on all the pulls. Then carefully cut that shape out on the bandsaw.

for the shorter pulls and another one for the longer pulls.

After sawing and smoothing the desired curve in the edge of a piece of ½-in. plywood, mount a back stop, two adjustable end stops, and a hold-down. Use a router table with a pattern bit to ride the template and copy the curve into the inside edge of the pull. Take several light passes, removing slightly more material with each pass until the bearing of the bit rides along the template. After routing, clean up any machine or burn marks with a quick stop at the spindle sander or by hand sanding.

Glue up and reinforce the miters

To glue the miters we use the quick, effective rub joint. On a clean, flat surface, apply glue and slide the mating miters against each other until the two tack together. Apply finger pressure for half a minute and let them dry overnight.

Then cut the legs to length on the table-saw. To do it safely, we use a simple sliding jig with a fence and a toggle clamp. Next drill holes into the ends of the legs. Mounting pulls by screwing into end grain is not a plan for longevity, so we add threaded inserts, and these holes accept them.

To strengthen the tiny miter joints, we use shopmade keys made from the same wood as the pulls. To cut slots for the keys, we made a jig that straddles the table-saw's rip fence and cradles the pull at 45°. Once we've cut the slots, we use a caliper to measure the width of the kerf, and then



FINISH IT UP

Final steps include sanding, routing a roundover, adding finish, and gluing the inserts in place.

Smooth the sawmarks. After bandsawing the outside shape of the pulls, sand them to a finished surface. A stationary belt sander refines the shape and removes machine marks. It's followed by a flap sander on the drill press.



Round it over. With a $\frac{1}{8}$ -in. roundover bit at the router table, round all the edges of the pull, except the bottom of the legs. Then hand sand to remove any machine marks.



Pop the grain with finish. Huff and Spiece start with boiled linseed oil to bring out the grain of the wood, and then they topcoat with spray lacquer from a can.



Threaded inserts are the final step. Use 5-minute epoxy to secure the inserts. The insert has a shoulder, and a barbed shaft that fits a $\frac{1}{4}$ -in.-dia. hole (stafast.com, No. TS083207).

rip key stock at the tablesaw to fit the kerf. Rip several long strips to thickness and hand-cut or bandsaw the keys to length. Apply glue to the slot and the key. Press the key into place, ensuring it seats fully, and leave it to dry.

Shaping and finishing touches

We trace a template to establish the outside shape of the pull. Then we cut the shape at the bandsaw and refine it on a disk sander. The cross-grain disk sander scratches are removed on the sanding belt.

With a $\frac{1}{8}$ -in.-radius bit at the router table, round over all the edges. Sand the pull flat by rubbing it on 180-grit sandpaper on a flat surface. Touch up the edges with 180-grit to remove tearout from the router.

To further refine the shape and give the pull a nice, soft quality, we finish up those hard-to-reach edges with a flap sander in the drill press. This sanding tool gives the pull a wonderfully tactile feel. Be sure to

wear gloves as it is not such a lovely, tactile feel on your bare hand.

Finishing up

Walnut really comes to life with a splash of boiled linseed oil. The pulls are liberally wiped with oil, then wiped clean and left to dry for five days. We topcoat them with spray lacquer. Apply three coats, buffing with 0000 steel wool in between. □

Larissa Huff and Rob Spiece run Lohr School of Woodworking in Schwenksville, Pa., and make custom furniture.



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CHARLES PALMER AND OLIVER WAGNER

Albuquerque, N.M.

This altar coffer is a reproduction of a 17th-century piece in New York City's Metropolitan Museum of Art. Charles and Oliver drew their plans from information on the Met website and photos they took in the museum. The angled leg joinery was the biggest challenge. They made molds for the brass drawer handles using the lost wax process and sent them to a foundry for casting. The drawers are still missing their latches, because the two are still researching how exactly the originals work.

ROSEWOOD AND WALNUT, 21½D X 73W X 30H

Photo: Charles Palmer



KEITH BLANKENBAKER

Portland, Ore.

Keith was attracted to an article in *FWW* #57 ("Cold Molded Cradle") in which Larry Hendricks used a boat-building technique to build a cradle. In cold molding, strips of veneer are wrapped around a mold and glued, layer by layer, until the desired thickness is reached. Keith adapted Larry's design and added a stand to make it easier to use. He built his first cradle in walnut, for his grandson, and followed that with a maple version for his granddaughter a few years later.

WALNUT, 21D X 40W X 32H

Photo: Paul Blankenbaker



CATHY HARMS

Raleigh, N.C.

Cathy designed this bench to showcase its slab seat, with clean lines on the base that serve to highlight the grain. "The ash slab was a gift from my friend's dad back in Iowa. He is a woodworker who has built his own sawmill and kiln. I picked it up on an RV road trip through the Midwest and brought it back to North Carolina," Cathy says. She retained the bark on the underside, drilling angled holes through it to accept the turned tenons at the top of the legs.

ASH, 13½W X 57L X 19¼H

Photo: Sandy Everett Photography



JUAN-MANUEL PINZON

Richmond, Va.

This bench evolved from a small model that Juan-Manuel built in his first year woodworking, inspired by George Nakashima's work. In revisiting the model, his goal was a light, airy, strong piece, using a wood that would accentuate the lines and add a sense of movement. "Finding this beautifully warm and radiant piece of elm really brought the project to life and gave inspiration for some little details along the way."

ELM, 17D X 51 $\frac{1}{2}$ W X 33H



ABBIE NUGENT SMITH

Springfield, N.H.

As a student at North Bennet Street School, Abbie would spend hours after class had finished for the day carving this table, which was inspired by her father, John S. Nugent, a lifelong sailor. The schooners depicted in the inlay are the Bowdoin, Olad, and North Wind—"all of which are sailing because John either built or rebuilt them," she says. "This piece tested me in many ways, but ultimately I think my father would be proud of the result and it certainly made me grow in my craft."

CHERRY, 21D X 31W X 30H

Photo: Lance Patterson





SETH MORIN

Akron, Iowa

Seth used *shou sugi ban* as the finish on the top of this oak table. The process involves burning the wood until the surface is charred, removing the outer charred bits with a wire brush, and then coating it with oil, in this case tung oil. Seth described his inspirations for this design as “your magazine combined with drunken doodling.”

RED AND WHITE OAK, 19D X 48W X 29½H

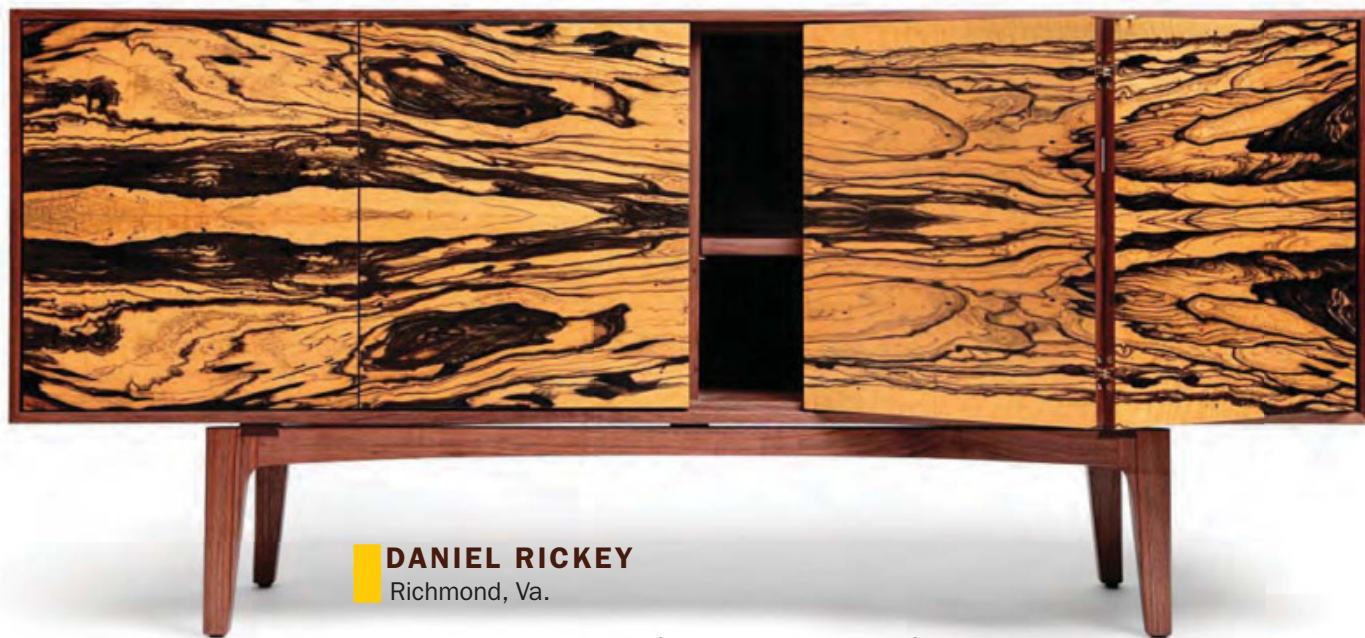


RYAN D. CHENEY

Louisville, Colo.

Ryan designed this wall-hung mirror/cabinet at his wife's request. Decorative details abound in this piece; the door alone is made up of more than 53 individual pieces, including bits of beading, edge banding, copper, leather, and handmade paper. The design was inspired in large part by the work of furniture designer Carlo Bugatti, “but ultimately, my own design,” Ryan says.

CHERRY, WALNUT, EBONIZED WALNUT; 5½D X 35W X 28½H

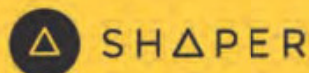


DANIEL RICKEY

Richmond, Va.

This credenza has a case made of two book-matched slabs of walnut, with legs that are secured to the stretchers with sliding dovetails. The bi-fold doors, veneered with white ebony, open via handmade brass pulls and run in tracks along the case. Daniel made this piece for a client; he said it was tough to let it go.

WALNUT AND BLACK/WHITE EBONY VENEER, 18D X 66W X 30H



Shaper Workstation turns the Shaper Origin router into an unmatched joinery machine. Cutting paths can be created directly on board the router, or imported from a wide variety of drawing programs.

Whether it's the 3D printer, smartphone, or any other game-changing technology, the real possibilities only emerge in the hands of real users. The same is true for Shaper Origin, the world's first and only handheld CNC, introduced in 2017 and joined in 2020 by Shaper Workstation, a rugged, versatile workholding platform that turns Origin into a fully realized system for both flat work and fine joinery.

On YouTube, in the growing libraries and archives on the Shaper website



Shaper Origin can also orient itself on workpieces large and small using inexpensive adhesive tape. Indiana furniture makers Audi Culver and Ivy Siosi use Origin to rout accurate mortises for the large rectangular inlays that distinguish their tables and benches.

Woodworkers unlock potential of handheld CNC

SHAPER ORIGIN AND WORKSTATION TEAM UP TO CHANGE WOODWORKING

(ShaperTools.com), and in the pages of this publication—see Roland Johnson's review of Shaper Origin in *FWW* #280—users are turning the tool's early promise into proven practice, sharing hundreds of projects, ideas, and cutting files for this innovative tool. Here are just a few examples.

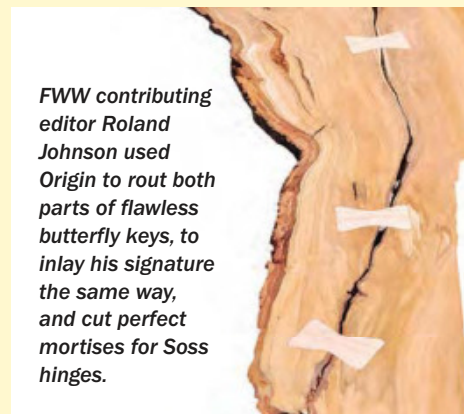
From common tasks to uncommon capabilities

Indiana furniture makers Audi Culver and Ivy Siosi use Shaper Origin to rout the SIOSI logo into the underside of every custom piece they build. The CNC router has also changed the way they inlay the thick, overlapping rectangles that distinguish their tabletops and benches. "The deeper you go with a chisel, the more room for error there is," Culver said. These days they use Origin to create deep recesses for inlay, quickly and flawlessly, leaving just a few minutes of handwork in the corners. "Origin taught us that incorporating CNC work into the craft that we do can be very valuable," Siosi said. "It's still fully us, but it's like having a little buddy to do the hard work first!"

FWW's contributing editor Roland Johnson used Origin for inlay too, crafting custom butterfly keys and perfect recesses to match them. He also used the cutting paths available on ShaperHub—the company's online library of cutting paths and projects—to mortise round-ended Soss hinges into his work, a tricky task he had avoided in the past.

On ShaperHub you can also browse "premium" projects, contributed by talented makers from the woodworking

FWW contributing editor Roland Johnson used Origin to rout both parts of flawless butterfly keys, to inlay his signature the same way, and cut perfect mortises for Soss hinges.



community. One of the latest is an elegant side chair by Jonas Winkler, a product designer and woodworker in Germany. Like his other published projects—a latticework lamp and a lovely hand-tool cabinet—the clean, modern chair shows how the Workstation platform turns Origin into an unmatched tool for wood joinery—from classic to cutting-edge.



The Shaper website now offers "premium" project plans from talented woodworkers like Jonas Winkler, whose minimalist "Stock Chair" features a comfortable woven seat.

For a world of ideas, project plans, and ready-to-use cutting paths, go to www.ShaperTools.com. And check out the "Origin in Action" channel on YouTube.

SPONSORED CONTENT



ROB SPIECE AND LARISSA HUFF

Schwenksville, Pa.

There are 112 dovetails in this chest, hence its formal name: the No. 112 Chest of Drawers. "Yes, we counted and without shame," Rob says. The design was inspired by the vertical book-matches of the Biedermeier style. "Biedermeier furniture tends to be pretty visually overwhelming, so we wanted to move away from the burlled veneers usually found on those pieces," he says. "This walnut veneer we found has a lovely shape and the sapwood gave us the bold graphic element we were looking for."

WALNUT, 18D X 32W X 60H

Photo: Eoin O'Neill

HAIM ZENNOU

Yodfat, Israel

Haim has been using *Fine Woodworking* as inspiration for his projects since he started woodworking four years ago. This cabinet was inspired by Heide Martin's cabinet in *FWW* #268 and Mike Pekovich's book, *The Why and How of Woodworking*. The kumiko door panel is covered with mulberry paper. Haim says the tall and relatively thin dimensions of the cabinet help it to stand out, as does the door.

WHITE OAK AND ASH, 7D X 16W X 47H

Photo: Nitzan Hafner



WILLIE SANDRY

Camas, Wash.

This countertop wine rack isn't complicated to build, but it has plenty of details that make it functional. It has a copper back panel, wrought iron hooks, and a slide-out cheese board made from oak with walnut accents. To read more about the construction, go to FineWoodworking.com/289 or check out Willie's YouTube channel, The Thoughtful Woodworker.

WHITE OAK, 12D X 16 $\frac{5}{8}$ W X 15 $\frac{1}{2}$ H



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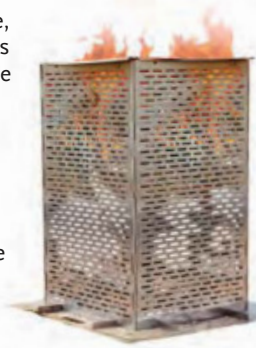
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Rosanna Coyne: Carving out a life in woodworking

BY ASA CHRISTIANA

Master wood carver and wood turner Rosanna Coyne was introduced to the hands-on life at an early age. Her mother and father both emigrated to the United States from Sicily, Italy, and did things the old way. Her mom canned the produce from her father's big garden. He worked as a general contractor, and Rosanna followed him around job sites from the time she was 9 or 10 years old, filling nail holes in trim or whatever she could do to be useful.

On a recent visit to her grade school, Coyne saw her awards from 7th and 8th grade industrial arts classes, still on display. "I started reading *Fine Woodworking* at 12 years old, and I wanted to make my own stuff," she said. "My dad had a shop in the basement, with a radial arm saw, tablesaw, and bandsaw, and I made bookshelves and a desk for my bedroom. I used them, and I was proud of them."

After graduating from the University of Hartford in Connecticut with a business degree, she went to work in the city's main industry, insurance. "My heart wasn't in it," she

said. "But I was able to save money, and I started buying woodworking tools."

Through college and her corporate career, Coyne continued to work with her father. "It was fun," she said. "Finish carpentry was the highest level he got to, so I would do the built-in cabinets, mantels, closets, and higher-end stuff."

To build her knowledge of fine woodworking, Coyne took a series of weekend classes with Steve Brown at Boston's North Bennet Street School.

Carving, turning, and whatever it takes

While still at the insurance company, Coyne took another class at NBSS, a carving course with Dan Faia, which launched the main direction of her woodworking career.

Noting her passion and aptitude for the work, Faia told Coyne about renowned wood carver Dimitrios Klitsas, who offered classes at his shop in central Massachusetts. She took classes with Klitsas from 1994 to 1999, and left her corporate job in 1997 to work full-time in his studio. A European immigrant





Project of a lifetime. Coyne was recruited to carve the main door and a smaller side door on a full-scale replica of Norway's Borgund Stave Church built on private property in rural Lyme, Conn. The two massive doors took her a year and a half to complete, and mark one of her proudest achievements.



like her dad (who shared a similar upbringing and traditional values), Klitsas was a little hesitant to hire a woman. "He was old-school, from Greece," she said. "Having a woman work for him was huge." Just as she had with her father, Coyne focused on the work, and earned a respected place in the workshop. In 2002 she moved on with Klitsas's blessing to work for herself.

The plan was to work on carving jobs while building a house for herself and her husband in Hampden, Mass. Acting as the general contractor, Coyne subcontracted the foundation, framing, roofing, electrical, plumbing, and drywall, and then built everything else, from floors to trim, doors, cabinets, kitchen, baths, and more. "It saved us quite a bit of money," she said.

When the house was done, Coyne refined her wood-turning skills in a class with famed turner David Ellsworth, and began

taking on turning jobs soon after. The house was finished in 2006, and Coyne has been a full-time woodworker since, focusing on carving and turning when possible, but taking on a wide variety of work to fill the gaps. "My work is spread out," she said. "I'll do a kitchen island, or cabinetry, or a small shed," Coyne said. "Last year, I built a pig shelter!"

"I like the variety, and new challenges keep things interesting, but I want to really focus on carving now," she said. "It's my strongest skill, and I want to keep developing it."

Notable commissions along the way

One of Coyne's favorite commissions was for two massive doors she carved in 2014 and 2015 for a Connecticut replica of the Borgund Stave Church in Norway, which dates to 1180. The



Turning is a nice complement. After establishing herself as a professional carver, Coyne took classes to add turning to her skill set. The advantage of the lathe is speed, allowing her to make an object in a few hours. “I put it on Instagram when it’s completed, and people ask if it’s for sale.”



sinuous, deep-relief carving, on both the main entrance and a smaller secondary door, took 1½ years to complete.

Most of Coyne’s work comes from word-of-mouth, but social media has also been helpful. “I can mount a log on the lathe and in a matter of a few hours make an object,” she said. “I’ll post it on Instagram when it’s completed, and people ask if it’s for sale.”

Instagram also gave Coyne a huge break, when her feed (@rosannacoyne) was featured by @Instagram, exploding her followers from 800 to 40,000 in a day or two. Instagram also landed Coyne the opportunity to turn a series of bowls for designer Kelly Wearstler, which sold in Wearstler’s Los Angeles store. Coyne also turned a range of vessels for a house in San Francisco, which were featured in *Architectural Digest*.

Other commissions from interior designers have included carved, veneered, and ebonized furniture and pedestals used in show homes.

Good advice for professionals and hobbyists alike

Woodworking classes have been a theme for Coyne. Despite having a wide array of skills and producing impeccable work in so many areas, she still takes advantage of classes today in new areas of exploration. “Whether you are a hobbyist or a pro, you should find the masters and study with them,” she said. “You’ll save a lot of time and money, learning which tools to buy and avoiding mistakes.”

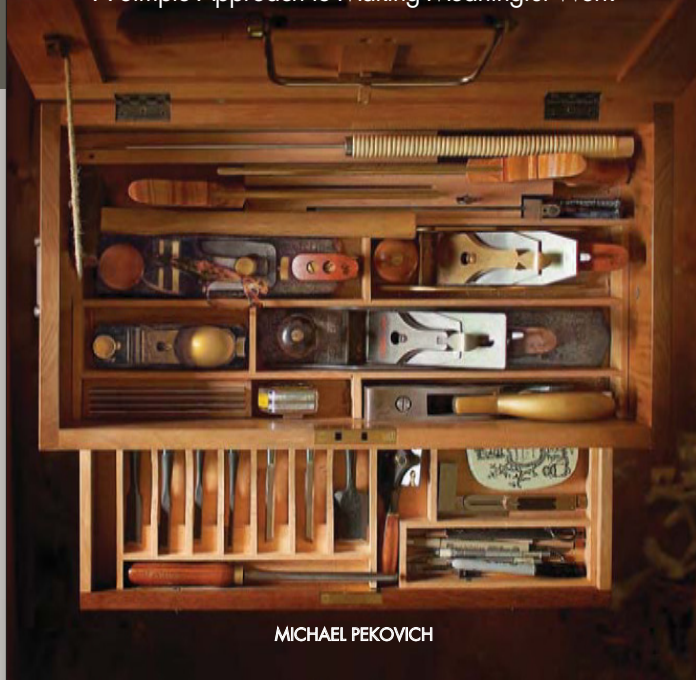
In the case of carving tools, Coyne says you can’t have enough. “I have 200 carving gouges and chisels,” she said. “I use most of them when I do high-relief carving.”

Low-relief, shallowly incised carving—such as Scandinavian chip carving—requires fewer tools and is a great place to start learning the craft, she said. In a recent class with Peter Follansbee, she took on the flat 17th-century style of carving,



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Sweat equity. After leaving the shop of carver Dimitrios Kliitsas to establish her own woodworking business, Coyne built this house for herself and her husband in Hampden, Mass. After hiring out the foundation, framing, roof, electrical, plumbing, and drywall, she built everything else. “It saved us quite a bit of money,” she said.

in which he used just 12 tools to execute ornate traditional patterns. “It’s a very freeing approach,” she said. “He uses a compass and gouges to do the layout, and then the gouges match the pattern.” As for carving skills, Coyne rates sharpening above all else.

Tools can be a rabbit hole for wood turners also, she says, but you don’t need near as many. “Take classes or talk to someone who has done it a while to find out which ones to buy,” she said.

The veteran turner’s go-to tools are traditional gouges and skewers, which cut wood, as opposed to new carbide-tipped tools that scrape it. “Learn to sharpen high-speed-steel (HSS) tools that slice wood,” she said. “You’ll get a better finish, with less sanding and a lot less work. You’ll also get better forms because you’re using your body to move the tool through the wood. Scrapers stay in one position and don’t help you with the form of the piece.”

As for lathes, Coyne recommends buying the best you can afford, citing machines from Oneway, Robust, and Powermatic that offer extra mass and rigidity.

Coyne is just as straightforward and candid about woodworking as a career path. “It’s really hard to make a living at it on your own,” she said. “It works if you have a supportive partner, but I don’t know if I could have done it otherwise.”

“If you can make it work, though, you’re your own boss, and you’re doing what you love. I can’t imagine doing anything else, and with wood carving, I’ll never have to retire.” □

Asa Christiana is a woodworker and freelance writer/editor in Portland, Ore.



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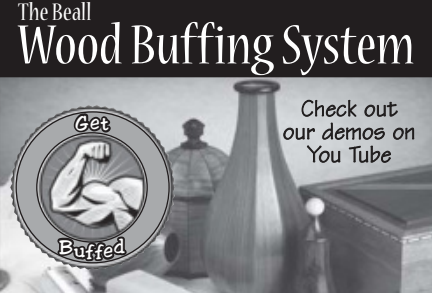
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A long loose end

BY DAVID WELTER

In 1988, I was a freshly employed instructional aide in a woodworking school with a well-appointed shop. Surely I'd have time after hours to build a useful piece of furniture for our home. The particleboard dresser in use was an embarrassment, particularly given my choice of vocation.

The nine-drawer dresser of my dreams would be a solid piece of utility, at home in a farmhouse. It would be coated with milk paint, the practical nature of the finish harmonizing nicely with the form. Even the materials would be utilitarian. Poplar, the primary wood, takes paint well; firm but not hard, it resists splitting and is fun to plane. The side panels would be maple plywood and the drawer frames maple.

Nothing would be spared in construc-



tion techniques. I'd use the shop's best practices plus a few details gleaned from Charles H. Hayward's *Woodwork Joints*: a dovetailed carcass joint tying the sides together at the top frame, and halved joints at the intersection of the drawer blades and the center divider.

Work went well at the beginning. But school duties had a way of intruding on

lunchtime work, and after hours time was claimed by the demands of putting an addition on our house. Shortly after the new bedroom was completed, a Deco chest of drawers came our way, removing the last bit of urgency to complete the project.

At that point the carcass was complete but the top was not glued up; the pins of all of the drawer front dovetails were done and the top three drawers were in and functioning, though lacking pulls. Remaining parts were stored in the pockets that the completed drawers would occupy. And so the incomplete dresser obstructed entrance to my small cubbyhole of a workspace for the next 27 years, serving to stash student supplies, clippings, letters, and objects of indefinite classification. The top was not always clear, but there was always space for a coffee cup. Even in its incomplete state, it served a utilitarian purpose.

When my time at the school was done, my companion was the last of my

The incomplete dresser obstructed entrance to my small cubbyhole of a workspace for the next 27 years, serving to stash student supplies, clippings, letters, and objects of indefinite classification.

possessions to leave. Now my focus was on building a shop and guest room in our back yard. The unfinished dresser went to a spare bedroom.

The shop was functional a year after the footings were poured. Eventually, excuses exhausted, it was time to bestow upon the old dray horse her intended glory. Reorientation took a bit; questioning why I did something that way, then begrudgingly admitting there was some sense to the choice. I did

see fault in my dovetail layout. Maybe someone will notice someday that at the back of the drawers the pattern changes halfway down and wonder why. A couple of the drawer fronts had cupped a little; as the dovetails were done, there was little to do but count on the joinery to pull the front flat—a moderately effective plan. Really, all that needed to be done was to finish dovetailing, assemble and fit the drawers, make some pulls, glue up a top, clean up the carcass, and deal with the greatest obstacle: choosing a paint color.

My farmhouse dresser has an admitted Shaker character. Looking for drawer-pull guidance, I noticed that Shaker pulls were usually round, equally sized, and vertically centered on drawer fronts. Having spent so much time with James Krenov, I find dead-centered focal points to be exactly that—dead. I fashioned oval pulls

from a cherry tree cut down to make room for my shop. Sized in proportion to the drawer size, the pulls are variously positioned for the sake of the user, adding a bit of liveliness to the cabinet face.

The humble witness to nearly my entire school shop career has re-emerged in our home, carrying the first chapters of a hopefully long tale of life. □

David Welter retired in 2016 after some 30 years at the Krenov School.





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The Bowl is a Bird

A pair of wrens nested in Dave Fisher's yard in western Pennsylvania one summer and entertained him and his wife, Kristin, for weeks with their song, their flights ferrying twigs and food, and with the dramatic upward flip of their tails. That fall, when Dave came into a batch of trimmings from a neighbor's Norway maple tree, one crooked chunk sparked his imagination: "I looked at the branch and it reminded me of a wren with its tail cocked in

the air." After he had spent some time using an ax, a drawknife, and a rasp, the branch was becoming a bird. He carved out the bowl with bent gouges and a hook knife, then finished the outside with a flexible card scraper and very fine sandpaper. Fisher often uses found wood for his carvings, and relies on it to inspire him. "Nature is a kind of design partner for me," he says. "I could never have made this bowl without this particular piece of wood."

—Jonathan Binzen

