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Smart jig for
pattern-routing, p. 64



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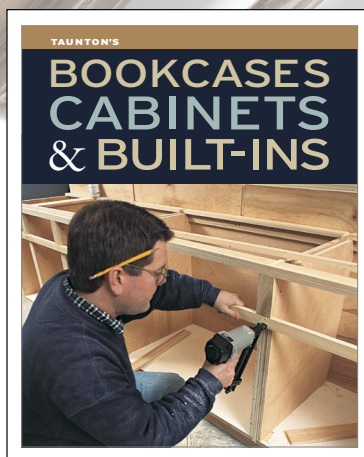
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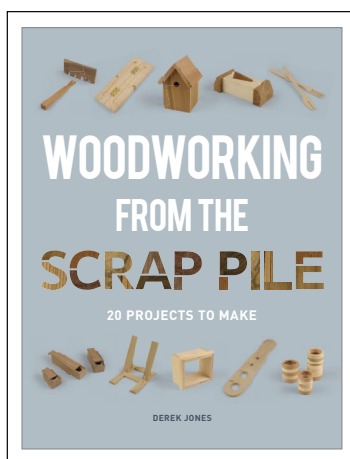
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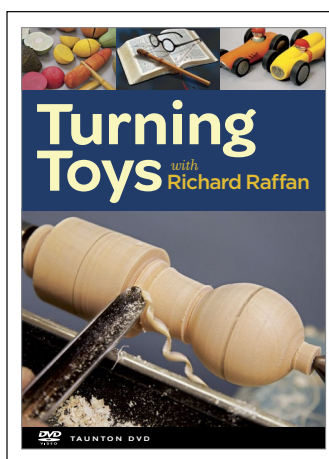
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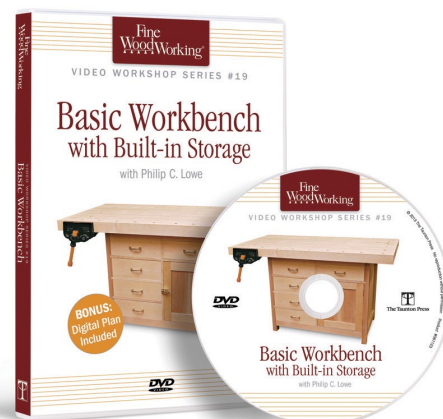
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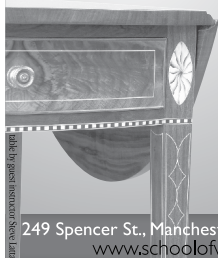
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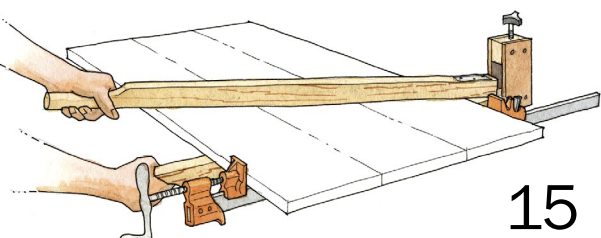
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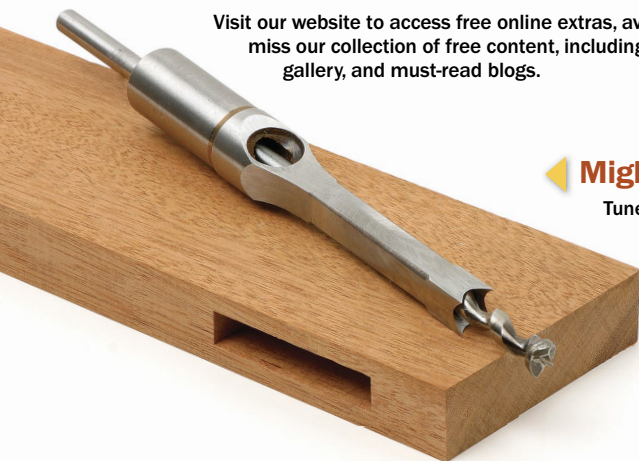


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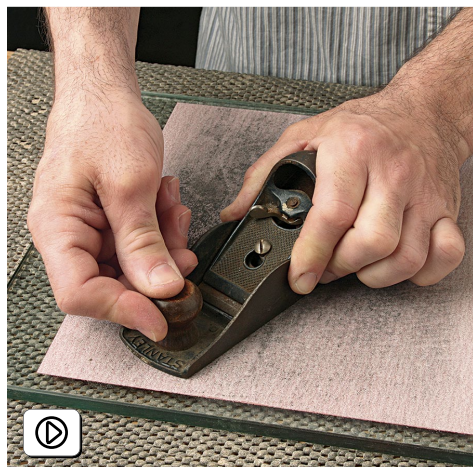


◀ **Mighty Smooth Mortises** ▶

Tune up your hollow-chisel mortising bits for silky-smooth operation (p. 44) with our step-by-step video tutorial.

Ditch the Clamps ▶

Learn how drawboring (p. 38) can bring mortise-and-tenon joinery together tight as a drum—without clamps.



Baby Your Block Plane

A dash of TLC goes a long way when it comes to block planes (p. 22). Learn how to turn a mediocre tool into a star performer with our tune-up tips.



Picture-Perfect Pattern Routing

Take the fear out of pattern routing with our video tour of a tip-top routing jig (p. 64) that delivers great results while keeping your fingers out of the danger zone.

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Fine Woodworking: (ISSN: 0361-3453) is published bimonthly, with a special seventh issue in the winter, by The Taunton Press, Inc., Newtown, CT 06470-5506. Telephone 203-426-8171. Periodicals postage paid at Newtown, CT 06470 and at additional mailing offices. GST paid registration #123210981.

Subscription Rates: U.S., \$34.95 for one year, \$59.95 for two years, \$83.95 for three years. Canada, \$36.95 for one year, \$63.95 for two years, \$89.95 for three years (GST included, payable in U.S. funds). Outside the U.S./Canada: \$41.95 for one year, \$73.95 for two years, \$104.95 for three years (payable in U.S. funds). Single copy U.S., \$7.99. Single copy Canada, \$8.99.

Postmaster: Send address changes to *Fine Woodworking*, The Taunton Press, Inc., 63 S. Main St., PO Box 5506, Newtown, CT 06470-5506.

Canada Post: Return undeliverable Canadian addresses to *Fine Woodworking*, c/o Worldwide Mailers, Inc., 2835 Kew Drive, Windsor, ON N8T 3B7, or email to mnfa@taunton.com.

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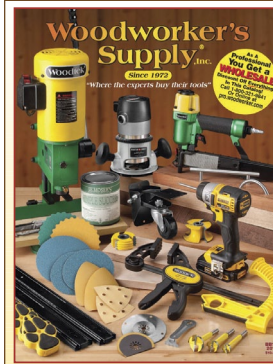
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Allan Breed (“Carve a Perfect Ball-and-Claw Foot”), winner of the 2012 Cartouche Award from the Society of American Period Furniture Makers, began his career in woodworking as a teenager poking through flea markets for old furniture to take home and repair. A few decades later he was reproducing the Nicholas Brown Desk and Bookcase for the Brown family, when they sold the iconic Newport secretary for \$12.1 million. Breed, now working with his son Sam, continues to build period furniture at his shop in New Hampshire and to teach carving and furniture making there.

Making anything other than furniture? “I’m reproducing 17 freestanding carved oak columns, each 8 in. dia. by 10 ft. tall. My shop’s on the third floor of an old mill, and they had to be hoisted by crane and brought in and out through the window.”

Gerald Curry (“Engineering a Chest of Drawers” and “A Closer Look: Understanding Wood Movement”) taught himself furniture making in the 1970s by studying antiques at Boston’s Museum of Fine Arts. He built period furniture for 25 years. In 2000, he quit reproductions cold turkey, making the transition to original work. Of course, his own designs build on everything he’s learned, from careful wood selection to time-tested engineering and techniques.

Key to success as a pro? “Realizing that furniture making is about a lot more than just woodworking.”

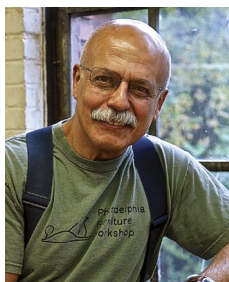


Jeff Miller (*Fundamentals: “Do More with Your Block Plane”*) has been making furniture professionally for 30 years. Lately he is doing more and more teaching, much of it at his Chicago shop. “Teaching is more than just conveying information,” Miller says. “For me, it’s all about understanding the students and figuring out just what they need in order to progress.” Miller’s shop is outfitted with an extraordinary collection of workbenches he has built.

Best and worst things about Chicago? “The food and the wind, in that order.”

Mario Rodriguez (“Robust Kitchen Table”) teaches full time at the Philadelphia Furniture Workshop and has been working wood since serving a four-year apprenticeship with the Carpenters and Joiners Union in New York City in the mid-1970s. He’s passionate about furniture making, but also about food—and the two came together when he saw Julia Child’s kitchen table and decided to build one like it.

What will you serve on this new table? “Spaghetti carbonara with a serious bottle of Zinfandel. For dessert, fresh strawberries soaked in vinegar, topped with sugar and a hit of black pepper.”



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

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

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Spotlight

ISSUE NO. 240
May/June 2014
p. 10

CHARTER SUBSCRIBERS STAND UP TO BE COUNTED

John Porter's letter in *FWW* #240 served as a call to action for subscribers who've been with us since the start. We received lots of letters and emails (and a few phone calls) from our longtime subscribers, many with interesting tales about their woodworking journeys and how the magazine played a role in those trips. Here are some memorable quotes and stories from those who stood up to be counted. We value these longtime subscribers not only for their loyalty, but also for their dedication to, and love for, the craft. Thank you.

—TOM McKENNA, editor

I still have on the shelf in my office every issue ever printed of *FWW*. Very old school of me to keep all of them all these years, I admit, but I refer to them often.

Every year I struggle with the question of going all-digital with my subscription but, so far, I've just not been able to give up on the good old print copy. I think that would signal the end of an era for me, which I'm not ready to face yet. Plus, I still enjoy finding copies all over my office and workshop (some years old) with dog-eared pages pointing to articles on the perfect jig I need to make or how to refurbish that old plane I have, which I know I'll get to someday!

—WALT BENSMAN, Salem, Ore.

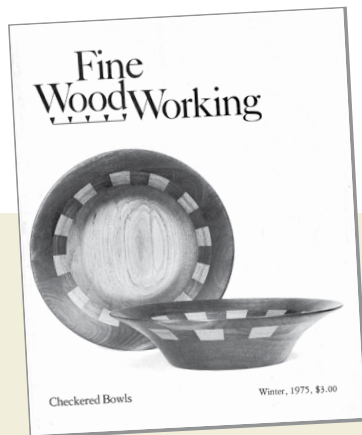
You must be doing something right.

—BOB WALDER, Northampton, England

The magazine has been a great inspiration to me over the years. Every time I make something I think is great, I open up the latest issue and am humbled again by what people are doing. *FWW* really opened up my eyes to what is going on out there in the world, and now with the online presence, my solitary life as a woodworker has opened up. I enjoy the podcast you put on and it is great to get the different perspectives.

—JEFFREY SIMON, Hayden, Colo.

John Porter is not alone. See me? Over here, waving my hands? I was a young hippie cabinetmaker, and somehow I learned of a new quarterly devoted to woodworking of the kind I aspired to. With a young family and a pretty sorry income, I squeezed the cost of a subscription out of my wallet, and the rest is history, continuous history. I loved your large format with the excellent black-and-white photos and sharp drawings. But it was a long time between issues. When it began



In praise of the mighty miter box

The review of chopsaws (*FWW* #240) was well done and satisfies the 95th percentile inside the error margin in parametrics, but as a person not so much in love with power tools, let me suggest the alternative of using a classic hand tool—the miter-box saw.



I got into manual miter boxes several years back. The first one, a Millers Falls 73C, is a beast in terms of quality engineering and mass of cast iron. It cuts 5-in. miters dead-on. The Stanley 150 box also is a great tool. You can cut fine moldings using a 12-in. backsaw, rip, crosscut, or whatever saw you favor. The smoothness of the cuts is remarkable.

On occasion, it might be revolutionary to provide a review of an older generation tool that still provides great service. The tech-savvy, younger generations may be clueless about its value.

—WALT JAAP, St. Petersburg, Fla.
FWW subscriber from Vol. 1, #1

Fix for badly bowed boards

In *FWW* #239, Marc Adams has an excellent article on using the jointer. But I detected one omission.

When I first started using one, I had problems with bowed boards that were longer than the infeed table. I needed the length, so cutting such a board was not an option. Since the infeed table on most 6-in. jointers is around 2 ft. long, even a 3-ft. bowed board was a problem.

If I just ran the board through, it would gradually rise as the back end climbed onto the table, and I wound up with a severely tapered board. There's more than one solution. The one I use most often is to joint a few inches on one end, then reverse the board and do the same to the other end. Repeat the process,

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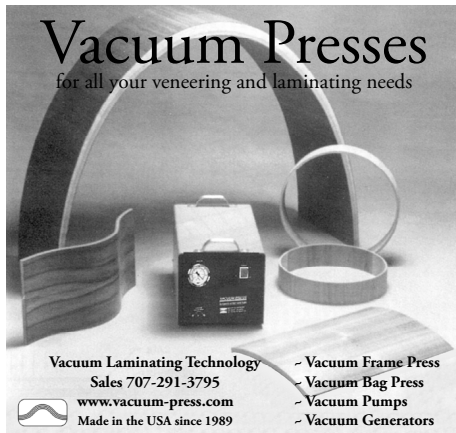
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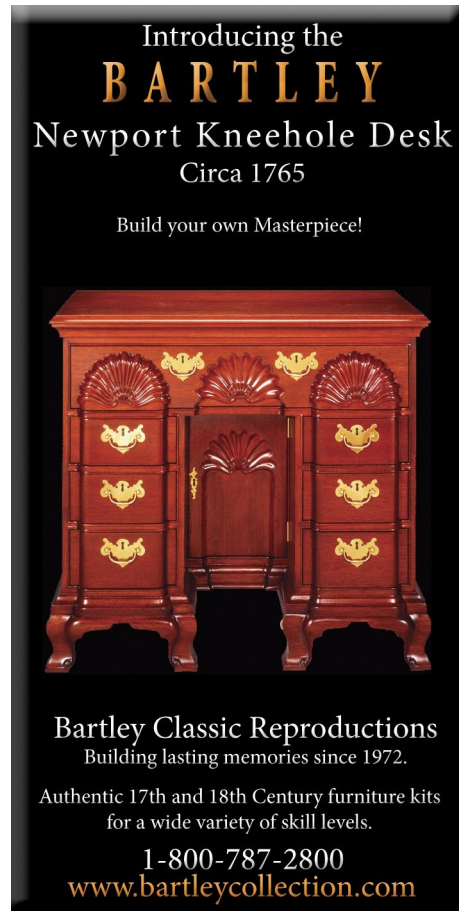
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coming every other month, I wondered if it would be long before it became monthly. Alas, still waiting. I hung in there when you went with color. I stuck around when your format was reduced, and have pretty much accepted that change by now. I've been through all your wrapped and unwrapped mailings, and have only a couple of times had to request replacement of copies damaged in transit. Two or three times I've purchased replacement copies of issues that mysteriously went missing from my collection. I no longer loan copies, but tell visitors where they can get their own.

I'm retired now, and have reduced my shop space to a single garage bay with an 11-ft. ceiling. There are only two machines, a 14-in. bandsaw and a midi-lathe. All the rest is hand tools, and I'm reveling in the clean and quiet shop where there is one long wall-mounted shelf with 240 issues and a Windsor chair for reading and re-reading.

Keep them coming. You'll know I've croaked when my subscription isn't renewed.

—KERMIT CHAMBERLIN, Temecula, Calif.

I built several things inspired by your magazine, including the stroke sander featured in *FWW* #3, as well as the Tage Frid workbench featured in *FWW* #4. I built it of Brazilian louro and açoita cavalo and am still using it today. Recently, my wife asked me why I continue to subscribe to your magazine. My reply: for ideas, challenges, and inspiration.

—CRAIGE A. STEELE, Newport, Tenn.

I live in Marin County Calif., where John Porter received his first issue of *FWW*. Marin is still a hotbed of woodworking talent, almost as much as our Sonoma County woodworking cousins just to the north. (A sample of Sonoma County work was featured in the May/June issue.) Most everybody I know that is serious about woodworking is a subscriber to *FWW* and more than a few from the first issue on. Certainly the magazine has helped me and many others grow as a woodworker and craftsperson.

—BOB ROUDMAN, San Rafael, Calif.

I have every issue of *FWW*. They take up a lot of space but are so worth it. I own the electronic index from a few years ago and have been tempted to buy the CD, but then my wife would want me to get rid of the magazines, and I won't part with them.

—LARRY WOODS, Apopka, Fla.

It is, without a doubt, the finest magazine of its type available. From it, I have learned much and continue to do so. Please continue your good work.

—CHARLES L. HERRING, Kinston, N.C.

I remember being upset when you progressed to color. I am over it by now.

—JOE VAN BENTEN, Chestnut Hill, Mass.

increasing the length jointed on each pass, until the board is almost flat. Then take one or two passes with the grain the full length of the board.

—LARRY BLANCHARD, Spokane Valley, Wash.

A hand for Handwork

I am enjoying the Handwork column and the subjects covered therein very much. In the last two years or so, I have discovered an unparalleled love of handwork partly as a result of this column. I have been woodworking for over 12 years and nothing gives me as much satisfaction or pleasure in working wood as using hand tools, such as planes, chisels, and handsaws. I hope that you will not only continue to produce the Handwork column, but might also consider increasing the number of handwork articles in the future.

—DAMIEN KING, Highland Falls, N.Y.

Editor replies: *Hand tools play a critical role in making furniture with precision. They always have been, and will continue to be, a main entree in our editorial menu.*

Illegal speed change

Regarding Christian Becksvoort's article on turning pulls at the drill press (*FWW* #240): Contrary to the article's instruction, if you want the fastest drill-press spindle speed you need to use the largest pulley on the motor shaft and the smallest pulley on the spindle.

—TYLER ROURKE, Everett, Wash.

Photo blunder

In "12-in. Chopsaws" (*FWW* #240), we misidentified Doug Dale and Zane Powell in a photo. Zane is in front; Doug in back.



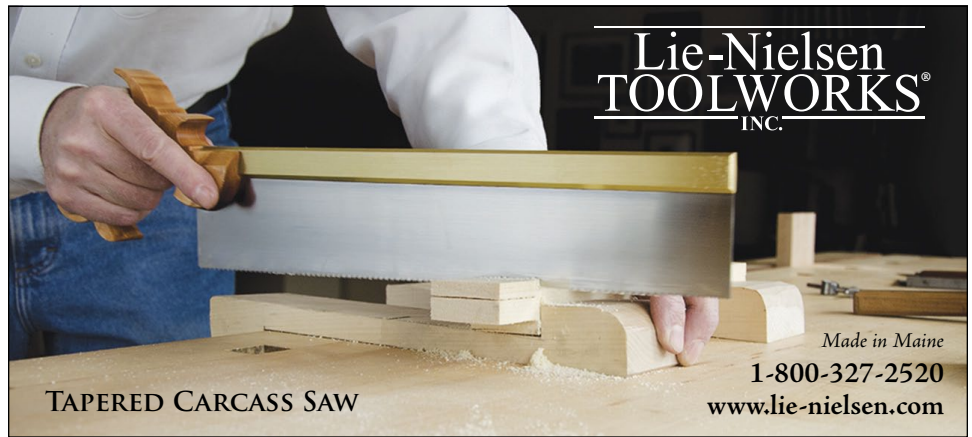
About your safety

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

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

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Best Tip Quick-locking stop block



Charles Green started woodworking in the 1950s to furnish a home for his growing family. In the 1970s, he discovered Tage Frid, bought FWW issue #8, and started a subscription that continues to this day. Green describes his winning tip as a “Yankee trick,” employing a skill he learned from his father—“making do with what you have by simplifying the project.”

I used to struggle to keep a stop block located accurately while clamping it in place on my tablesaw crosscut sled.

Then, while making some cam clamps for my shop, I realized I could use the same cam-tightening idea for a stop block. With a cam-tightened block, I need only one hand to position and clamp the stop in place.

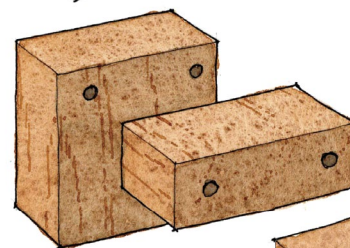
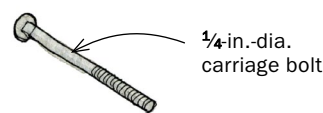
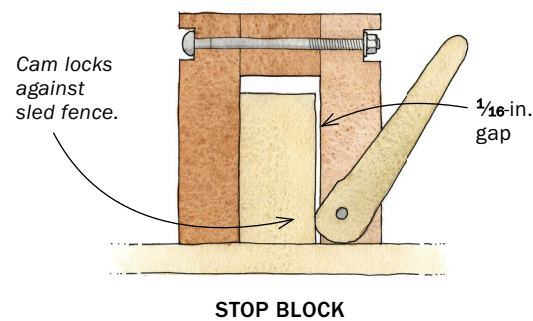
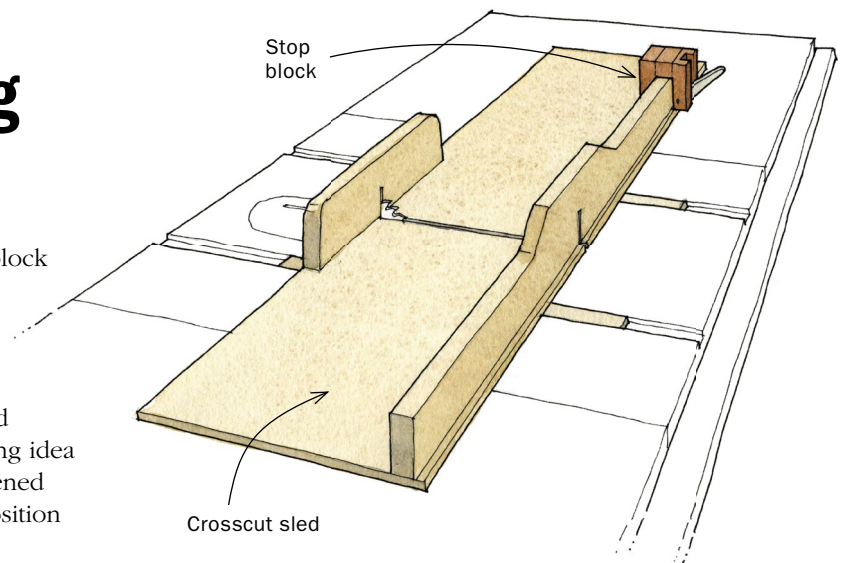
The block is a U-shaped bridge that straddles the sled's fence and holds the pivoting cam. Size the components so that there is a $\frac{1}{4}$ -in. gap above the sled's fence and a $\frac{1}{16}$ -in. gap between the back of the bridge and the fence.

To make the back of the bridge, rout a stepped groove to fit the cam, leaving a 1-in.-long web of $\frac{1}{4}$ -in.-thick material at the top to connect the two halves. Reinforce the glue-up with counterbored $\frac{1}{4}$ -in.-dia. carriage bolts.

The cam's profile starts with a 1-in. circular section on the bottom. Locate the $\frac{1}{4}$ -in. steel pivot pin in the back so that $\frac{1}{8}$ in. of the circular section protrudes on the inside. Trim the part that protrudes to a flat, then round the sharp corner to blend the flat into the circular section. The cam should lock against the fence when pushed down about 30° to 45° .

The block design can easily be adapted to a drill press, a chopsaw, or any other tool with a fence.

—CHARLES GREEN, West Des Moines, Iowa

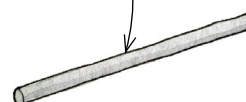


Remove material to create flat.

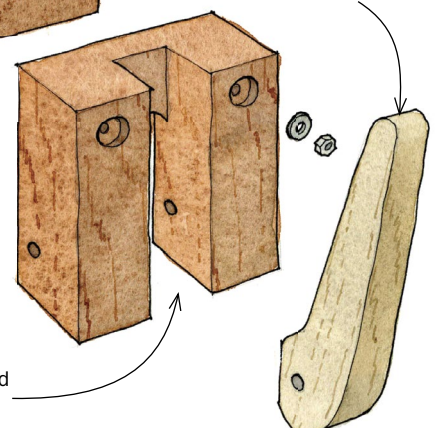
CAM

$\frac{3}{4}$ in. thick

Pivot pin, $\frac{1}{4}$ -in. steel rod



Stepped groove



A Reward for the Best Tip

Send your original tips to fwmow@taunton.com or to Methods of Work, Fine Woodworking, P.O. Box 5506, Newtown, CT 06470. We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was a Veritas block plane.

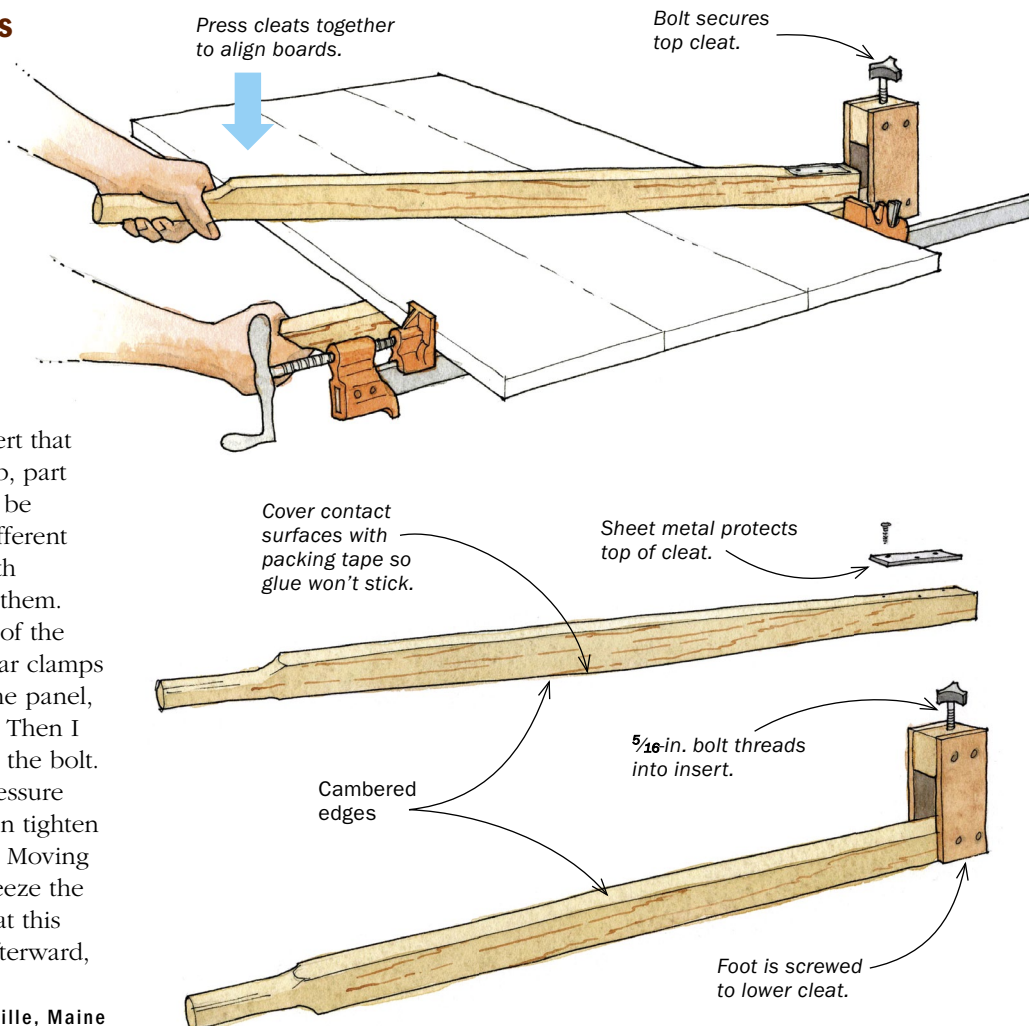
Alignment fixture for wide glue-ups

While gluing wide pine panels recently, I made this fixture to align the edges of the boards and speed things up. It consists of two cleats, 1½ in. thick by 2 in. tall by about 36 in. long. I cut a ¼-in. camber on the facing edges so the cleats act as cauls that apply even pressure across the glue-up. I also shaped a handle on one end of each cleat.

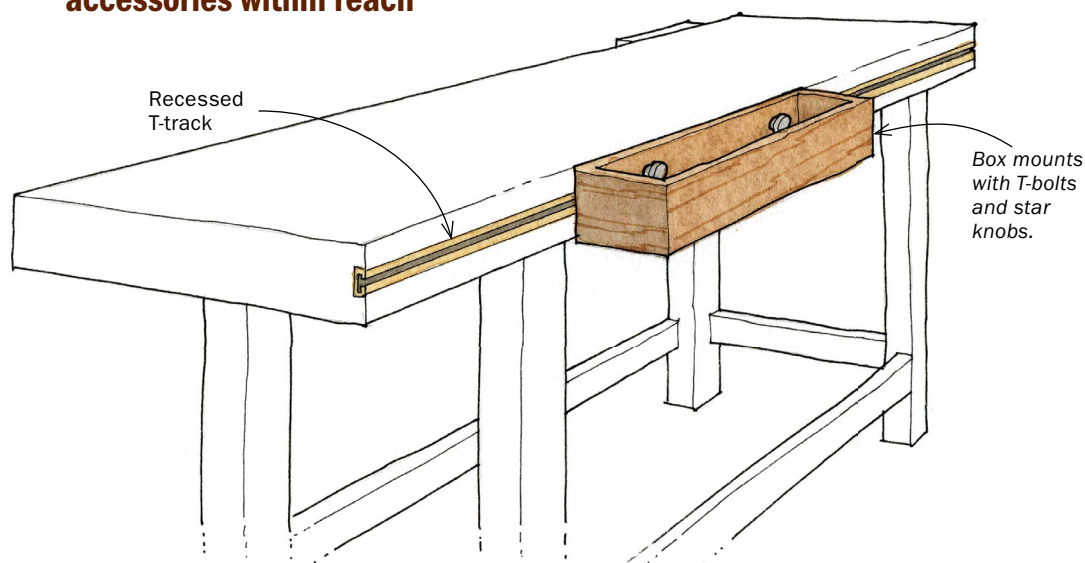
The cleats are “hinged” at one end with an open foot attached to the bottom cleat. This foot is fitted with a threaded insert that guides a ⅝-in. bolt (with a Snap-Lock knob, part No. 00M70.30, leevalley.com). The bolt can be adjusted to accommodate workpieces of different thicknesses. Finally, I covered the cleats with packing tape to keep glue from sticking to them.

To use the fixture, I start at the right side of the glue-up, which is slightly elevated by the bar clamps at each end. I slide the lower cleat under the panel, then turn it 90° so the open foot is upright. Then I slide the top cleat into the open foot under the bolt. I pull the two handles together to apply pressure across the panel and align the boards. I then tighten the first clamp a bit to hold things in place. Moving left, I put another clamp on the panel, squeeze the alignment fixture, and tighten again. I repeat this sequence until all clamps have been set. Afterward, I go back and tighten them fully.

—CHUCK LAKIN, Waterville, Maine



Sliding box keeps workbench accessories within reach

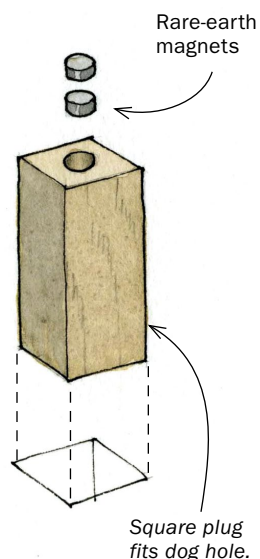


When I built a new workbench, I liked the idea of having a tool trough on the back. But I did not want to sacrifice the table space permanently. So I came up with the idea of adding a recessed T-track to the back. This lets me add (or subtract) a tool trough or any other useful workbench accessory, such as a glue bottle holder.

The only modification I made to the standard T-track was to use longer mounting screws to ensure that the track could handle the load. The great thing about this method is that I can easily reposition or remove any workbench accessories if they get in the way in my space-limited shop.

—MIKE THOMPSON, Bryan, Texas

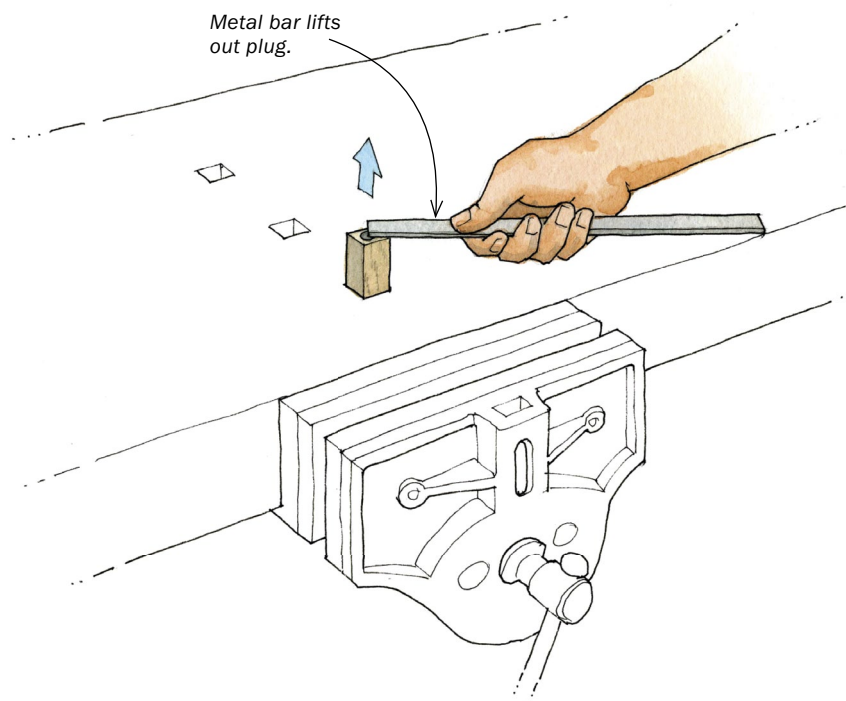
Magnetized plug keeps benchdog holes clear



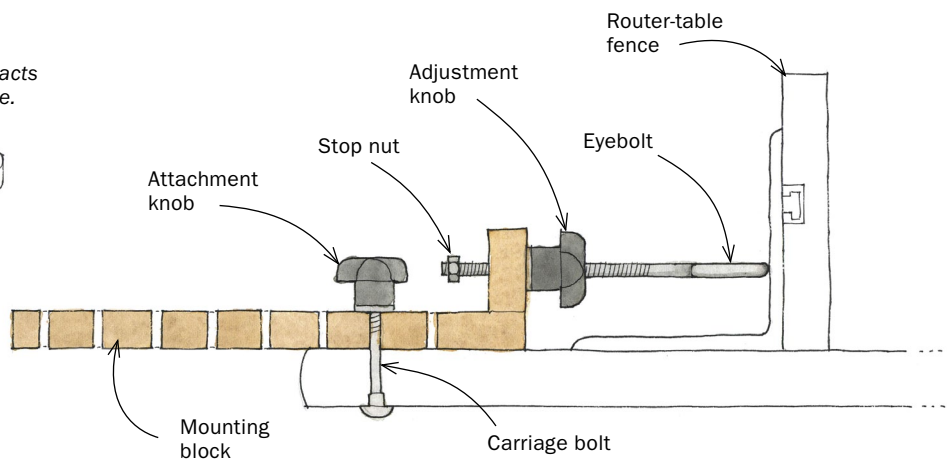
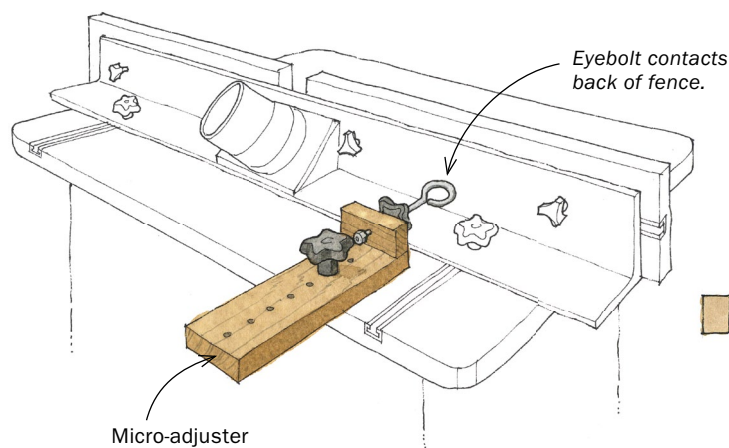
If, like me, you get annoyed when the dog hole that is right above your vise gets filled with sawdust and shavings, here is a simple fix. Cut a wooden plug that will fill the dog hole flush to the benchtop and will slide in and out easily. Now drill a hole in the end of the plug and glue in a couple of rare-earth magnets so that they are flush with the top.

Drop the plug into the dog-hole opening. It will prevent the hole from filling with debris. To remove it, just touch the top of the plug with something steel and lift it out. Finally, be careful not to replace the plug magnet-side down.

—PHILIP C. LOWE, Beverly, Mass.



Micro-adjuster for router-table fence



When making fine adjustments to my router fence, I don't like the imprecision of tapping the fence back and forth, so I designed and built this micro-adjuster. I chose a $\frac{3}{8}$ -in. by 16-pitch eyebolt for the adjuster so that each revolution of the adjustment knob would provide $\frac{1}{16}$ in. of movement. Since the fixture moves only one end of the fence, that really translates into $\frac{1}{32}$ in. at the bit.

The fixture consists of a mounting block, an attachment knob, an eyebolt screw, and an adjustment knob through which the eyebolt is threaded. The mounting block has holes drilled every 1 in. so that the jig can accommodate a variety of fence

positions. It is attached to the router table by a $\frac{1}{4}$ -in. carriage bolt driven up from beneath the table. The eyebolt screw works well for the adjuster because the eyebolt contacts the fence at a single point.

To use the fixture, attach the block to the tabletop in the appropriate mounting hole and secure it to the table with the attachment knob. With the eyebolt against the back of the fence and with hand pressure to keep the fence against the eyebolt, turn the adjustment knob to move the fence in or out. When the adjustment is right, lock the fence down.

—MATTHEW H. STERN, Huntington, N.Y.



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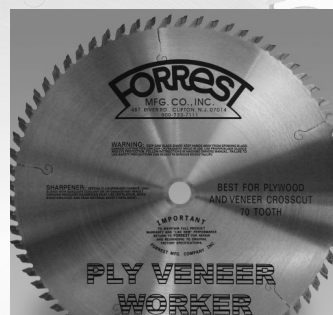
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■ MACHINES

Cabinet saw with great perks

LAGUNA'S FUSION 10-IN. TABLESAW has the beefy cabinet-mounted trunnions, vibration-free operation, and very nice T-square-style fence of a full-size cabinet saw, but sports a $1\frac{3}{4}$ hp, 110-volt motor. So you can get the benefits of a cabinet saw, even without a 240-volt circuit in the shop.

When setting up the saw, I had no trouble aligning the cast-iron extension wings flush to the table, and everything was acceptably flat. The blade was parallel to the miter slots, and I measured less than 0.001 in. of runout on the arbor (very impressive). Blade adjustments for height and tilt were smooth and easy, and there was no backlash in the gears.

The fence slides smoothly and did not deflect during use. The large paddle switch can be positioned anywhere along the front rail. The blade is

surrounded by a dust shroud, and a 2-in.-dia. hose runs from the shroud to a 4-in. port in the cabinet's side. Over all, dust collection was fine.

I was happy to see that the motor was plenty powerful for furniture making, easily ripping $4\frac{1}{4}$ hickory, $5\frac{1}{4}$ ipé, and $10\frac{1}{4}$ hard maple. But it can draw up to 30 amps, so you need a circuit that can handle the load.

The saw is loaded with convenient features. A pair of lockable casters let you move the saw like a wheelbarrow. A bracket on the fence holds the included push stick, and the saw's cabinet has a bracket for storing the fence and a hook for the arbor wrenches.

—Roland Johnson is a contributing editor.



Quick-change riving knife. With the twist of a star knob, you can change from the blade guard to the riving knife in no time at all.



Convenient switch. You can locate the large switch anywhere you want on the fence rail, so it's always within reach.



Fusion Tablesaw by Laguna

\$1,295



Unique mobility. Lift up on the fence rails like a pair of wheelbarrow handles, and the saw is ready to roll. The casters lock, so the saw doesn't move when in use.

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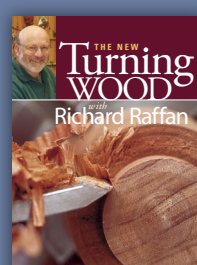
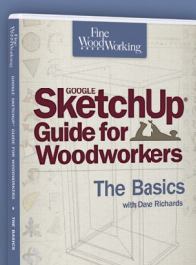
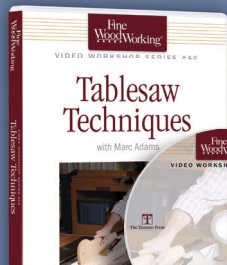


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■ SHARPENING

Waterstones sharpen quickly and stay flat

WHEN I TESTED WATERSTONES head-to-head (*FWW* #224, p. 53), Ohishi waterstones were not available. But for the past several months I've been using their 1,000-, 6,000-, and 10,000-grit stones to sharpen my chisels and plane blades, which includes blades made from high-carbon, A2, and PM-V11 steel. They are just as good as the stones I named Best Overall during the head-to-head test.

These stones cut very fast. It took just two or three minutes to work through all three stones, using the 1,000-grit stone to establish a fresh edge, the 6,000-grit to begin the polishing, and the 10,000-grit stone to refine the edge and complete the polishing.

These stones also are very hard, so there is no need to soak them. All they need is a spritz of water prior to use, and an occasional spritz during use. They remain flat for a long time, but flatten easily with a diamond plate when the time comes.

—Chris Gochnour is a professional furniture maker and hand-tool expert.

Waterstones by Ohishi

\$55 for 1,000 grit

\$70 for 6,000 grit

\$115 for 10,000 grit

lie-nielsen.com



Triple threat. Ohishi waterstones sharpen blades quickly, remain flat for a long time because of their hardness, but still manage to be easily flattened with a waterstone when they do need maintenance.

■ ACCESSORIES

Finishing blade cuts a smooth edge

ONE OF THE KNOCKS ON THIN-KERF tablesaw blades is that they are prone to deflection and vibration, leaving a rougher cut (especially on crosscuts near the end of a board) than their standard-kerf brothers. Freud's new Diablo 60-tooth finish blade proves this accusation false. I tested it in very hard woods such as hickory, hardwood plywood, and oily exotics like Goncalo alves. Without exception, it left behind a smooth surface with no tearout after every cut. It's an excellent blade at a great price.

—Peter Breu is a woodworker in Manchester, N.H.

10-in. Tablesaw Blade by Freud

Diablo D1060X finish blade

\$40



■ ACCESSORIES

Router base does the work of many jigs

THE MPOWER ROUTER BASE attaches to a router with two rods, just like many edge guides. But that's where the similarities end. The multi-function base can be configured to rout arcs, small and large circles, and both centered and off-center mortises. For edge-routing, the base can be used offset with a comfortable knob to help keep it flat on the workpiece, or with an anti-tilt leg that registers on the benchtop and prevents the router from tipping.

You could make jigs that perform these same jobs, but they won't be as easy to set up and adjust. This base slides smoothly on the rails that attach it to the router, and has a micro-adjuster that makes small changes to bit location a snap. This makes the CRB7 MK3 a good accessory for your router, especially if you'd rather not make a bunch of jigs.

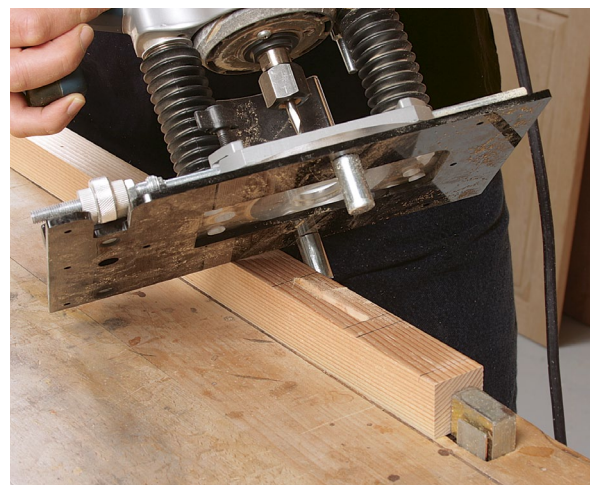
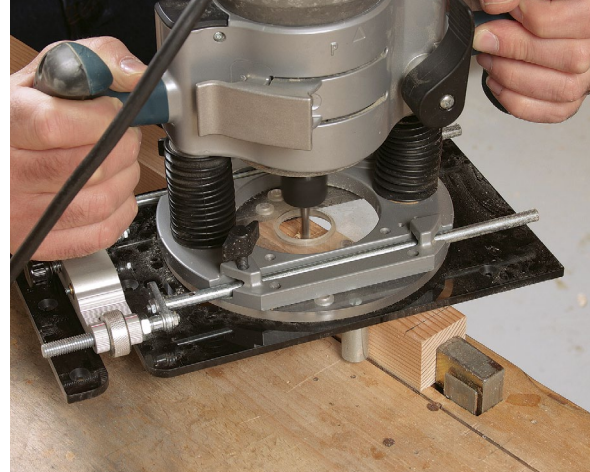
However, not all of the base's functions work well. When set up for large arcs and circles, for instance, there is too much flex in the single trammel rod, and it attaches to the base off the center line. And the anti-tilt leg doesn't work as well as simply taping a strip of wood the same thickness as the workpiece to the bottom of the router base.

—Jeff Miller is a furniture maker in Chicago who also teaches and writes about woodworking.



Multi-Purpose Router Base by MPower

CRB7 MK3
\$110



No tedious setup. Just rotate the base until both pins touch the workpiece, and the mortise is automatically centered.

■ ADHESIVES

Instant glue creates strong bond

EVERY NOW AND THEN YOU COME ACROSS a tool that dramatically changes the way you work. Nexabond 2500 is one of those tools. I use a lot of jigs when making furniture, and it's the perfect glue for securing fences and other parts to them. It also works great for gluing solid-wood edge-banding to sheet goods, even around curves. And because it contains no water, it doesn't cause materials like MDF to swell. The bond it forms between parts is amazingly strong, but for critical jig parts I'll continue to reinforce the joint with screws.

Application is very easy. Just a few drops is all you need (don't spread it over the entire joint like you do with PVA glues). Hold the parts together for a few minutes with clamps, and the joint is done. Edge-banding can be

trimmed flush after just 30 minutes. But you don't need to rush. Nexabond 2500 remains workable until you bring the two parts together and apply pressure. You can apply it to a joint and let it sit. It is available in three different set times: fast (1 to 3 minutes), medium (3 to 5 minutes), and slow (5 to 10 minutes). I use the medium set most frequently.

I also tried Nexabond 2500 for slip-tenon joinery on some small tables. The glue acted as a lubricant, making it easier to get the tenons into the mortises. However, joints must be really tight for the glue to activate. And the squeeze-out became rubbery and difficult to remove. Nexabond 2500 is great for jigs and edging, but I'll stick with PVA glue for joinery.

—Michael Fortune is a contributing editor.



Nexabond 2500
by Sirrus
(formerly Bioformix)

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Do more with your block plane

BY JEFF MILLER

The block plane is a great acquisition for a woodworker of any skill level. Pound for pound (or ounce for ounce), it packs in more value than almost any other hand tool. The key is its compact size. A block plane fits in one hand, making it easy to control. It can be used with a delicate touch, and with your grip being so close to the wood's surface, it's easy to develop a good feel for the tool.

I'll show you how to use a block plane to take your woodworking to another level. But first, a few words about the tool itself.

Go low angle, and keep it sharp

There are two types of block planes, standard models with the blade, or iron, held at 20°, and low-angle models with the blade bedded at 12°,

Compact and versatile

The block plane has no equal when it comes to trimming and refining furniture parts. It accommodates a variety of grips. Work one-handed to free up your other one to hold the work, or clamp down the workpiece and use two hands for more control.



Trimming parts flush



Shaping and smoothing



Breaking edges

Fast flush-trimming

The block plane is wonderful for bringing one part down perfectly flush to another and for leveling joinery, with no damage to the surface below.



Perfect for plugs and pegs. Whether it is plugs that cover screw holes or pegs used to strengthen mortise-and-tenon joints, the block plane brings them flush quickly. Angle the plane sideways as you push it forward, to make a cleaner, shearing cut.

designed for end-grain work. Both types have the blade bedded with the bevel facing up. I would recommend a low-angle model as a first block plane. Get the blade razor sharp (I hone the bevel of the low-angle plane at roughly 30°), set up the plane to take fine cuts, and you'll get great results on end grain and long grain alike. (For more on standard vs. low-angle block planes, and for recommendations on which ones to buy, see Mario Rodriguez's review in *FWW* #228.)

How to push (or pull) a block plane

The block plane is designed to be held easily in one hand, but I recommend using both when possible, to increase your control over the tool. There are a number of ways that I add my second hand (see photos, this page and opposite); I even reverse hands and pull the tool through the cut when needed. It works just as well.

The cap at the back of the plane goes in the palm of your main hand, to help you push firmly. It



Best way to trim edge-banding. Make solid-wood edging a little wider than the thickness of the plywood, and then plane it flush after the glue dries. To keep the plane level, run its heel end along the panel.



Great for dovetails, too. To avoid chipping off the edges of these end-grain dovetail pins, Miller planes in toward the drawer, where the grain is supported.



Level a drawer's edges. The block plane balances nicely on narrow surfaces, and can be held in a number of ways. Miller starts by planing down the highest edges (left). When they are level with the others, he changes his grip and pulls the plane around the corner (right) for a final clean pass.



also helps to keep your wrist straight so that your forearm lines up with the direction you want the tool to move. You want an easy and direct transfer of force from your body through your arm and the base of your hand to the tool.

Heavy planing is best done with the force coming from your lower body—all the way down to your feet—leaving your hands and lower arms for control. But for lighter cuts or awkward situations, you'll find that pushing with your arms is just fine.

A host of helpful tasks

One job where the block plane has no equal is bringing one part down level with another. Some woodworkers use a sanding block. But a sanding block is hard to control and can damage the surrounding surface. The block plane, on the other

Crisp bevels and quick roundovers

The nimble block plane balances nicely on corners, too, whether lightly breaking an edge or forming a full roundover.

Make edges friendlier. To make the corners of your projects softer to the touch, use the block plane to put a light, even chamfer on them.



Crisp bevels, too. To make perfect bevels of any size, such as on this tabletop, first lay out guidelines along the adjacent surfaces (above). Adjust the angle of the plane as you work toward the lines (right).



Change your approach on end grain. To avoid tearout when beveling the end of the tabletop, Miller points the toe of the plane toward the end grain as he planes. This shears it cleanly.



Detail work is no problem. A heavy bevel finishes off the bottoms of these table legs. Skew the plane for this end-grain cut, but make sure the toe starts out level for each pass.

hand, is a precision instrument that lets you focus the cutting action where it belongs. Hold the work securely and work the plane with two hands, if possible, to better feel the surface below and do a better job of keeping the plane parallel to it.

Get everything level, and then use a sanding block for final smoothing.

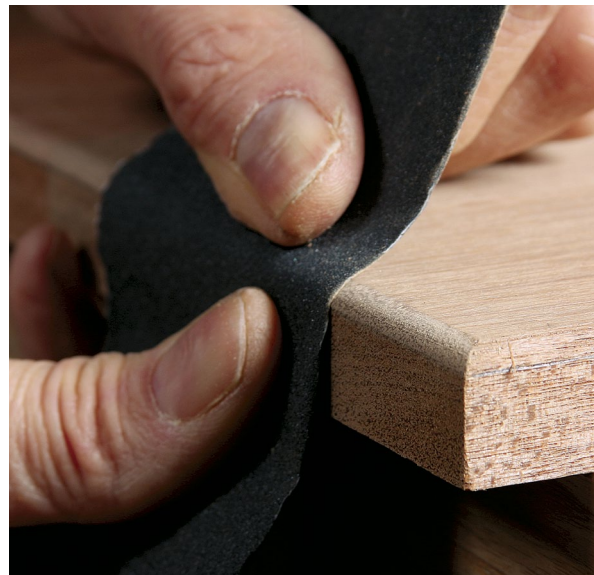
Another task the block plane handles best is easing the edges of a project. Beginners often stumble at this stage, either sanding big, inconsistent roundovers onto the edges, or moving to the other extreme and leaving them too sharp. The block plane offers perfect control over the process, letting you do everything from a tiny chamfer to an obvious bevel or even a smooth roundover.

Working an edge can be done with either one or two hands on the plane, but if you are simply breaking the edges, the work goes faster if you hold the workpiece down with one hand, rather than clamping it in each new position. Hold the plane at 45° to the board, of course, but also skewed at an angle to the line of travel, ensuring that it will make a shearing cut for the smoothest results.

As with all handplaning, you want to cut with the grain, and you can usually determine its direction by looking at the predominant grain pattern at the edge. But the fact that you're planing at the intersection of two surfaces can make things tricky. You may have to simply check the results to see which direction works best.

Great shaping tool, too

The versatile block plane can form everything from big curves to tiny facets, delivering glassy surfaces in seconds.



Turn a bevel into a roundover. By lightly planing the top corner (left) and the lower corner (right) of a big bevel, and then making even lighter passes on the corners of the three smaller bevels, you will create a series of tiny facets that form a uniform radius.

Even it out. Light hand-sanding blends the tiny facets into one even roundover, faster than you could make it with a router, and cleaner, too.



Smoothing shallow curves. By rocking the plane forward as he goes, Miller is able to quickly smooth the bandsaw cuts on this table leg, leaving a more uniform curve than a sanding block would create.



Forming small parts. After bandsawing this custom drawer pull, Miller cleans up each facet with the block plane. On a small surface, find the right planing angle, lock your arms, and push with your upper body.

If you're chamfering end-grain corners, as on the bottom of a leg or the ends of a panel, be sure to angle the plane so it is pointed toward the end grain. Otherwise, you will get tearout. To make a larger chamfer at any angle, you'll need to start with some basic layout. Mark out the final edges of the bevel on the two adjoining surfaces. Now take a guess at the angle to hold the plane, and make a few passes. You'll soon be able to see how you're doing in relation to your marks and adjust the angle as necessary.

To ease an edge so it is even more pleasing to the touch, start with a 45° chamfer. Now plane the two corners

to make an edge with three facets, and then repeat the process to achieve a roundover.

The block plane is also a good choice for smoothing gentle convex curves. You'll need both hands on the plane for this, and a bit of practice. Keep the plane aligned with the direction of cut, and find the balance between your hands that brings the edge into contact with the work. Push forward with your lower body

and concentrate on following the curve. This should feel like you're pushing the plane over a wheel that is rotating.

The same feel and control over the plane's orientation makes the block plane wonderful for shaping and smoothing small parts, or small facets on larger parts. Check the surface as you go, adjusting your planing angle as needed, and then lock in the angle with your hands and arms and push with your upper body. □



Article Extra

Learn how to tune up your block plane for optimal performance.

Jeff Miller makes custom furniture and teaches woodworking in his Chicago shop. Go to furnituremaking.com for information.

Dust off your dividers

DIVIDE AND CONQUER DISTANCES
WITH SPEED AND PRECISION

BY STEVE LATTA

Dividers may not get a lot of attention, but these simple little tools bring a lot to the table. For layout, stepping off distances, and comparing gaps and openings, they save time and increase accuracy, and that's a combination that can't be beat.

Dividers are easy to adjust, so you won't be wasting time with scratch paper and a calculator, or squinting to count off tiny increments on a rule. And here's the best part: You can pick up a pair at any flea market for just a few bucks.

Here I'll show you the most common ways I use dividers. Once you've mastered these jobs, I'm sure you'll think of more ways to use them in your own work.

What types, sizes to buy

The two main types of dividers are spring dividers and wing dividers. Spring dividers have a C-shaped spring or "bow" at the top, and are adjusted by a knurled nut. Spring dividers can open to about 60°. In practical terms, this means that the maximum possible setting of a pair is equal to the length of its legs.

A more versatile option are wing dividers, which are named for their wing-shaped adjustment arm. They open much wider than spring dividers, making them useful for larger arcs and distances.

Both types come in a variety of sizes ranging from 4 in. to 12 in. I own multiple spring dividers sized at 4 in., 5 in., and 6 in., along with wing dividers sized at 6 in., 8 in., and 10 in. But if you don't own any, I recommend starting with a pair of 4-in. and 6-in. spring dividers and a pair of 8-in. wing dividers.



Pick a pair

Spring dividers are much more plentiful in the smaller sizes, so it's easy to get them on the cheap. Winged types are usually bigger, and much heavier and bulkier, which makes them tougher to use for small, delicate measuring but perfect for large-scale jobs.

Though dividers are available new, you often can find them at flea markets, collectibles stores, or online markets such as eBay, usually at well below retail cost. Look for a pair with straight legs and a taut spring, with a reputable name like Starrett or Brown & Sharpe. Other names worth watching for are Pexto, and Peck, Stow, and Wilcox. These manufacturers typically used the best steel, which means that even with a little minor rust, the tool will clean up nicely for another generation or two of service.

To clean up the dividers, use a little 0000 steel wool to remove major rust, and add a drop of light machine oil to the moving parts. Dull, blunt points should be reground—a good sharp tip is more accurate, because it's easier to put right on your mark. I grind both tips to a point using an edge sander. After the tune-up, the dividers are ready to go.

Space dovetails perfectly

Using dividers, you can quickly lay out the proper spacing for your dovetails,



A good starter set. Spring dividers are more readily available in the smaller sizes, and are great for small work. Because of their larger size and heavy construction, wing dividers (far left) are ideal for measuring larger distances.



Wings reach farther. These wing and spring dividers are the same size, but the wing design opens much wider.



SHARP TUNE-UP



Make a point. Latta uses a belt sander and a light touch to sharpen the points on an old pair of dividers. Equipped with a nice set of fine points, your dividers can easily be placed right on the mark, making very fine divots for exact measurements.

Dividers speed up layout



FAST, ACCURATE DOVETAILS

Mark the first pin and set the dividers to the approximate width of a pin plus a tail. The pin mark is the starting point (1). Step, or walk, the dividers across the board to the other side (2). Adjust the dividers until you land exactly at the edge (3). Start back at the first edge and step it off again to lay out the other side of each tail (4). Now pencil in the lines using an angle gauge and a combination square (5), and you're ready to cut some dovetails.



and at the same time, mark each side of the pins and tails.

First, use a combination square and a pencil to mark the width for the first pin at the edge. Decide how many tails you want, and set the dividers for roughly that number of steps across (the actual distance is the width of a tail plus the width of a pin). The first divider setting is a rough estimate, so just take your best guess. Starting at your mark for the first pin, step, or walk, across the drawer side. Adjust the dividers in or out until they land exactly on the opposite edge. Mark these points with a pencil—they will become one side of each tail.

Now start again at the beginning, this time at the very edge. Step off the dividers a second time, and you should end up with an equal-sized pin at the final edge. These points will be the other side of your tails. Now you can finish laying out your dovetails, marking in the lines with a square and angle gauge.

Nail shelf-pin holes

When drilling holes in a line, say, for shelf pins, dividers will help you get perfect spacing. Use a combination square to mark a light pencil line down the length of the piece. Set your dividers to the spacing that you need, then start the dividers at the top and step off the part, leaving precise divots with each step.

The divots made by the divider points also make it easy to get the drill bit started without wandering.

Compare sides of a drawer opening

To compare the sizes of two things, most of us measure the two and then look at the measurements. A better way is to set a pair of dividers to

SHELF-PIN HOLES WITHOUT A JIG



Line 'em up. Use a combination square to locate the first hole. With the dividers set at your desired spacing, step off the length of the board. Pushing the tips into the wood gives your drill a solid starting point.



one side of the opening, and then move it to the other side. The differences will become immediately obvious. This is a quick way to make sure things are lined up during a glue-up, and makes it easy to figure out if things are not coming together square.

Divide circles, too

It's very convenient to divide a circle into six or three even segments, because the distance from the center to the edge (the radius) is exactly $\frac{1}{6}$ of the circumference (the distance around the circle). This is great for laying out the legs of a tripod candlestand table, or any six-sided decorations, like the line-and-berry inlay on a spice chest.

To do this, set the dividers to the radius of the circle and step the dividers around it. When you get back to your starting point, you should have six even sections, having landed exactly on your first mark.

This works for other configurations, too. Just estimate your settings to get started, and adjust the dividers each time until it's just right. Try this method out, and you'll find that it takes only a few adjustments to divide a circle into any number of segments.

Worried about making too many marks on the final piece? To keep the small dimples from showing up again when the finish is applied, first practice on a piece of scrap to get the right settings, and then lay out the final piece. □

Contributing editor Steve Latta teaches woodworking at Thaddeus Stevens College of Technology in Lancaster, Pa.

SIZE A DRAWER OPENING



Compare the two sides. Set the dividers to one side of the opening. Now check the other side of the opening. It's a quick way to make sure things are correct just before, or during, a glue-up.



DIVIDE ANY CIRCLE

Simply step it off. Dividers are the fastest way to divide a circle evenly, and are perfect for stringing details, like the line-and-berry inlay on this spice chest.

Engineering a

How to build a case that will stay square and

A solid-wood chest of drawers is one of the great feats of furniture design, providing square, stable pockets for drawers while accommodating big swings in seasonal humidity and the resulting swelling and shrinking of every component.

For me, success means drawers you can close easily by pushing on just one corner in any season, from the muggiest summer to the driest winter. Achieving this lofty goal is the culmination of many thoughtful decisions and careful steps throughout the designing and building process. I've been studying and refining traditional construction for almost 40 years, and here I'll show you the best ways I know to make the chest itself. In the next issue, I'll finish the story, showing you how to make drawers just as efficiently, and fit them precisely to their openings.

Drawers go into tables, boxes, and more, but I'll focus here on a traditional chest of drawers with solid-wood sides. Master that, and the others are easy. I'll stick to the most common design, one with

Size drawers wisely

Part of determining the overall dimensions of a chest is mapping out the sizes and proportions of the drawers. This has everything to do with how the drawers will perform.

HEIGHT

All solid-wood drawers shrink and expand top to bottom, across the grain. If they are more than 7 in. or 8 in. high, and sized to accommodate even moderate swings in humidity, they will have large gaps at their tops when the humidity is low. These large gaps not only look bad, but they will also cause the drawer to tip forward and jam when opened.

WIDTH

Drawers that are more than twice as wide as they are deep are prone to jamming. Even closer tolerances and more care will be needed when fitting these. Narrower drawers are much more forgiving in their fit, and work better.



Chest of Drawers

stable through the seasons

BY GERALD CURRY

an overhanging top and a flat front, but I'll give options for two types of base treatments. These construction approaches will work for chests of many sizes and styles, from traditional to contemporary.

The basic idea

With solid-wood sides, tops, and bottoms, a fine chest of drawers presents two major challenges. The first is the obvious back-to-front shrinking and swelling of the case. Second, because the inside is closed off to air circulation, wide panels tend to cup inward or outward from uneven moisture exchange, potentially pinching the drawers.

The main challenge is creating the drawer pocket. The big issue here is how to install the drawer runners, which run front to back (creating a cross-grain

situation). Their length won't change much, since wood hardly expands or contracts in that direction, but the depth of the case will change significantly—moving up to $\frac{3}{8}$ in. on a typical chest at different times of the year. Traditional woodworkers dealt with this in a variety of ways, but I use web frames, a 20th-century innovation, to solve the problem.

As for the case itself, one construction approach will fit the majority of your needs. On the most common type of case, with an overhanging top and a separate, bracket-style base, I use sub-rails at the top of the case and half-blind dovetails to join a solid bottom to the sides. However, if you want the case sides to extend seamlessly to the floor, forming the feet, you won't be able to attach the case bottom with standard dovetails. In this case, I use sliding dovetails, which stabilize the sides and strengthen the feet.

Gerald Curry is a professional furniture maker in Union, Maine.

Wood selection matters

A chest of drawers is a deep cabinet, with wide pieces that will expand and contract considerably. But if you follow the methods for case construction shown in this article, you'll head off most wood-movement problems. Nevertheless, the wood species you use are also very important. For more on wood movement, see A Closer Look on p. 82.

TWO OPTIONS FOR CASE SIDES



Use single, wide boards if possible for the sides and top of a case. These usually have a combination of flatsawn grain in the middle and rift-to-quartersawn near the edges, giving them a nice combination of attractive grain and stability.



For increased stability, you could go with all quartersawn wood. You won't find a single quartersawn board wide enough to make a chest side, but you can glue up several pieces. With this straight-grained stock, the gluelines won't be obvious.

USE SECONDARY WOODS BUT MATCH THE SHRINK RATE

Not all parts of a chest are visible. So to save some money, and also boost performance, you should consider making some parts from secondary woods. For the web frames, choose something durable and straight-grained, like ash, red oak, or soft maple. Poplar is OK, too, but drawers slide better on harder woods. For the big panels that form the case, however, the shrinkage rate of secondary and primary woods needs to match, at least roughly, or you risk the case side cracking. For example, the solid panel that forms the bottom is mostly secondary wood, and should expand and contract similarly to the sides and top of the case.



Case construction

There are several ways to attach a top to a chest of drawers, but I prefer to use subrails (right). This array not only lets you attach the top along its front and back edges but also at the center point of the sides, which keeps the top flat and keeps the sides from cupping inward or outward. At the bottom of the case, the construction approach varies depending on the look I want. The two methods shown below prevent the sides from cupping and help the feet withstand decades of dragging over bumpy floors.

Use subrails at the top

Like many woodworkers before me, I dovetail rails onto the top of the sides, and run kickers front to back to keep the top drawers from tipping downward when they are pulled out. The kickers are tenoned into the rails, but the tenons get no glue at all, neither front nor back, and the middle few inches of the kicker are glued and screwed to the case sides. None of the attachment holes need to be elongated to allow for wood movement. In fact, the center holes shouldn't be, so they can do their job, stabilizing the case sides.

Screw through center of kicker into top.

Screw through rails to attach top.

Two choices for bases

On a traditional chest, the bottom of the case connects to the sides with half-blind dovetails (near right). The base of the cabinet is a separate unit, attached after the case is assembled.

If you want the case sides to extend seamlessly to the floor, for a more contemporary look, you'll need to attach the case bottom another way (far right). The best method is to slide a wide panel made from the secondary wood into a long, tapered sliding dovetail. The tapered joint is self-tightening and much easier to assemble than a straight sliding dovetail, which tends to seize up on wide workpieces. Some of you might be hesitant to try it, but a tapered dovetail isn't that hard to execute, and its strength is unmatched. For a tutorial on cutting the joint, see Martin Milkovits's article in *FWW* #194 ("Quick, Sturdy Bookcase"). Last, I insert a rail at the front, just like the drawer rails above it, made of the primary wood and attached with short sliding dovetails.

However, if you are not yet ready to add a tapered slider to your arsenal, I've included an alternative approach that uses dados. It won't grip the center of the case sides quite as firmly, but it will stop them from cupping inward and pinching the drawers.

Classic bracket base

The most common way to handle the base of a chest of drawers is with a separate bracket base, fitted and attached after the case is assembled. The bracket feet can be traditional or contemporary.

Case sides, primary wood, $\frac{3}{4}$ in. to $\frac{13}{16}$ in. thick, typically 14 in. to 18 in. wide

Half-blind dovetails

Bottom, part secondary, part primary wood, $\frac{3}{4}$ in. to $\frac{13}{16}$ in. thick

Splined miter

Cut and assemble feet before gluing to frame.

Mortise-and-tenon joint

Top edge of frame is $\frac{1}{8}$ in. to $\frac{1}{4}$ in. proud of case.

Elongate back holes to allow movement of case bottom.

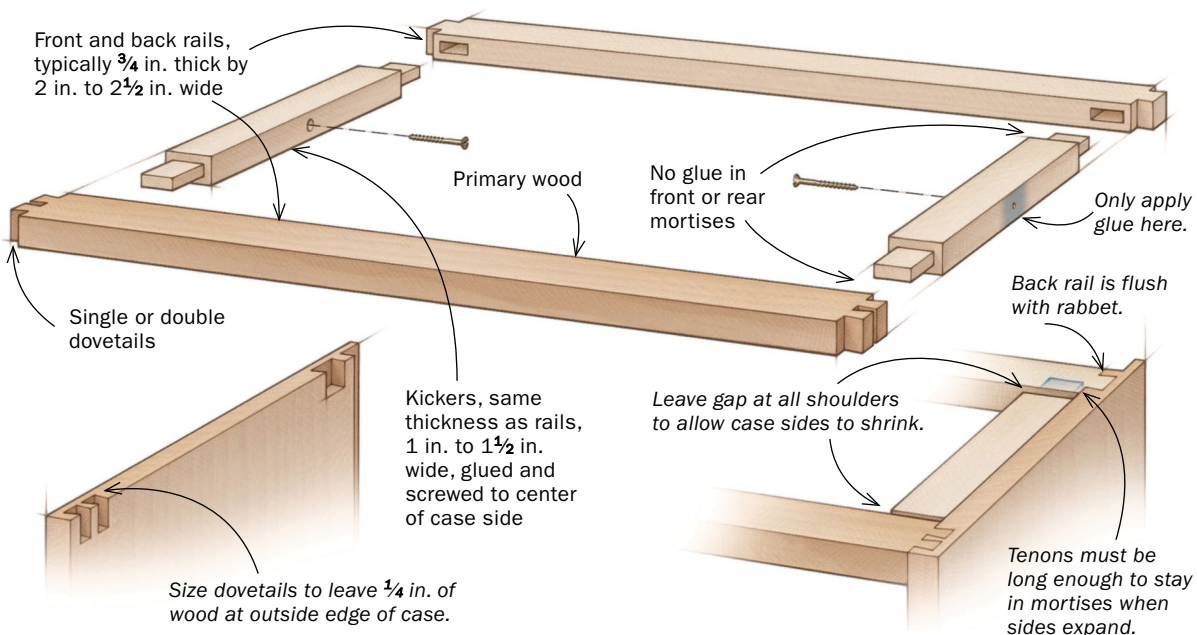
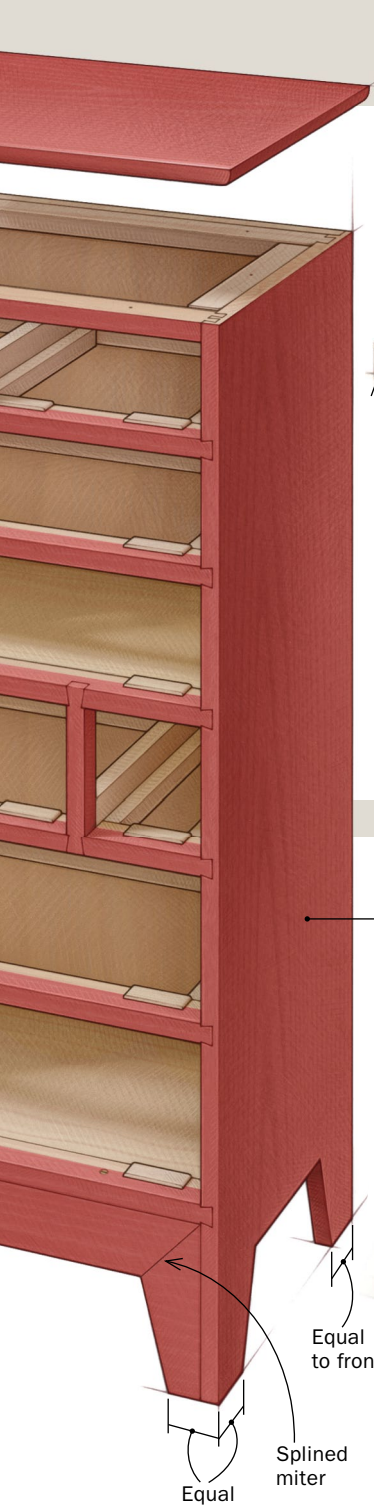
Glue together before milling.

Screw frame to case bottom after feet are attached.

Mold edges of frame before attaching feet.

CONTEMPORARY FEET

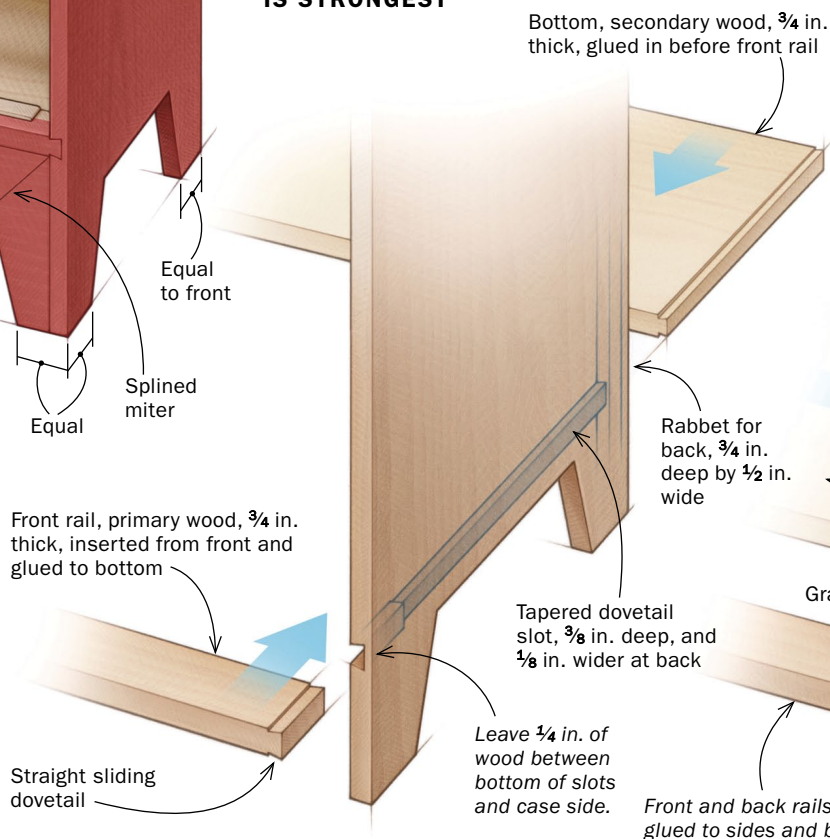
TRADITIONAL FEET



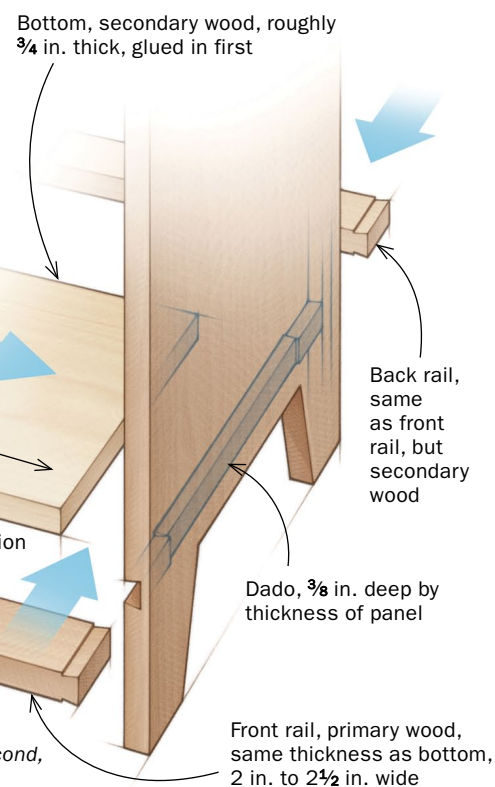
Sides that go to the floor

In this case, half-blind dovetails can't be used to attach the bottom. Curry recommends tapered sliding dovetails there. But dadoses will work, too.

OPTION 1: TAPERED SLIDING DOVETAIL IS STRONGEST



OPTION 2: DADO IS A LITTLE EASIER



Make perfect pockets for drawers

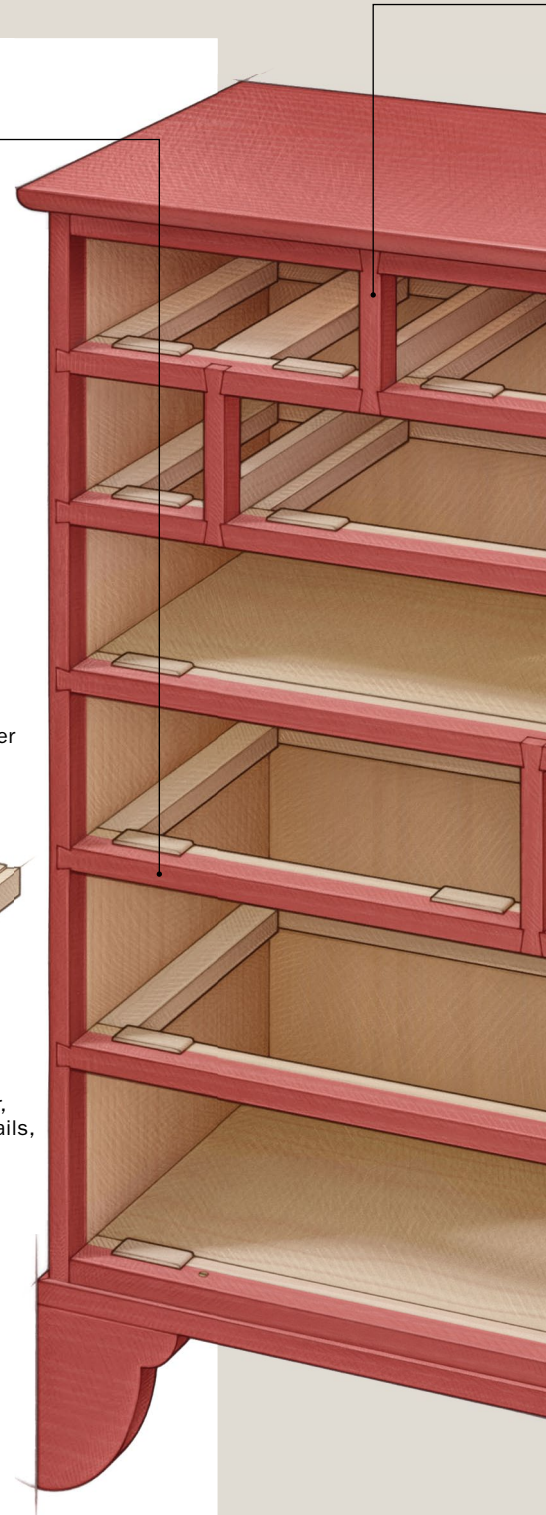
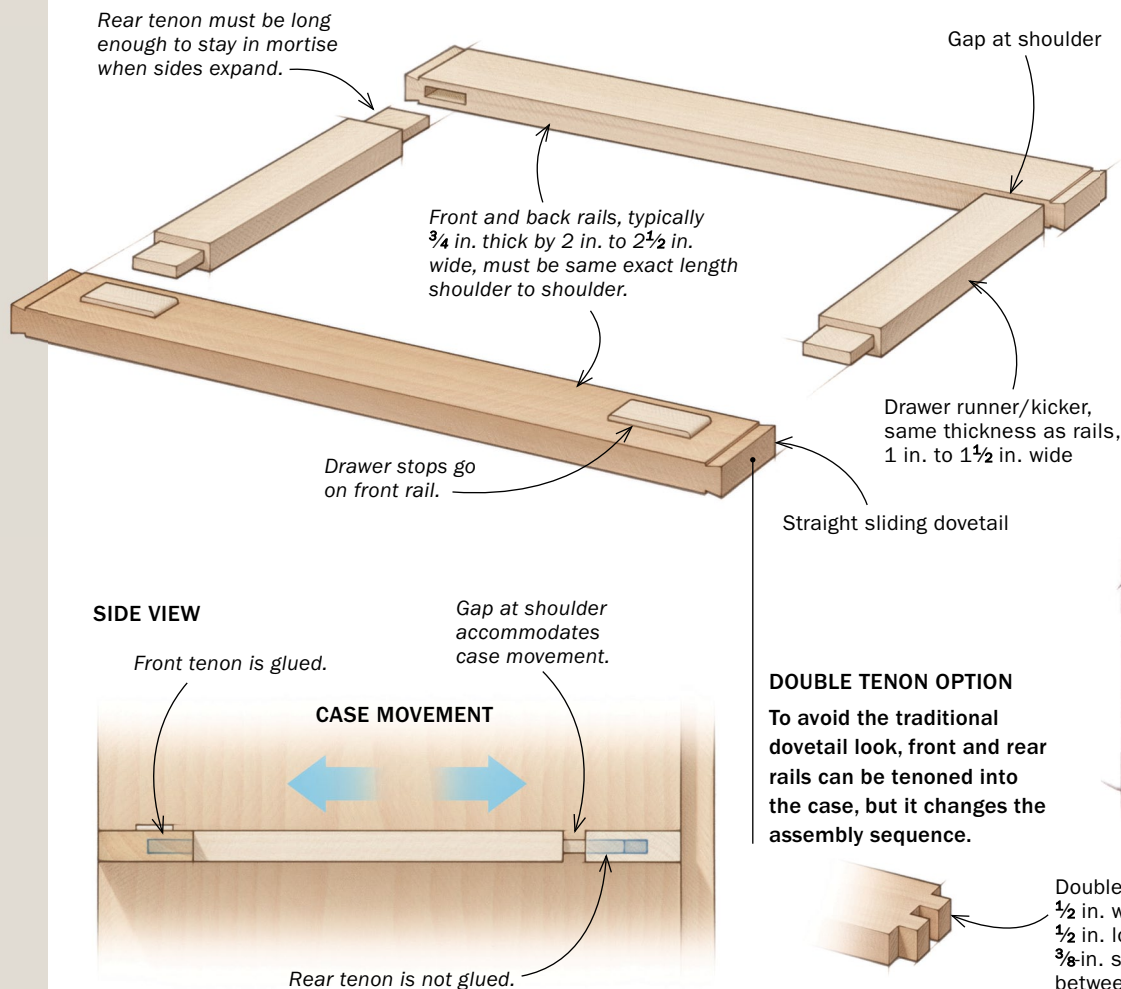
Start with a web frame

Although there are several other good ways to attach runners to a case side, the web frame is my favorite. It accommodates the shrinking and swelling of the case sides, while maintaining a flat, stable pocket for the drawers. The front and back rails keep the front and back dimensions of the opening exactly the same, which is critical for smooth drawer action. Web frames also make it easy to add runners in the center of the case, when you divide a drawer pocket for multiple drawers.

The strongest, most efficient way to attach the rails to the case is with sliding dovetails,

which make glue-up easy and maintain a strong grip on the sides. If you don't want to see the dovetails at the front of the case, you can also attach these rails with double mortise-and-tenons.

The runners must be attached to the rails in such a way as to allow the case sides to shrink and swell. This is done by leaving the rear tenon unglued, with extra room at its shoulder to allow the sides to contract. Also, the tenon must be long enough to stay in its mortise when the case expands. By the way, do not glue the runners to the case sides.



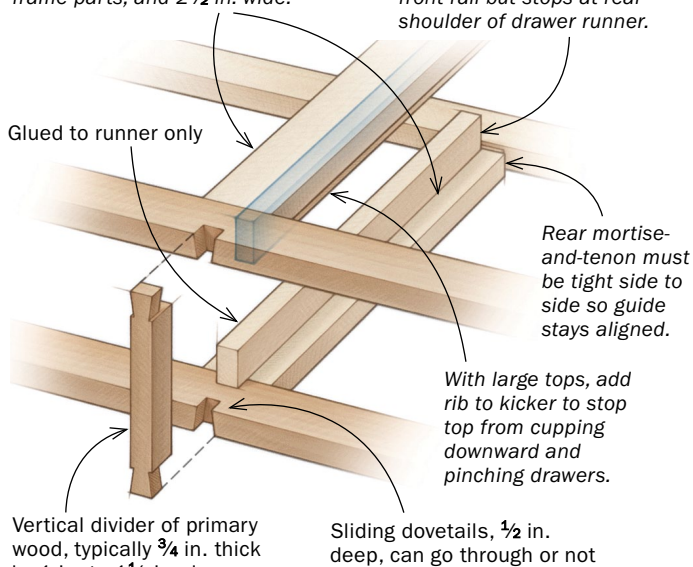
Add vertical dividers

Web frames make it easy to divide a drawer pocket to hold multiple drawers. You'll need an extra drawer runner in the web frame where the vertical divider will be placed. This runner is tenoned into the rails and needs to be wide enough to support both adjacent drawers. A kicker goes in the web frame just above, to keep the drawers from tipping downward. The kickers and runners are glued at the front only, with a gap at the rear.

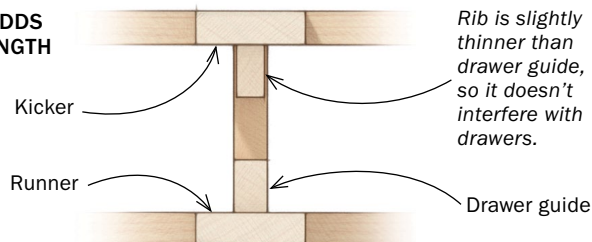
A vertical divider (or dividers, if dividing more than once) is dovetailed into the front rails of the web frames. If you are working in the top row of drawers, the subtop frame just acts like another web frame. A drawer guide is then glued to the center of the runner, aligned with the divider to keep the drawer on track.

Runner below and kicker above are the same thickness as the other frame parts, and 2½ in. wide.

Drawer guide, same thickness as divider by 1 in. tall, overlaps front rail but stops at rear shoulder of drawer runner.



RIB ADDS STRENGTH

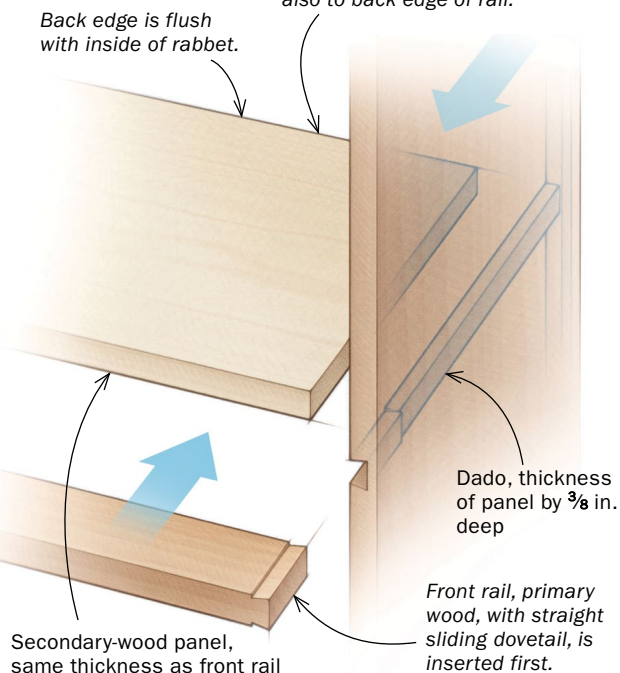


Panel prevents cupping in tall cases

Due to the lack of air circulation inside the case, it's inevitable that there will be uneven moisture exchange. That means that one side of the case parts will be drier than the other at times, causing cupping, which can make drawers stick in place. The top and bottom of the case, if handled as described on p. 32, will constrain that movement. And if the distance between them is roughly 24 in. or less, this will be enough to keep the sides flat. But for taller chests of drawers, you can still get some cupping near the center of the sides. The

web frames will hold the sides in place at the front and back, but the runners don't do much to restrain them in the middle, and it doesn't take much to pinch a well-fit drawer. So for chests with sides that are taller than roughly 2 ft., I recommend replacing one of the central web frames with a solid panel as shown.

Panel is slid into dado after front rail is dry, glued into dado and also to back edge of rail.



Three options for the back

Besides its obvious job—to keep dirt, dust, and critters out of the case—the back also helps to keep the case square. The sides of the case are rabbeted to hold the back while hiding it from view. At the top and bottom of a standard chest, simply leave the case parts short, so they align with the bottom of the rabbet.

If you don't mind the aesthetics of plywood, it makes for a very good back. Attach it with screws so it can be taken off when needed. But for a fine solid-wood case, I prefer a solid-wood back assembled with shiplapped boards. The simplest approach is to use wide boards made from a secondary wood, screwed into rabbets in the sides, and also to the top rail and case bottom. Unless I am making a period piece, I attach the back with brass screws (vs. cut nails).

The wider the boards, the more they help to keep the case square, which means wood stability is important again. That's why I like softer woods for my shiplapped backs, like pine and cedar, or soft hardwoods like butternut, catalpa, or poplar. These are stable, and have more give around the screws. Even so, I elongate the screw holes on wider boards.

If the back of the case will be seen, you can go with a frame-and-panel back. This is the best-looking option, especially when multiple panels are used and laid out in a pleasing design. The panels can be flat or raised, solid or plywood. Again, it's always good to choose a stable wood and/or quartersawn stock for these frame members, and again I use brass screws to attach the back. If you're making this in the dry season, leave a slight gap between the frame and the rabbet to allow the stiles to swell a bit without blowing out the thin edge of the rabbet.

To avoid the piston effect that happens with well-fitted drawers, when pushing in one drawer tends to push out another, I often put a simple vent somewhere in the back of the case, usually near the bottom.

Plywood

Simple and strong, if not elegant

Rabbet matches plywood thickness.



Shiplapped boards

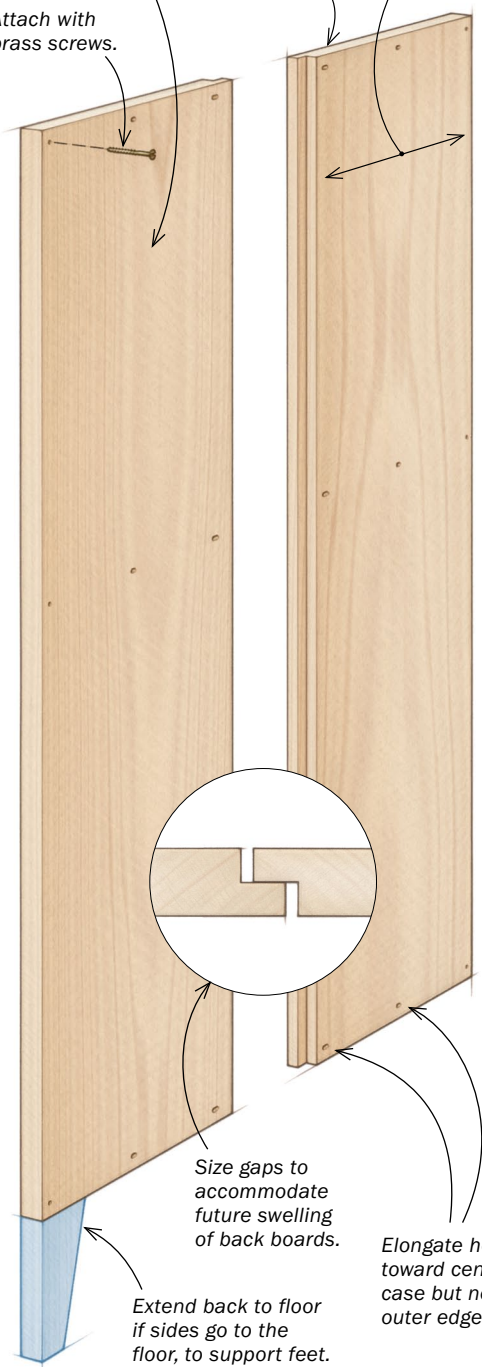
Historically correct, and easy to do

Grain can run vertically or horizontally, depending on proportions of the piece.

$\frac{3}{4}$ in. thick

Wider boards add more rigidity to case.

Attach with brass screws.



SHIPLAP DETAIL

$\frac{3}{8}$ in.

$\frac{1}{2}$ in.



Frame-and-panel

Best combination of looks and strength

Frame pieces, $\frac{3}{4}$ in. thick by $2\frac{1}{2}$ in. to 3 in. wide

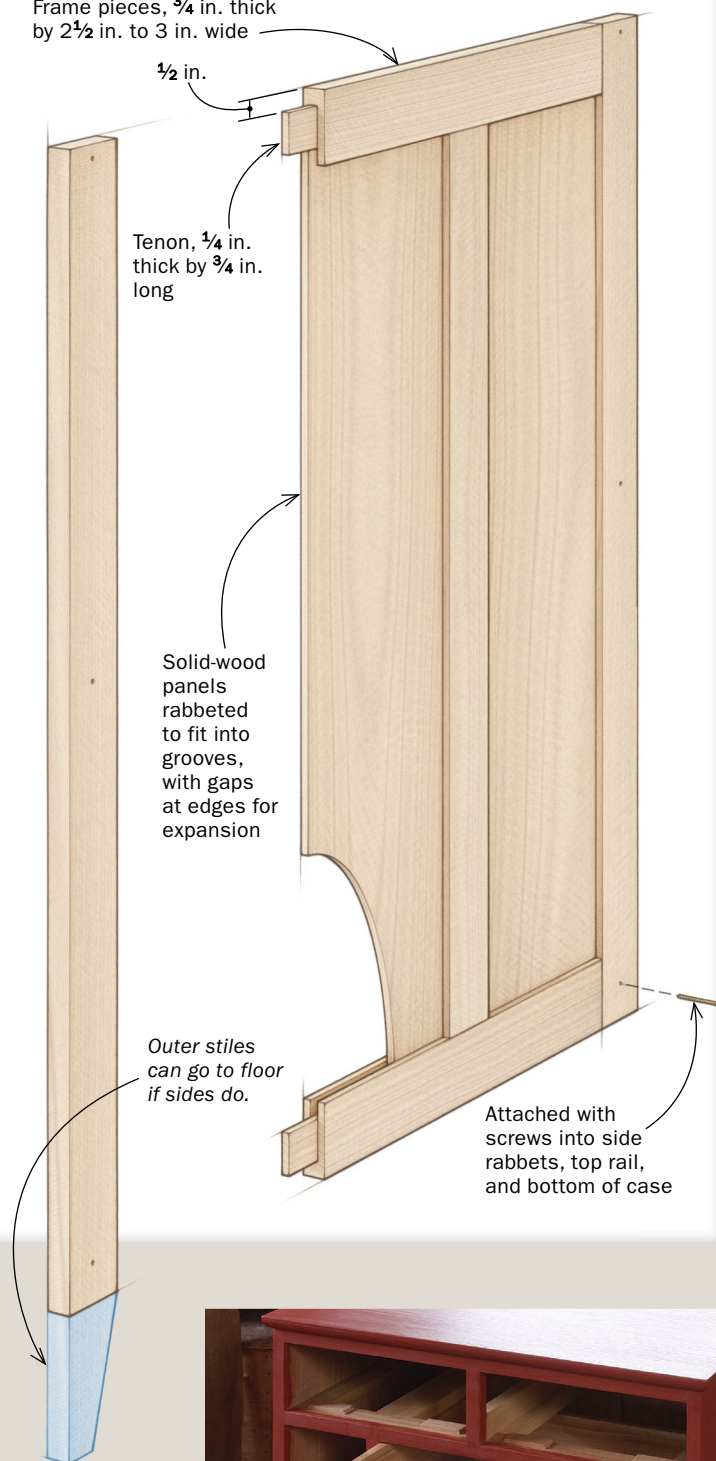
$\frac{1}{2}$ in.

Tenon, $\frac{1}{4}$ in. thick by $\frac{3}{4}$ in. long

Solid-wood panels rabbeted to fit into grooves, with gaps at edges for expansion

Outer stiles can go to floor if sides do.

Attached with screws into side rabbets, top rail, and bottom of case



COMING UP

See FWW #242 for Curry's companion article on making sweet-fitting drawers.



Drawbore Your Tenons

Ditch the clamps and add detail with this age-old technique

BY STEVE LATTA

OFFSET HOLES ARE THE KEY

As the pin passes through the offset holes in the mortise and tenon, it pulls the joint tight, eliminating the need for clamps.

Shoulders are pulled together as pin is driven in.



Hole in tenon is offset toward shoulder.

More often than not, I add draw-bored pins to my mortise-and-tenon joints. They send a message of strength and endurance, and speak of a time when things were built to last longer. More importantly, they make assembly much easier.

Drawboring means offsetting the hole in the tenon so that the pin pulls the parts together tightly—and permanently. If your tenon shoulders are square, your assembly will be, too. This changes the way you work. Clamps, which can damage workpieces and pull them out of square, are eliminated. This is especially great on doors, where a little twist can add up to a big problem. I also like the flow of my work when I drawbore. Without clamps in the way on each subassembly, I can just pin the joints and keep moving, without having to wait for glue to dry.

Drawboring is also a godsend when clamping is difficult. Long tables, like the one I'm making for a local church, sometimes exceed the reach of my clamps, but drawbored pins work all the same. They also work well for the angled joints in chairs, which are tough to grip firmly with clamps. In other cases, where a pin goes into an elongated slot to allow wood movement, such as on breadboard ends, I use drawboring to ensure those pieces stay tight.

This type of construction often lends itself to pre-finishing components, which can be damaged by clamps. After assembly, a bit of oil on the pin ends and perhaps another layer of finish are all that is required.

Strong, but subtle

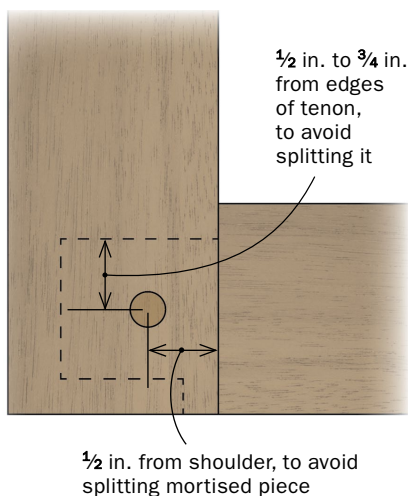
There are a variety of ways to style the heads of pins, whether drawboring them or not. I think of myself as a tradesman more than a designer, and I like to keep it simple. I tend to match the pin material to the surrounding wood, so the darker end grain of the pin stands out only slightly, and I trim the pins flush with the surface. For very soft woods, like pine, I make the pins from a harder wood like maple, providing extra strength while maintaining a nice color and grain match.

I make pins from riftsawn or quarter-sawn stock if possible, with straight grain on both faces, cutting them $\frac{1}{4}$ in. square and 4 in. or 5 in. long. You don't need to use thicker pins on bigger pieces, at least not for strength reasons, because the glue reinforces the joint and you'll never shear

Get the offset right

Getting the offset dead on is critical. Too much, and the pin will jam and could split the mortised piece; too little, and you won't pull the shoulders tight. The steps below will help you nail the offset in any situation.

1 DRILL THE MORTISED PIECE



Go all the way through. After laying out the pin locations, use a drill press and a brad-point bit for clean, accurate holes. Put a sacrificial piece below to keep the exit hole clean, too.

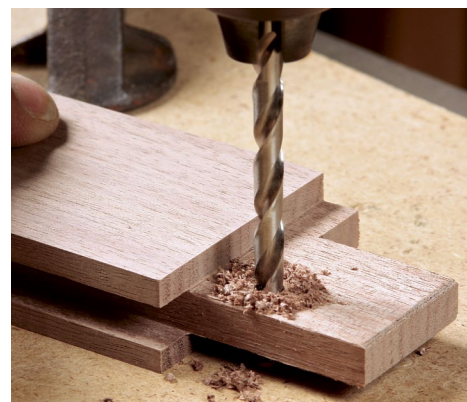
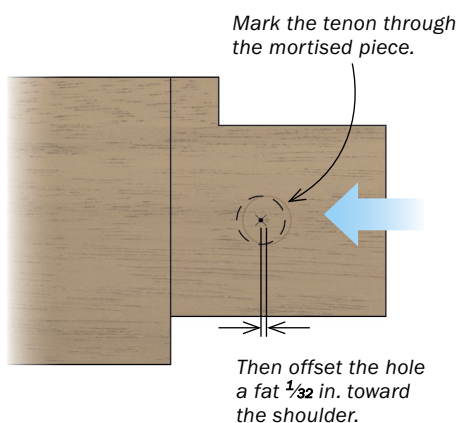
2 OFFSET THE HOLE IN THE TENON



Mark the tenons. Insert the tenons all the way, with no gap at the shoulder. Then use the same drill bit to mark the center of the pin holes.



Mark the offset. Use an awl to offset the center of the hole in the tenon.



Drill the tenons. Use the same drill and be sure to center it on the right mark.

Make and install the pins

Latta always uses straight-grained stock for pins to avoid splitting. Except on narrow workpieces, he prefers the look of square heads. Whether they will end up round or square, however, he makes the pins the same way.



From square to round. Rip the pin stock square, the same size as the pin holes. Cut the pieces 3 in. or 4 in. longer than necessary, and chuck the pin in a drill to round the lower section, holding it against a belt or disk sander (left) as the drill spins. Take the pin to a full round near the bottom, but taper the transition to the square head section. Sharpen the tip so it will grab the drawbore offset.

a 1/4-in. pin. However, I occasionally vary the size for aesthetic reasons, using slightly fatter pins on big timbers or slightly thinner ones on small doors.

I generally use square heads on my pins, and turn them 45° to create a traditional diamond look. A bonus is that if they go in a little twisted, it is less obvious in the diamond orientation than if I were trying to get them perfectly square. Some woodworkers cut a square slot in the top of the hole to accommodate a square head, but I haven't found this necessary. If you use the same or harder wood for the pins, a square head will make its own pocket, especially if you taper the transition from the round section to the square head when making the pins. Occasionally, the head gets rounded slightly, but imperfection is part of the handcrafted look.

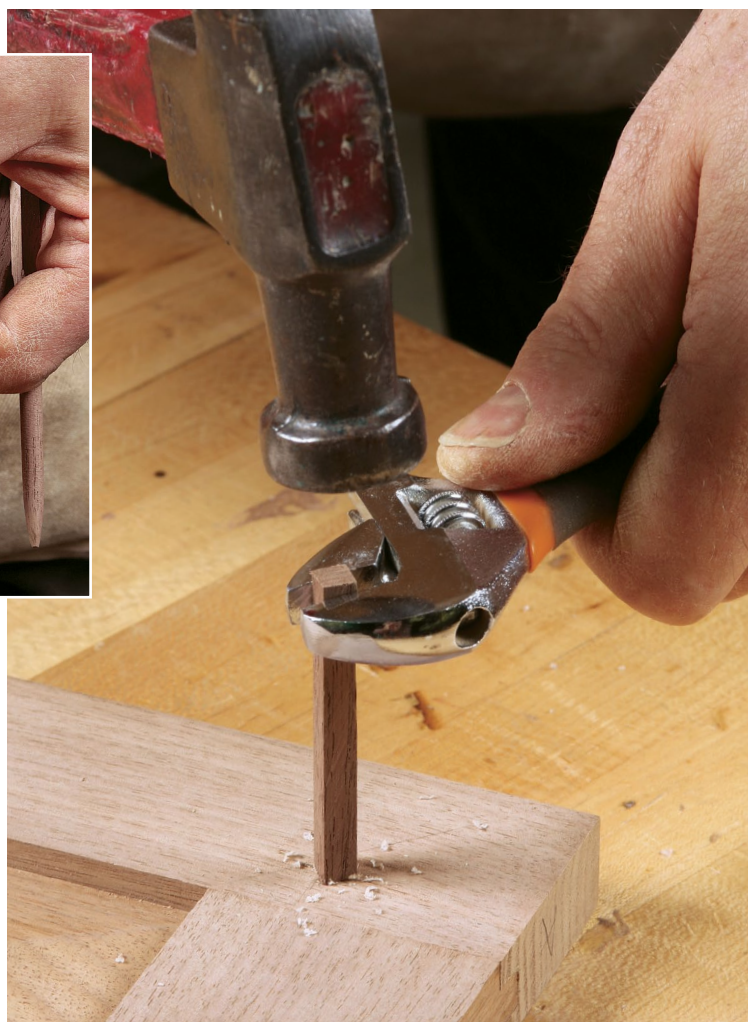
If the pieces being joined are narrow, say less than 2 in. wide, square pins can look like overkill, so I use round ones there. But there is no right or wrong here. It's up to the individual builder to give this age-old joinery detail his or her unique spin.

Pinning a door is lesson one

Drawboring is a wonderful way to assemble doors and this is a good first lesson in the basic technique. The same steps apply



No glue needed. Latta uses paraffin wax on his drawbored pins (above), not glue, making them easier to drive. Don't worry; they'll stay put for life. Working over a dog hole on his bench, he drives in the pin (right) until he is happy with the way the head looks. Use a wrench to steer square pins as you drive them. Latta prefers to twist his square pins 45° for a diamond look.





Trim 'em flush. Use a flush-cut saw (above) to trim the pins close but not completely flush. Then pare them level with a chisel (left).

in any situation. On most doors, only a single pin will fit into each tenon, but on very large doors, two pins are better. See p. 42 for how to position two pins in a tenon.

Once you've cut the mortises and tenons, pin layout always starts on the mortised piece, in this case the door stile. Bore the holes on the drill press, using a 1/4-in.-dia. brad-point bit. You are drilling through the stiles only here, with the door apart. You'll drill through the tenons later. Use a backer board to avoid blowout on the back side of the stile. If you drill slowly, you'll get only minimal chipout inside the mortise.

Assemble the door, using a clamp as necessary to draw the joinery tight. Then insert the same brad point into the hole to mark its center on the tenon. Now disassemble the parts and, using the tip of the bit or an awl, make a more pronounced mark just a hair more than 1/32 in. toward the shoulder of the tenon. Be sure you go toward the shoulder and not away. It is an easy mistake with the direst of consequences.

Now, using a drill press and the same brad-point bit, bore through this new mark. Afterward, reassemble the joint and eyeball the offset to make sure it is right.

Prep the pins—To round and taper the pin body, I simply chuck it into my

WATCH YOUR BACKSIDE

The back of the pin will be visible on a door, so it needs to look as good as the front.



Saw it off. Cut off most of the excess, leaving a little extra for paring.



Check for gaps, and fill if needed.

If you see a problem (above) after sawing off the back of the pin, grind a round tip onto a piece of steel and use it to dimple the end, expanding it (right). Then trim the pin flush with a chisel as usual.



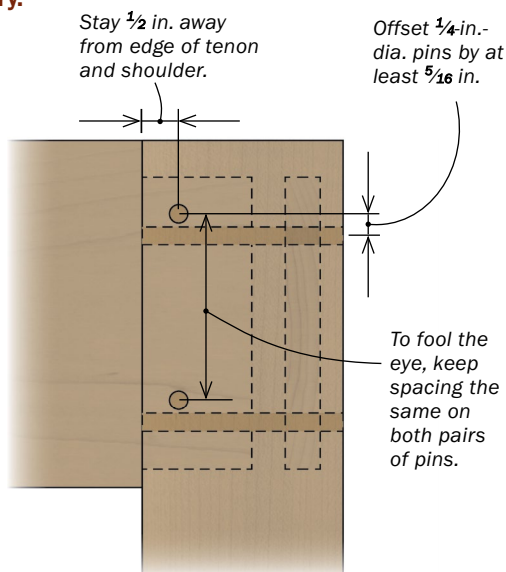
Tame difficult glue-ups

BIG TABLE BASES

Drawboring works great on a large table, where you might not have clamps long enough for the job. The technique also lets you assemble the entire base at once without waiting for a subassembly to dry.

STAGGER THE LAYOUT

Follow the general layout rules shown on p. 39, but stagger the pins on adjacent faces of each leg so that they don't run into each other inside.



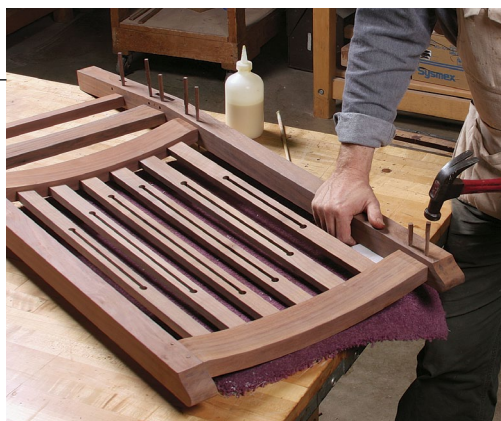
Easy assembly. Pin the long sides first (left), laying them flat on the bench to make them easy to handle. Finish up the assembly with the table base standing upright (below).



ANGLED JOINERY

Drawbored pins are perfect for chairs, pulling together the angled and curved joints as easily as square ones.

Tight joints and no waiting. Latta starts by assembling the chair back (right). Without waiting for glue to dry, he can assemble the front of the chair, and join it to the back (below). It's only now that he must pause, to take the final measurements for the arm joinery.



cordless drill and spin it against a belt or disk sander, leaving the last couple of inches square. This method is fast and accurate. With doors, where the inside face will be visible, I leave the round section a little fuller, not quite rounding the square entirely, to be sure the hole is filled on the inside of the door. But I always sharpen the tip of the pin on the sander so that it will clear and then catch the offset hole.

Drive them home and trim them flush—There's no need to glue the pins. Instead, prior to assembly, put a thin layer of glue on the tenons and a heavier layer along the walls of the mortise. Excess glue on the tenons will end up as squeeze-out.

I wax and insert the pins from the front of the door, holding the square section with an adjustable wrench. This helps me control the orientation of the head as I pound in the pin, using a steel hammer. I hammer the pin until the head has firmly established itself in the face of the stile.

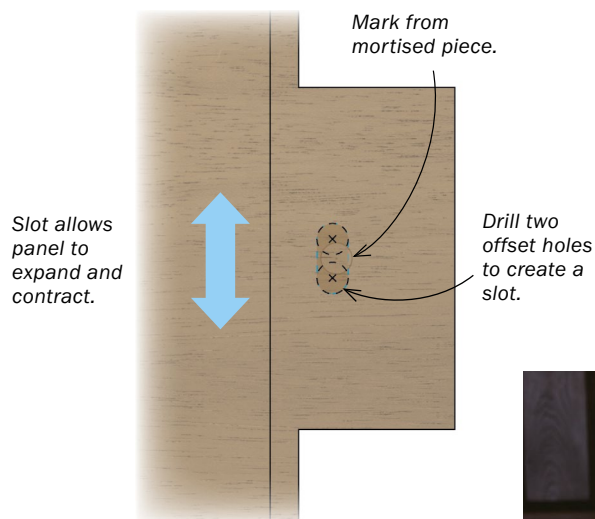
Trim the pins after the glue on the mortise-and-tenon is dry. I cut them close with a flush-cut saw, and then pare them perfectly flat with a chisel.

A host of other uses

A long table is one place where drawboring works great. The process here is

PULL BREADBOARDS TIGHT

Breadboards must allow the panel to expand and contract with the seasons while staying tight to it for decades to come. The solution is elongated holes in the tenons, combined with drawbored pins.



very similar to the one on a door, with a few differences. Because the aprons are wider than the door parts, two pins are required, and since the legs are so much thicker, the pins need to be a couple of inches longer. Also, because I don't care about the back side, I sand the round section a bit smaller, too.

Most importantly, though, you need to stagger the pins in a table leg, or they will intersect inside. You'll want to keep their spacing consistent so they look good, while keeping them far enough from the edge of the tenon to avoid splitting.

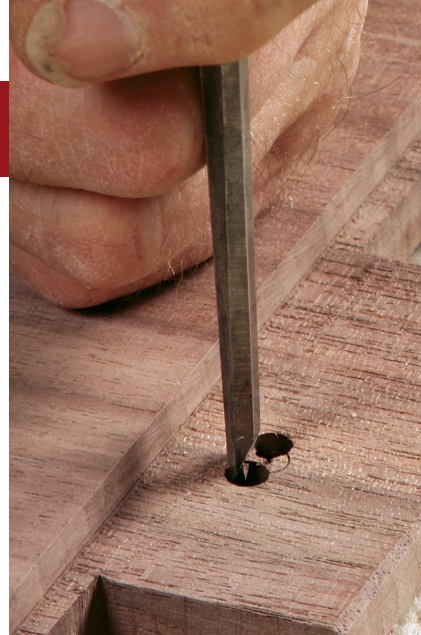
Because of their angles and curves, chairs are often difficult to assemble. Again, drawboring offers an easy solution. Pinning the tenons ensures tight joints and makes this multi-stage glue-up much faster.

Breadboard ends are a great way to keep an unsupported panel flat. Whether it's the top of a trestle table, the lid on a blanket chest, or the drop-front on a traditional desk, tenoning a long rail to the ends does wonders to stop warping as moisture content changes with the seasons.

But these cross-grain rails create a problem. Their length won't change, but the width of the panel certainly will. That means you can't glue all the tenons, and instead must use pins or screws to attach



Two holes in the tenon. To lay out the slots, Latta uses dividers to mark centers for two offset holes with $\frac{1}{4}$ in. of wood between them.



Turn them into a slot. A bit of chisel work knocks out the material in the middle, creating a smooth slot.



Assemble and pin. To keep the front of the breadboard flush with the front edge of this chest lid, Latta applies glue to the front tenon only, and drills a normal hole there. The panel's movement is directed toward the back, via slots in the other tenons.

them, elongating the holes in the tenons to allow them to move sideways.

That inevitable movement leads to another problem: The ends of these rails won't stay aligned with the edges of the panel. On a tabletop, you want to lock down the tenon in the middle to divide

the misalignment between each end. But on a blanket chest that will always be against a wall, you want to lock in the front tenon to keep the front end flush and send all of the movement toward the back edge, where the misalignment won't be as noticeable. Chalk up another victory for drawboring. □



Article Extra

Watch a drawbored joint come together.

Contributing editor Steve Latta teaches furniture making at Thaddeus Stevens College of Technology in Lancaster, Pa.

Benchtop Mortisers

These fast, accurate drilling machines cut square holes easily

BY ROLAND JOHNSON



The mortise-and-tenon might not be the most glamorous furniture joint (there is no denying the dovetail's beauty), but it's strong, reliable, and versatile, suitable for tables, chairs, casework, and more. Many woodworkers, however, find the mortise half of the joint to be a challenge. To cut it by hand you need only a chisel and mallet, but it takes time to learn the technique. Drilling or routing out the waste and then squaring up the walls with a chisel also works, but it, too, is time-consuming.

A better tool for the job is the hollow-chisel mortiser, which cuts square holes quickly and accurately. The machine's

head is fitted with a square, hollow chisel with a drill bit running through the center. As you plunge the chisel and bit into the wood, the bit removes most of the waste, and the chisel squares up the hole.

Although mortisers come in a variety of sizes, a benchtop model will cut just about every mortise you'd need for furniture. Benchtop mortisers have enough power to plunge a chisel up to ½ in. square into hardwoods, and they cost significantly less than larger, floor-standing machines. Plus, they are light and small enough to store out of the way when not in use.

I tested the 13 benchtop models available to find out which performs the best and which is the best value. First, though, I'll tell you what to look for.

Power, leverage, and ease of use

It's not easy to plunge a chisel and drill bit simultaneously into wood, so a mortiser needs a strong motor,





Make sure the fence is square. When you mortise a part, you press it against the fence with a clamp, rollers, or your hand. If the fence leans in or out, the mortise won't be square to the edge. All of the mortisers tested—except the Baileigh Industrial MC-625—had square fences.

and a handle that creates leverage. I tested all of the machines with the same ½-in. bit from Charles Schmidt and Company (sharpened between machines). With models that have less than ¾ hp, you'll need to slow the feed rate in harder woods to keep the chisel and bit from clogging. However, most furniture mortises are between ¼ in. and ⅜ in. wide, and all of the machines easily cut mortises in that range. For leverage, you want a longer handle, and it's better if it is easy to adjust.

Most important is how easy the mortiser is to use. Adjustments to the fence shouldn't require a tool. The depth stop should be simple and quick to operate without tools. And the drill chuck should be easily accessible.

Two mortisers rise to the top

All of the machines tested, except for the one from Baileigh Industrial, are capable of cutting mortises accurately and maintaining their settings so that you can cut a series of identical mortises. However, the power and convenience of the Powermatic PM701 and General International 75-050T make them stand out. The Powermatic has a powerful ¾-hp motor, so it cuts quickly, even with a

SQUARE FENCE THAT'S EASY TO USE

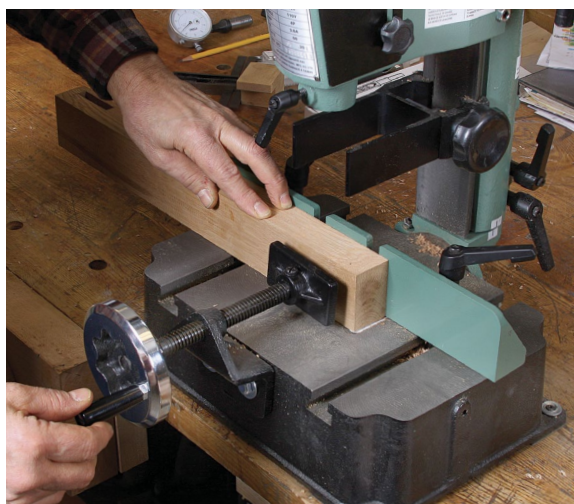
Every time you set up to cut a mortise, you have to adjust the fence, so it should be easy. Also, the fence must be square to the table to ensure accuracy. A convenient system to hold the work still is worth having, too.



Easy adjustments, in and out. On the Powermatic (shown), Delta, and Grizzly mortisers, the fence moves forward and back on a rack-and-pinion mechanism, making for quick and accurate adjustments.



Helping hands. It's nice to have help holding work against the fence. Rollers, like those on the General International 75-040 (top), work best, allowing you to move the part between plunges without loosening them. But a vise, like the one on the General International 75-050T (bottom), works, too. The downside is that you must loosen the vise to move the part between cuts.



CONVENIENCE IS KING FOR BIT CHANGES

The chucks on all of the machines tested are behind a door, so it should be a snap to open. And there should be plenty of space to get the chuck key in.



Wide open for business. The door on the Powermatic is the largest and easiest to open. This makes it very easy to lock bits in the chuck.



Thumbscrew is tedious. Having to completely remove a thumbscrew to gain access to the chuck, like on the General International 75-040, complicates bit changes.

½-in. chisel. It's also the most user-friendly. Every adjustment (except the drill chuck) is made without a tool, and the stop, fence, and hold-down moved smoothly and easily. The fence locks down with two cam levers—simple, effective, and fast. Access to the drill chuck is easy via a door that snaps open easily; inside, there's plenty of room for the chuck key and your hand.

The General International 75-050T is a great machine, too. The only mortiser in the test with a tilting head, it's the best choice for anyone who cuts angled mortises on a regular basis, like a chair maker. The head also rotates, so you can cut mortises on parts that wouldn't fit under the chisel otherwise. (The Shop Fox has this feature, too.)

The Wood River mortiser is the Best Value among these machines. It has a big table with extensions, rollers to hold parts against the fence, and you can reposition the lever with one hand.

Roland Johnson is a contributing editor—and tool junkie—in Sauk Rapids, Minn.



Article Extra

Learn how to sharpen a hollow chisel in our step-by-step video.

DEPTH STOP MUST BE DEAD-ON

A stop will prevent you from accidentally cutting a through-mortise. But more importantly, it guarantees that every cut is the same depth.



Two stops in one. The bottom stop controls the depth of cut, and the top one allows this chisel to clear the part without having to raise the lever fully—a convenience featured only on the General International 75-050T.



Easy stop. A ratchet handle tightens the Powermatic's stop against the dovetailed ways. It was easy to adjust and tighten.

BIGGER TABLES ARE BETTER

A big table stabilizes the workpiece, so you can use both hands to adjust the mortiser's settings, and lessen the chance that the part will move during the cut.



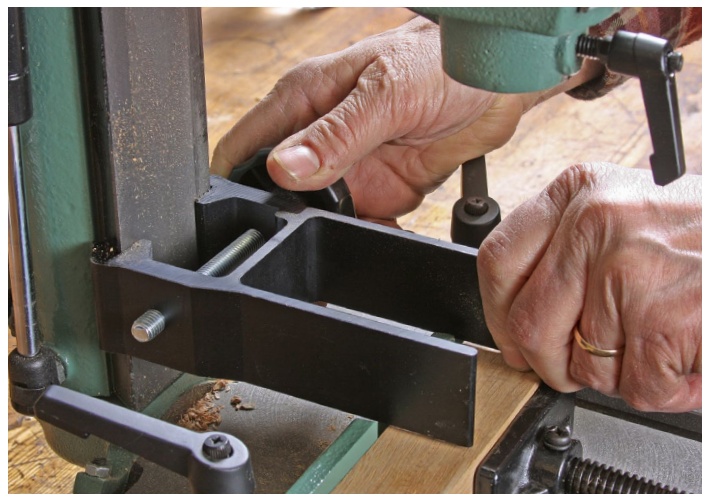
Extensions for long parts. The Wood River, General International 75-040, and Steel City machines have extensions that keep legs and other long parts level for setup and mortising.



Small table, big headache. Mortises are often near the end of a part, and on a small table like the one on the Woodtek 138224, the part will tip up. You have to keep a hand on it any time the clamp isn't tight against it, which can complicate setup.

HOLD-DOWNS MAKE WORK EASIER

When raised out of the cut, the chisel and bit can pull the part up off the table. A good hold-down prevents that.



Tighten in a flash. The large knob on the General International 75-050T is easy to turn, and always there, so adjustments are fast.



Keep the Allen wrench close by. Four machines (Shop Fox, Steel City, Wood River, Woodtek 876775) require the use of an Allen wrench to adjust the hold-down, an unnecessary complication.

ADJUSTABLE LEVER IS BEST

Sometimes the lever interferes with the cut. It might hit a wide or thick part before you cut to the mortise's final depth, for example. If you can reposition the lever on the fly, you can finish the cut.

Reposition with one hand. On the Steel City, Shop Fox, and Wood River machines, you need only tilt the lever out with your hand and then rotate it.



Limited options, and difficult changes. The levers on the machines from General International and Woodtek have two positions only, and require you to loosen a set screw before you can switch between them.

Benchtop mortisers

Johnson tested the machines with the same 1/2-in. bit, sharpened between tests. All the machines were able to cut mortises adequately, but the best offer a combination of power and convenience that makes them stand out from the crowd.

**POWERMATIC
PM701**

AUTHOR'S
BEST OVERALL
CHOICE



**GENERAL
INTERNATIONAL
75-050T**

AUTHOR'S
BEST OVERALL
CHOICE



**WOOD RIVER
151223**

AUTHOR'S
BEST VALUE
CHOICE



**BAILEIGH IND.
MC-625**



**DELTA
14-651**



**GENERAL INTL.
75-040**



**GRIZZLY
G0645**



**JET
JBM-5**



**RIKON
34-250**



**SHOP FOX
W1671**



**STEEL CITY
25200**



**WOODTEK
138224**



**WOODTEK
876775**



	MODEL	STREET PRICE	MOTOR	HOLD-DOWN	CLAMPING	FENCE	TABLE	DEPTH STOP	COMMENTS
	Baileigh Industrial MC-625	\$355	½ hp	None	Good	Poor	Poor	Poor	Only mortiser with an X-Y table
	Delta 14-651	\$320	½ hp	Good	None	Very good	Good	Good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.)
	General International 75-040	\$390	½ hp	Good	Excellent	Very good	Excellent	Good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.)
	General International 75-050T	\$620	½ hp	Excellent	Very good	Very good	Fair	Very good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.); tilting head makes it ideal for chairmaking.
	Grizzly G0645	\$255	½ hp	Good	None	Very good	Very good	Good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.)
	Jet JBM-5	\$355	½ hp	Good	None	Fair	Very good	Good	MDF table can be replaced with shopmade jigs or larger table.
	Powermatic PM701	\$490	¾ hp	Excellent	Good	Very good	Very good	Very good	Every adjustment, except for drill chuck, can be made without a tool.
	Rikon 34-250	\$280	¾ hp	Good	None	Very good	Good	Good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.)
	Shop Fox W1671	\$320	¾ hp	Good	None	Fair	Very good	Good	Includes three chisels (½ in., ⅝ in., ¾ in.)
	Steel City 25200	\$350	½ hp	Good	Good	Very good	Excellent	Good	Table extensions and rollers make mortising more convenient.
	Wood River 151223	\$290	½ hp	Good	Good	Very good	Excellent	Good	Includes four chisels (¼ in., ⅝ in., ⅜ in., ½ in.)
	Woodtek 138224	\$550	1 hp	Excellent	Very good	Good	Fair	Good	Long handle and big motor make mortising easy.
	Woodtek 876775	\$340	½ hp	Very good	None	Fair	Very good	Good	Includes five chisels (¼ in., ⅝ in., ⅜ in., ½ in., ¾ in.)

Comfortable Outdoor Chair

Curvy chair is built to last

BY MICHAEL FORTUNE



The Garden Chair, Part 2

In Part 1, we covered how to make the bent laminations for this project. Now it's time to cut all of the parts to shape and assemble the chair.

When I set out to redesign the classic Adirondack chair, I wanted to capture the spirit of the original while making it more comfortable and attractive. With that in mind, I added a few more curves, inspired by the plants in my garden. But I didn't stop there. The seat is closer in height to an indoor dining chair, and does not have the severe backward slope of the classic. That makes it much easier to rise up from. It can even be pulled up to an outdoor dining table. At the same time, there is nothing to stop you from falling asleep in the sun.

In Part 1 (*FWW* #240), I showed how to make the two types of bent laminations you'll need: one for the arms and front legs, and

one for the seat and back slats. Now I'll show you how to trim those laminations to size, cut out the rest of the parts, and put the chair together. The joinery amounts to a few small notches and a pile of screws, so it goes quickly.

As with most chairs, the various angles and joints took me a while to work out. But you'll have no such trouble. I've outlined patterns for every part (see p. 53). Be sure to make them all, using $\frac{1}{8}$ -in. Masonite or MDF so they can be flexed into the curved parts. The patterns make things easy. You'll use them to trace the shapes of each part, and also to mark the locations of the notches and even the holes for the screws.

Start with the arms

Once you've cut out and smoothed the patterns, transferring them onto both flat and curved pieces is a cinch. Be sure to keep track of the left and right arms, which are mirror images of each other.



Simple tracing job. Use spring clamps to hold the pattern in place on the bent-laminated arms while you trace the edge profile.

Using bent-laminated pieces

In Part 1, I finished up by jointing one edge of each lamination to create a nice reference edge. The rest of the shaping and trimming happens on the bandsaw. I don't trim curved parts on the tablesaw because of kickback danger. For most of the slats, which have straight sides, you can just bandsaw the opposite edge parallel using the rip fence, keeping the curve down on the table at the cutting point.

The other laminations are cut to specific shapes. The arms have a long curved line bandsawn down one side, and a shallow curve on the inside. Before laying out and bandsawing the arms, place them back on the bending form and transfer the mark for floor level onto their edge and face. That will help you align the pattern.

Trace these shapes on the curved pieces by pressing the Masonite patterns into the curves and holding them there. Then bandsaw the profiles right to the line, and trim them to length.

When cutting the slats to length, the trick is to have their ends line up to form smooth, graceful curves on the finished



Curves on curves. The bandsaw is the perfect tool for cutting curved profiles on curved parts. Just make sure the workpiece is always touching the table in the area where the blade is cutting. Quick tip: A bit of side pressure on the back of the blade will help you control the path of the cut.

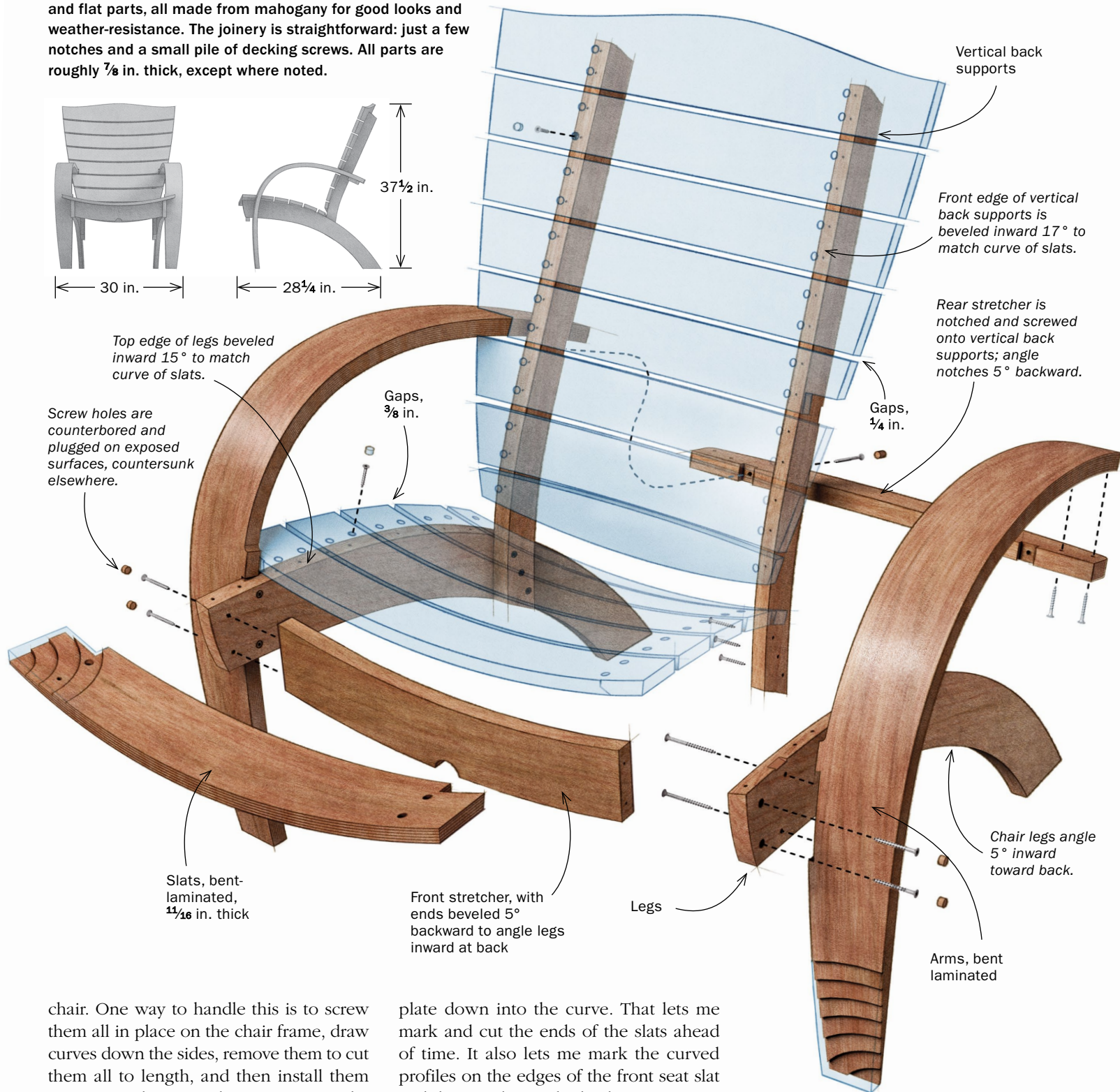


Arms need notches. The legs rest in a long, shallow notch on the inside edges of the arms. A simple router jig is the best way to make this shallow notch. Mark the notch on the arm and set it on a piece of softwood, at the location of the notch. Trace both edges of the arm (left), and cut along those lines. Throw out the middle section, glue coarse sandpaper to the curved edges, and clamp the arm flush between the pieces. Use a plunge router and straight bit to rout close to your layout lines, cutting into the jig as needed (bottom left). Finish up with chisel work.



Use simple joinery for curved parts

Fortune's garden chair is a combination of bent-laminated curves and flat parts, all made from mahogany for good looks and weather-resistance. The joinery is straightforward: just a few notches and a small pile of decking screws. All parts are roughly $\frac{7}{8}$ in. thick, except where noted.



chair. One way to handle this is to screw them all in place on the chair frame, draw curves down the sides, remove them to cut them all to length, and then install them again. But there is a better way. I make two big templates, one for the entire seat shape and another for the back. Then I lay the respective slats on a benchtop, place appropriately sized spacers between them, align their centerlines, and press the tem-

plate down into the curve. That lets me mark and cut the ends of the slats ahead of time. It also lets me mark the curved profiles on the edges of the front seat slat and the top slat on the back.

Patterns include joinery, too

The rest of the parts are solid wood. Use the curves and grids on the opposite page to make patterns for the curves on the legs,



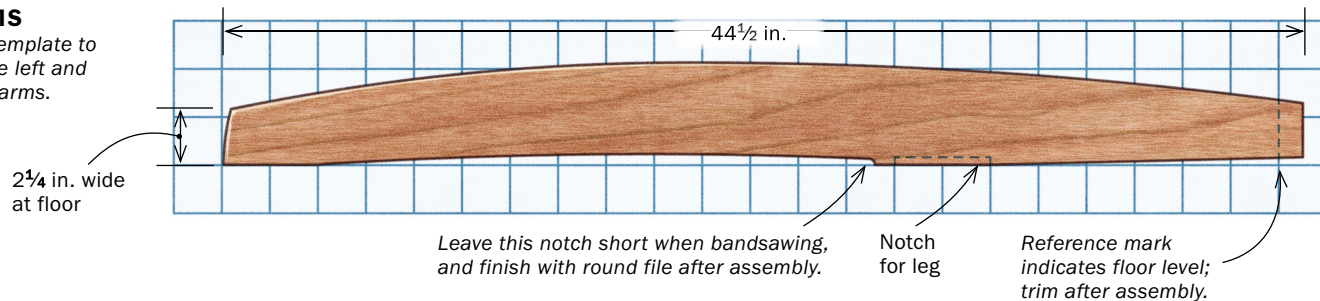
To purchase expanded plans and a complete cutlist for this garden chair and other projects, go to FineWoodworking.com/PlanStore.

SMART TEMPLATES HAVE ALL THE INFO YOU NEED

Transfer the patterns below onto $\frac{1}{8}$ -in.-thick Masonite or MDF, including all of the layout marks on every pattern. Those tell where other parts intersect, where notches need to be cut, and even where the screw holes go.

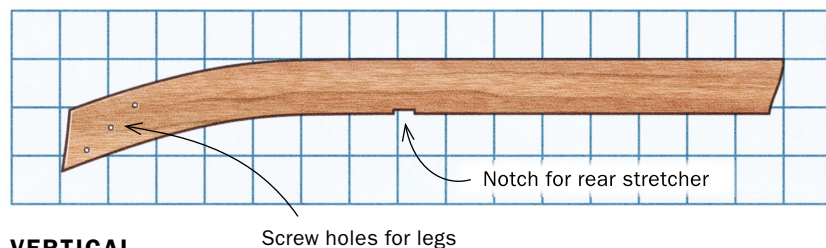
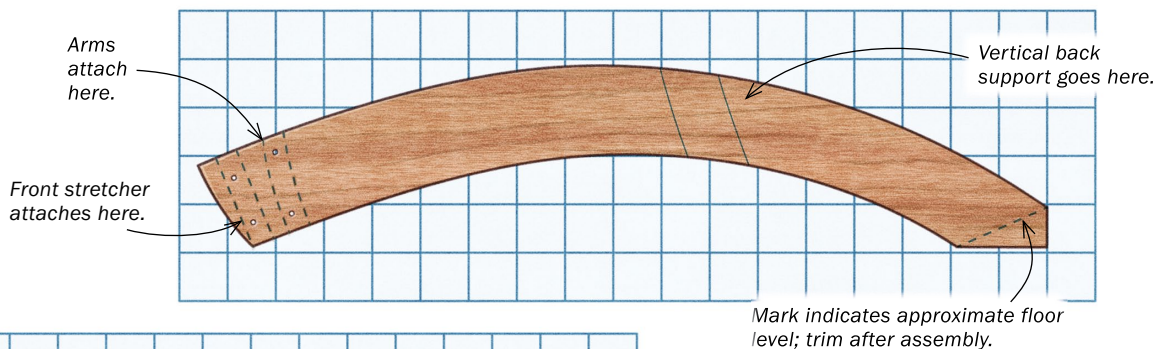
ARMS

Flip template to create left and right arms.



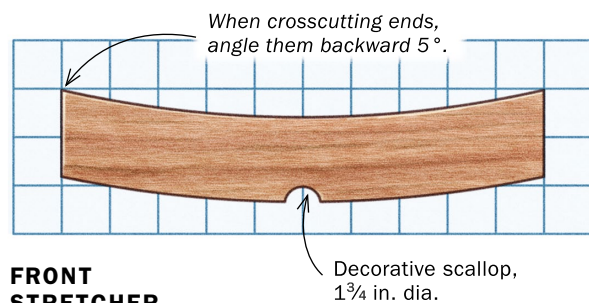
LEGS

Flip template to create left and right legs.

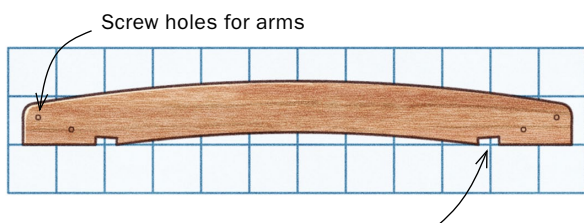


1 square = 2 in.

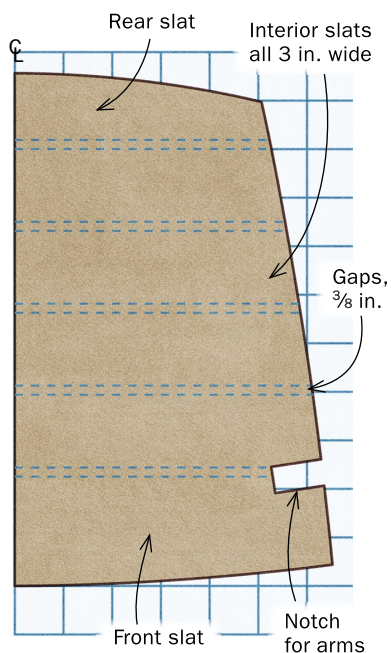
VERTICAL BACK SUPPORT



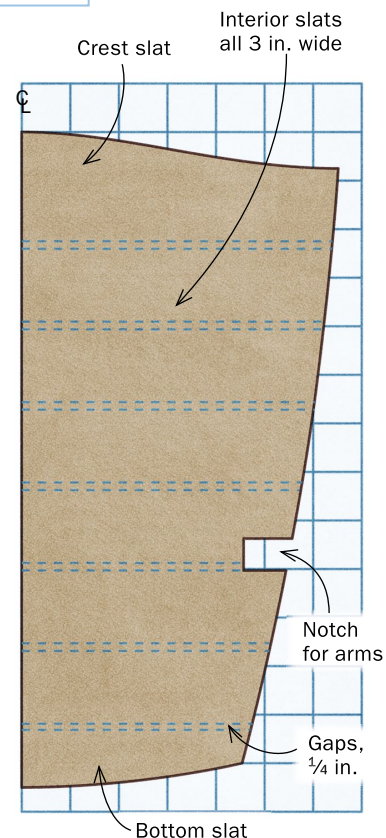
FRONT STRETCHER



REAR STRETCHER



SEAT SLATS



BACK SLATS

Trace and shape parts

Follow the templates. The patterns for each part also contain joinery information, such as the locations of screw holes, mating parts, and notches. Be sure to transfer that information, too.



vertical back supports, and two stretchers. Most of the construction is simply screws and glue, but there are a few key notches in the weight-bearing areas. Those take the pressure off the screws and guarantee the chair a long life, even if your guests are big fans of poutine (Go Canada!).

There is a long notch in the side of the arms to receive the legs, and small mating notches that connect the vertical supports and the rear stretcher. I cut these after sawing the curves. To help you lay out all of the joinery and screw holes, I've marked their locations on the patterns. You can simply transfer everything to the parts when you are tracing the curves. On the leg patterns, I've also marked where the front stretcher and vertical back supports cross over. Transfer those marks to the parts, too.

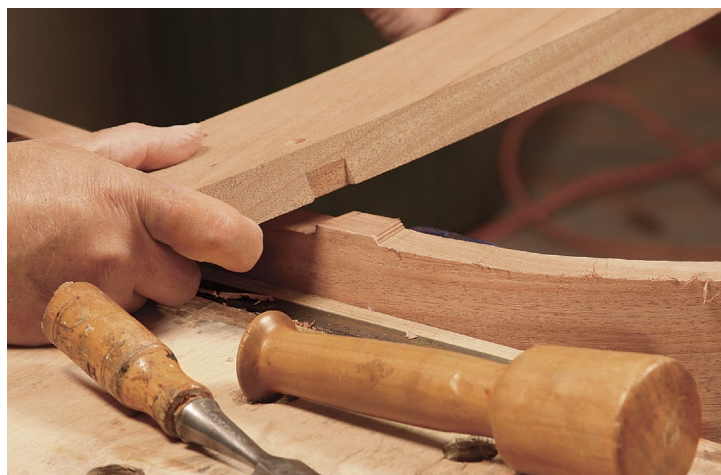
Note that the legs need a 15° bevel on their upper edge to accept the curvature of the seat slats. So when bandsawing those curves, you'll need to tilt the table. Warning: This makes the two legs unique right and left parts. The same goes for the vertical back supports, which need a 17° curve on their forward edge. Make sure those opposite bevels face inward on the chair.

Sand, notch, and drill the parts now

This is a good time to smooth all of those bandsawn edges and sand all of the faces. Then you'll be able to cut and fit the notches accurately.



Bevels on the bandsaw. The legs and the back supports have beveled edges (slightly different angles for each) where they meet the curved seat and back slats. Tilt the bandsaw table when following these lines on your layout, but keep careful track of the left- and right-handed parts.



Fine-tune the leg-to-arm joint. The top edges of the legs are beveled, so you need to cut a small notch there to create a flush joint. Cut that notch before paring the long notch in the arms to final length.



Drill, countersink, and counterbore on the drill press. On the ends of the legs, Fortune uses his pattern to lay out all four holes. He drills all four from the same side, but counterbores only two. Then he flips the part over to countersink the last two holes on the opposite side.

FRONT STRETCHER GETS SPECIAL TREATMENT

The ends of the front stretcher are beveled at 5°, aiming the back of the chair slightly inward. The stretcher's bottom edge gets a scallop detail.

I use a variety of tools to smooth curved edges: spokeshave, block plane, and a number of flat and curved sanding blocks, made of softwood with sandpaper wrapped over them and stapled at the front and back. I don't recommend spindle sanders; they tend to leave a wavy surface on gentle curves, no matter how big a drum you use. I smooth the outside faces with a normal flat sanding block, but I use curved blocks for the inside faces. I also put a nice chamfer on all of the edges.

A handsaw and chisel will handle the small notches at the back of the chair. However, for the long notches on the inside edges of the curved arms, which receive the sides of the legs, I use a simple router jig (see p. 51).

Screws speed assembly

All of the joints, notched or not, are screwed together. Visible screws are plugged to avoid unsightly screw holes and the inevitable stain from the metal hardware. Less-visible screws are simply countersunk flush to the surface. In this chair, I used a variety of #10, square-drive decking screws, which have a coating for outdoor use.

Drill the clearance holes, countersinks, and counterbores now, while the parts are separate and you can do the job cleanly and accurately at the drill press. The counterbores are $\frac{3}{8}$ in. dia., for $\frac{3}{8}$ -in. wood plugs. Make them at least $\frac{1}{4}$ in. deep.

Thanks to the simple joinery, this chair assembly goes quickly. With your clearance holes drilled, it's just a matter of clamping the various parts into position, and reaching through the holes to drill pilot holes for the screws.

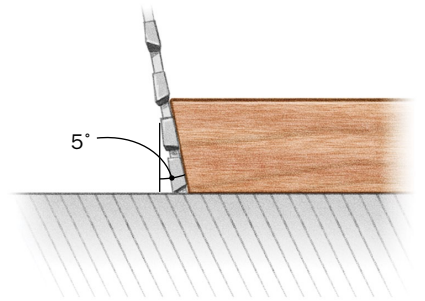
The first step is attaching each of the vertical back supports to its corresponding leg, the one joint in the chair that gets glued along with the screws. Then attach the front stretcher and arms. When the frame is done, you can attach the slats.

Attaching the slats

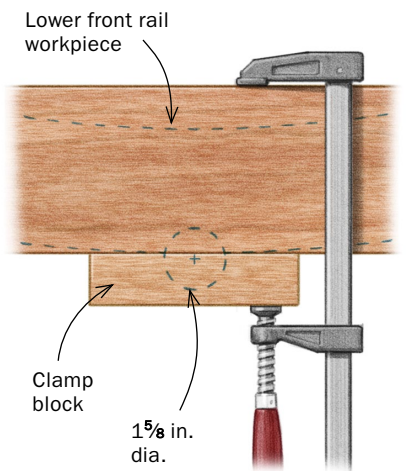
One goal with outdoor furniture is to prevent water or debris from getting trapped and rotting the wood. For this reason, the slats on the seat of this chair have a healthy $\frac{3}{8}$ -in. gap between them, while the back slats are spaced $\frac{1}{4}$ in. apart. Because of the



Bevel the ends. A miter saw cuts clean bevels on the ends of the front stretcher.



Decorative detail. Clamp on a scrap block and use a Forstner bit on the drill press to drill a clean hole through the edge of the workpiece (left). Then saw the curves to reveal the final look (bottom).



Assembly is easy

With all the parts notched, drilled, and marked, assembly goes quickly. Clamp each new part in place, use the existing clearance holes to locate and drill pilot holes, and then screw the parts together.



VIDEO WORKSHOP

Watch Fortune build this chair from start to finish in a members-only Video Workshop series.



Cross the T's. Screw and glue each of the vertical supports to its mating leg. Be aware that there are left and right versions of all four parts. These are the only joints that are glued.



Attach the front stretcher. Screw a temporary spacer into the waste area at the back of the legs, jack up the front of the chair on a board, and clamp the front stretcher in place. Then drill pilot holes and drive screws.

way the chair is viewed, the gaps will seem similar. When you are happy with their spacing from front to back, locate the slats side to side and lay out their screw holes. To do that, place a slat on the chair, with its appropriate spacers, and even out the overhang on each side. Then carry the location of the legs up onto the edge of the slat and onto the face. When laying out the holes in the seat slats, offset them toward the inside of the chair, about $\frac{1}{8}$ in. off the centerline, to adjust for the curve. That way the screws won't make a surprise appearance on the outside of the legs. Drill the legs with their curves down flat on the drill-press table. Then place the spacers again, use your layout lines to line up the slat side to side, drill pilot holes, and drive the screws.

The back slats go on the same way, but it's probably better to start at the middle slat, which notches around the arms. Remember that the gaps between these slats are $\frac{1}{4}$ in. Also, because the vertical back supports are not only beveled but also tilt inward by 5° , you'll need to offset the screw holes a full $\frac{1}{4}$ in. toward the center of the chair.

Plug the holes, trim the legs, and finish

There are just a few details to see to before you can take this chair outdoors. For one, the screw holes need to be plugged.



Rear stretcher and arms. After screwing the rear stretcher into its notches, Fortune clamps the arms in place and fits their inner notches onto the fronts of the legs. He uses a flexible drilling attachment to drill and drive screws from the inside. Last, he attaches the arms at the back.

INSTALL THE SLATS

Fortune cuts the curved profiles along the outside edges of the seat and back slats before he installs them. Use the half-templates on p. 53 to make full templates.

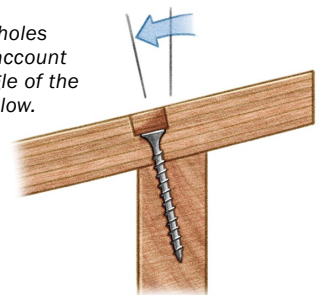


Press and mark. Lay down all the slats for the seat or back, with spacers between them and tape to keep them aligned. Press the template down to mark the ends of each slat, then cut the slats on the bandsaw and sand them smooth.



Locate the screw holes. Using spacers again, start at the back of the seat. Even out the overhang on each slat before transferring the location of the leg onto the top face. Drill the holes and counterbores on the drill press.

Offset the holes inward to account for the angle of the support below.



Drill and drive. Working in the same order and using the same spacers, put the slats back in place on the chair to drill pilot holes and drive screws into the legs below. Then do the back slats.

I cut plugs using a $\frac{3}{8}$ -in.-dia. plug cutter from Lee Valley, which is tapered so the plug tightens as it is tapped home. Also, when you drill the cutter all the way down into the wood, it cuts a nice chamfer on the tip of the plug, which helps you install it later. Cut the plugs from the face of a piece of the same wood the chair is made of, at least $\frac{3}{4}$ in. thick. After cutting a couple of rows of plugs in the board,

cut them loose with a resaw cut on the bandsaw, with the board on edge.

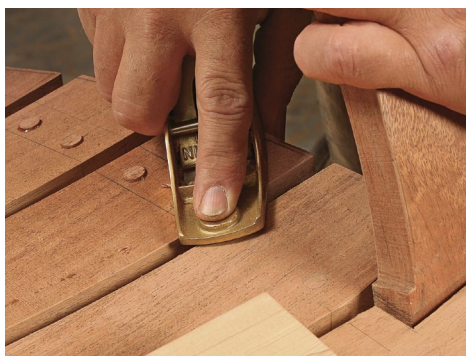
To install the plugs, dip the tips in glue and drive them home. After they dry for a couple of hours, trim them flush.

Level, sand, and finish—With so many curves in play, I left all four feet 1 in. extra-long, so I could level them after assembly (below). Put a heavy chamfer around each foot so it doesn't splinter when dragged.

Sand everything to 150-grit, and finish with an outdoor oil, which won't chip or peel and will let the chair weather to a nice soft gray. Now carry it out to the garden, sit down, and take a well-deserved, comfortable break. □

Contributing Editor Michael Fortune makes furniture in Lakefield, Ont., Canada, and teaches around the world.

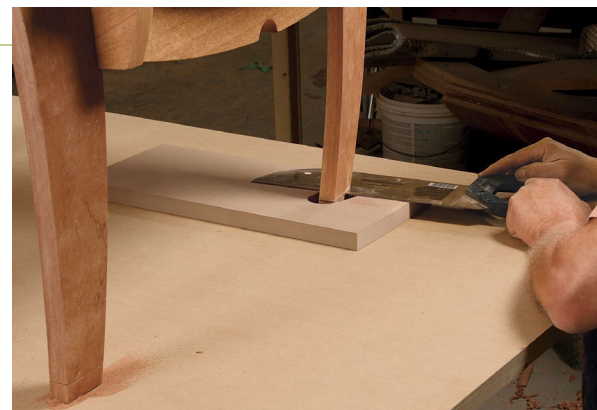
FINISHING TOUCHES



Plugs hide screws and repel water. Cut and install wood plugs, and trim them flush with a block plane and a curved sanding block. If you align their grain, they almost disappear.



One last detail. Use a round file to fine-tune the rough notches you left on the inside edges of the arms, making them end near the seat. Protect the slats with blue tape while you work.



Leg-leveling trick. Hot-glue three feet down onto a flat surface. Use a 1-in.-thick spacer to saw almost all the way through all four legs, before cutting off the waste completely.

Carve a Perfect Ball-and-Claw Foot

A veteran carver reveals his secret to success

BY ALLAN BREED

The iconic ball-and-claw foot has its origins in Chinese furniture and in the myth of a dragon pursuing a flaming pearl—if the dragon catches the pearl, it will bring him eternal life. When Colonial-era furniture makers adopted the ball-and-claw foot, they executed it in many regionally distinct variations. Boston, Philadelphia, Newport, New York, and rural Connecticut all had different ball-and-claw feet. The Newport, R.I., foot I'm carving here, from a John Townsend high chest built around 1765, is the most naturalistic of the lot and is probably my favorite. It has pronounced tendons running up the legs, no webbing between the claws, and long, lifelike talons. The effect is dramatic, almost scary, and the extra time it takes to carve is well worth it.

Some ball-and-claw feet have open talons—there is space between the talons and the ball. This one (shown after scraping and before sanding) is not open-taloned, making it easier to carve and less subject to the



Rough in the claws

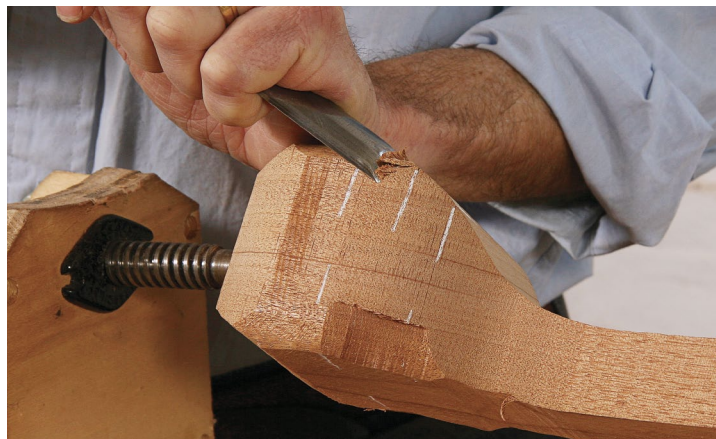


Chamfer and check. Using a #7-20mm gouge, knock off the corners of the foot until the gouge fits over them.



ravages of the vacuum cleaner. Since attempting my first ball-and-claw feet 40 years ago, I've carved hundreds of others, and I've discovered that visualizing two things helps me with the process. First, the ball-and-claw lives in a cube with a claw on each corner. Second, there is a lot more ball than claw when all is said and done. It's also very helpful to have a sample foot for reference as you carve. This could be an actual foot or a resin casting (\$40 at The Breed School, breeds@comcast.net).

I most often use mahogany, but walnut also carves well. If you select a clear piece of stock with no figure, your carving tools will leave a smooth



Create facets from knuckle to knuckle. Working to the knuckle layout lines, rough in the outer profile of the claws and talons with a #7-20mm gouge. Later these ridges will be scooped to a saddle shape from knuckle to knuckle, but for now make them straight.



Incurve at the ankle. The rear claw has an inward curve that begins above its one knuckle. Create the curve with a #7-20mm gouge, making cuts from the bottom and top that meet in the middle. Alternatively, this curve can be shaped with a rasp or a spokeshave.



Draw the claws. After making a horizontal pencil line to mark the top of the ball, Breed defines the outlines of the claws.



Claw carving. Cut in the claws with a #12-8mm V-gouge, working down to within $\frac{1}{8}$ in. of the circle on the bottom of the foot, then back up the ankle. Use the same V-gouge (right) to establish the recess formed between the top of the ball and the crotch of the claws.



Shape the ball



Bring the ball into being. Use a broad, shallow gouge (#5-35mm) to begin creating the spherical shape, from the equator downward.



Arriving at the equator. Carve upward from the equator into the crotch between the claws (left). Then skew the chisel to clean up the V. Carve carefully and use the gauge (right) to see when the ball is the correct diameter.



X marks the high spot. Using the gauge, make a horizontal mark at the equator on each quadrant of the ball (left), then cross it with a vertical line centered by eye between the claws (above). These marks should remain visible through the rest of the carving.



Follow the equator. Carve around the ball at the equator with a #3-30mm gouge. Take light cuts near the claws, and sight from the bottom of the leg to be sure your arcs look continuous from one quadrant to the next.

Refine the sphere. Use the shallow-sweep #5-35mm and #3-20mm gouges to true up the ball, shaving nearly to the footprint circle on the bottom.



Bring the claws to life



Redefine the claws. Use a V-gouge to further clarify the edges of the claws (above) where they meet the ball. Then shape the sides of the claws with a #8-16mm backbent gouge (right), taking them from square and chunky to rounded.



Start at the cuticle. Create the cuticles at the tops of the talons with a #7-20mm gouge, making two cuts to form a shallow V-shape. Make the cuts about $\frac{1}{16}$ in. deep.

Tackle the talons



Taper the talons. With a $1\frac{1}{2}$ -in.-wide paring chisel, chop the talon to a taper. The talon should be $\frac{7}{16}$ in. wide at the cuticle and $\frac{1}{4}$ in. wide at the floor.



Give them some curves. After shaping the outer profile of the talons with a #8-13mm gouge and drawing a line down the center of the curve you've cut, round both sides of the talon from the ball to the centerline with a #7-20mm gouge.

Define the details



Carve the tendons. After using a narrow gouge (#11-7mm) to cut channels up the leg that define the tendons (above), work across the grain with a wide, shallow gouge (#3-16mm) to remove the waste between the channels (left).

finish and the wood will also scrape well. Practice is vital to success. Even now, I'll carve a practice foot or two before carving the final feet for a new piece. If you want to conserve your pricey mahogany, use basswood or pine for the practice round. Don't use poplar, as it's tough and very hard to push a tool through.

Due to the complexity of these feet, the tool kit required is more extensive than for most others. Sharpness is the most important attribute of the tools, however, and any dull tracks or scratches on the wood mean the tool needs resharpening. A light mallet is handy for roughing out, but the final work will be done without it. □

Allan Breed builds 18th-century furniture and teaches at The Breed School in Rollinsford, N.H.



Scrape the sphere. Scrapers ground to various concave shapes are ideal for doing the finish work on the foot.

Smart Jig for Pattern Routing

Rout multiple shapes with just one jig

BY TIM CELESKI



PERFECT PARTS IN THREE STEPS

If you need two or more of a workpiece that has a curve, bend, or decorative shape like a cloud lift, the smartest way to make them is with a pattern and router.



1

Trace. A full-size pattern not only guides the router, but it also guides a pencil as you trace the shape.



2

Cut. Bandsaw right up to the pencil line, leaving just a little waste for the router to remove.



3

Rout. With the pattern and workpiece overhanging $\frac{1}{2}$ in., lock the clamp plate to the base, then clamp in the pattern and workpiece.

Just about every piece of furniture I make involves shaped parts, and I often need to reproduce a shape several times on the same piece. I quickly learned there is no better or more efficient way to make identical parts than to rout them to a pattern. Now nothing gets made in my shop more than once without using a pattern.

I've also taught furniture making, and I've noticed that pattern routing makes many woodworkers nervous. It's understandable. There's an exposed cutter spinning at high speed, working hard to throw the workpiece being routed away from you. The only way to get over that anxiety is to learn how to rout to a pattern safely.

One of the key elements of safe pattern routing is a well-designed jig that holds the workpiece and pattern securely. Of course, patterns

MODULAR DESIGN ADDS VERSATILITY

The clamp plate can be secured anywhere on the base to accommodate any pattern.

Self-adjusting toggle clamp

Star knob

Hardwood fence, $\frac{3}{4}$ in. thick by 1 in. wide

Article Extra

Watch a video of the pattern-routing jig in action.

Riser pad, $\frac{1}{2}$ -in. plywood, 3 in. wide by $3\frac{1}{2}$ in. long

Clamp plate, $\frac{3}{4}$ -in. plywood

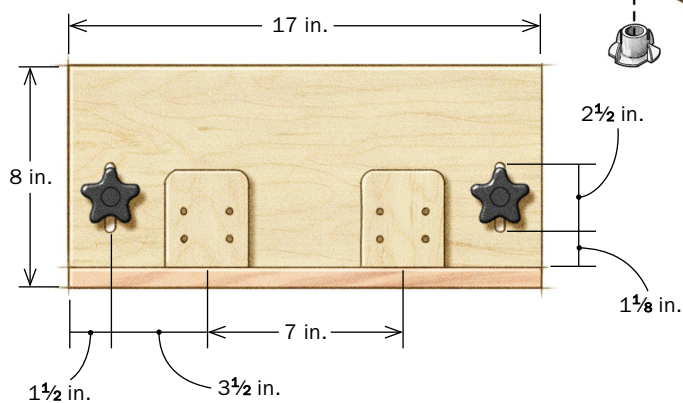
Slot for star knob, $\frac{3}{8}$ in. wide

Base, $\frac{1}{2}$ -in. plywood, 2 in. wider than clamp plate

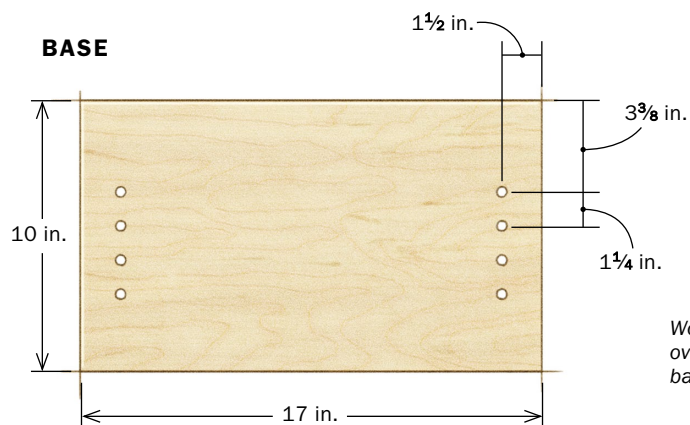
T-nut, $\frac{5}{16}$ -18

T-nut, $\frac{1}{4}$ -20

CLAMP PLATE

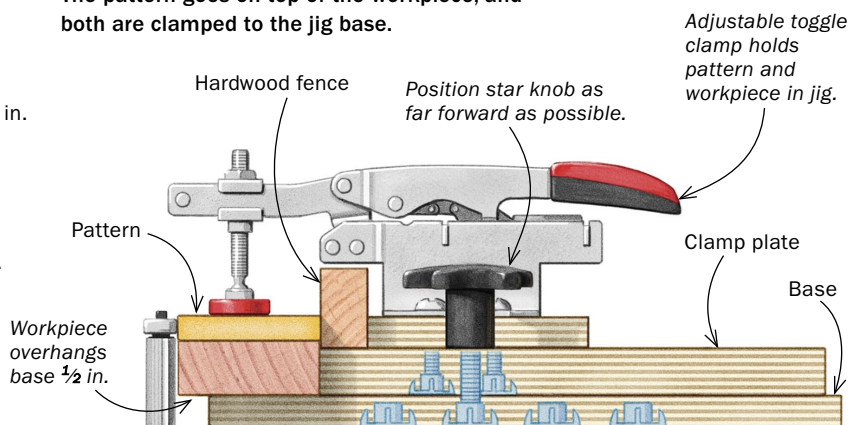


BASE

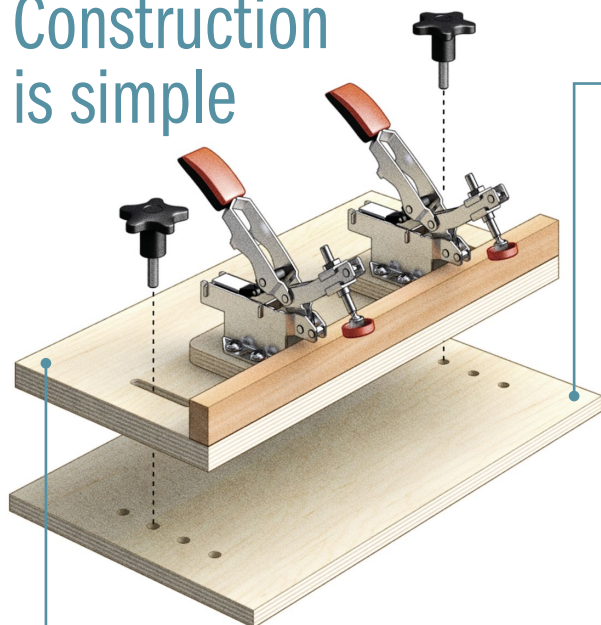


SIDE VIEW

The pattern goes on top of the workpiece, and both are clamped to the jig base.

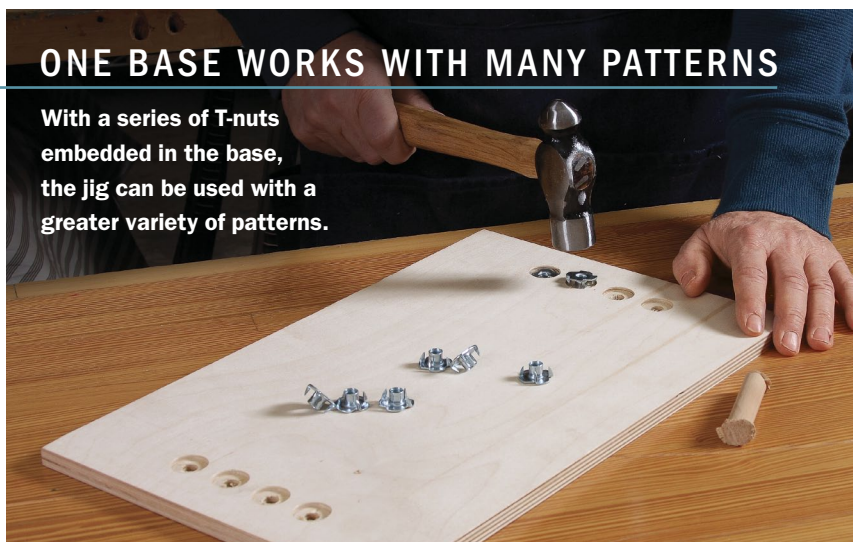


Construction is simple



ONE BASE WORKS WITH MANY PATTERNS

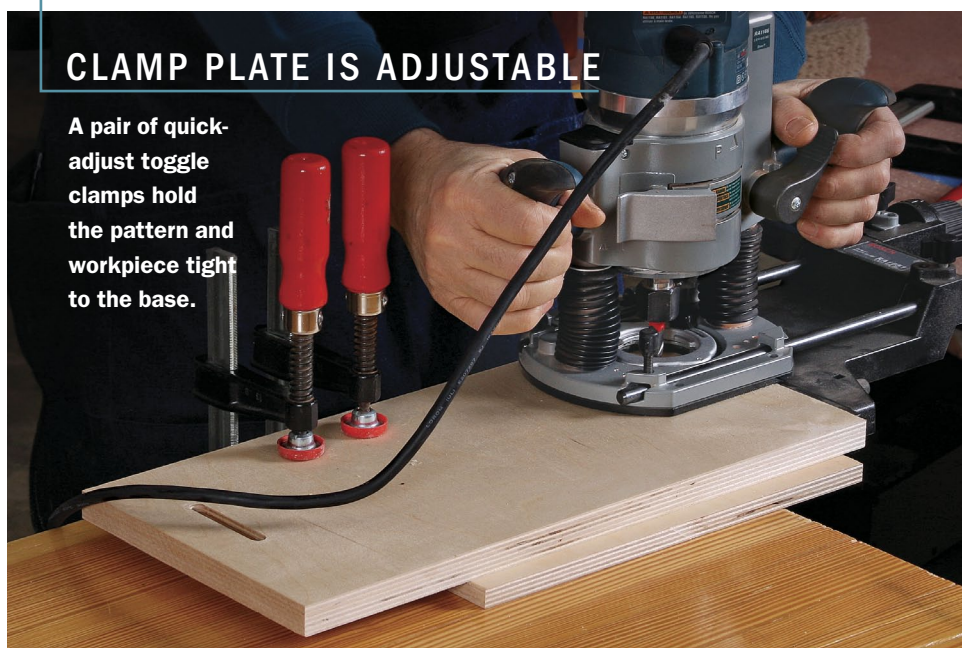
With a series of T-nuts embedded in the base, the jig can be used with a greater variety of patterns.



Knock in the T-nuts. Counterbore the underside to allow the T-nut's flange to sit just below the surface. Then drill all the way through for the T-nut's shaft. Celeski uses a dowel (foreground) to knock the T-nuts below the surface of the base.

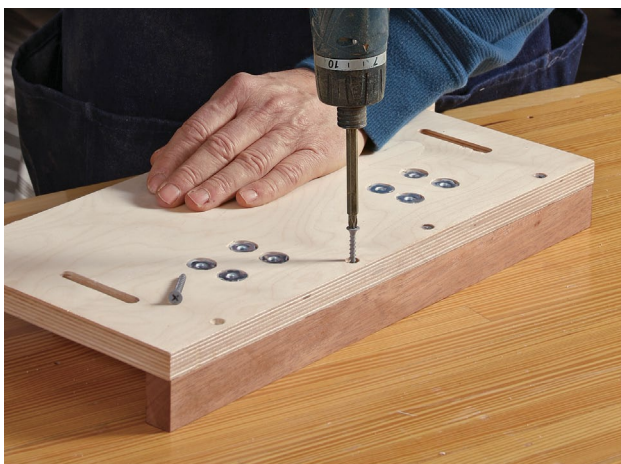
CLAMP PLATE IS ADJUSTABLE

A pair of quick-adjust toggle clamps hold the pattern and workpiece tight to the base.



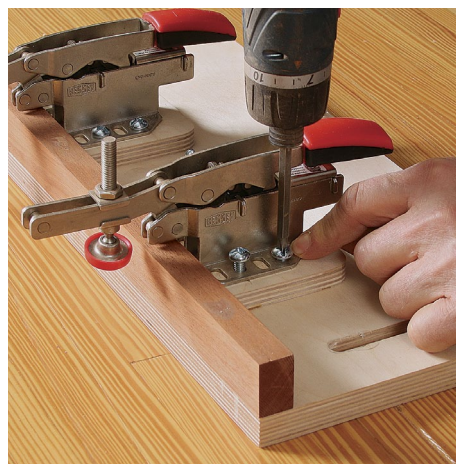
Slots allow for movement. Make them $\frac{1}{16}$ in. wider than the diameter of the knob's threaded shank so that you can angle the clamp plate differently to use the jig for a wider range of patterns.

Screw on the fence. The workpiece and pattern register against it, which helps to keep them aligned. The T-nuts are for bolting on the toggle clamps (right).



Add riser pads for the clamps. With the fence resting in place, glue and nail the pads to the clamp plate.

Bolt on the clamps. The upward force of the clamps could be too great for screws.



and workpieces come in a variety of shapes and sizes. You could make a jig tailored to the shape and size of each of your patterns, but that's a waste of time and materials. Instead, I designed and made a jig that can be adapted and used to shape a number of different patterns. It's safe to use and easy to make.

The jig has two parts: a base and a clamp plate, which is outfitted with two self-adjusting toggle clamps that hold the workpiece and pattern to the base. This plate can be adjusted on the base to accommodate narrow or wide workpieces, and angled for tapered workpieces—threaded star knobs lock it to the base. I've also spaced the jig's key elements (the clamps and star knobs) so that you can easily use more than one clamp plate on a base (I've found that 3½ in. apart is ideal).

The secret to the jig's versatility is its modular design. The jig can be altered quickly to better match the pattern at hand. For example, to rout a curved chair leg, you can make a base with the correct shape and use two clamp plates, one on each side of the bend. You can also make variations on the clamp plate (very narrow with one clamp, longer with three clamps, etc.) to increase the possibilities even more.

As for safety, the jig has good heft when holding a pattern and workpiece for routing, so the bit is less likely to pull it away from your hands. The star knobs make great handles, giving you good control, and they are positioned to keep your hands well away from the spinning bit.

This jig works so well that I use some version of it for 95% of my pattern routing. I'll show you the most basic version, for workpieces that are mostly straight. I'll also show you how you can expand the jig with additional clamping tops to rout long parts and odd shapes, like a curved chair leg. □

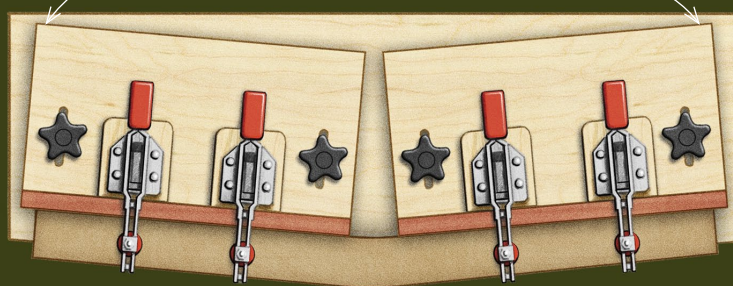
Tim Celeski lives near Seattle, where he makes furniture and runs the website workbenchdesign.net.

Jig is easy to adapt

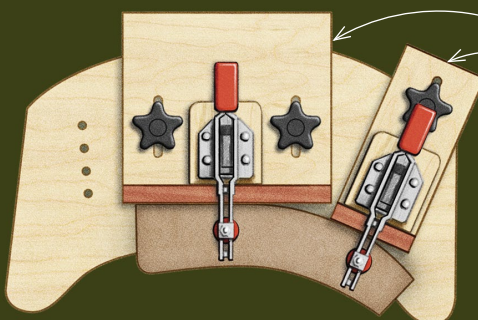
As versatile as the basic jig is, it does have limitations. The good news is you can adapt the design easily to handle any size or shape workpiece, such as long parts, bent parts, and convex and concave curves.



Multiple clamp plates work in tandem for legs and other long parts.



Add a second clamp plate for long workpieces. If the workpiece has a bend in it, like this chair leg, put a matching bend in the base.



Break up the clamp plate for curved workpieces.

Use different size clamp plates to get around curves. The second edge of this base is convex. The plates can be turned around so that you can rout outside curves.

Robust Kitchen Table

Pure lines meet powerful joinery
in a handsome everyday table

BY MARIO RODRIGUEZ

The Smithsonian Institution calls Julia Child's kitchen "the workspace of a master craftsman," and I have to agree. I'm a huge fan of Julia Child. She was friendly, curious, enthusiastic, down-to-earth, and crazy about food. Her simple, encouraging approach to cooking changed the way America prepared its meals. When I visited her famous home kitchen—it's now an exhibit at the Smithsonian, intact down to the last saucepan and ladle—I was fascinated by her kitchen table. It's a Scandinavian farm table, one she bought in Norway in 1960, and she and her husband Paul ate most of their meals at it. Like Child,

the table is both robust and unpretentious. I decided to make one like it for myself.

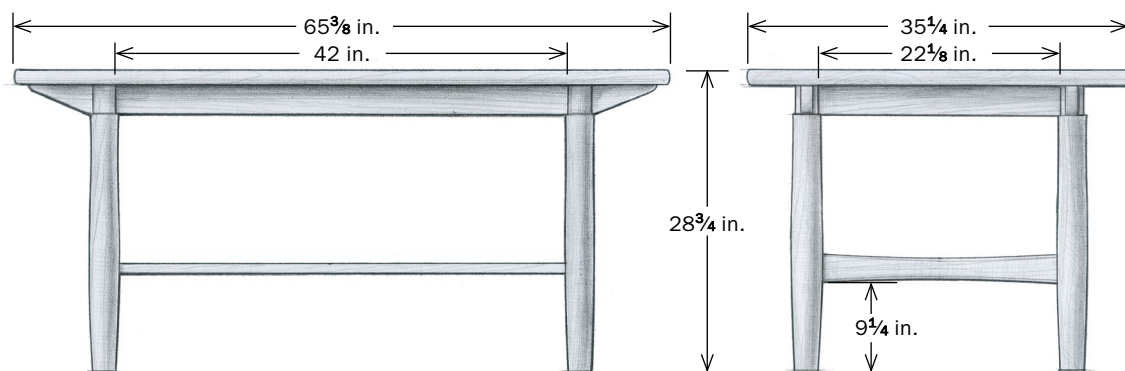
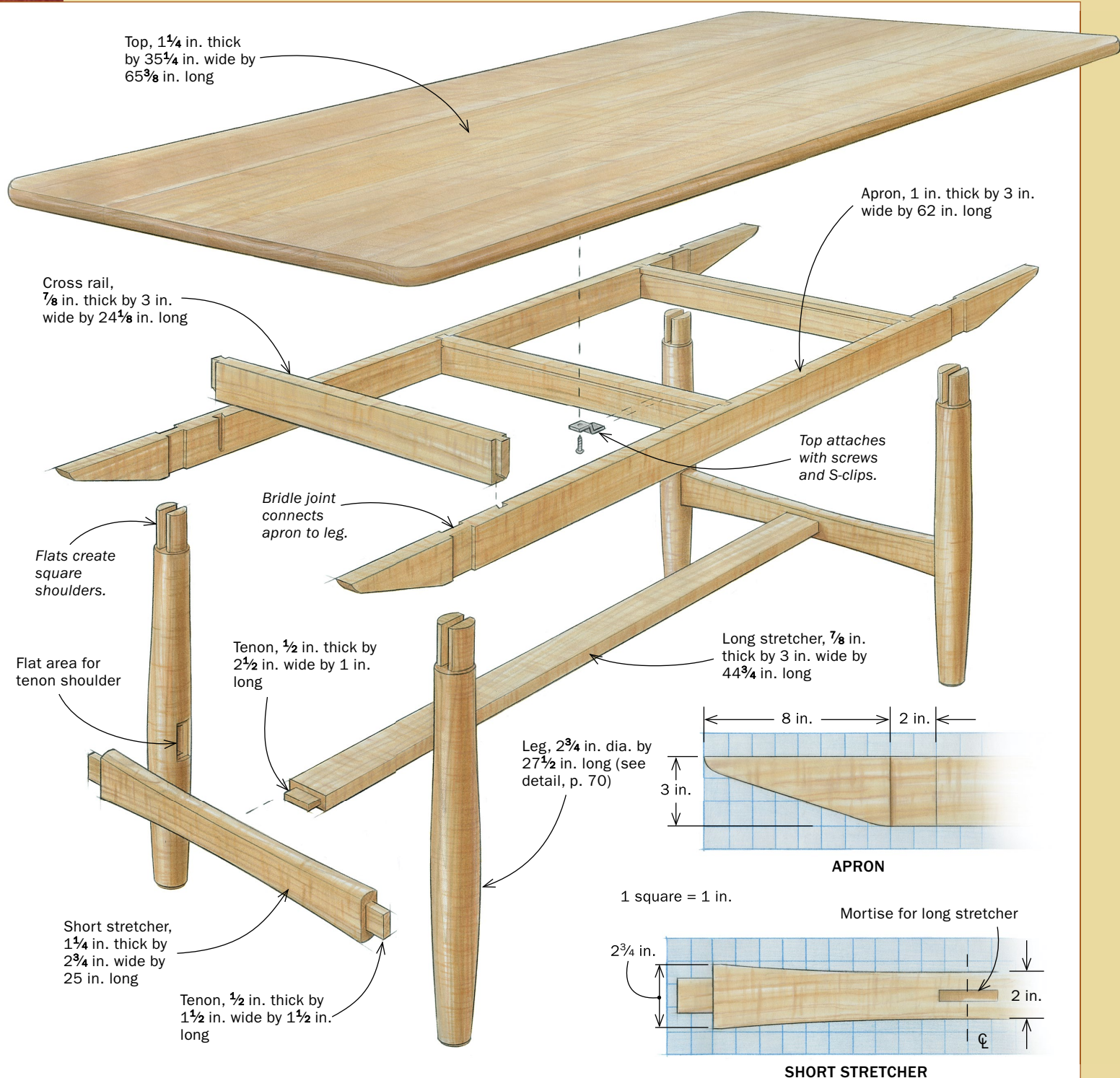
After quite a bit of wheedling, I got over-all dimensions from the Smithsonian, and online I found a photo of the table without a tablecloth, which had obscured some of its structure. Equipped with those and my experience repairing and reproducing many similar Scandinavian tables over the years, I worked out the details of part sizes, structure, and joinery.

The table's construction is unusual—and excellent. Dispensing with typical leg-to-apron joinery, the table has shouldered bridle joints that lock its legs to a pair of

long aprons. This arrangement eliminates racking along the table's length. Three dovetailed cross rails link the aprons, and along with the H-stretcher system, they make the table rock-solid. I built mine of soft maple—hard enough to survive daily use, but with a rosier, more attractive color than hard maple.

Shape the legs on the lathe

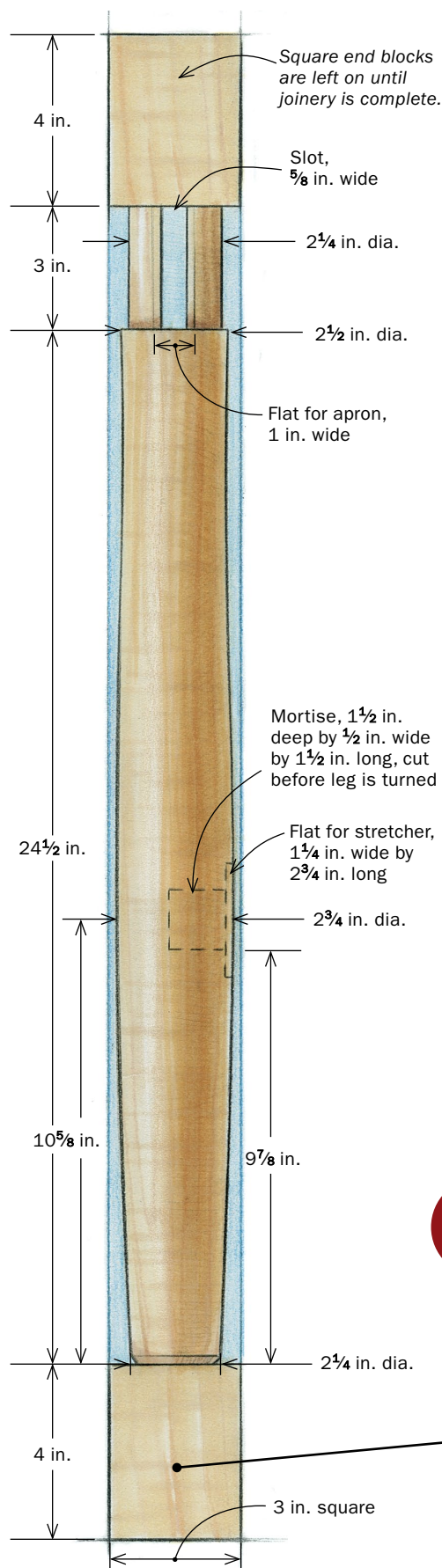
I began the table by preparing the leg stock. Although the finished legs would be 27½ in. long, I cut the 3-in.-square blanks to 35½ in. long. The extra length permitted me to turn the leg while leaving



SCANDINAVIAN KITCHEN TABLE

Instead of traditional mortise-and-tenon joinery, this table uses bridle joints to lock the legs to the aprons. The stretchers below and dovetailed cross rails up top combine for a clean, rock-solid structure.

Legs first



Turn the taper. After turning the leg to a cylinder with a roughing gouge, taper it gently toward both ends. By the way, Rodriguez cut the mortise for the stretcher while the blank was still square.



Prepare for the bridle. Turn a smooth cylinder at the top of the leg, where the slot of the bridle joint will be. Make multiple depth cuts with a parting tool (left), clear the waste with a narrow gouge, and finish the surface with a file (right).

TIP

TIP FOR SHORT-BED LATHES

If the 35 1/2-in.-long leg blank won't fit between centers on your lathe, you can still get the benefit of square end blocks, which greatly simplify cutting the joinery on a round, tapered leg. Before turning, cut the leg blank to the finished leg length and carefully fit a block to each end. Drive one screw dead center and another one offset. Remove the blocks and mark them. After turning the leg, screw the blocks back onto the leg to do the joinery.



JIG CREATES FLATS FOR THE JOINERY

Square end blocks make it easy to keep the round leg immobile and properly oriented while routing the flats at the stretcher mortise and the bridle joint.



a section square at each end. Those square end blocks made it simple to orient the leg while I cut the joinery, after which I sawed them off. To mark out the turned part of the blank, I made four $\frac{1}{8}$ -in.-deep crosscuts on the tablesaw, making a collar at each end of the leg. Before turning the legs, I cut mortises in them for the stretchers. I used a hollow-chisel mortiser, although a router or horizontal mortiser would work as well. It might seem that you would catch your turning gouge in the mortise, but it's not an issue.

Turn, turn, turn—Once I had a blank between centers, I turned the leg to a cylinder with a roughing gouge. Then I used a parting tool to establish critical diameters. I turned the leg to its long double taper with a shallow gouge, and smoothed it out with a light cut from a block plane.

To create the cylinder at the top of the leg where the bridle joint would be, I made multiple cuts to finished depth with the parting tool, checking the diameter with a pair of calipers. Then I cleaned out the waste between cuts with a narrow gouge and used a file for final smoothing.

Quick flats—With the turning complete, I used a shop-built cradle to hold the leg blanks as I routed two sets of flats: one

LEG CRADLE

Templates made by edge-gluing four pieces of $\frac{1}{2}$ -in. plywood

Slot in template for stretcher mortise, $1\frac{3}{4}$ in. wide by $2\frac{3}{4}$ in. long

Slot in template for bridle flats, $1\frac{3}{4}$ in. wide by $3\frac{1}{2}$ in. long

Base, $\frac{3}{4}$ -in. plywood, 3 in. wide

Sides, $\frac{3}{4}$ -in. plywood, $4\frac{1}{4}$ in. tall

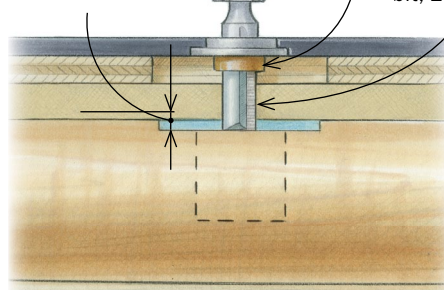
Square end blocks stabilize leg in jig.

Set bit depth to $\frac{5}{16}$ in. below end block height.

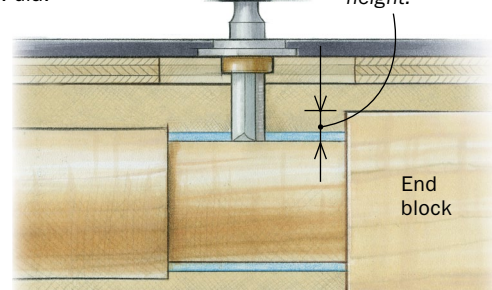
Guide bushing, 1 in. dia.

Straight router bit, $1\frac{1}{2}$ in. dia.

Set bit depth to $\frac{1}{2}$ in. below end block height.



STRETCHER MORTISE FLAT



BRIDLE JOINT FLATS

Apron joinery

SLOT THE LEG

Help for the slot cuts.

The end blocks ride on an extension fence as you cut the bridle-joint slot. Bandsaw right through the top end block to cut the first cheek. Rotate the blank to cut the second cheek, then make stopped cuts to remove the waste between the cheeks.



to mate with the shoulders of the short stretcher tenons, the other to mate with the shoulders of the apron bridle dados. I used a guide bushing on the router and made templates for the jig that control the travel of the bushing.

Cut bridles on the bandsaw

Next, I cut the slots for the bridle joints on the bandsaw. I made an L-shaped extension fence long enough to support the square blocks at both ends of the leg blank during the cut. I set the fence to cut the outer cheek, so any drift away from the fence would be into waste. After making the first cut, I rotated the blank to cut the second cheek. To remove the waste between those two kerfs, I made multiple cuts freehand, stopping them at the bottom of the slot. I checked the width of the slot with a scrap milled to $\frac{5}{8}$ in. thick, then I bandsawed the end blocks off the leg blank and cleaned up the slot with a chisel.

Other half of the bridle is a dado

The “tenon” in this bridle joint is created by dadoing both sides of the apron. I used the tablesaw fence to control the location of the cut. To establish one shoulder of the



Off with their blocks. Once the bridle slot is cut, saw off both end blocks. Rest the leg in a V-block as you make the crosscuts.

dado, I ran the end of the apron against the fence as I made the crosscut using the miter gauge. For the other shoulder, I put a spacer against the fence and ran the end of the apron against that. To dial in the exact height of the dado set, use a test piece the same thickness as the apron and cut dados in both faces at one end, creeping up on a good fit in the leg slot.

Next I made the diagonal cuts at the ends of the aprons on the bandsaw. I smoothed

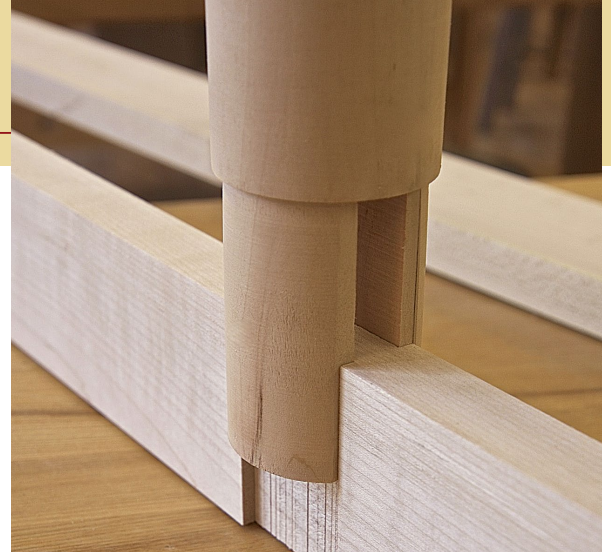


Bridle chamber. Clean up the bottom of the slot with a narrow chisel.

them with a handplane and used a spokeshave to round the ends.

Cross rails connect with dovetails

For maximum strength, I used sliding dovetails to connect the cross rails to the aprons. The sockets in the aprons are stopped. I routed them using a guide bushing and a plywood template, making one pass with a straight bit, then a second pass with an 8° dovetail bit. I used the same



DADO THE APRON FOR THE LEGS

Two dados make a tenon. Using the miter gauge on the tablesaw, cut dados on both faces of the apron so it mates with the slot in the leg (above). Rodríguez uses the fence as a stop while cutting one shoulder of the dado, and puts a spacer against the fence to cut the other shoulder. He removes the waste with subsequent passes.

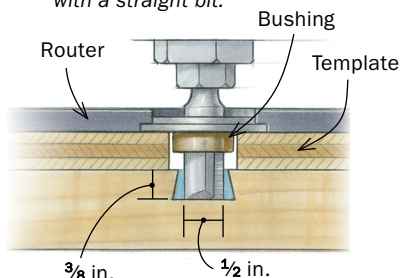


DOVETAILS FOR THE CROSS RAILS

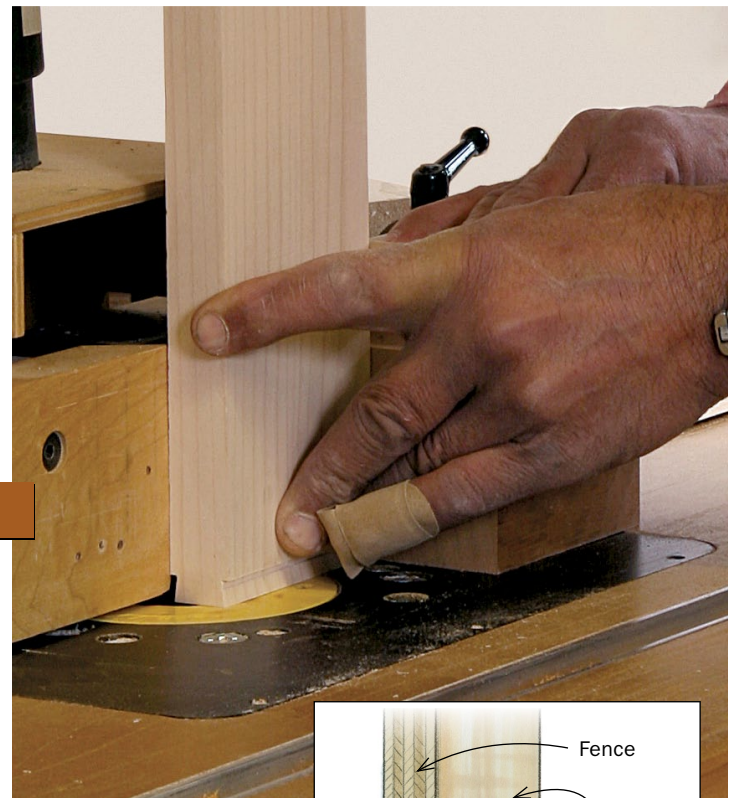
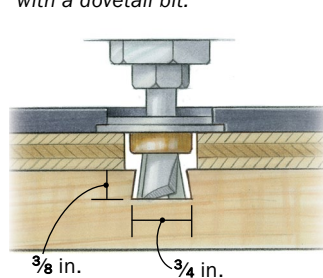
Socket session. A plywood template guides the router as you cut the stopped dovetail sockets in the aprons. Cut in two passes—first with a straight bit and then with a dovetail bit—for a clean, accurate socket. Two routers will speed this job.

EASY DOVETAIL SOCKETS

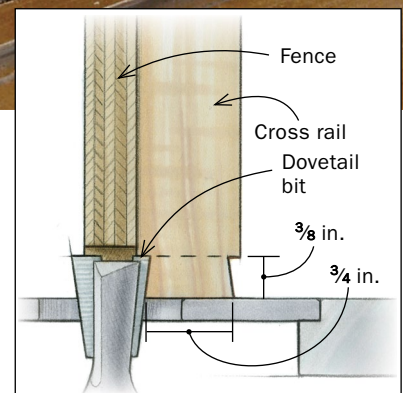
1. Make first pass with a straight bit.



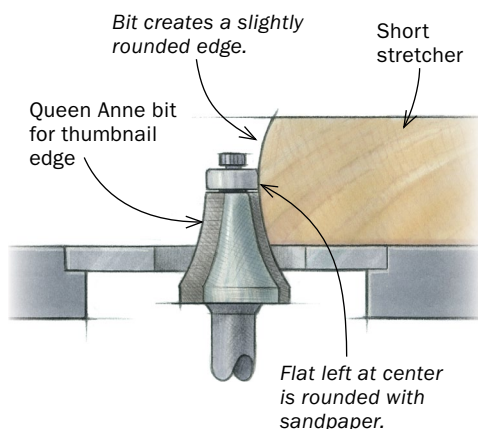
2. Make second pass with a dovetail bit.



The key to the joint. Using the same 8° dovetail bit that cut the sockets, Rodríguez cuts the dovetail keys on the ends of the cross rails. Afterward, because it will be a stopped sliding dovetail, he shoulders one end of the key, using a handsaw and chisel.



Fit the stretchers



Tapered and rounded. After cutting the tenons and mortises while the stretcher is still square, bandsaw and smooth the short stretchers to their bowtie taper. Then rout the edge profile.



Coaxing the curve. Two passes with the bearing-guided Queen Anne bit leave a flat strip at the center of the edge. A quick hit with sandpaper on a flexible block will fair the arc.

dovetail bit in the router table to cut the dovetail key on the ends of the cross rails. Afterward, I used a handsaw and chisel to trim the key back at the bottom edge so the rail would slide fully home in the stopped socket. Before putting the cross rails aside, I plowed a groove along one face $\frac{1}{2}$ in. from the top edge. The metal S-clips I used to attach the tabletop fit into this groove.

Stretcher recipe

The short stretchers are narrow at the center and widen at the ends. It's a nice touch, lightening the bulk of the part while maintaining joint strength. To simplify things, I cut the joinery on these pieces while the stock was still square. Then I cut the taper on the bandsaw, faired the curves with hand tools, and routed the thumbnail profile on the tapered edges with a Queen Anne bit (Infinity No. 10-500).

This table is built mostly by machine, but fitting the short stretchers' tenons to the legs requires careful handwork. The key is seating the tenon shoulders, which have curved edges. Push the tenon into the mortise until it stops against the leg and mark the curves in pencil. Then use a gouge with a matching sweep to cope the ends of the shoulder recess. With these joints fitted, dry-assemble the legs, aprons and short stretchers, then measure for the long stretcher to get the length just right.

To the top

To make the glue-up of the table's large, four-board top easier, I glued the boards in pairs, then glued the two pairs together. I used biscuits in the edges for registration.



Coping for a sweet fit. To get the joint seated properly, transfer the stretcher's curved edge profile to the leg.



Match the arc to a gouge. Use a gouge with a shallow sweep to chop to the pencil line (above). Then clean up the floor of the recess with a chisel. If there's a ledge along the sides of the flat area, trim it away with a chisel or scraper so the stretcher will be enclosed only at its curved ends.



Put it all together



Assembling the undercarriage. With the H-stretcher already glued up and set aside to cure, Rodríguez assembles the bridle joints.



Connect the sides. Once the bridle joints are cured, glue the H-stretcher to the legs (above). Then complete the base by knocking in the dovetailed cross rails (left).

To round the corners of the top, I made a plywood template about a foot square and rounded one corner of it. I traced the curve onto the four corners of the table and removed much of the waste with a handsaw. Then I clamped the template to each corner in turn, and followed it using a router with a bearing-guided, flush-trimming bit.

I used the same Queen Anne bit in a handheld router to give the top the same thumbnail edge detail as the stretchers. I routed around the perimeter from one face, flipped the top, and then routed from the other. The two passes left a small flat strip at the center, which I easily smoothed into a pleasing curve with sandpaper.

Get ready for dinner

Wanting a finish as sturdy as the table, I chose a wipe-on urethane varnish (by General Finishes) that is both durable and repairable. Before applying the finish, I sanded the entire table up to 220-grit. I applied four or five coats of the varnish, allowing each one to dry at least 24 hours before rubbing it out. Finally, I applied paste wax and buffed it with a clean cloth. Then it was just a matter of reaching for a platter and a corkscrew. Bon appetit! □

Mario Rodríguez, a 23-year contributor to the magazine, is constantly cooking up new projects at the Philadelphia Furniture Workshop (philadelphiafurnitureworkshop.com).



Clip it good. Metal clips hooked into the groove in the cross rails fasten the base to the tabletop.

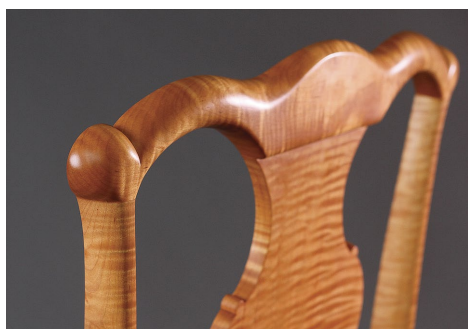
readers gallery

REID ERIC ANDERSON

Seattle, Wash.

Anderson made this Chippendale chair (22 in. deep by 20 in. wide by 32 in. tall) from a single piece of curly maple and completed it while attending North Bennet Street School in Boston. He did most of the shaping, including the curved back splat, with a spokeshave and handplane. After applying a mixture of oil and mineral spirits, he left the chair in the sun to enhance the figure before giving it a hand-applied varnish finish.

PHOTO: BEN HUTCHINSON



BERT RAY

Wimberley, Texas

This wall cabinet (16 in. deep by 54 in. wide by 26 in. tall) was built for a Dallas-based design company. Ray created the asymmetric, textured marquetry pattern on the doors by playing with the different veneers and their grain direction. The cabinet's frame is walnut and the doors are ebony, ash, satinwood, lacewood, walnut, tarara, kingwood, and pecan veneers over birch plywood. It's finished with five coats of Minwax Tung Oil.



2013 PORT TOWNSEND WOODWORKERS SHOW

The Splinter Group, a collective of wood artisans from the North Puget Sound region of Washington, holds the Port Townsend Woodworkers Show each fall. The 2013 show featured 22 artists who displayed musical instruments, modern cabinetry, custom furniture, and wood carvings for more than 1,400 visitors.



SETH ROLLAND

Port Townsend, Wash.

Rolland often designs furniture using a combination of sustainably harvested wood and natural stones sourced from the Pacific Northwest. His dining room hutch (20 in. deep by 44 in. wide by 85 in. tall) is no different. Inspired by the forests of the Pacific Northwest, the hutch is made of walnut and black slate with curved glass doors and shelves. It also features two hidden strips of dimmable LED lights and a recessed handle in the lower doors.



TOM AND JENNIFER DOLESE

Bellingham, Wash.

This queen-size sapele bed (60 in. wide by 80 in. long by 44 in. tall) was designed around a stained glass lamp shade picturing Lohanton cutthroat trout that Jennifer had made for a client. Following this motif, Tom used maple, birch, dyed poplar, ebony, and rosewood for the marquetry fish on the headboard. The finish is Sam Maloof-brand Poly/Oil Finish. PHOTO: MATTHEW BERGSMA



BRYAN WENTZEL

Port Townsend, Wash.

The claro walnut top on Wentzel's bench (11 in. wide by 84 in. long by 18 in. tall) captures the dual live edges in the center, allowing you to see the tree's natural shape within the rectangular form. The top is attached to the base with sliding dovetails and the madrone trestles are built with drawbored tenons and wedged through-tenons. The bench was finished with a 50/50 mix of varnish and tung oil followed by a buffed topcoat of Skidmore's beeswax cream. PHOTO: MYRON GAUGER

MIKE ROBERTS

San Antonio, Texas

This frame-and-panel cabinet (20 in. deep by 41 in. wide by 36 in. tall) won Roberts an award sponsored by the Society of American Period Furniture Makers at the 14th annual Texas Furniture Makers' Show. The case is cherry and soft maple with mora knobs and Brusso knife hinges and ball catches. The outside of the piece was finished with General Finishes Arm-R-Seal and the inside with shellac.



ALICIA DIETZ

Richmond, Va.

Dietz designed these ash and tempered-glass tables (29 in. deep by 59 in. wide by 18 in. tall) for a small apartment, where they can be used together as a coffee table or separated into two end tables when space is needed. Each small table is made of 10 to 12 bent laminations that are spaced to intertwine with the opposing table, allowing for numerous configurations. The wood was dyed black and then treated with liming wax to fill and accent the grain. The final finish was gloss polyurethane. PHOTO: AMANDA LASS



MICHAEL FERLAND

Ipswich, Suffolk, England

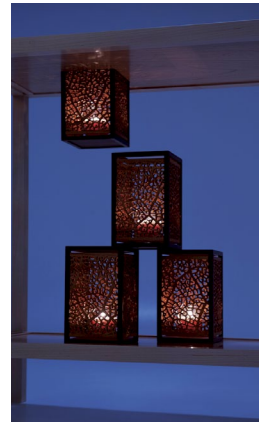
The live-edged yew lumber that would become this table (32 in. wide by 80 in. long by 32 in. tall) and matching benches (10¼ in. wide by 63 in. long by 17¾ in. tall) sat on Ferland's lumber rack for 10 years, waiting for the perfect project. The table's trestle ends are sister pieces from a resawn stump that were perfectly shaped for that use. To finish the pieces, Ferland applied seven coats of Liberon furniture oil.



JASON KLAGER

Prince George, B.C., Canada

Klager was inspired to build this entry table (14 in. deep by 38 in. wide by 29 in. tall) after watching floating luminarias during a lantern festival. He used maple for the table's main components and afromosia and canarywood for the lantern boxes. The pierced patterns on the lanterns are transferred from an image of the vascular system of a leaf and become visible when the lanterns are lit. The finish is equal parts Waterlox, tung oil, and mineral spirits. PHOTO: JAYSON HENCHEROFF



IAN CAMPBELL

Carp, Ont., Canada

- Campbell designed this folding chaise lounge (19 in. wide by 67 in. long by 32 in. tall) as a counterpoint to the classic Adirondack chair. It is constructed of ¼-in. bent laminations of western red cedar held together with polyurethane glue. The legs can be folded by removing the stretcher. The finish is Minwax Tung oil.





Dry small parts in your oven

Q: I want to make a box out of wood from a tree that fell recently. I had it milled into boards, but the sawyer told me that it would take several years to air-dry the wood outside. Is there a way I can dry it myself, without waiting forever for it to cure outside?

—ARCHIE MATTESON, Bakersfield, Calif.

A: IF THE BOARDS ARE SMALL ENOUGH, you can dry them in your household oven. You'll also need a kitchen scale and a pen and paper.

Label each piece of wood and record its weight on a chart, then place the pieces on the racks in your oven. Set the heat at 250° for about 30 minutes and turn the oven off, leaving the wood inside with the door closed. The next day, take each piece out, weigh it, and write down the weight. Then put the pieces back in the oven and repeat the steps from before.

As the wood loses moisture, it will lose weight. The process could take four or five days for a board that is 1 in. thick. Once the wood stops losing weight, it is dried, but before you use it, you still need to let it acclimate in your shop for a few days.

It's normal for the wood to warp and check a little in the process, so make sure you start with blanks that are thicker, wider, and longer than your final dimensions.

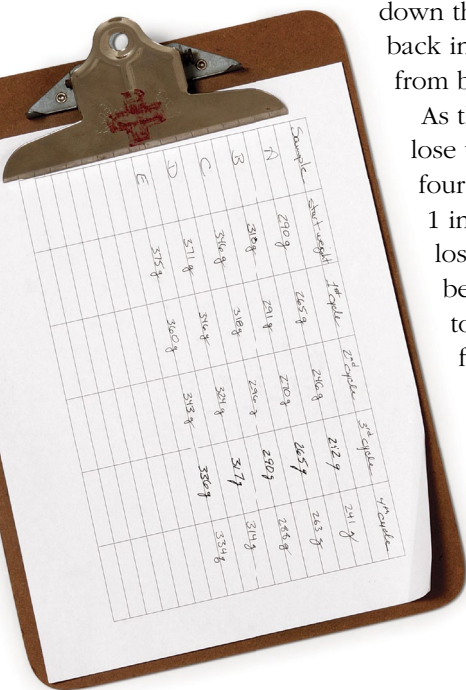
—Annie Raso is an artist and woodworking instructor who lives in Brooklyn, N.Y.



Label and weigh. Mark the pieces clearly so you can easily identify each one. Record the weight of each piece before and during the drying cycle.



Into the kiln. Using your home oven at low temperatures creates the right conditions to speed up the drying time of small parts.



Ask a question

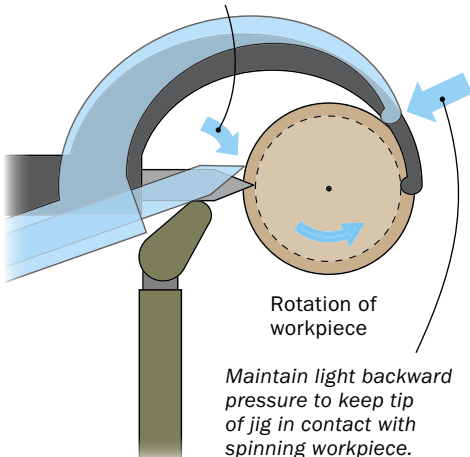
Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

Size turnings with a gate jig

Q: In the Shaker table article in *FWW* #239, Christian Becksvoort used a “gate jig” to size elements on the pedestal. Is it better than using a parting tool and a pair of calipers?

—CLARK SHELLLOTTE, Augusta, Ga.

Tip of parting tool is lowered into cut.



A: THE GATE JIG, OR “SIZING TOOL,” is made by Robert Sorby and works the same as using calipers and a parting tool. But it is more efficient because it combines the two into one tool, eliminating the need to pick up and put down calipers. It lets you turn and measure at the same time, making it the most efficient tool for tasks that need consistent sizing, like making long cylinders.

To use it, rough out your turning and leave it slightly larger than the diameter that you want. Then attach the jig to a $\frac{3}{8}$ -in.-wide parting tool and set it to the final diameter you’d like, measuring between the tip of the parting tool and the tip of the jig.

Start the cut as you normally would, with the parting tool on the tool rest, and bring the tip of the gate jig down to the workpiece. Then slowly lower the tool into the cut, making sure the tip of the gate jig stays in contact with the wood.

You’ve reached the final size when the parting tool stops cutting and slips below the center point of the blank.

—Christian Becksvoort
is a contributing editor.



Set it, then cut. Slide the jig onto the parting tool, adjust it to the correct diameter (left), and tighten the thumbscrews to lock it in. Bring the gate jig tip into contact first, then gradually lower the parting tool to begin the cut (below).



Prevent springback in bent laminations

Q: I’m building Adrian Ferrazzutti’s coopered table from Readers Gallery in *FWW* #225. For the bent-laminated staves, I’m using three layers of ash, with a walnut outer layer, all $\frac{1}{8}$ in. thick. After bending, I had issues with springback. Any advice? Would using a softer wood for the inner strips help?

—AL DONATO, N.J.

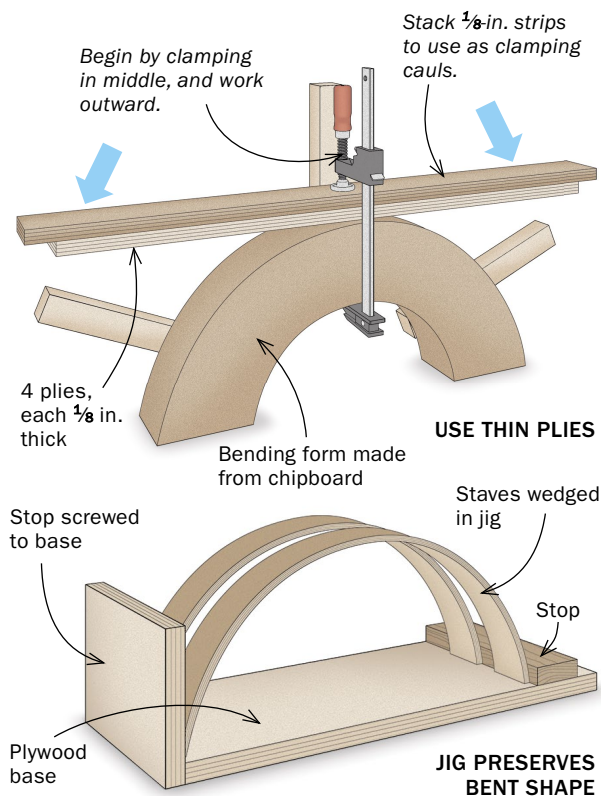


A: FOR THE LAMINATED STAVES in my table base, I used four plies, each $\frac{1}{8}$ in. thick. I used Titebond II and a form made of chipboard as well as a stack of $\frac{1}{8}$ -in. strips as cauls. When you get down to thicknesses of $\frac{1}{8}$ in. and under, the species of wood is not really a factor—everything will bend at that dimension.

When you glue up, use a lot of clamps and leave the laminations clamped up for 12 hours. After you take the parts off the forms, put them into a holding jig that keeps all the parts trapped between two fixed points. This will let the glue continue to cure without opening up or springing back, and free up your forms to make more parts.

If you’re still having issues, try making thinner plies and using more of them.

—Adrian Ferrazzutti is a professional furniture maker in Guelph, Ont., Canada.



Understanding wood movement

LEARN HOW TO PREDICT
DIMENSIONAL CHANGES
IN YOUR FURNITURE PARTS

BY GERALD CURRY



One of the reasons I started working with wood was because it seemed like a seat-of-the-pants activity. Just a few tools, a pile of lumber, and me, limited only by my imagination.

Then I found out about seasonal wood movement, and things got a lot more complicated. My first step was to learn construction methods that accommodate that shrinkage and swelling, so my furniture wouldn't crack and its joints fail. But sound engineering isn't enough. I also needed to know more about the differences among various woods—and the science behind my materials.

Many of the important properties of wood—strength, hardness, texture, and color—can be judged simply by examining and using the material. Stability, on the other hand, is more elusive and extremely variable. Seat-of-the-pants guesswork just won't do.

Most of the shrinking and warping happens during the initial drying process, before we get the wood. Then we mill it flat and straight again. But the movement is far from over. The moisture content of wood will always try to reach equilibrium with the humidity of the surrounding air. As the humidity changes, so do the dimensions of the piece of wood, sometimes to an alarming degree. This constant movement causes the most problems for furniture makers: tops and doors that warp, drawers that jam in the summer, and so on.

Start with the right wood

A successful project starts with choosing the right materials. Wood selection, both in terms of species choice and grain orientation, is very important, even more so in regions like New England, where I live, which sees large swings in humidity. The chart on p. 84 will help you make smart choices.

The next thing you need to know is that almost all shrinking and expansion happens across the grain; changes in the length of a board are negligible and can be ignored. Wood shrinks and expands most in line with its rings, which is called tangential movement, but less at right angles to those rings, called radial movement. That's why flatsawn boards of most species will shrink and swell about twice as much as quartersawn boards of the same wood. Flatsawn is also much more likely to cup.

So it makes sense to use quartersawn, or something approaching it, like riftsawn, for your furniture parts whenever shrinking, swelling, and cupping would be a problem. Drawer and door parts are a good example (see “Engineering a Chest of Drawers,” p. 30).

Why you need to calculate movement

Even if you build your projects to accommodate wood movement and choose the best materials for each part, there will be times when you need to estimate future movement very closely. One of the most critical examples is estimating the gap you need at the top of a drawer. I'll cover that on p. 86.

Armed with a few pieces of critical information, you can estimate how much any given workpiece will expand and contract. You'll need to know the shrinkage rates for the wood, the growth-ring orientation in the board (which tells you the shrinkage rate to use), the current moisture content (MC), and its future minimum and maximum moisture levels, based on the typical humidity levels where your furniture will live. After that, you have some math to do, but I'll make that as simple as possible, with the help of a few handy charts.

Gerald Curry has been making furniture in Union, Maine, for four decades.

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Keys to predicting dimensional changes

If you live in the continental United States and stick to the common furniture woods, you can use the chart of shrinkage rates (below) and the maps on the opposite page to estimate the current moisture

content (MC) of a board in your shop, and also to predict how much that board will shrink and expand. A moisture meter adds some precision to the process.

1. FIND THE SHRINKAGE RATE

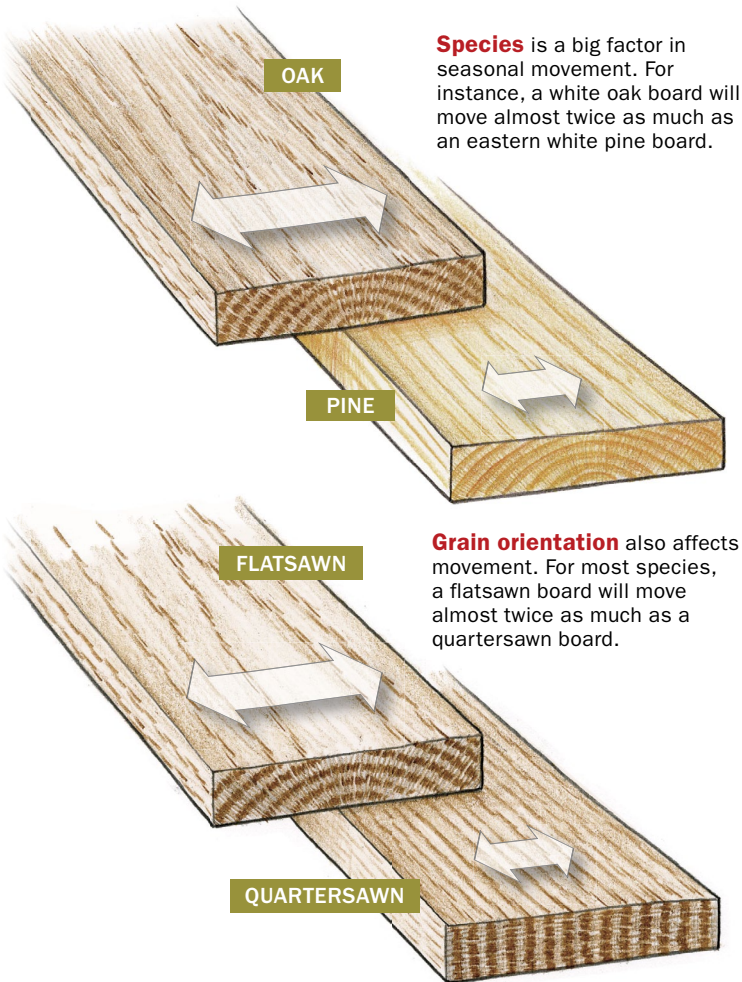
The shrinkage rate describes how much a piece of wood shrinks as it dries from its fiber-saturation point (near 30% MC) to oven-dry, or 0% MC. Wood that shrinks at a certain rate will swell at the same rate. These shrinkage rates allow us to calculate dimensional change as the moisture content changes. I put the rates for the most common North American furniture woods in a chart, below right. If the chart doesn't list the species you're using, you will probably find it on the Forest Products Lab's website (www.fpl.fs.fed.us/research/centers/woodanatomy/index.php), where more than 400 tropical and 100 North American species are listed with extensive information on each.

To know which shrinkage rate to expect, you need to know the grain orientation. That's as simple as looking at the end grain of the board. Flatsawn wood has growth rings that are parallel or nearly parallel to the face of the board, so they experience

tangential movement; quartersawn wood has rings that are perpendicular to the face of the board, so movement occurs radially. The rings are seldom exactly vertical or horizontal, and the angle usually changes across the board, so you often will need to make a judgment call. In some cases, parts of a board will be tangential and other parts radial, and in that case you can calculate the dimensional changes separately and add them together. If the rings are 45° or more to the face, I consider it radial for shrinkage purposes.

Bear in mind that these percentages are the average rates for the species. Very precise predictions are not possible for any single piece of wood. So this is about estimating as accurately as you can, and then staying on the safe side.

BOTH SPECIES AND GRAIN ORIENTATION MATTER



SHRINKAGE RATES FOR COMMON NORTH AMERICAN WOODS		
SPECIES	QUARTERSAWN	FLATSAWN
Alder, red	4.4%	7.3%
Ash, white	4.9%	7.8%
Basswood	6.6%	9.3%
Beech, American	5.5%	11.9%
Birch, yellow	7.3%	9.5%
Butternut	3.4%	6.4%
Cedar, eastern red	3.1%	4.7%
Cherry, black	3.7%	7.1%
Douglas fir	4.8%	7.6%
Elm, American	4.2%	9.5%
Honey locust	4.2%	6.6%
Madrone, Pacific	5.6%	12.4%
Maple, red (soft)	4.0%	8.2%
Maple, sugar (hard)	4.8%	9.9%
Oak, northern red	4.0%	8.6%
Oak, white	5.6%	10.5%
Pecan	4.9%	8.9%
Pine, eastern white	2.1%	6.1%
Pine, western white	4.1%	7.4%
Sassafras	4.0%	6.2%
Sycamore, American	5.0%	8.4%
Walnut, black	5.5%	7.8%
Yellow poplar	4.6%	8.2%

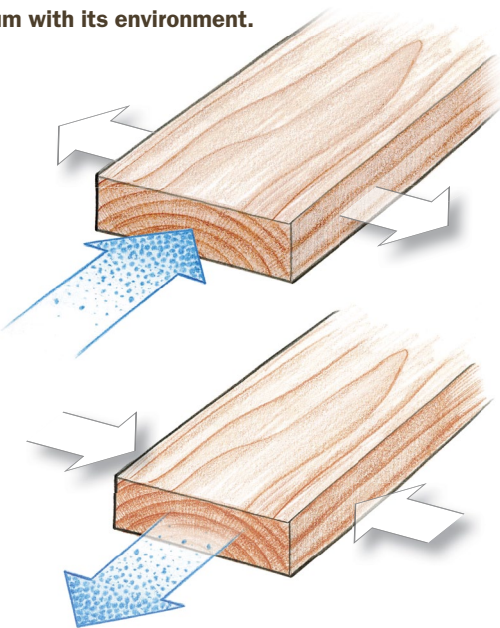
These rates assume perfectly vertical (radial) or horizontal (tangential) growth rings; reality is usually somewhere between. Look for low shrinkage numbers to find stable furniture woods.

2. DETERMINE THE CURRENT MOISTURE CONTENT

Far and away the most accurate and convenient way to obtain the current MC of lumber in your shop is with a moisture meter. I've found the type with pins to be much more accurate than the pinless variety. And at \$200 to \$300, a good meter is a smart investment for the serious woodworker.

Lacking a moisture meter, you can make an educated guess at MC by using the maps at right. This method works best toward the end of summer or winter when the interior of your boards will reach the equilibrium moisture content (EMC) depicted on the maps. Bear in mind that this won't happen unless the wood has been on stickers in your shop with decent air flow for some time, so it is in equilibrium with its environment.

Moisture in, moisture out. Wood is a hygroscopic material, absorbing and releasing moisture throughout the year as humidity levels change. Wood cells expand and shrink in the process, affecting the width and thickness of a board. Finish will slow this exchange, but will never stop it.



YOU NEED A MOISTURE METER

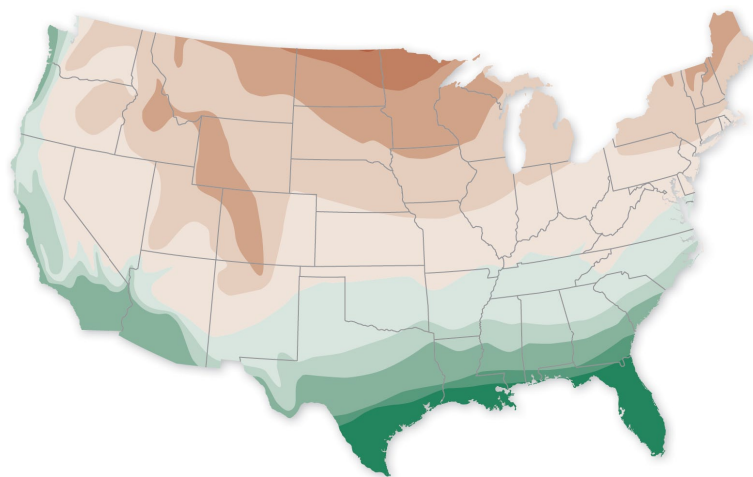
Instead of using charts to make a guess at the EMC in your shop or home for the season you are in, you can press a button on a pin-type moisture meter and get an accurate measurement of the boards you are using.



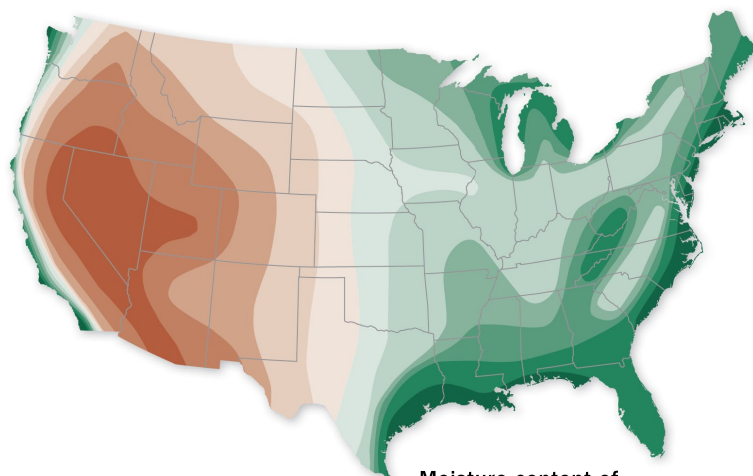
Using the meter. Today's meters are simple to calibrate for a wide range of species. The pins leave holes in the wood, so find a waste area to place them in. Take readings on the face of the board. Stay an inch or two away from knots.

3. ANTICIPATE FUTURE HIGHS AND LOWS

The maps below will help U.S. woodworkers to predict future high and low EMCs for their region of the country, but this is another area where a moisture meter adds precision. If you live outside the map area, or in a micro-climate such as near a body of water, you can gauge the swings very accurately by doing your own seasonal testing of lumber in your shop, and also some tests on the backs or bottoms of furniture in the home. This will not only reveal the highs and lows for your neck of the woods, but also how much the moisture levels in your shop tend to vary from those in the house.

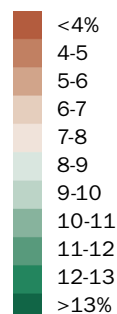


Moisture content of interior woodwork in January



Moisture content of interior woodwork in July

Moisture content (%)



SEASONAL MOISTURE CONTENT MAP

In most of the United States, the average MC of interior woodwork varies from winter to summer. It's those seasonal changes that cause wood to shrink in winter and expand in summer.

Handy chart does most of the work

There are a number of ways to convert shrinkage rates to actual dimensional changes, based on the factors listed here, and the math can be complex. So I've created a chart that makes the math simpler. It gives the amount of movement per inch, based on a given shrinkage rate and the amount of change you expect in the MC.

To get the change in dimension, start with the current MC of the board, plus its estimated shrinkage rate, based on its species and grain orientation (see chart, p. 84). Then use the regional maps to determine what the MC will be during the muggiest and driest months. The difference between the current MC

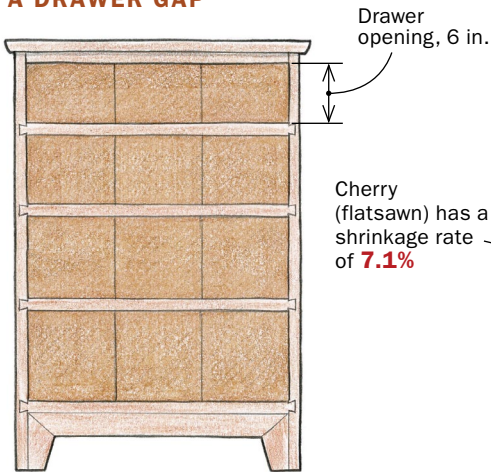
and the high and low MCs for the year can be plugged into the chart below to get the expected dimensional change per inch of width. Then just multiply that by the width of the board in question.

By the way, though the numbers on the chart are five places to the right of the decimal point, it is just an approximation. So err on the safe side when picking a final number for expected dimensional change.

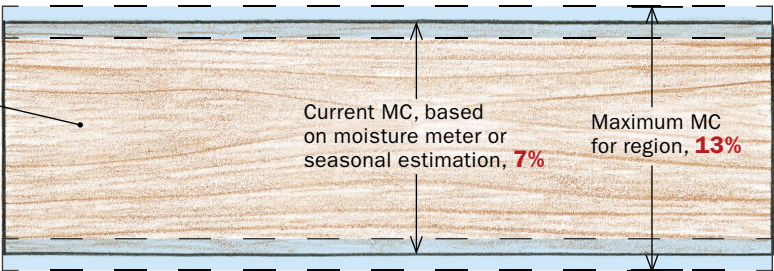
Let's work through a specific example to see how this process works in practice.

CALCULATING A DRAWER GAP

To figure out how much of a gap to leave at the top of a drawer, do the following math. Then add $\frac{1}{32}$ in. to your answer, to make sure there is still a thin gap at the top in the most humid season.



1. Consult the shrinkage rate chart on p. 84.
2. Estimate current MC and maximum MC using seasonal MC maps on p. 85.



WOOD MOVEMENT PER INCH				
SHRINKAGE RATE	CHANGE IN MOISTURE CONTENT			
	2%	4%	6%	8%
2%	0.00143	0.00286	0.00429	0.00571
3%	0.00214	0.00429	0.00643	0.00857
4%	0.00286	0.00571	0.00857	0.01143
5%	0.00357	0.00714	0.01071	0.01429
6%	0.00429	0.00857	0.01286	0.01714
7%	0.00500	0.01000	0.01500	0.02000
8%	0.00571	0.01143	0.01714	0.02286
9%	0.00643	0.01286	0.01929	0.02571
10%	0.00714	0.01429	0.02143	0.02857
11%	0.00786	0.01571	0.02357	0.03143
12%	0.00857	0.01714	0.02571	0.03429

3. Consult the wood movement chart at left to find the expansion factor.
- Shrinkage rate: 7%
Change in MC: +6%
Expansion per inch: 0.015 in.
4. Multiply expansion factor by height of drawer to predict actual expansion.
- 0.015 in. x 6 in. = 0.09 in.
5. Add $\frac{1}{32}$ in. to predicted expansion and round upward for safety. The answer is the current gap needed at the top of the drawer.
- 0.09 in. + $\frac{1}{32}$ (0.03125) = 0.12125 in.
Round up to nearest fraction: $\frac{1}{8}$ in. (0.125)

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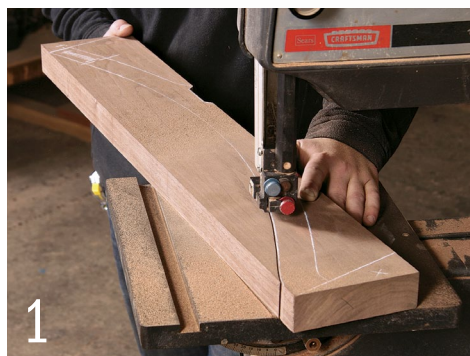
From lumber to leaves

BY JONATHAN BINZEN

To build the slender-legged organic base of his tilt-top table (see the back cover), Greg Brown started with some hefty planks. The front legs were sawn from 8/4 boards, and the back leg and the two arching stretchers required 10/4 stock. Brown did the shaping and carving in stages—nearly all of it before final assembly. For the tilting mechanism (right), he adapted a period technique, in which round tenons pivot in round mortises cut into the battens attached to the underside of the tabletop.



Carving comes to life. A vine of carved ivy climbs the table's branchlike base.



1
Join, then saw. Brown cut the mortise-and-tenon joints while the blanks were still square, then bandsawed out the legs.



2
Chamfer layout. The shaping will begin with chamfers chiseled along the length of the parts. Here, with a leg and stretcher dry-fitted, Brown lays out lines to guide the chamfering.



3
Rasping it round. After rough-shaping the parts with chamfers, Brown refines them with a rasp. Because the parts swell at the junction to mimic branching, he added gunstock miters to the mortise-and-tenon joints to avoid problems with short grain.



4
Climbing ivy. Brown carved the ivy before final glue-up so that the parts could be worked on dry-assembled or separated. He drew the leaves freehand, but used an old carver's trick to establish a natural-looking line for the stem, winding string around the parts and tracing it.

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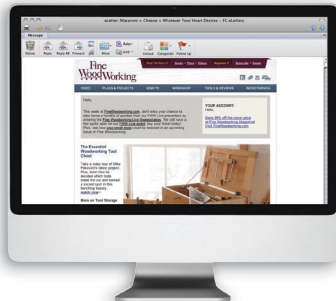


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Mother Nature Meets Her Match

Many furniture makers, following George Nakashima's example, build live-edge tables by placing natural slabs on stark, geometric bases that defer to the beautiful planks above. Greg Brown wasn't interested in that equation. When the New Hampshire carver and cabinetmaker decided to build a table in tribute to his older brother, Tommy, who died recently at 38, he started with a gorgeous slab of walnut burl. He loved the plank, but he wasn't in a deferential mood. "I tried to make the base just as beautiful as the top," he says. In the process,

he grafted some of the flowing botanical forms he admires in Art Nouveau furniture together with winding ivy that he carved in a style inspired by Federal-era master Samuel McIntire. In another tip of the cap to his period predecessors, Brown adopted the traditional tilt-top format (see photo, p. 90) so that when it isn't in use, the top can be raised to its vertical position and viewed like a work of art.

—Jonathan
Binzen

Photo: Bill Truslow

How They Did It Turn to p. 90 for more details on how Brown shaped and carved the base of his table.



Audio Slide Show See more of Brown's furniture and hear him describe it in an exclusive audio slide show.