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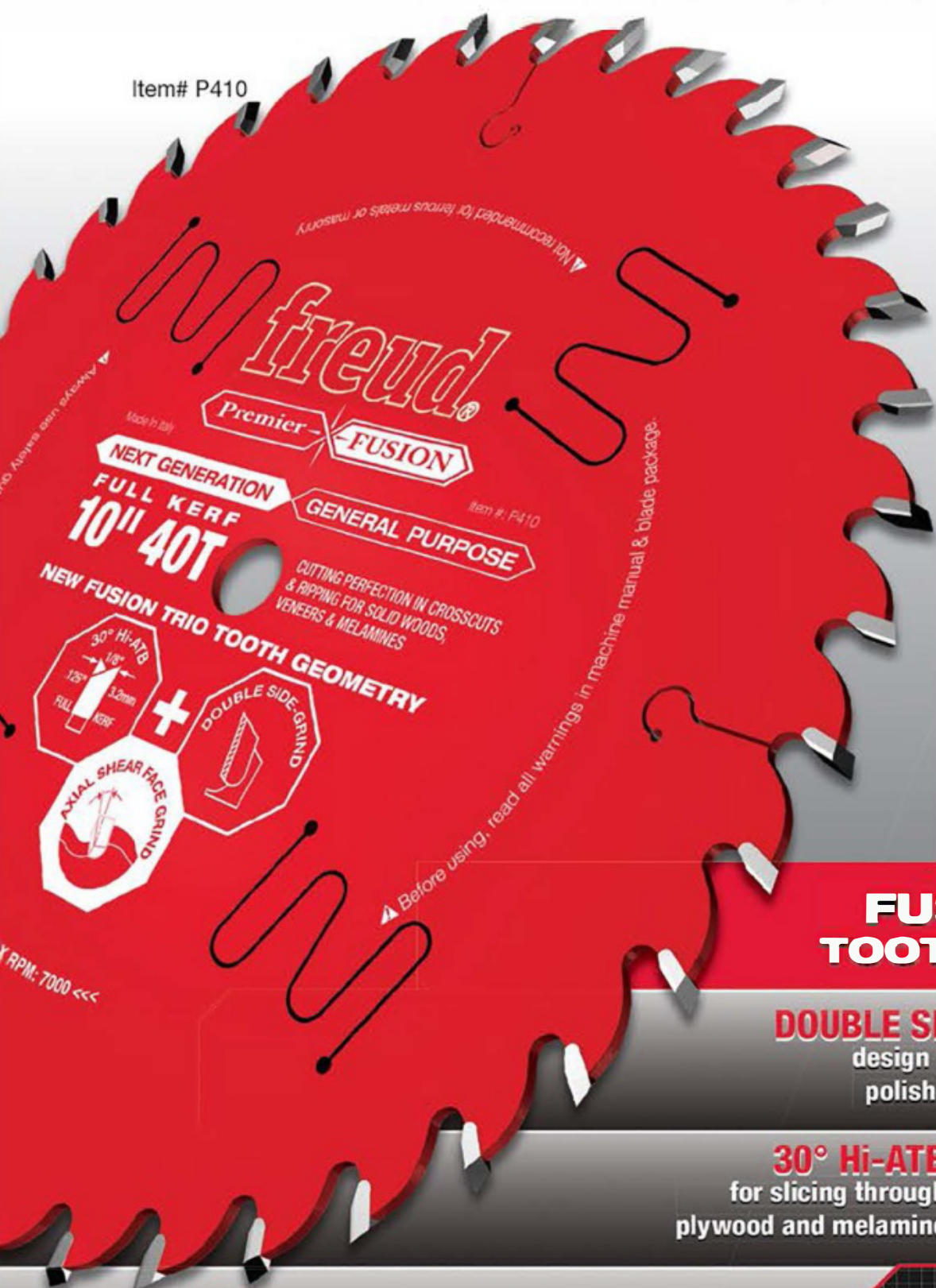
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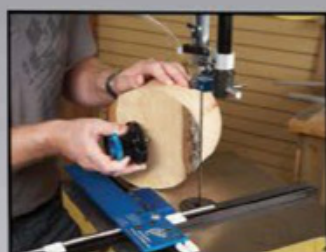
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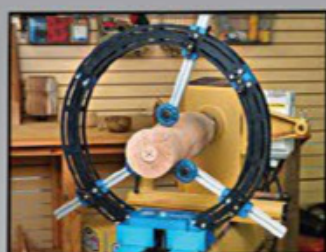
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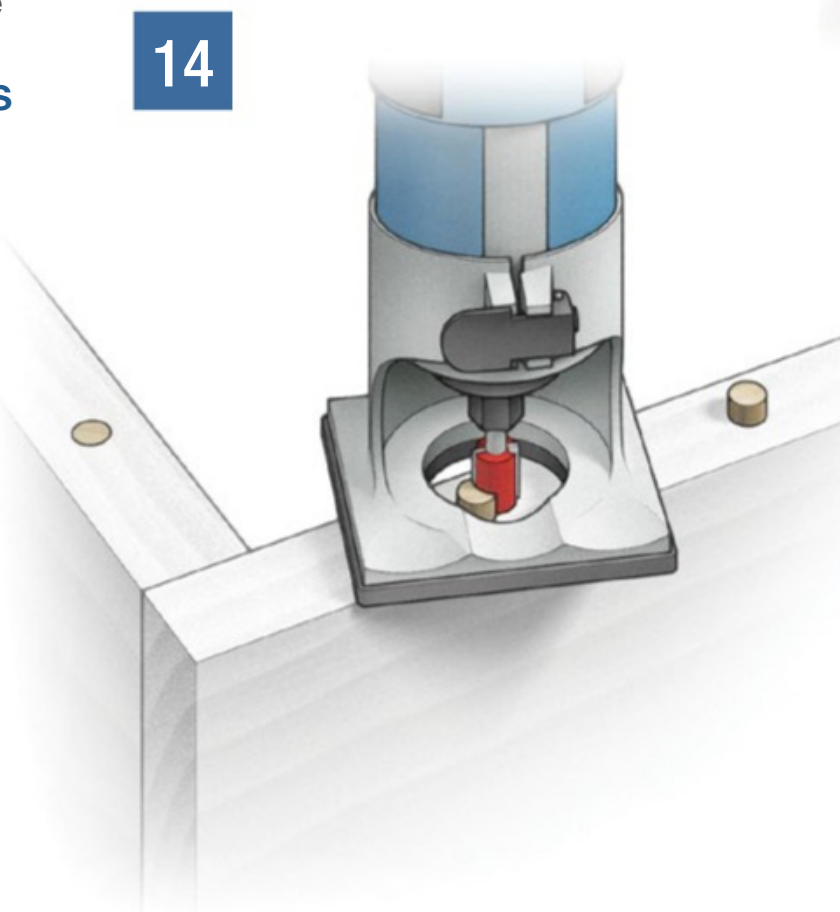
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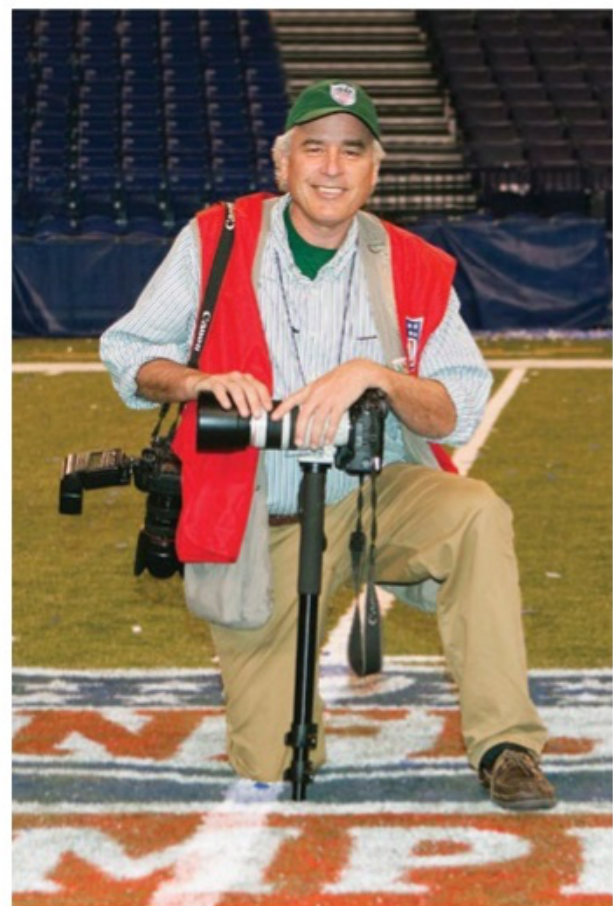
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Contributors



Scott Grove has been working wood for 30 years, but he's also a talented sculptor, author, and tool designer. His work can be found in books, magazines, museums, and galleries. In addition to teaching at the Marc Adams School of Woodworking in Indiana, The Yestermorrow Design/Build School in Vermont, and the Chippendale International School of Furniture in Scotland, Scott shares woodworking tips and business advice on *ImagineGrove.com*. See Scott's snowflake ornament on page 26.



Feeling comfortable in a workshop isn't a problem for **Randy O'Rourke**, whose photos have appeared in dozens of books devoted to woodworking and home improvement (see p. 59.) Publishing assignments have taken this Connecticut resident to nearly every state in the U.S., and brought him into contact with Sam Maloof, Mira Nakashima, and Bruce Hoadley. Randy's schedule gets a little tight every autumn, when he attends New York Jets games as the official photographer for *JetsInsider.com*. "I became a fan back when Joe Namath led the Jets to a Superbowl," Randy says. "It's been tough keeping an optimistic outlook lately." ■



Ralph Lee Anderson began his photography career at age 13 on the school yearbook staff. Since then, he has shot everything from fashion to food. Ralph recently retired from product photography at a major publishing company and now enjoys gardening, scale model building, and freelance photo assignments (see p. 35). Ralph and his wife, Sally, live in rural Kentucky.

On the Web



Avoid flake mistakes!

Check out this onlineEXTRAS video that shows the techniques Scott Grove uses to create snowflake ornaments, as shown at right and on p. 26.



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Crafting the future

Woodcraft Magazine turns 15 this year and we couldn't be prouder. Technically speaking, this child isn't yet old enough to legally drive, but she's wise beyond her years. To celebrate, we're showcasing our best Tips & Tricks from the last decade-and-a-half, having splashed them with color. Consider this a refresher if you're familiar with some of these tips, and maybe share them with an aspiring newbie!

I find that this recent reflection on the past has me future-gazing. (And what sounds more futuristic than "the year 2020"?) If you think about it, woodworking is a rather staid industry. Our primary power tools have changed little over the past century, and hand tools have kept their basic design legacy even longer. Nevertheless, the past 15 years have seen rapid innovation. Advances in manufacturing technology have produced fast, efficient methods of joinery like Festool's Domino and Kreg's pocket screw system, which have made it easier than ever for people to get into "making." Hyper-accurate digital measuring devices keep us precise, while Sawstop's tablesaw-brake technology keeps us intact. And CNC continues its forward march of machines that can do more, faster, and for much less money. It's an interesting time.

I wonder what woodworking will look like in another 15 years? Surely smarter machines will become yet more efficient, and innovation will continue to unfold at a steady rate. Who knows? Artificially intelligent robots may well be able to build beautiful furniture. Even so, I don't worry about the soul of our craft. I feel that the human need to work with our hands will always pull us to the shop. If working wood is in your blood, you don't build simply to have a new set of cabinets or a dining room table. You do it because the work focuses and sharpens the mind. It keeps some of us out of trouble.

As part of our anniversary, we want to lay the groundwork for the woodworkers of tomorrow. To help someone get started with a few good hand tools, see p. 31. Build the game-board (p. 47) and the bed (p. 35) to encourage kids to play in the real world sometimes, and to rest well in fun too. Mark your work for your descendants (p. 54), and try to leave a few trees behind when you depart (p. 72).

To paraphrase Bob Dylan, "the times they are still a-changin'." And, as they do, *Woodcraft Magazine* is pushing forward to keep woodworking alive and well. Here's to the future!

Chad McClung

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Have a tough woodworking question?

We'll do our best to find the expert and provide the answer. Email us at editor@woodcraftmagazine.com and put "Expert Answers" in the subject line.

News & Views:

This catch-all column is where we do our best to correct mistakes, publish feedback from readers, and share other noteworthy news items. It's easy to participate in this discussion. Just email us at editor@woodcraftmagazine.com and put "N&V" in the subject line.

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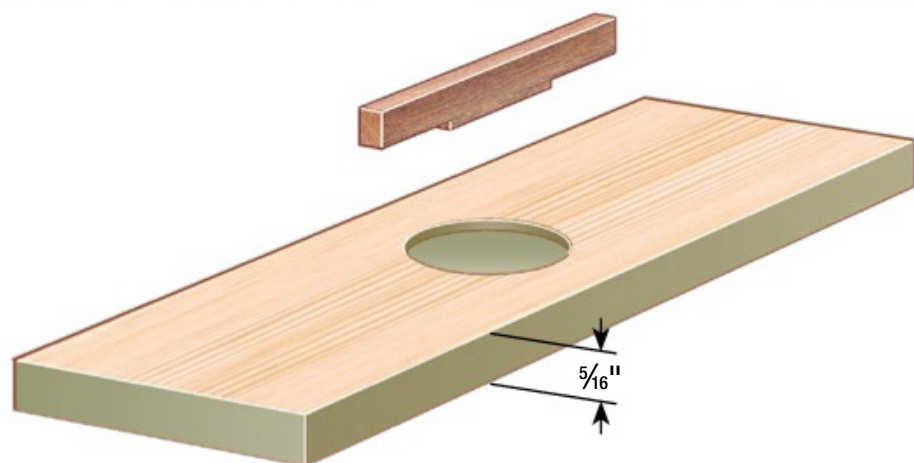
because they allow you to get more turning from less stock, they cut with less resistance and they open up other design options (*like the grooves of a honey dipper*). The problem is, the thinner parting tools get, the harder they are to sharpen. The Ultra-Shear Parting Tool-Ci changes all that by eliminating sharpening altogether. Instead, the cutting edge is a nano-grain carbide insert, ground on computerized equipment, polished to a razor-like edge and replaceable in seconds.

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We also designed the blade holder to keep the inserts where they belong. Ultra-Shear's re-designed geometry improves the wedge-theory with a profiled feature that grips the insert securely, even at odd approach angles.

If you're looking for a parting tool that cuts clean each and every time you pick it up, and never needs sharpening, Ultra-Shear's Parting Tool-Ci is for you.





Lids for the 3-Top Box

I like the small box project featured in the Aug/Sept 2019 issue, and I've already built several. Instead of making box parts from vertical grain fir, I used quartersawn oak, which shows off the same straight grain appearance. I made my box lids $\frac{1}{4}$ " thick, as indicated in the drawing on p. 25. But in the photo on the facing page, the lids stand slightly proud of the sides. This would indicate that the lids are thicker, or that the rabbets are shallower. Which dimension is correct?
—Dave Wasserman, Philadelphia, PA

Matt Kenney replies:

The lid thickness dimension in the drawing is incorrect. I deliberately make my lids thicker ($\frac{5}{16}$ ") than the rabbet depth so that a narrow-painted band will show when the lids are in place. Many of the boxes I build have painted accents; it's fun to develop a design that allows these contrasting details to complement the color and grain of the wood.

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Sticky suggestion for the circle-cutting jig

The bandsaw circle cutting jig (Oct/Nov 2019) is a great addition to my workshop. But when sawing round cutting boards with the jig, I didn't want to drill a hole in the board for the pin, as described in the article. My solution is to use a piece of plywood as the rotating platform and attach the cutting board to the plywood with double-stick tape. If you are cutting a batch of same-size circles, one support blank could work for the whole run.
—Allan Bragdon, Barnstable, MA ■



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Reader Showcase



TIM KENNEDY, FREDERICKTOWN, MO
Candle-powered carousel. The Holiday Carousel in issue #62 (Dec/Jan 2015) inspired Kennedy to build several variations, including this version with a live-edge maple base and red oak trees. When the candles are lit, the fan spins, along with the snowman and tilting tree.



JERE CROSS, ALTOONA, PA
Classy curves. Cross has built several quilt racks, but the oval ring version featured in issue 63 (Feb/Mar 2015) has become his wife's favorite gift. "The oval rings made it more difficult to build," he says, "but it was worth the effort. Now many of our friends want one."



JOHN BRAUN, WEST CHESTER, OH
A peak for plants. Having completed the garden obelisk featured in issue #88 (April/May 2019), Braun is looking forward to having his project play host to climbing clematis and other greenery. "Using the full-size layout board as illustrated in the article was a real lifesaver," he says.



JAY DORROUGH, SEGUIN, TX
Crisply made corners. Waterfall edges distinguish this desk, which has a pecan top supported by black walnut legs, stretchers, and braces. Dorrough used loose tenons to assemble the mitered edges.

Show off your work!



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A jig with a few new moves

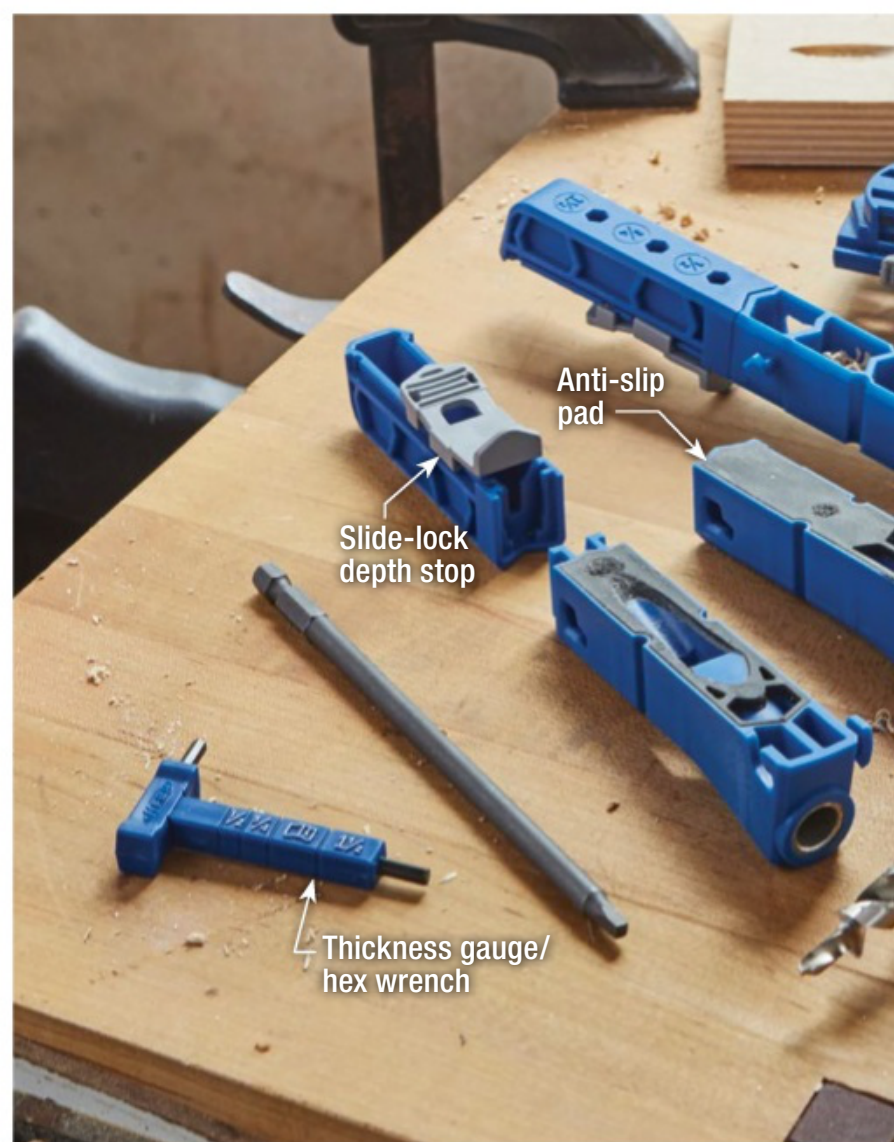
Kreg 300-Series Pocket-Hole Jigs

Kreg's new 300-series pocket-hole jigs will please beginners and experienced woodworkers alike. As with earlier models, this new jig works perfectly well in its standard, two-hole configuration. What's new is that the parts can separate and be used independently. The modular design allows you to slip a fully functional jig into a tool belt, or sneak a pocket screw into a tight space for an on-site repair. For larger projects, users can join multiple guides and spacers (sold separately)

together to create custom multi-hole drilling jigs.

The 320 kit includes two drill guides, each with a material-thickness stop and anti-slip base, a hex wrench with a built-in thickness gauge, and a universal clamp adapter. My favorite improvement is the easy-set drill bit and stop collar. The stepped bit now has standard dimensions engraved on its shank, and comes with a windowed stop collar to make bit setup stone simple.

—Tester, Joe Hurst-Wajszczuk



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Overview

- 320 double drill-guide kit (shown) \$39.99.
- Engraved dimensions on bit, guide, and thickness gauge/wrench simplify jig set up.
- Spacers can be added or removed for custom pocket-hole spacing.
- Clamp adapter works with trigger-action clamps as well as Kreg clamps.
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Over the past 15 years, we've published hundreds of great tips and tricks to help you along your woodworking journey. They have included everything from cleverly designed jigs and shop storage solutions to innovative approaches to milling, marking, joinery, clamping, and finishing. Here, we reach back over the last decade and a half to pluck 15 time-honored perennials from that bounty. Enjoy!

Flush-routing plugs

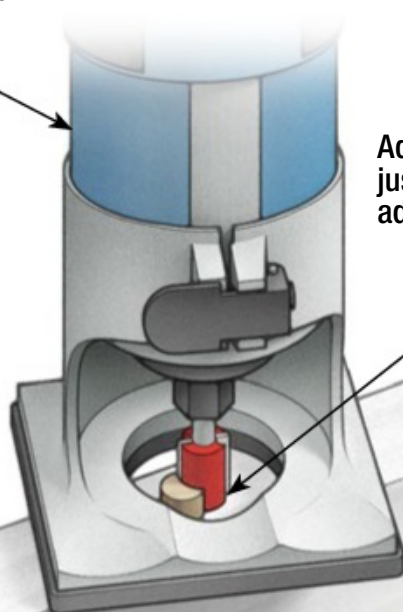
I've found that a router equipped with a straight or spiral flute bit does a much faster job of cutting plugs flush than the old saw-and-chisel approach, with much less tear-out as a bonus. I simply adjust the tip of the router bit shy of the workpiece surface by about the thickness of a sheet of loose-leaf paper, and then tilt the router to lower the spinning bit onto the end of the plug. The few thousandths of an inch of plug projection that remains is easily sanded or scraped away.

A laminate trimmer works best because of its maneuverability and small footprint. However, sometimes adjacent plugs prevent setting the subbase completely onto the work surface. In that case, you may have to trim a few plugs the old-fashioned way to create a landing pad for the base.

—George Aspinall, Tacoma, Washington

Laminate trimmer

Adjust bit height just above surface adjacent to plug.

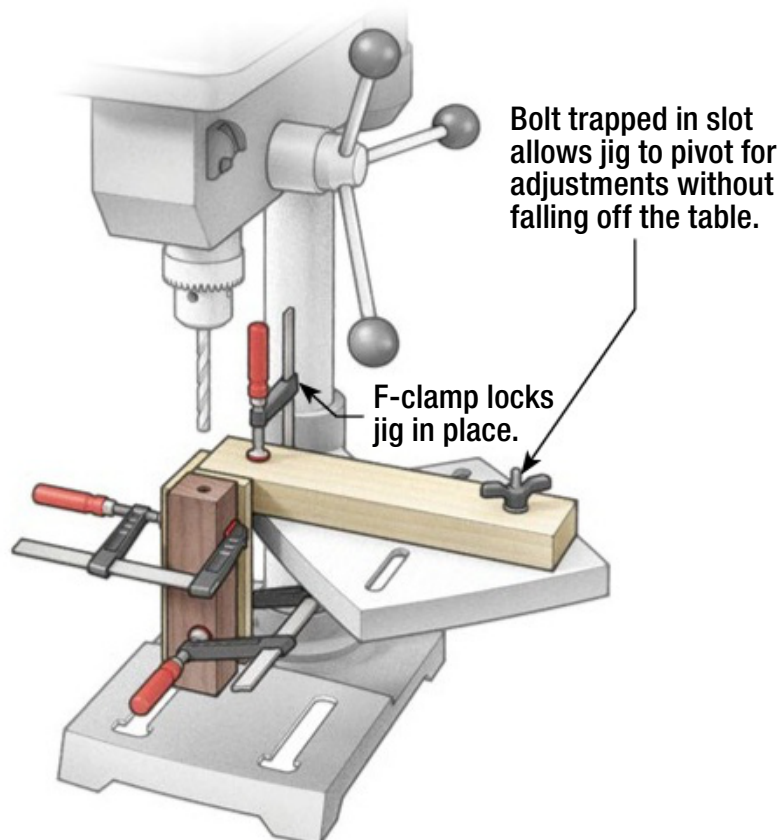
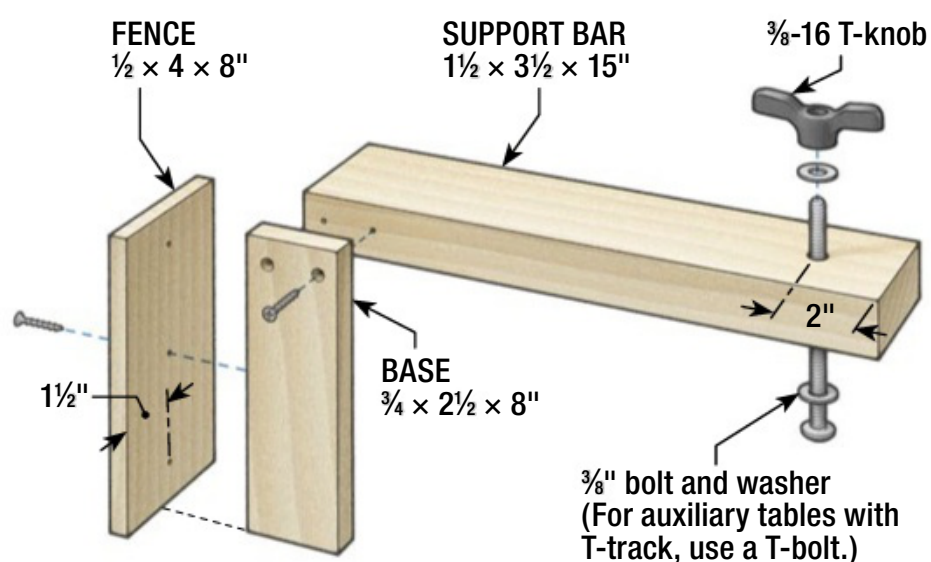


Self-supporting vertical drilling jig

Here's a simple jig for your drill press that will come in handy the next time you need to bore a vertical hole in the end of a pen blank, post, or any other long workpiece. Unlike other versions that simply clamp to the table, my jig bolts to it. This allows the jig's support bar to pivot easily for repositioning without risking a fall to the floor.

Use these dimensions as a starting point. If you have a large auxiliary table, lengthen the bar to suit. (If your table has T-slots, replace the hex head bolt with a T-bolt.) To use the jig, swing the drill press table clear of the bit, bolt the jig in place, and then clamp the workpiece to the fence and base as shown. When the workpiece is in position, use an F-clamp to lock the bar to the table, and then drill your hole.

—Joe Hurst, senior editor

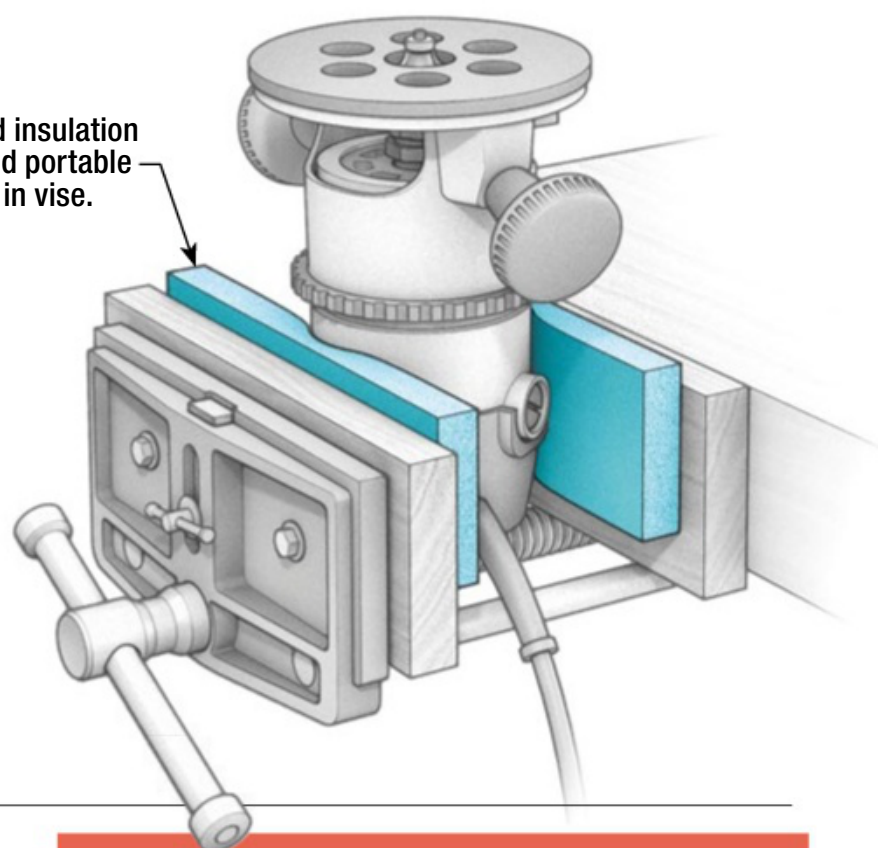


Vise pads for power-tool mounting

It can be difficult to rout or sand small workpieces with portable power tools. In those cases, it's best to take the work to the tool instead of the other way around. But what do you do if you don't have a router table or stationary sander? Well, you could construct a custom platform of some sort for your router or sander, but there's an easier approach. I just cut some appropriately sized pads from $\frac{3}{4}$ "-thick rigid insulation and squeeze the tool in my vise between the pads. The soft, but firm material conforms to the tool, holding it very securely without damaging it. If necessary, knife out any sections on the pads to accommodate large protrusions, and make sure not to block any tool vents.

—Roger Townshend, New Britain, Connecticut

Pads of rigid insulation securely hold portable power tools in vise.



Paper rags at the ready

For cleanup around the shop, I use paper rags like those sold in boxes at home supply stores. They're convenient to use, but tearing off a perforated section can be a two-handed hassle, with one hand (often already fouled with finish) to hold the box, and the other to rip away the necessary rags. The easy fix is to store the box upside down in a cabinet whose bottom has been drilled to create a dispensary hole for the rags. A quick, one-handed sideways pull is all it takes to free up whatever length you want. If you don't have a suitable cabinet, you can create a simple shelf for the job, mounting it to a wall or perhaps between overhead joists.

—Carl Rettiger, Billings, Montana

Invert box over hole.



Drill hole in cabinet bottom or shelf.

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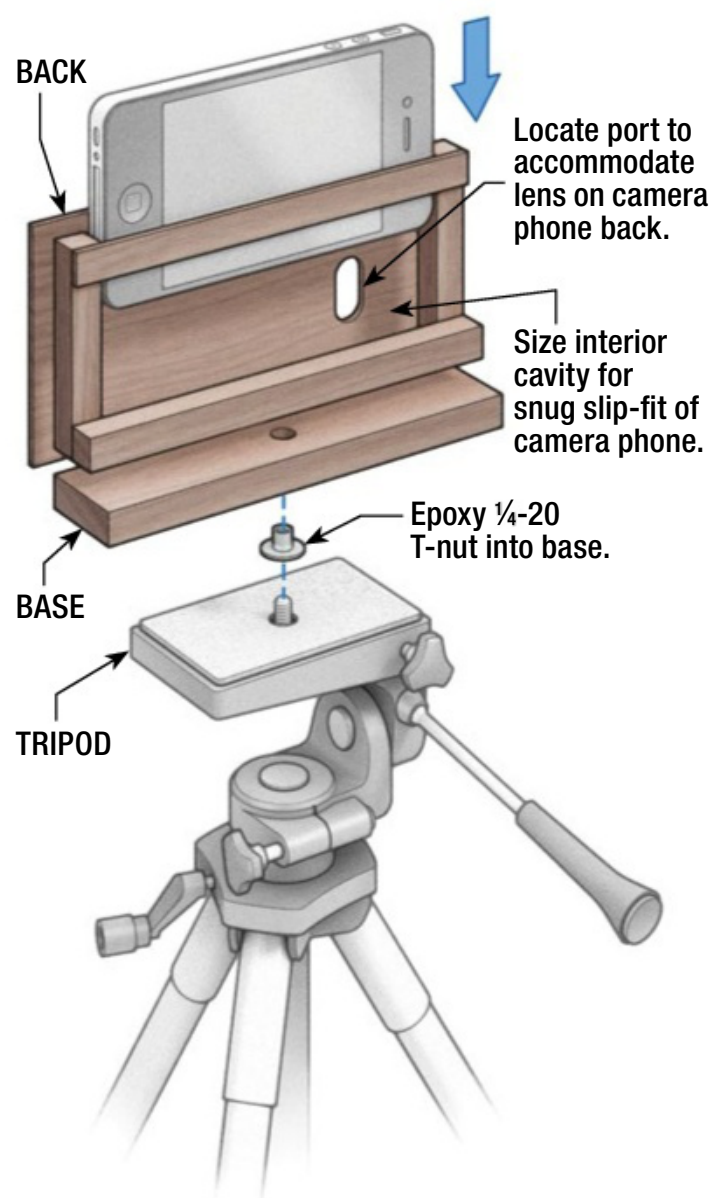
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Important: Please include your phone number, as an editor may need to call you if your trick is considered for publication.

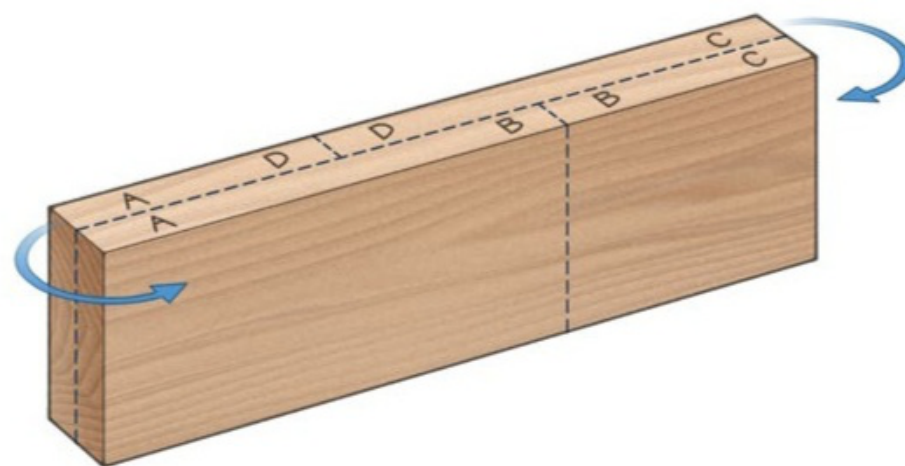
Camera phone tripod mount

A camera phone makes it easy to photograph your completed projects before they slip the shop and your memory. It also allows you to record videos of complicated jig setups and hard-to-remember procedures, making the job easier the next time. I find that using a tripod helps enormously, especially when including hands-at-work to help demonstrate a technique. To mount my phone, I cobbled together the unit shown. To make one yourself, size the pieces and locate the lens port to suit your particular model. Epoxy a ¼-20 T-nut in the bottom piece to connect to a typical tripod head.

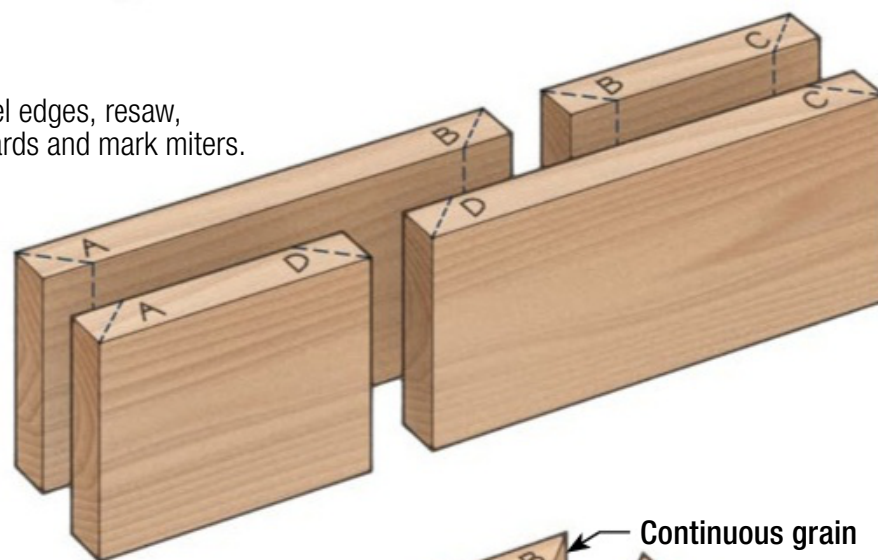
—Lee Wimbs, Greensboro, North Carolina



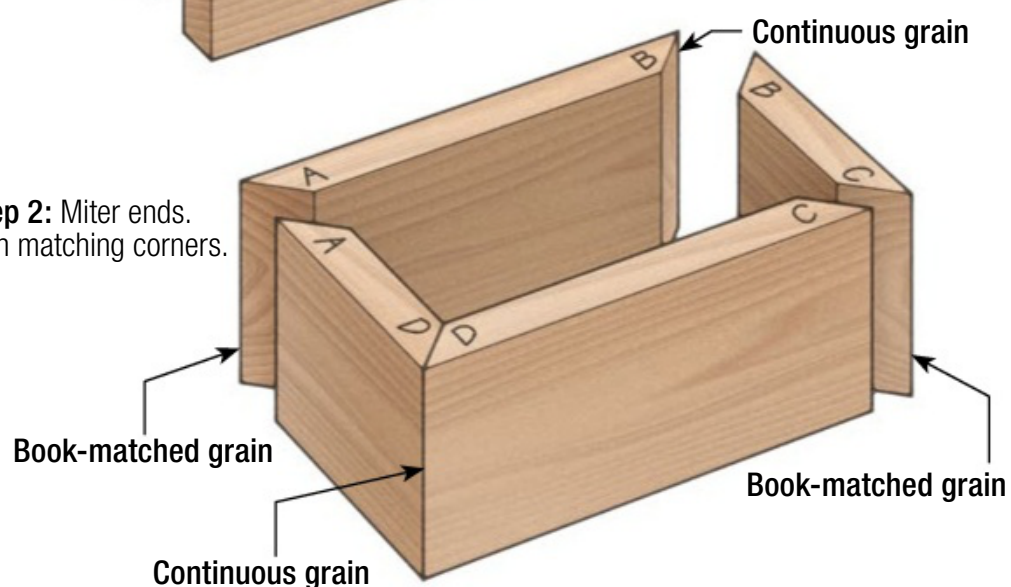
How to grain-wrap a box



Step 1: Label edges, resaw, then flop boards and mark miters.



Step 2: Miter ends. Join matching corners.



A mitered box looks best when the grain runs uninterrupted around the corners. To perform this trick, begin with stock that's twice the desired thickness of your finished wall, plus ¼" or so for milling. Rip it to finished width, and about ¼" longer than the combined length of 2 contiguous walls. Lay the walls out to length in the order shown in the top drawing, lettering the individual parts for reorientation later. After resawing the stock, plane it to final thickness, and then cut the pieces to length. To lay out the miters, first swap the pieces as shown in the top 2 drawings, which effectively turns the blank inside-out. After cutting the miters and joining the letter-matched ends, one pair of diagonally opposed box corners will exhibit continuous grain, and the opposite corners will be book-matched. Nice!

—Geoffrey Noden, Trenton, New Jersey

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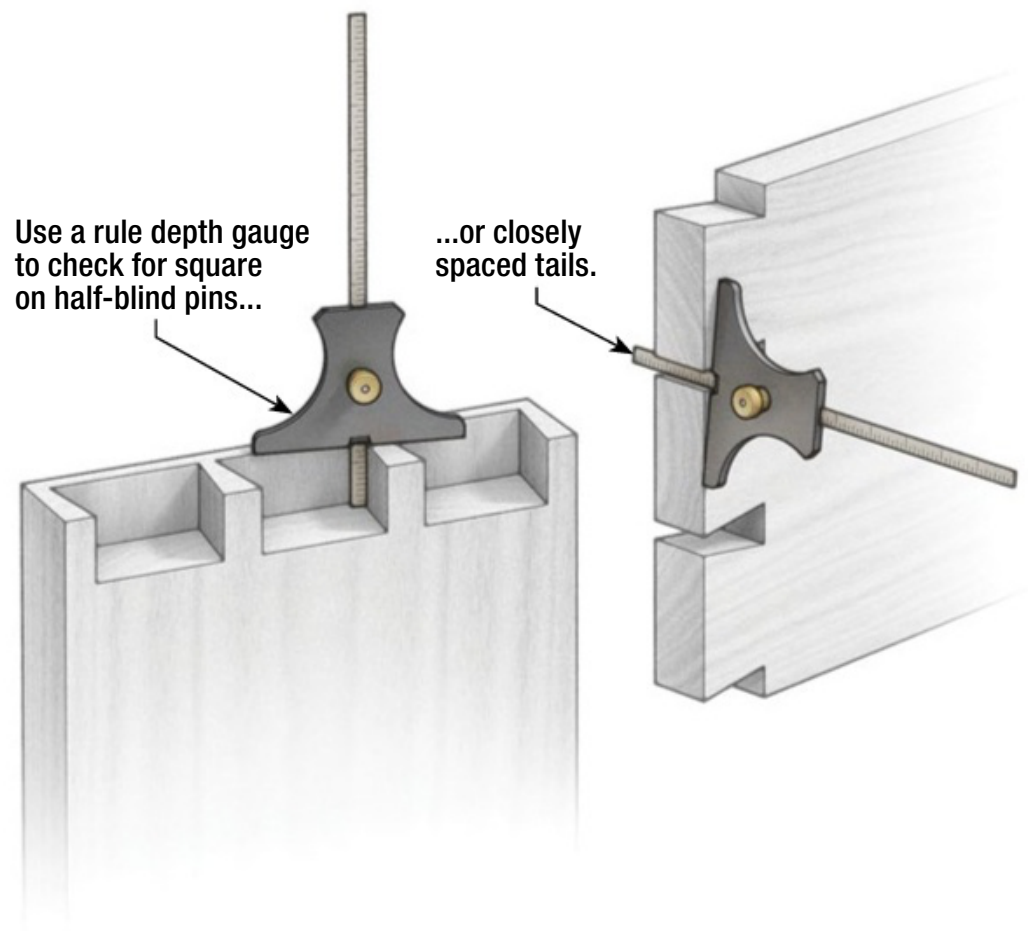
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Rule depth gauge as mini square

When it comes to hand-cutting dovetails, precision matters. For the joint to fit well, the baseline shoulders and the tail cheeks must be square to the faces of the boards, and the pin cheeks must be square to the ends of the boards. Unfortunately, it can be difficult to maneuver a regular square into place to check those surfaces, especially with closely spaced dovetails. However, you can repurpose a rule depth gauge to do the job. Designed to measure the depth of dadoes, mortises, and other recesses, its narrow blade also easily slips into pin sockets to allow checking dovetail cheeks and baseline shoulders. Likewise, you can retract the blade and place the tool's stock against the end of a pinboard to check pin cheeks. To locate the tool, type "rule depth gauge" into your search browser.

—Ric Hanisch, Quakertown, Pennsylvania



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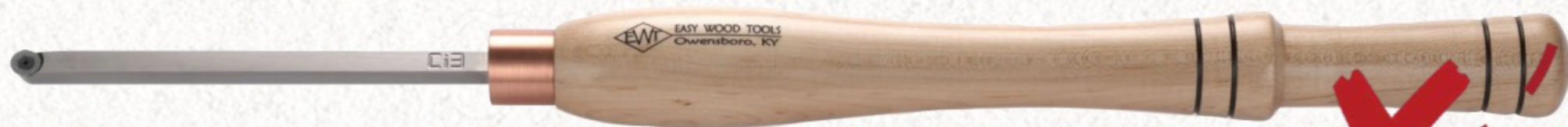
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Read this issue closely to answer the following questions.



1. What's an alternative use for a hinge?
2. Which chess piece is missing from the Gameboard photo on page 47?
3. How many passes does it take to rout the slots in the slide for the Sanding Jig?

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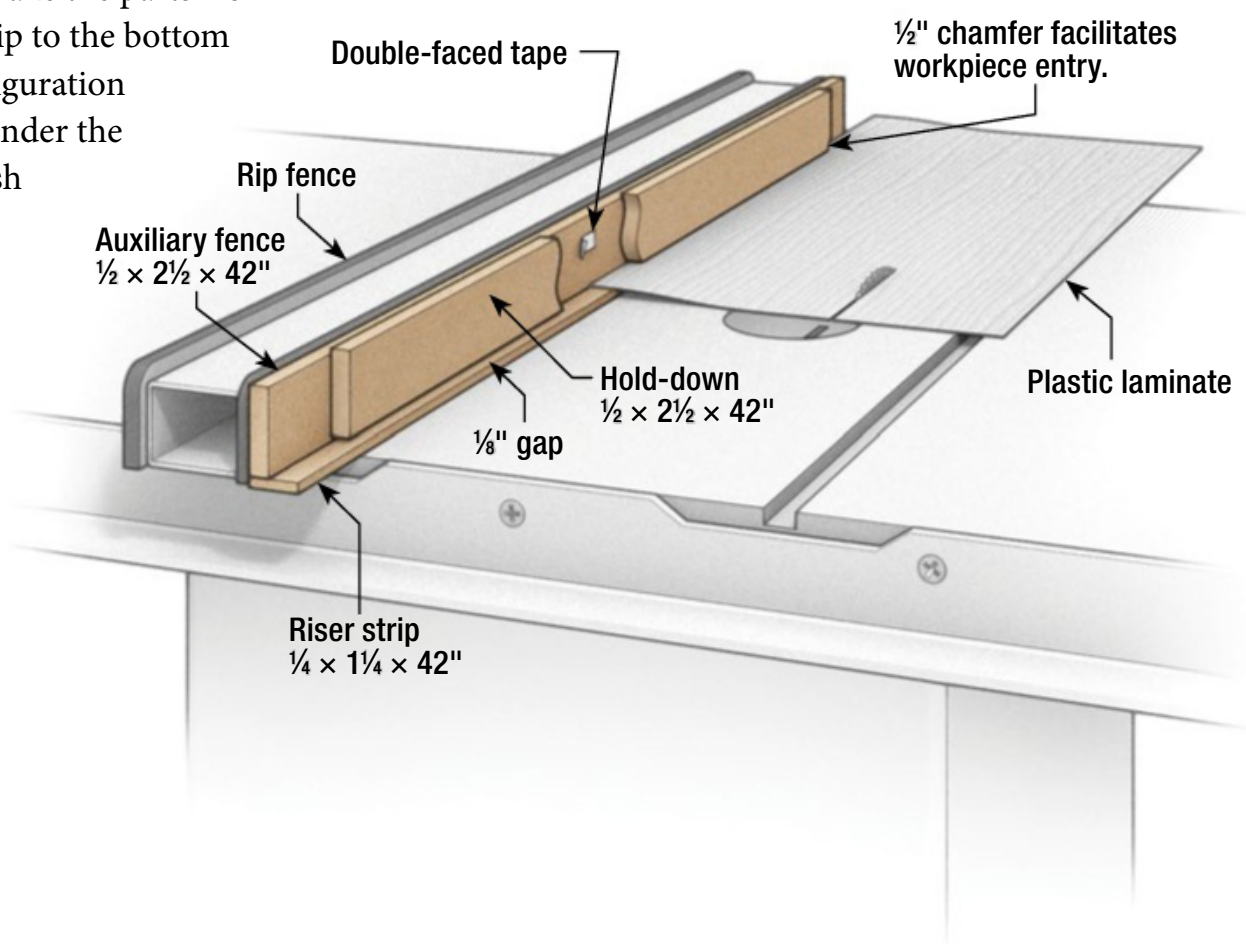
Laminate-sawing auxiliary fence

When feeding plastic laminate on the table saw, the material tends to pinch in the gap under the rip fence. It also wants to ride on top of the spinning blade if the sheet isn't held down. Furthermore, the heel of a push stick too often slips upward off of the thin stock. This simple jig neatly solves all three problems. Make the parts from plywood or MDF, gluing the riser strip to the bottom edge of the auxiliary fence. This configuration prevents the material from slipping under the rip fence, and lifts it enough for a push stick heel to easily catch. The hold-down, of course, prevents lifting.

I use double-faced tape to attach the hold-down board in case I need to raise it more than $\frac{1}{8}$ " to accommodate acrylic or other slightly thicker material. The hold-down is a few inches shorter than the auxiliary fence to allow inspection of workpiece/fence contact at both ends of the fence. For most cuts, you can simply clamp the jig to your rip fence. However, clamps can impede push stick travel

on very narrow cuts, in which case I attach the jig to my rip fence with double-faced tape, applying clamp pressure to the taped areas for a few moments to ensure a good bond.

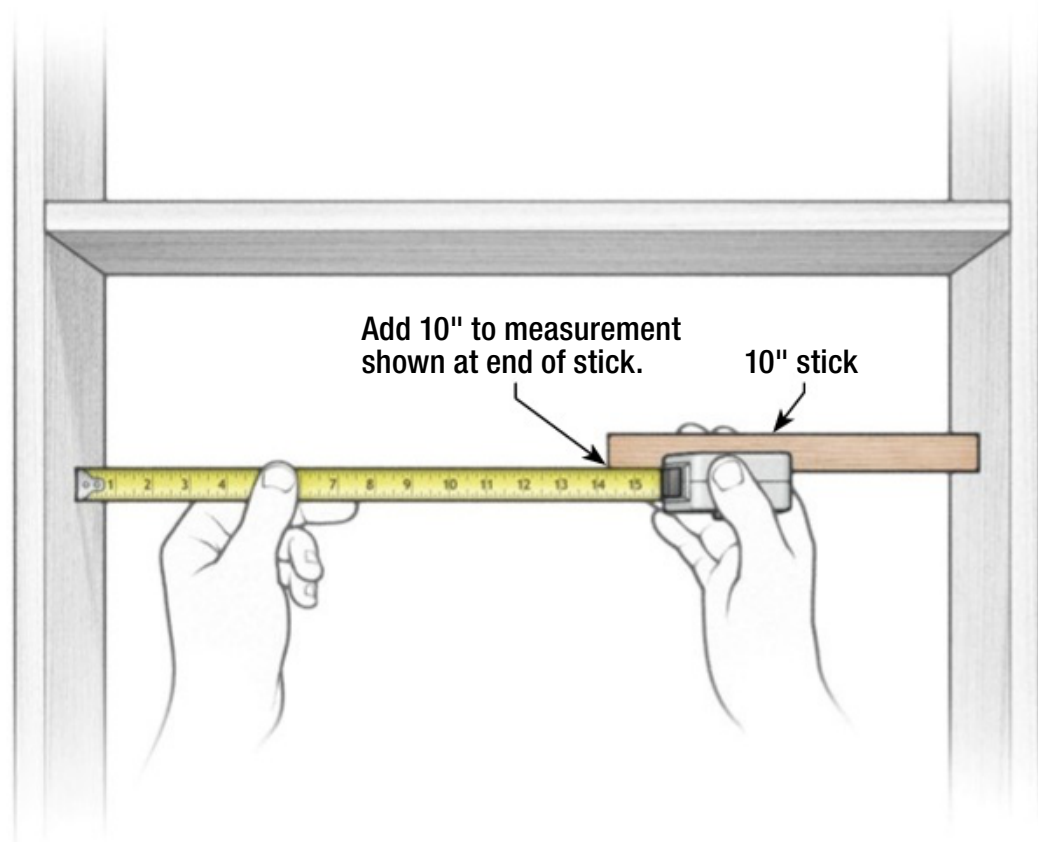
—Paul Anthony, senior editor

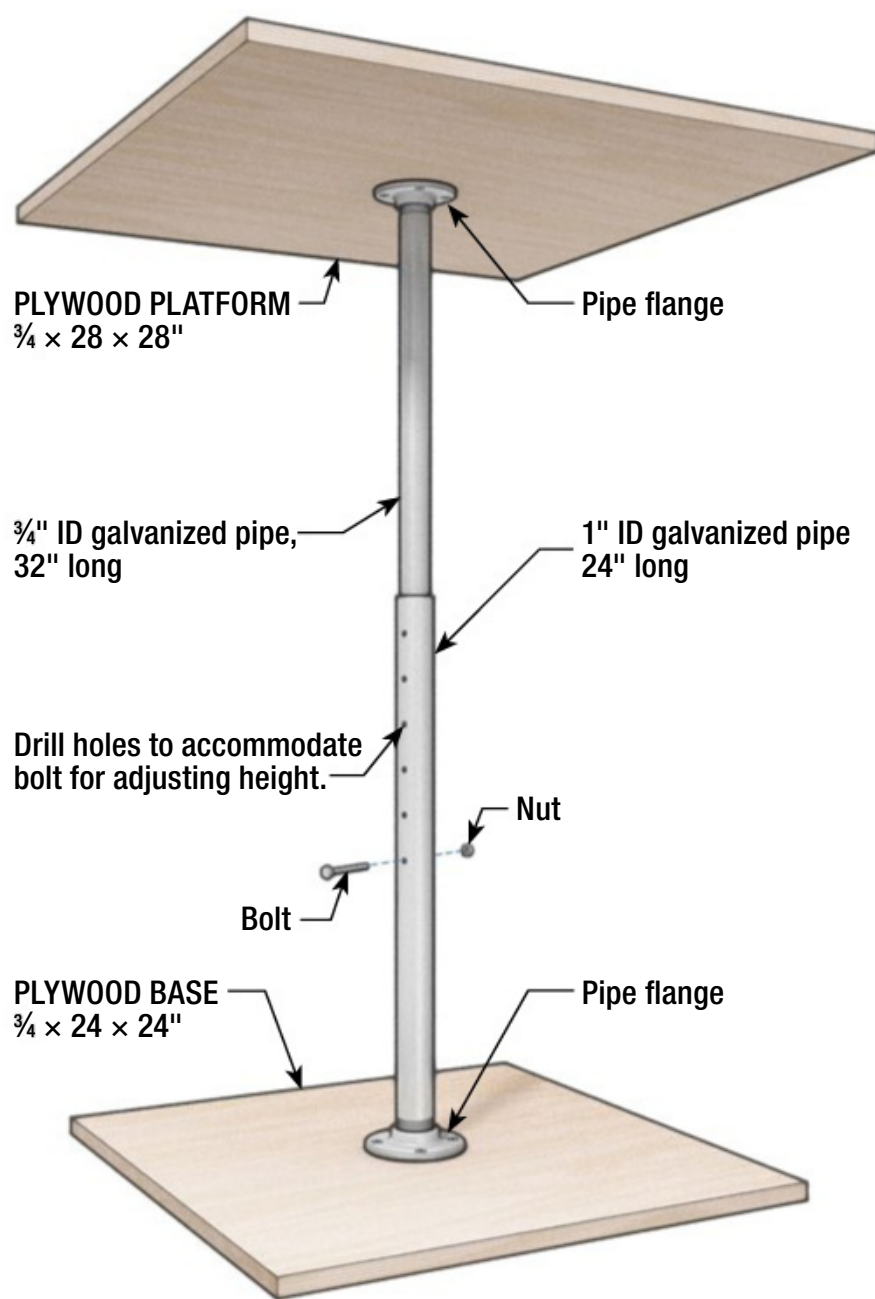


Accurate inside measurements

I find that taking inside measurements of a cabinet using a common tape rule can be iffy because the tape won't bend completely into a corner for a dead-on read. To get an accurate measurement, I incorporate a stick of wood cut precisely to an easy-to-add length, such as 10". Holding one end of the stick against one cabinet side, I extend the tape to the opposite cabinet side and note the measurement at the extended end of the stick. Adding 10" to that measurement gives me the precise interior width of the cabinet.

—Paul Kellam, Visalia, California





Finishing turntable

When faced with spray-finishing a half-dozen Windsor chairs, I realized that I needed a rotating platform. When I remembered seeing a design for a turntable built around the concept of one pipe slipped inside another, I headed to the hardware store to buy the parts, and found that $\frac{3}{4}$ " ID galvanized pipe can nestle nicely inside 1" ID galvanized pipe. (But double-check, because some pipe diameters vary.) I had one end of each pipe threaded, and bought the appropriate pipe flanges and mounting screws, along with a $\frac{3}{16} \times 2$ " bolt.

Back at the shop, using a scrapwood V-cradle at the drill press, I drilled a row of $\frac{7}{32}$ "-dia. holes through the larger pipe, screwed each pipe flange to a piece of $\frac{3}{4}$ " plywood, and slid the pipes together. Voila! A turntable! To adjust the height for comfortable spraying of smaller pieces, I simply slip the $\frac{3}{16}$ " bolt into the chosen pipe hole, where it serves as a rest for the bottom of the $\frac{3}{4}$ " ID pipe. In use, rotate the top platform clockwise to prevent the flange from unscrewing from the pipe.

—Marlon Rappaport, Newport, Rhode Island

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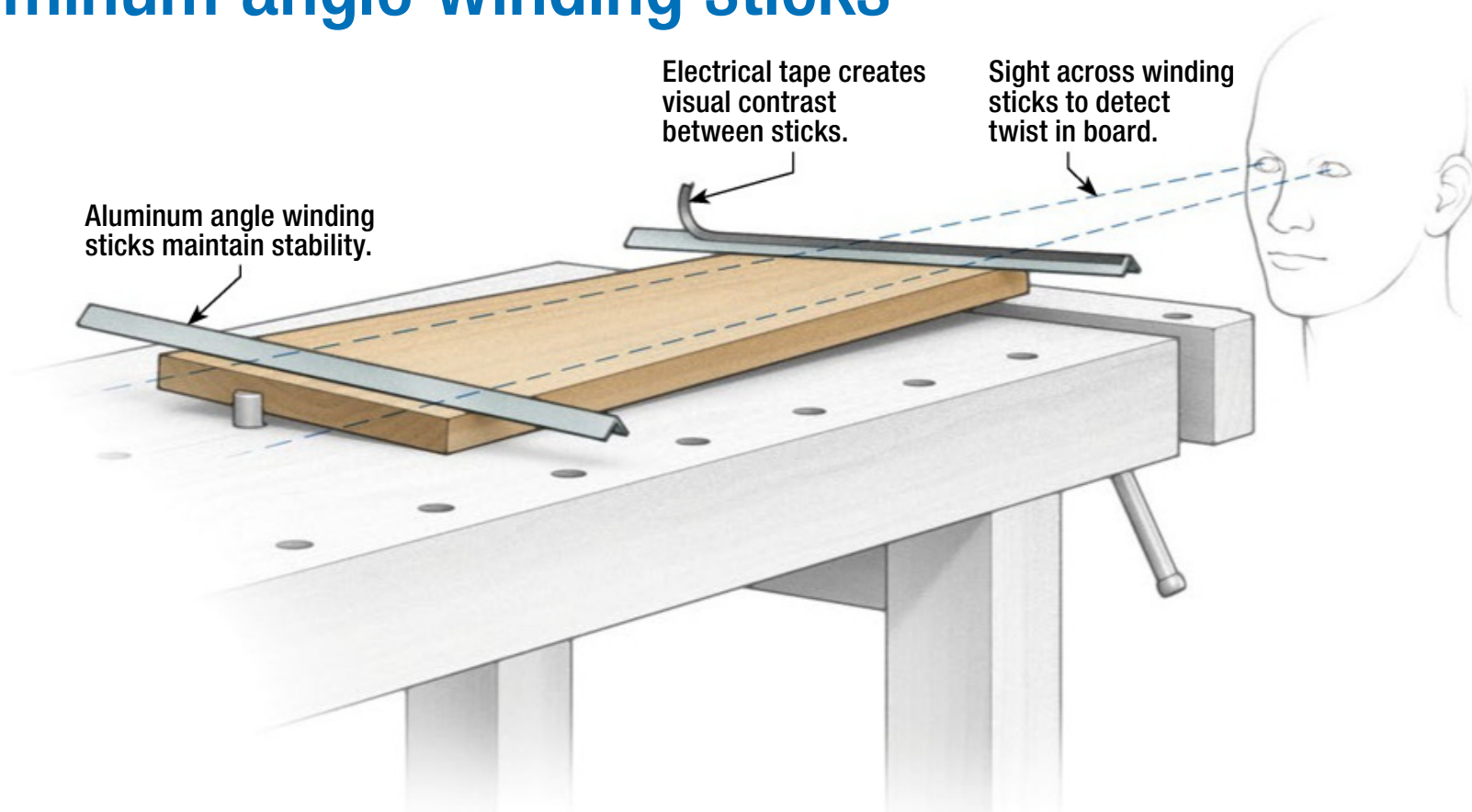
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Aluminum angle winding sticks



Winding sticks provide a time-honored way to check the flatness of workpieces or assemblies. Used in pairs, winding sticks are placed parallel to each other at opposite ends of, for example, a board being hand-planed. To check for twist, or “wind,” crouch so that your eyes are level with the top edges of the sticks, and then sight across them with both eyes open. Any deviation in the flatness of the surface will be immediately apparent.

Traditionally, winding sticks are made from straight-grained, identically sized pieces of hardwood—often of strongly contrasting colors for easy sighting.

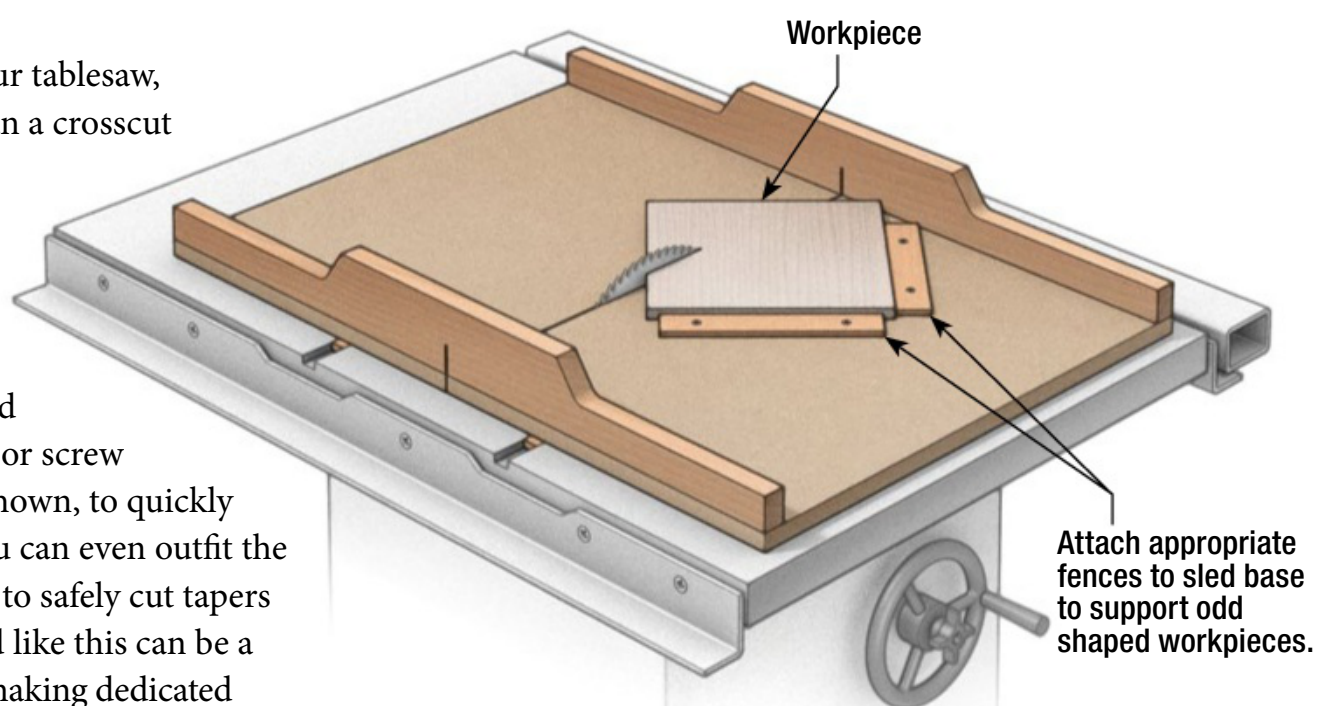
The problem with wood is that it can warp over time, requiring occasional redressing. Instead, I use aluminum angle from my local home supply store. (For straightness and rigidity, get the 1/8"-thick stock.) To provide contrast, crown one with black electrical tape.

—Will Murphy, San Francisco, California

Multipurpose crosscut sled

If you have a crosscut sled for your tablesaw, you actually have much more than a crosscut sled. What you have is a sliding base to which you can attach all sorts of custom fences and hold-downs to accommodate specialty cuts. For example, say you need to saw multiple plywood gussets for a project. Simply tack or screw two fences to your sled base, as shown, to quickly and accurately make the cuts. You can even outfit the sled with fences and hold-downs to safely cut tapers on small workpieces. Using a sled like this can be a great labor-saving alternative to making dedicated jigs that will see service only once or twice.

—Paul Anthony, senior editor



Crosscutting short pieces

Over the years, I've seen a variety of jigs for holding short pieces to be crosscut on a power mitersaw. Some incorporate toggle clamps and other hold-downs to secure the work while keeping your hands a safe distance from the blade.

These setups are fine for guys who love to make jigs. Me, I like to keep things simple. I usually crosscut small pieces using a technique I call "bridge-clamping." All you need is a short piece of wood the same width as the one you're cutting and a stout stick at least 12" long. Position your workpiece for the cut, and then firmly hold it in place by bridging over from the fulcrum scrap as shown, keeping your hand a safe distance from the blade.

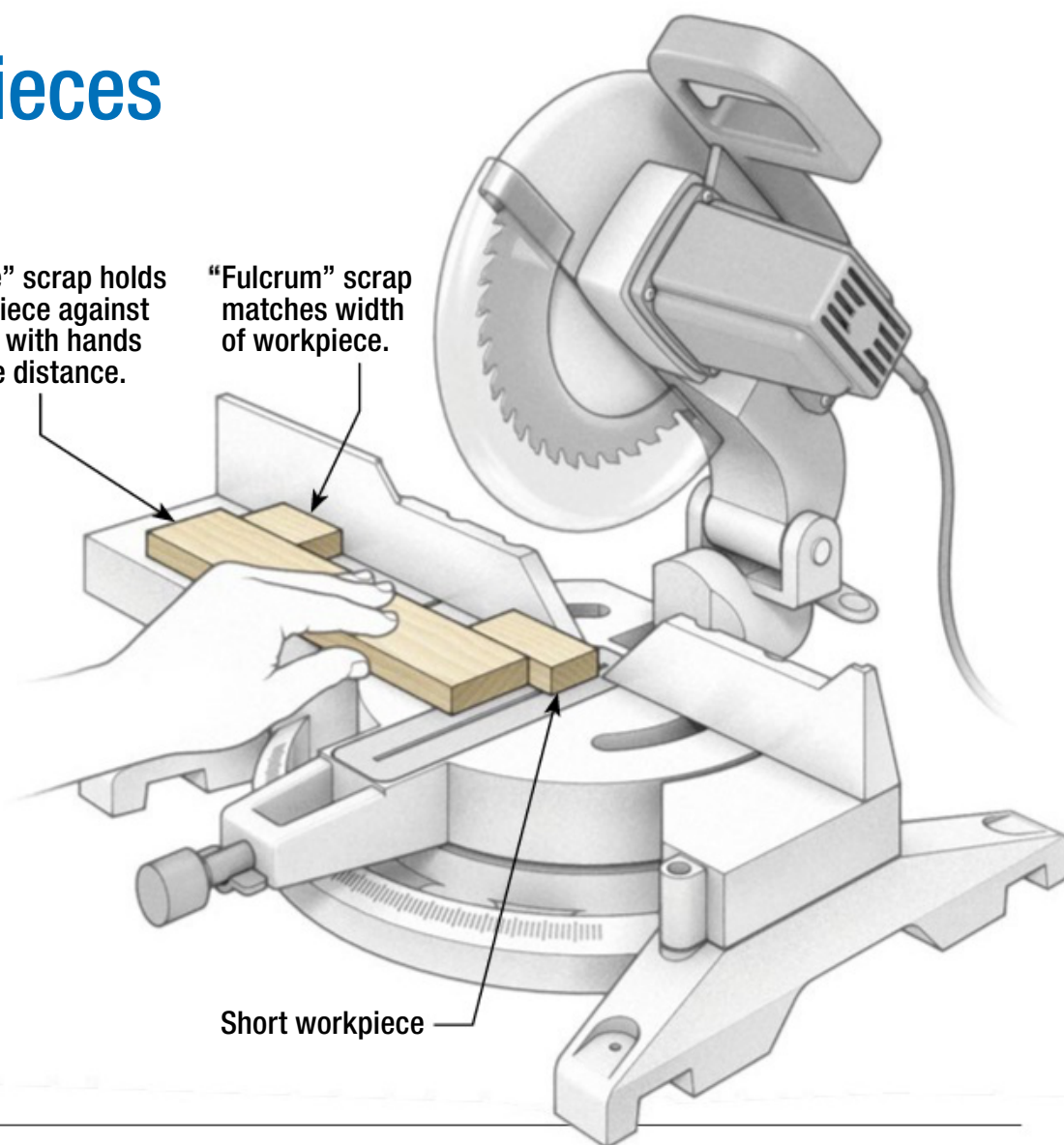
This same technique works on a crosscut sled or miter gauge extension fence.

—Peter Ashton, Sacramento, California

"Bridge" scrap holds workpiece against fence, with hands at safe distance.

"Fulcrum" scrap matches width of workpiece.

Short workpiece



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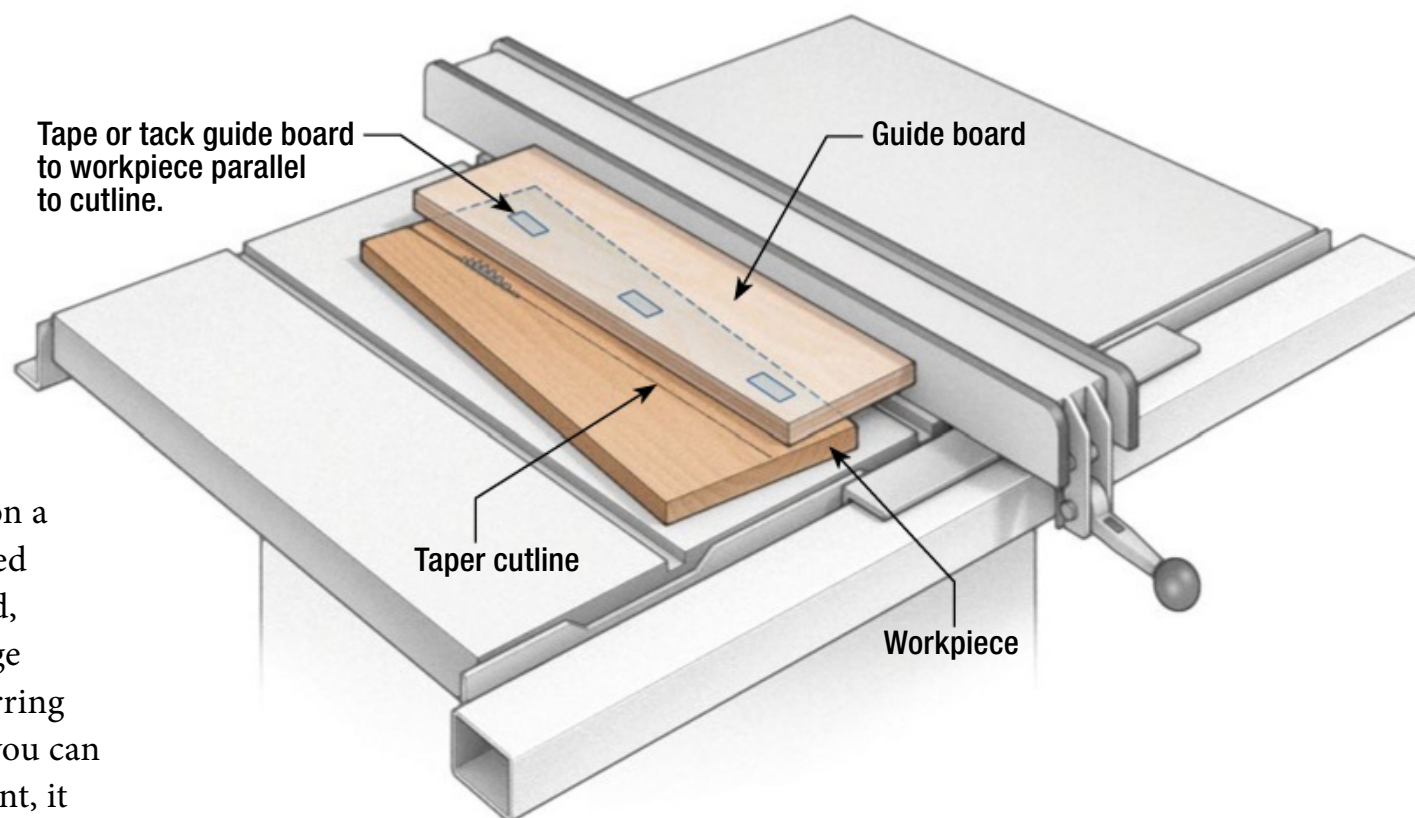
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Simple tapering at the tablesaw

I was working on an outdoor seating project recently that called for tapering some $\frac{3}{4}$ "-thick boards. I own a tapering jig, but it wasn't big enough for the job. So, to make the cuts, I used a straight-edged board to serve as a guide against the rip fence. After marking out the taper on a workpiece, I used double-faced tape to attach the guide board, aligning its fence-bearing edge parallel to my cutline. (If marring the workpiece isn't an issue, you can use nails instead.) At that point, it was a simple matter of ripping to the cutline in the usual fashion.

—Mark Clement, Phoenix, Arizona



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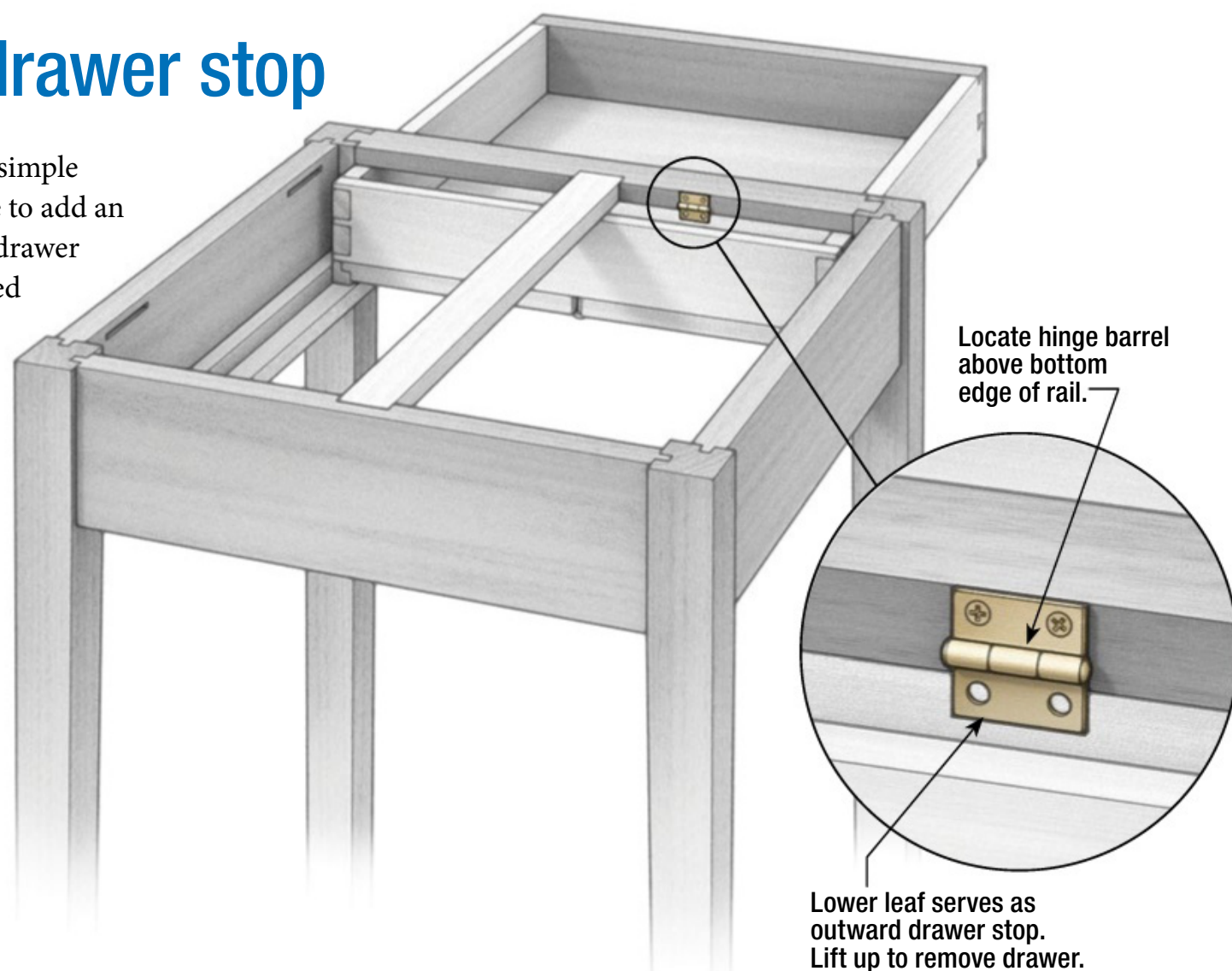
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Hinge as a drawer stop

When I make a project with simple wooden drawer guides, I like to add an outward stop to prevent the drawer from accidentally being pulled all the way out and spilling its contents on the floor. Of all the techniques I've tried, one of the simplest and most effective is to screw a hinge to the rear edge of the top rail. Locating the hinge so that only part of the lower leaf extends below the rail creates an effective stop that can easily be lifted up out of the way when you want to remove the drawer. ■

—James Hoyt,
Lexington, Nebraska



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CARVE A SNOWFLAKE ORNAMENT

Crushed shell creates the icy sparkle

By Scott Grove

Despite our best intentions, many of the “quick and easy” projects that we start in the weeks leading up to the holidays aren’t ready until next year. Here’s a project that you can wrap up in a few hours. In a good weekend, you could finish a flurry of unique gifts.

The secret to the ornament’s snowy sparkle is crushed mother of pearl. The iridescent inlay is set into the carved grooves of a snowflake-shaped design with cyanoacrylate adhesive (CA) (see Buyer’s Guide, p. 70).

To get you started, I’ve provided a few snowflake patterns, but I encourage you to come up with your own designs because experimentation keeps things exciting.

If you don’t have a lathe to create the convex shape, you can simply carve the snowflake patterns onto flat discs, but I think that it’s easier to refine the carving on a convex surface. Either way, select a wood that’s easy to carve and tight-grained. Dark-colored woods like purpleheart, walnut, and padauk offer an attractive contrast with the translucent white-ish color of the mother of pearl inlay. If you choose to use a lighter-colored wood like beech or maple, you can change the color of the inlay with aniline dyes to make the carvings stand out.



A flurry of flakes. This project offers an opportunity to experiment with different shapes, wood species, and carving techniques. No two flakes need to be identical.

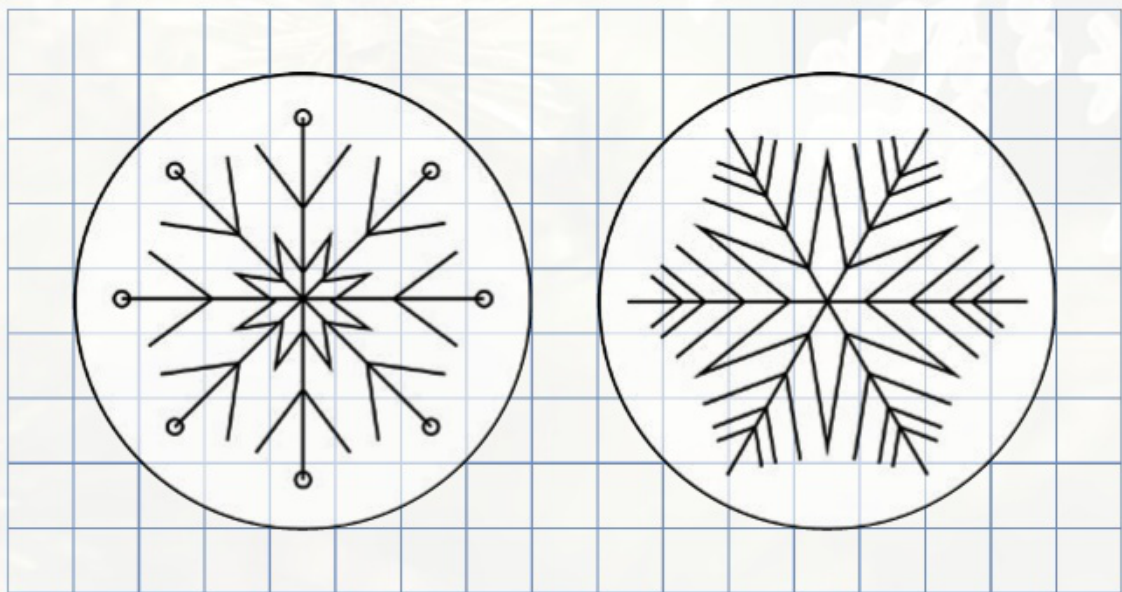
1 Pick and print a pattern

To guide your carving, glue a paper pattern to the convex face of a wooden disc. Here are a few snowflake patterns to get you started. Feel free to add or omit branches, or create new designs, but I recommend using a pattern rather than carving freehand. In the real world, most snow flakes are irregular, but I think that symmetrical designs are more visually appealing.

Full-Sized Pattern



Half-Sized Patterns



1 square = 1/2"
Enlarge 200%



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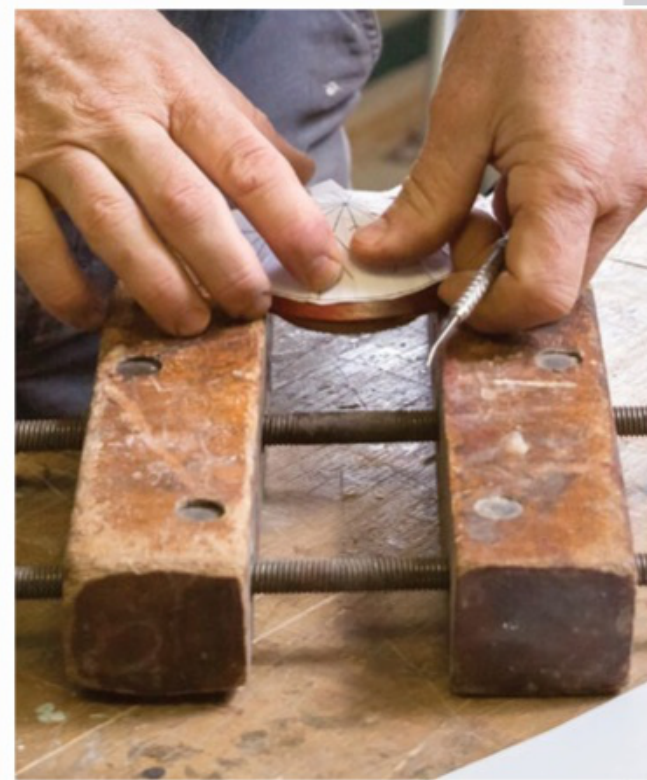
Ready to start carving? Go to woodcraftmagazine.com and download a PDF of full-sized snowflake patterns.

2 Prep the blanks

Start by planing your stock approximately $\frac{3}{4}$ "-thick, and then saw out a stack of $3\frac{1}{2}$ "-diameter discs. To mount the blanks to my lathe's scroll chuck, I used a $2\frac{1}{2}$ " hole saw to make $\frac{3}{4}$ "-thick discs which I glued to the blanks' back faces. (Tip: Gluing a piece of paper between the block and blank will make it easier to separate the two later.) Next, mount the blank to your lathe, and shape as shown. Seal the surface with a light coat of shellac, and then apply the pattern.



Shape the blank. Set the turning speed to around 1000 RPM. True the blank and then shape a $3\frac{1}{4}$ "-diameter dome. The glued-on backer block makes it possible to mount the blank without marring the ornament with faceplate screws.



Make it stick. Cut out a pattern, and then slit between the snowflake's stems so that the paper can lie smoothly on the convex surface. Mount the pattern to the blank with spray adhesive.

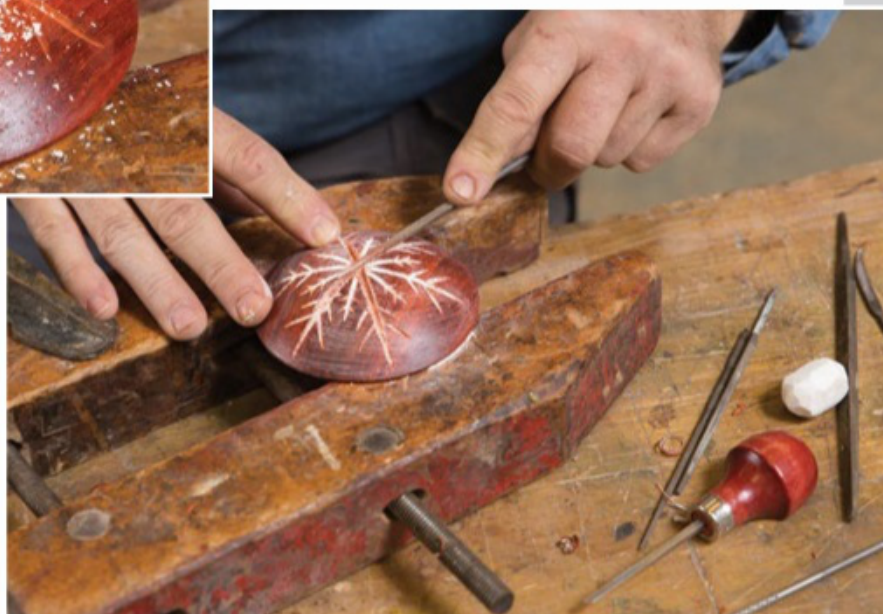
4 Check your work

The secret to a snowflake's beauty is symmetry, so make your carved lines as uniform as possible. I discovered that rubbing chalk in the grooves makes it easier to inspect my work. After evening out the depth and width of the grooves, set a compass in the center of the snowflake and verify that the ends of the branches are even. When you're done, wipe away or blow off any remaining chalk.



Chalk it up. Scrape off a few crumbs of white chalk and rub them into the carving to highlight minor imperfections.

Fixed with a file. Finesse the carved branches with a needle file, or a strip of 180-grit sandpaper affixed to a narrow stick.



5 Fill and finish

Now's the time to add the snowy sparkle. Don a dust mask, take a pinch of mother of pearl, and rub it into the grooves. Then fix the inlay in place with thin CA glue. After the glue dries, inspect your handiwork. If the inlay material hasn't completely filled the carving, simply add more and set it with another drop of CA.

Once the glue has dried, remount the ornament on the lathe, level the inlay with a sanding block, and give it a final sanding. Then blow off any dust and apply a light coat of CA glue.

Finally, pop off the mounting block with a chisel and finish-sand the ornament's back face. Drill a hanger hole and add a loop of cord, and your ornament is ready to hang.

3 Clamp it down, then start carving

To do the carving, you can employ any small 2-8mm V-shaped parting tool. However, for faster results, I recommend using a power carver with a 6 or 9mm V-shaped cutter. With each branch, start by carving the main stem and then adding the branches and finer offshoots. When you're done, use mineral spirits to remove the paper and glue.



Follow the lines. The ornament's dome-shaped face facilitates carving the branches in toward the center, but if the wood lifts ahead of the chisel, try working from the opposite direction.



Binocular magnifier

Flexible shaft power carver

Riffler files

Palm-handled carving tools



Rub it in. Press the mother of pearl into the grooves. Do this work on a piece of kraft paper or paper plate so that you can salvage excess material.



Glue it down. Dribble a light coat of CA to set the pearl into the carving. Work out from the center until the entire snowflake is covered.



Cups keep track of sanding disc grits.

Sand and seal. Sand the inlay material flush with the ornament's face, and then finish-sand the surface through 400 grit. To use CA as a finish, set the lathe to about 500 RPM, and apply 3-5 light coats as shown. ■



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12 Must-Have Layout Tools for 20 BUCKS UNDER

Mark and measure your way to a merry holiday By Chad McClung

Whether complicated or simple, every project deserves an accurate layout. But you don't have to spend a lot of cash for on-the-money tools. Here are 12 (one for each day of Christmas) trustworthy marking and measuring tools for under 20 bucks.

This is by no means a complete list of layout tools. You'll need a dependable combination square – the heart of an accurate layout. But this selection will start a beginner off right, or bolster a veteran woodworker's arsenal with a reliable backup set. For the woodworkers in your life, give the gift of precision.

Make your mark

This tool is imperative to accurate joinery layout. The wheel cutting gauge has a disc cutter on the end that can slice a clean line with and across the grain, creating a definitive guide for chisels and saws.

WoodRiver Wheel Marking Gauge

#153490, \$18.25



Circling the point

There's no way around it: You need a compass if you want to incorporate circles and arcs into your work. A compass can also be used as a divider for stepping off dovetails, for example.

General Tools Pencil Compass

#13G3A, \$7.50



Mechanically inclined

A mechanical pencil gives you a consistent line weight, unlike its wooden counterpart that dulls as you use it, widening your line and reducing your accuracy. I use 0.5mm lead for precise marking. Get colorful bodies for easy spotting in your dusty shop. **Check your local office supply store.**

\$5-\$20

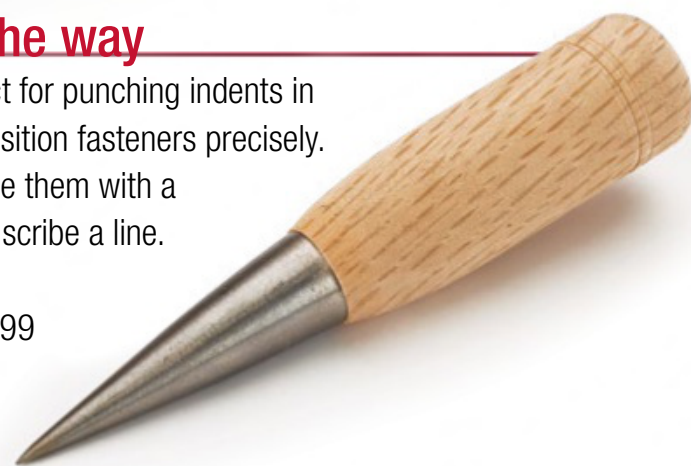


Pointing the way

Awls are perfect for punching indents in your work to position fasteners precisely. And you can use them with a straightedge to scribe a line.

Socket Awl

#156739, \$18.99



Multi-purpose knife

My craft knife gets a lot of use in the shop. I use it to trim paper shims, to cut double-stick or painter's tape (for masking and layout), and as a marking knife. **WoodRiver**

Precision Craft Knife

#159343, \$7.99

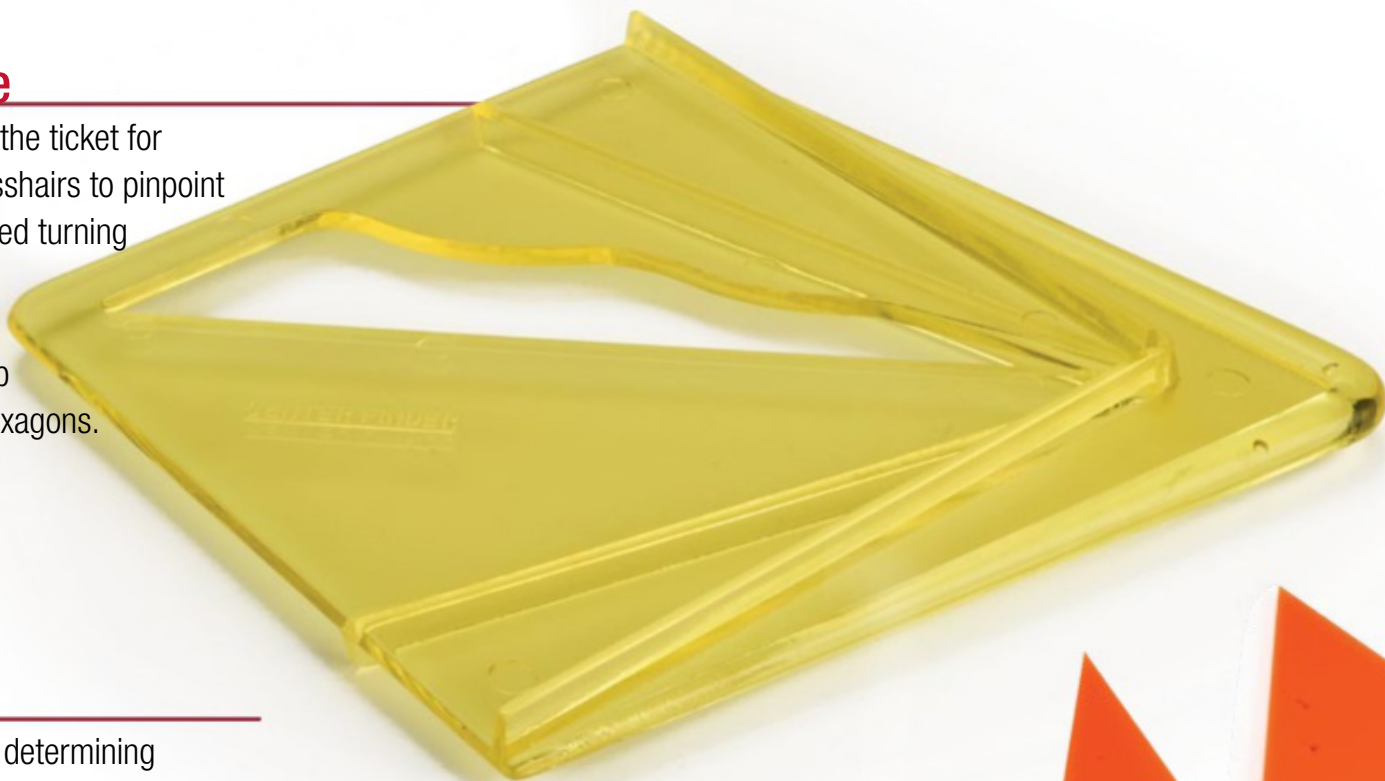


Right down the middle

Center finders like this one are just the ticket for quickly and accurately creating crosshairs to pinpoint the center of cylindrical or multi-sided turning stock up to 8" in diameter. Use the 90° flange for circles, squares, and octagons. The 60° flange on the flip side finds centers for circles and hexagons.

ZeroZero Center Finder

#02J14, \$9.99



Gauging the angle

A sliding T-bevel is the best tool for determining and transferring angles. This stainless steel gauge is hefty despite its thin profile and sleek design. The knurled brass knob reliably holds the blade at your desired angle.

Shinwa 6¼" Sliding T-Bevel

#156735, \$18.69



Saddle up to this square

Wrapping layout lines around a board is a whole lot easier with a tool designed for the job. This anodized aluminum square turns a two-step process into one step.

Veritas Large Saddle Square

#833749, \$18.99



Livin' on the edge

A reliable 6" rule is a must-have in the pocket of your shop apron, but this handy tool is a saddle square and rule rolled into one. You can mark an exact dimension on the edge and face of a board at the same time. And it's made in the USA.

Woodpeckers 6" Woodworkers Edge Rule
#166083, \$12.99



Not all cheap plastic is bad

Triangles serve you at the bench, and at the board, when you're designing projects. I also use them for machine setups like adjusting my table saw blade or miter gauge for making precise angled cuts. Buy various sizes (6", 8", 10") and angles (30°/60°, 90°/45°) for versatility. **Office supply stores.**
\$5-\$20



Shop mainstay

Tape measures are indispensable in the shop. But not so fast; not any tape will do. Three rivets in the tang are better than two, and the marks should be easy to read. Also, most woodworkers don't need the typical, bulky 25' tape in the shop. Most of the time, a compact 12-footer like this one does the job. Plus, FastCap tapes feature a dry-erase surface for jotting down dims as you go.

FastCap Metric/Standard 12' Tape Measure
#834529, \$9.99



Bonus gift ideas

They say all work and no play makes Jack a dull boy. So spread some good cheer and stuff a stocking with these fun items. ■

Leather Patch Hat
#169137, \$21.99



Yep, this one's over \$20. But we couldn't help ourselves, it's a cool hat.

Woodgrain Tumbler
#163158, \$19.99



Woodcraft Magazine Subscription

#WMAG1, \$19.99

Shameless self-promotion? Sure. But a great gift nonetheless.



Perfect dovetail layout

Like the saddle square at far left, but for dovetails. Genius. I don't cut a lot of dovetails by hand, which is exactly why I need a marker like this. Veritas offers various angle degrees and ratios, making layout fast, foolproof, and precise.

Veritas 14° Dovetail Saddle Marker (Other angles available.)
#153361, \$14.99





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154276 (B) Pattern/Plunge
154274 (C) Combination

A BED THAT GROWS WITH YOUR KID



Older kids

Adaptable design combines fun, safety, and storage

By Joe Hurst-Wajszczuk

My chief complaint with many kid-aimed projects is that they are outgrown too quickly. Not wanting to spot another carefully crafted piece sitting in a basement or attic, I designed this project with serious staying power. Unlike the cheap, flimsy furniture that is lucky to make it to the next growth spurt, this bed is built to last. By pairing the solid frame with the appropriate shop-built accessories, this bed is able to grow with your kid from kindergarten through college.

Like previous Basic Build projects, the bed can be constructed from materials found at a home center. To ensure that it can withstand hard play and heavy sleepers, the ends are assembled using super-sturdy loose tenons. Similarly, the mattress frame is joined together with heavy-duty no-mortise bolting hardware.

The elevated platform offers a range of unique options. Initially, the height allows for a climbing ramp and slide to

make bedtime fun. The blackboard doubles as a safety rail to prevent late-night tumbles. Years from now, your child will discover that the space below offers storage, a valuable commodity in tiny dorm rooms and first apartments.

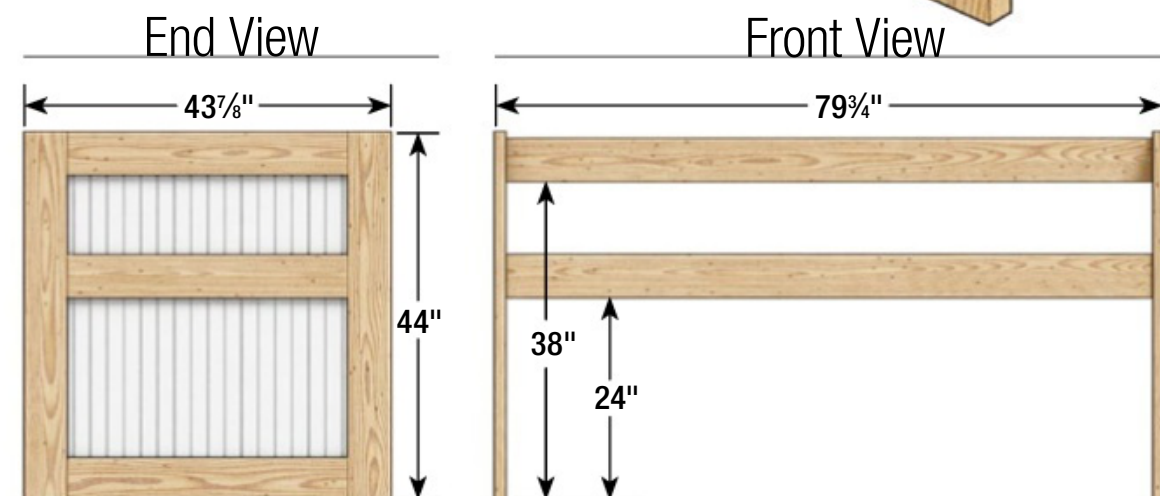
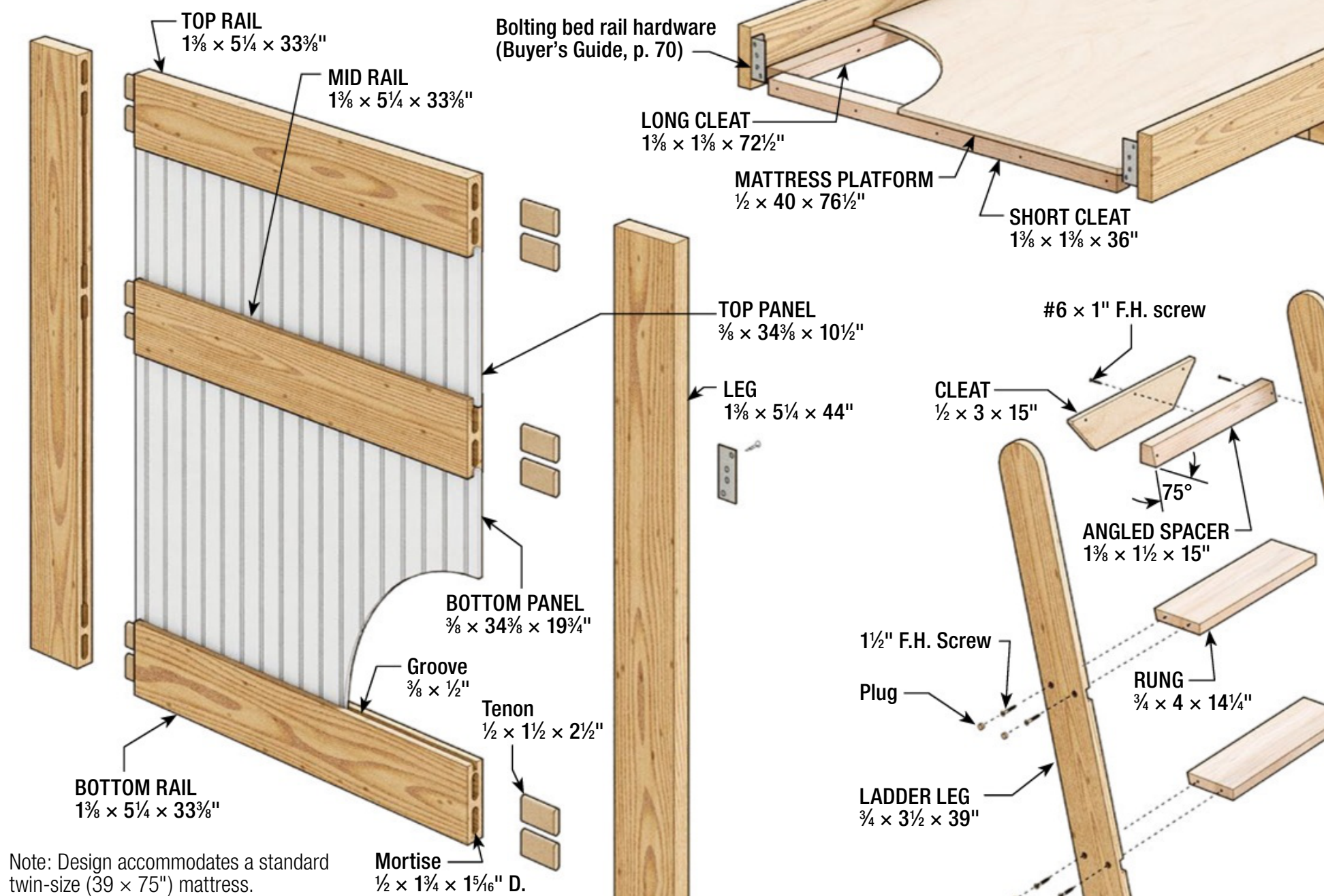


Little Kids

2×6's and no-mortise hardware make a rock-solid sleeper

This bed is a big project, but it's neither difficult nor expensive to build. The two end panels are joined with loose tenons. The bolt-together hardware used to secure the rails to the end assemblies ensures that the bed will remain rock-solid.

Most of the material needed for this project is available at your local home center (see Shopping List, below). Dry construction-grade 2 × 6 fir will suffice for this painted project, but be choosy: select the cleanest, straightest stock.



- SHOPPING LIST**
- ☐ (10) 8' - 2" × 6"
 - ☐ (1) 1/2" × 4' × 8' plywood
 - ☐ (1) 3/16" × 4' × 8' beaded white wall panel
 - ☐ (1) 1 × 6 × 8" hardwood board
 - ☐ Bed rail hardware
 - ☐ Paint



Prep makes perfect

Milling is often skipped in instructional text, but it may be the most important step in any successful project. Dressing the 2x6's used to make the end and side rails offers an opportunity to practice this essential woodworking skill.

First, cut the parts about 8" longer than final length. Next, flatten one face of a board. To do this, first joint the board with its bowed face oriented downward, and the grain running

downhill from the cutterhead. Then, straighten and square one edge, as shown.

Before thicknessing, set the boards alongside your planer, orienting them so that the cutterhead will be slicing with the grain to prevent tearout. Set the planer to shave no more than about $\frac{1}{16}$ ", and then feed the boards as shown. Once both faces are flat, start flipping the boards end-for-end and continue planing until reaching final thickness.



Joint a face and edge. Use a push pad to start the board on the infeed table. As soon as the leading end passes the cutterhead, focus your pressure on the outfeed table. As you near completion, hook the trailing end of the board with your pusher. To joint an edge, orient the jointed face against the fence. After passing the board over the cutterhead, use your front hand to press it against the fence as shown. Use your rear hand to maintain downward and forward pressure.



Plane train. With many planers, the cutter head shifts at the beginning and end of the cut, causing a dip, called "snipe." An easy way to control this miscut is by staggering your boards and butting the workpieces end to end.

Order of Work

- Mill the stock for the ends and rails.
- Make the mortising jig, then rout the legs and rails.
- Assemble the ends.
- Attach the hardware to the side rails and assemble the bed.
- Cut the mattress platform to fit.
- Paint and accessorize to suit.

onlineEXTRA

- Consumer Product Safety Commission Safety Standards for Bunk Beds
- Joinery Class: Loose Tenon Joinery
- Paint like a Pro

Make the headboard and footboard

Loose tenon joinery is a solid choice for a bed that's likely to see as much play as sleep. The machined joint offers large face-grain surfaces for glue, and great mechanical strength. To make the joints, you'll need a simple jig and a plunge router outfitted with a $\frac{1}{2}$ "-diameter upcut-spiral bit and a 1" O.D. bushing.

Build the jig as shown, then rout the bed rails and legs. The jig's sliding stop enables routing a pair of mortises with a $\frac{1}{2}$ " section between them. Next, make the loose tenons to fit, and assemble the end frames as shown on the facing page.

CLAMPING BOARD
 $1\frac{3}{8} \times 4\frac{1}{2} \times 17"$
(Install to platform so that slot centers on workpiece.)

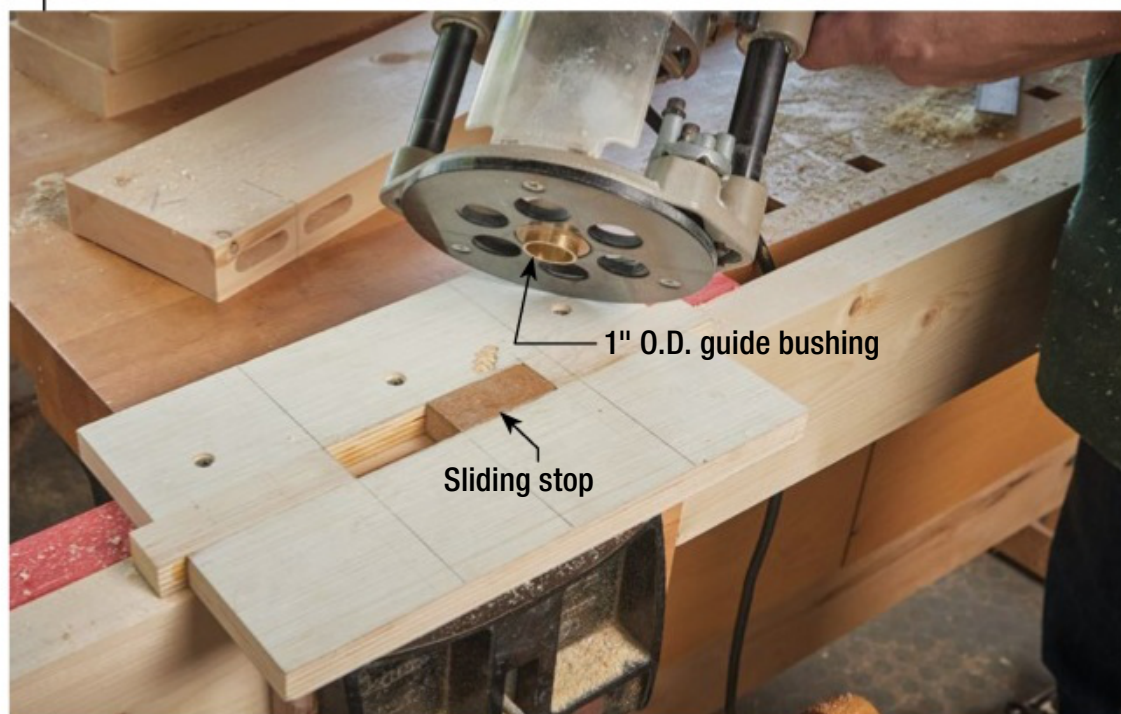
F.H. screw
#6 $\times 1\frac{3}{4}"$

Sliding Stop
 $\frac{3}{4} \times 1 \times 2\frac{1}{4}"$

CENTER STRIP
 $\frac{3}{4} \times 1 \times 4"$

PLATFORM HALF
 $\frac{3}{4} \times 3 \times 11"$

Notch for clamp access
 $1\frac{1}{2} \times 6"$



1" O.D. guide bushing

Sliding stop

Mortising the legs. Align the joint's centerline with the inner end of the sliding stop, and clamp the jig to the workpiece. For clean mortises, plunge-cut both ends to full depth, and then remove the waste between with a series of successively deeper cuts. After completing the first mortise, reposition the sliding stop, and rout its mate.



Mortising the rails. Align the mortise and jig centerlines, clamp the jig to the rail, and rout as before. To avoid part misalignment, orient the clamping board against the same faces (inner or outer) of each leg and rail.



Test piece

For stopped grooves, the edge guide has the edge. To create a centered groove to fit the undersized panels, use a $\frac{1}{4}"$ straight bit and rout from both faces. Take care that you don't groove the section between the twin tenons.



Tackle through grooves at the router table. Use the test piece routed in the previous step to set the bit and fence. Rout the first pass, then flip the stock so that the opposite face contacts the fence, and make a second pass for a perfectly centered groove.

Shop-made loose tenons: Make a snug-fitting strip, then cut to length



Round to fit. The 1½"-wide tenon stock is already narrower than the mortise length, but bullnosing the edges enables better shifting for lateral joint alignment. A table router outfitted with a ¼" roundover bit does the job.



Saw to length. Setting a standoff block against your rip fence creates a safe "fall-off" area for the freed tenons, preventing kickback.



Stick, slide, and squeeze.

The oversized beadboard panels are glued back-to-back, and then cut to fit. To avoid headaches, assemble the ends in stages. Attach the rails to one leg first. When dry, slide in the two-ply panels, insert the loose tenons and remaining leg, then apply clamping pressure.



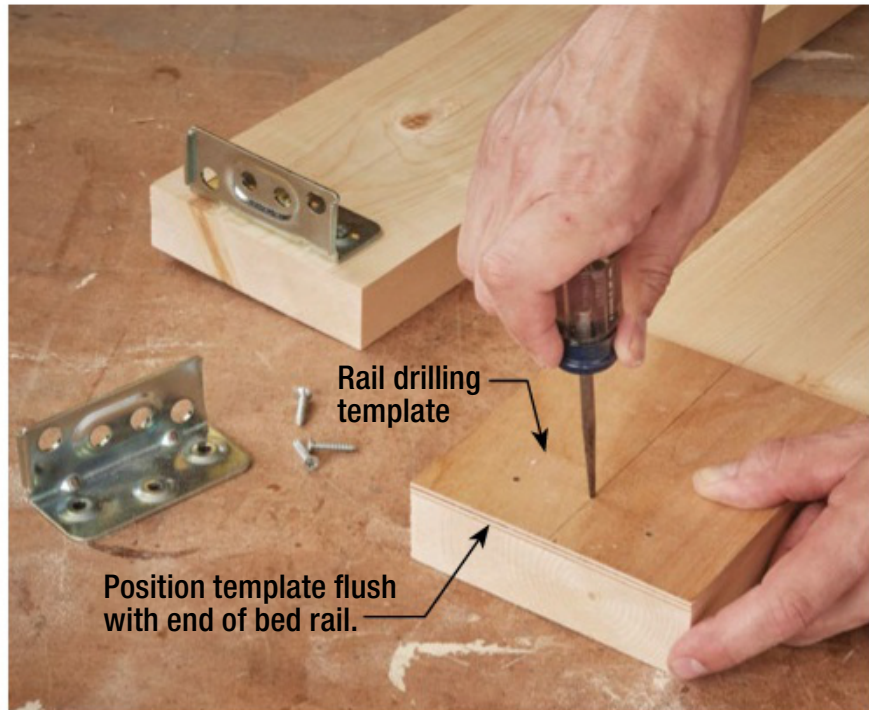
Add the rails and the mattress pad

Using no-mortise hardware to install the bed rails simplifies the assembly process, but it's not completely fool-proof. If the position of either half of the bolt-together hardware isn't spot-on, the holes won't line up. To ensure proper

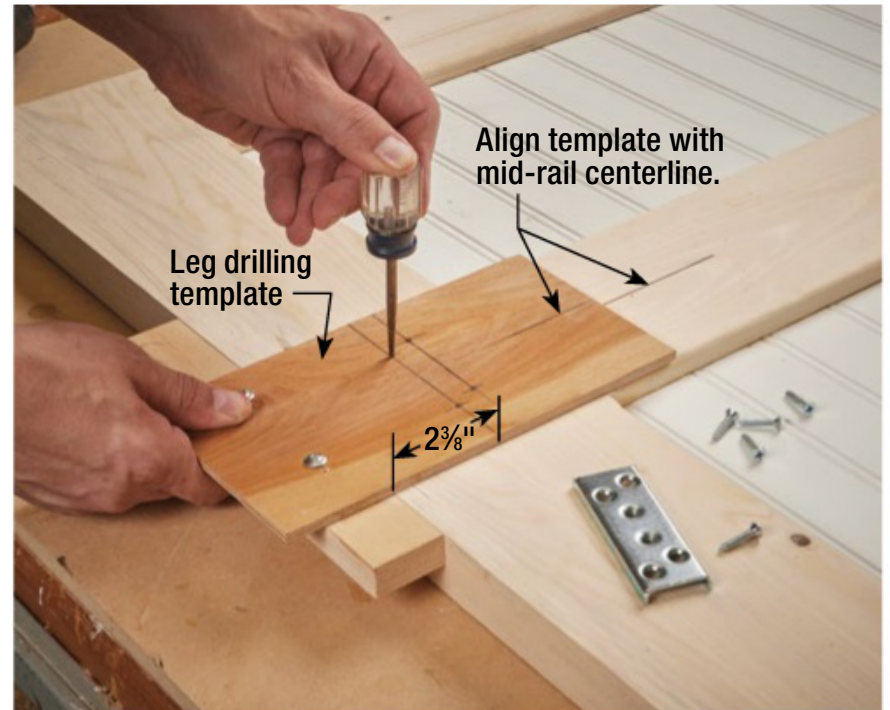
placement, I made a test corner, then used the location of the screw holes to create a pair of drilling templates.

The back rail serves as a back rest and safety rail, but because it provides only secondary reinforcement to the bed

frame, I opted to attach it with simple slide-lock brackets. This type of hardware is easier to install in place. Set the upper rail in place between the ends, and then screw the assembled hardware to the rail and legs, as shown.



Plywood positioner. The rail template ensures that the rails fit tightly against the end assemblies. Draw centerlines on the stock and jig to center the bracket on the rails.



Automatic offset. Center the leg template on the mid rail, and then use an awl to mark the screw hole locations on the leg. Attaching a fence to the template ensures that all four brackets have the same offset.



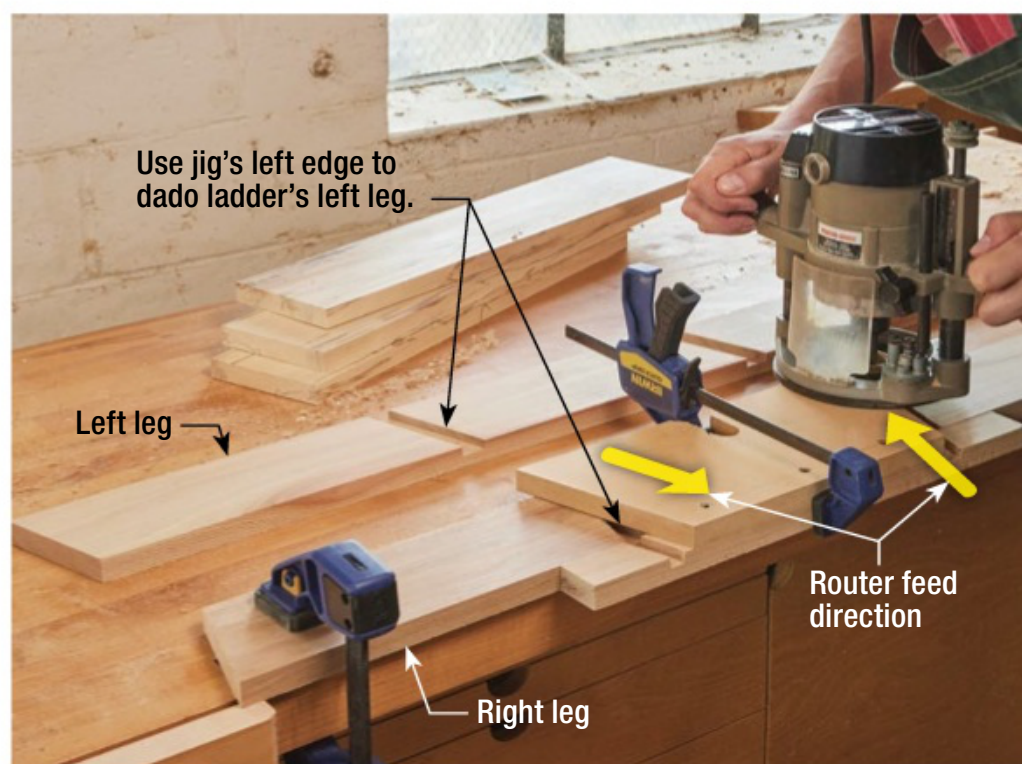
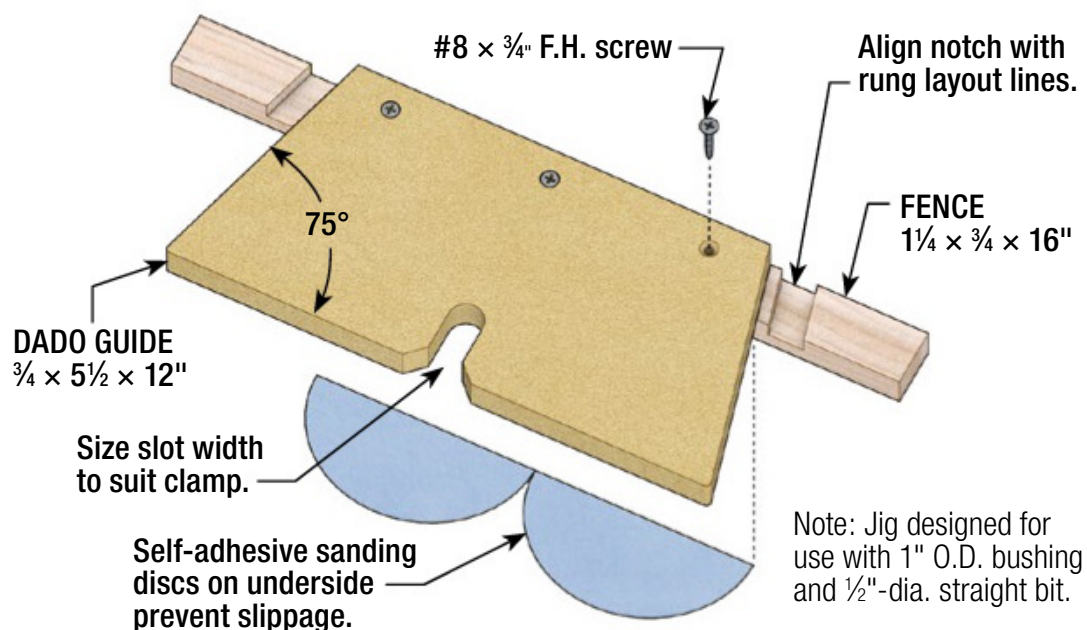
Test assembly. Triangular braces clamped to the end panels are a silent stand-in for a shop helper, supporting the rails during assembly. After installing all three rails, cut the cleats and mattress platform to fit.



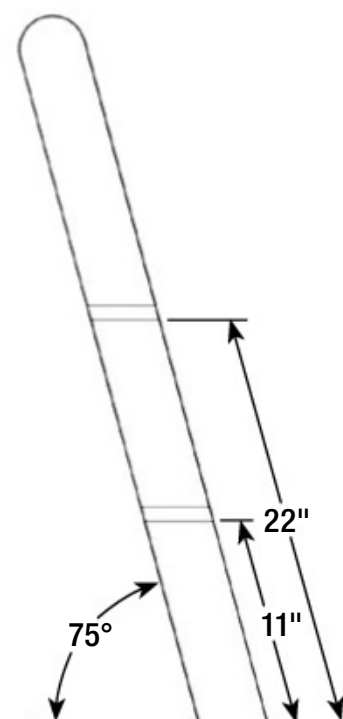
Slide-locking solution for the back rail. Attach the studded plate to the rail and the angled bracket to the leg. The cam-shaped holes cinch the two parts tightly together.

Make a ladder

A ladder helps short legs step up to the 30"-high mattress. I used sycamore, but any hardwood will suffice. To make the ladder, mill the stock, cut the legs to shape, and then lay out the rung dadoes. (Note that the legs are mirror images of each other; be careful not to make two rights or lefts.) To rout the dadoes, I made a jig that works with the same bit and bushing used to rout the frame mortises. To determine the location of the spacer and cleat, simply lean the finished ladder against the frame and install in place.



A double-edged jig for mirrored dadoes. Rout the right-leg dadoes with the jig fence against the front of the leg as shown. The left-leg dadoes were cut with the jig fence against the rear of the left leg, feeding the router in the opposite direction against the jig's left edge.



Finishing Touches

The secret to a good paint job is careful prep work. After filling knots and rounding over sharp corners, I sanded the parts through 180 grit, sprayed on a coat of primer, and then knocked down whiskers with 320-grit sandpaper.

After spraying on the main color, I masked the edges of the center panels and finished up with a brush. For additional protection, I top-coated the painted components with General Finish HP Flat.

Getting ready for bed. For smaller sections, a brush is faster than a spray gun. Taping off the center panels makes it easier to stay in the lines.

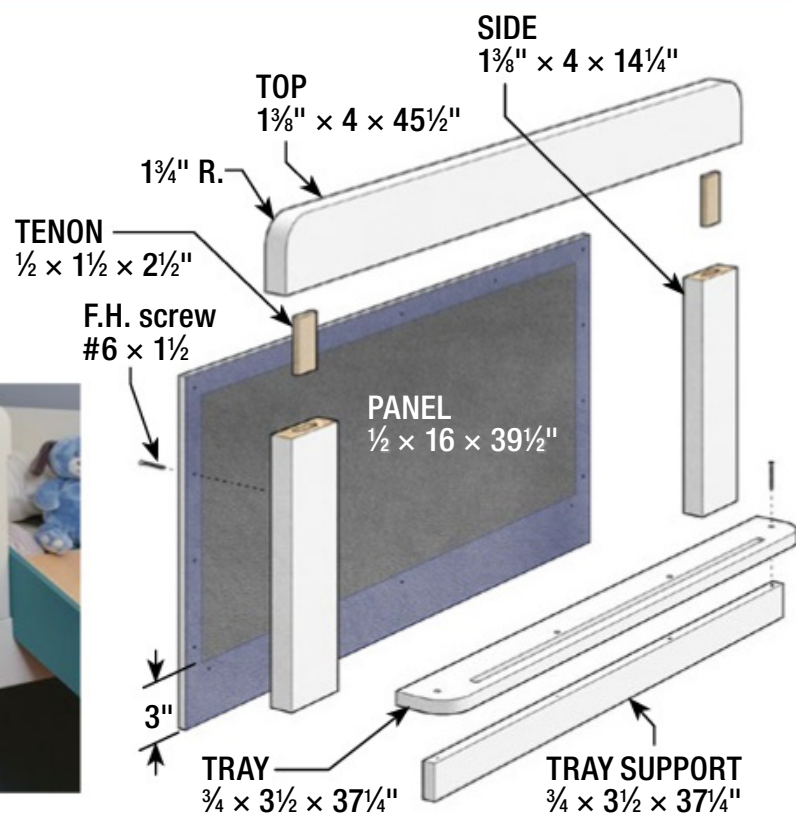


Design options

The bed can be a handsome addition to a child's room, but the accessories that you add will be the things that make childhood memories. Here are three easy-to-build options to consider. ■

Blackboard/Safety Rail

Use the mortising jig to join the top to the sides, then attach the blackboard-painted plywood panel. Screw the tray assembly to the front of the the bed rail, and the panel to the rear face of the rail.

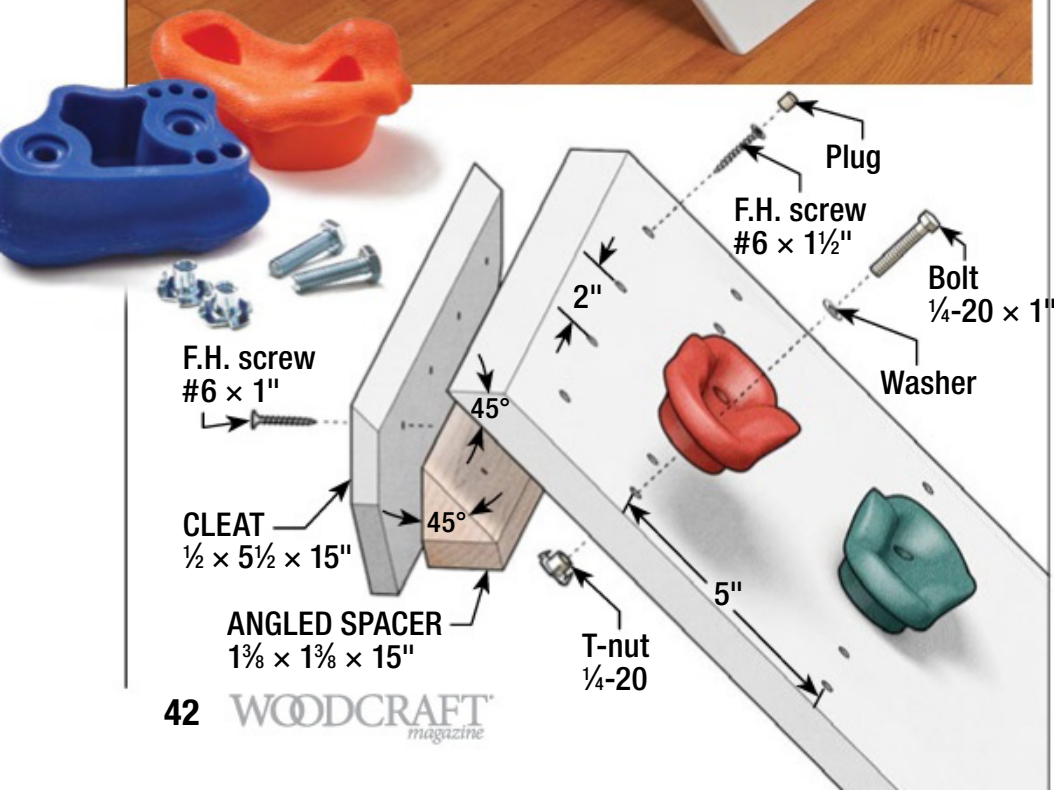


Rock Climbing Ramp

When kids outgrow this accessory, it can be attached to a wall for greater challenge. Make a drilling jig to match the rocks to ensure that they can be fit anyplace on the ramp.

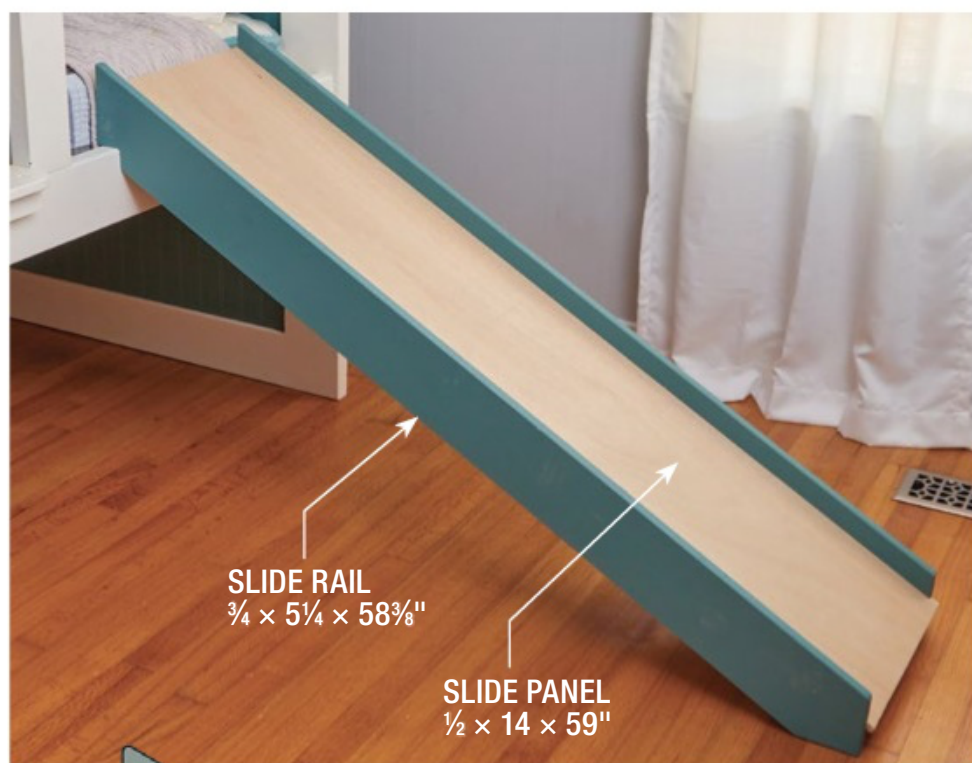


PLYWOOD CLIMBING RAMP
3/4 x 15 x 45 3/4"



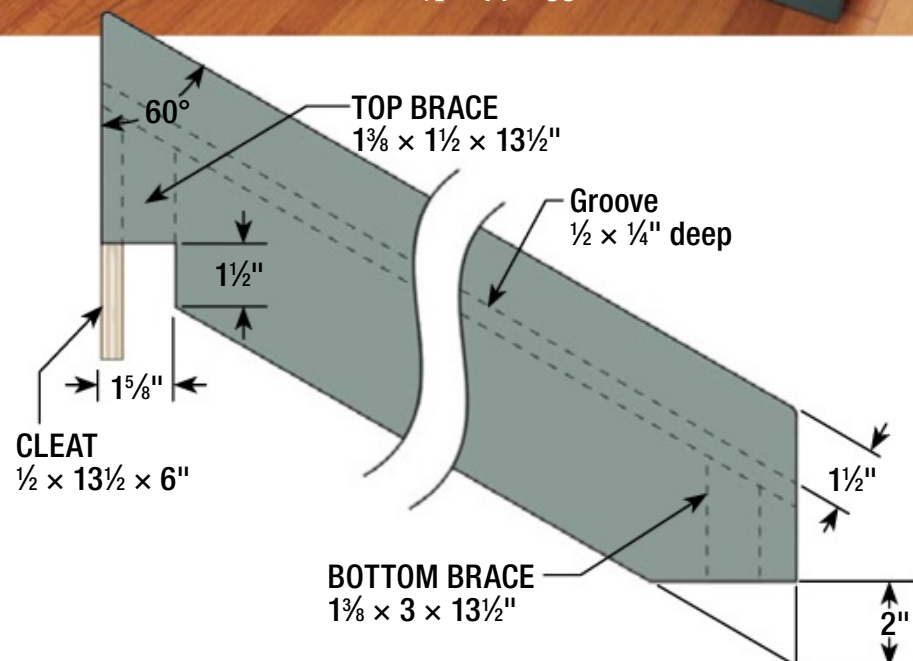
Simple Slide

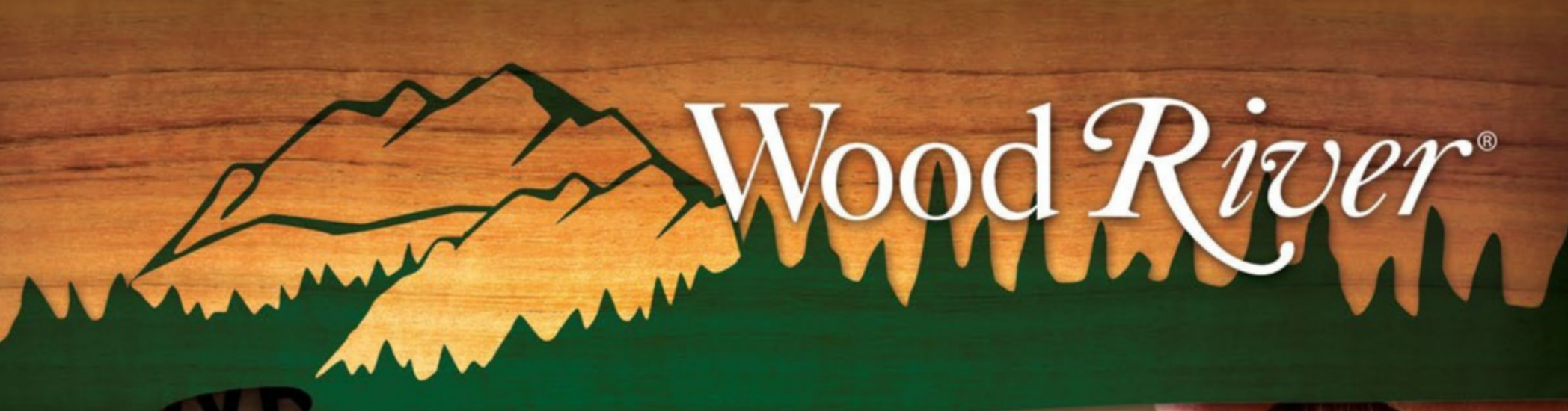
After grooving and notching the rails, attach them to the slide panel, then cut the cleat and braces to fit. Like the climbing ramp, the slide's top cleat hooks onto the bed rail.



SLIDE RAIL
3/4 x 5 1/4 x 58 3/8"

SLIDE PANEL
1/2 x 14 x 59"





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ROUTER TRAMMEL

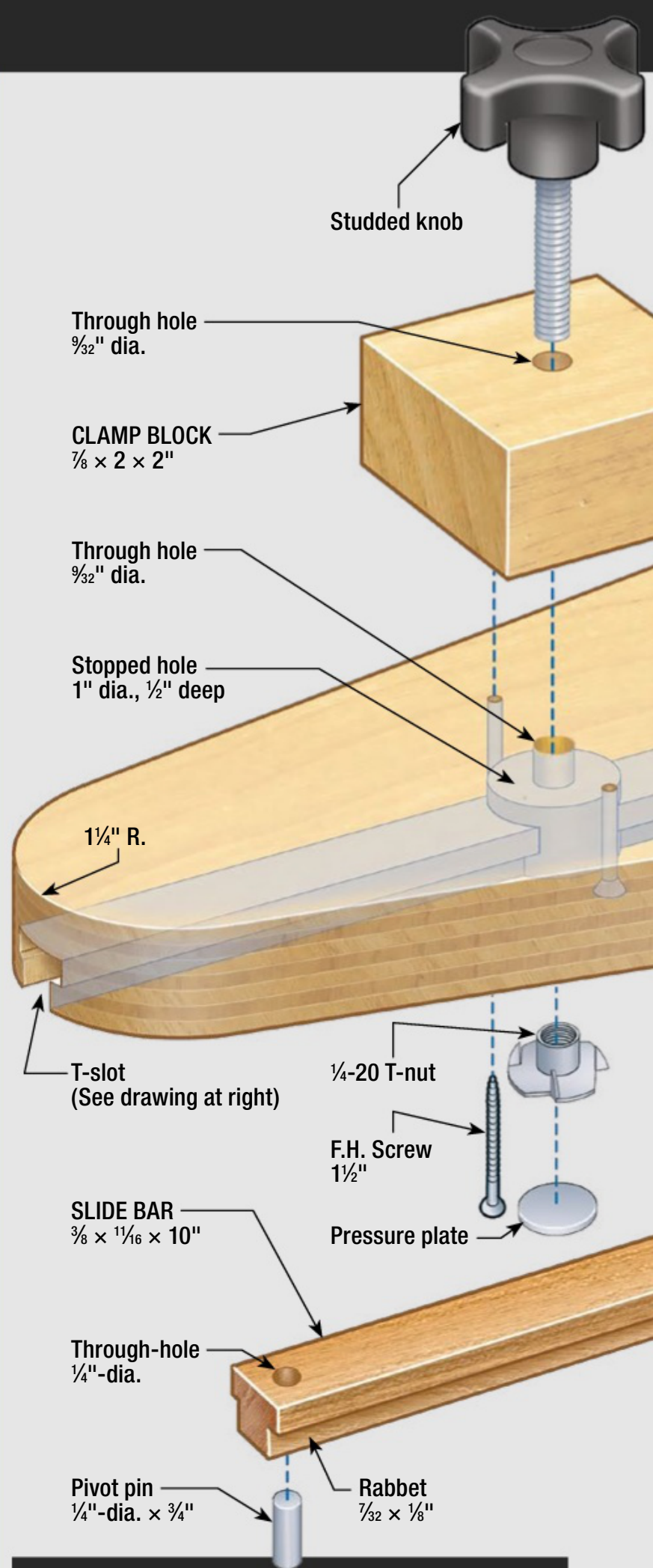
Versatility and precision built into an essential jig

By Ken Burton



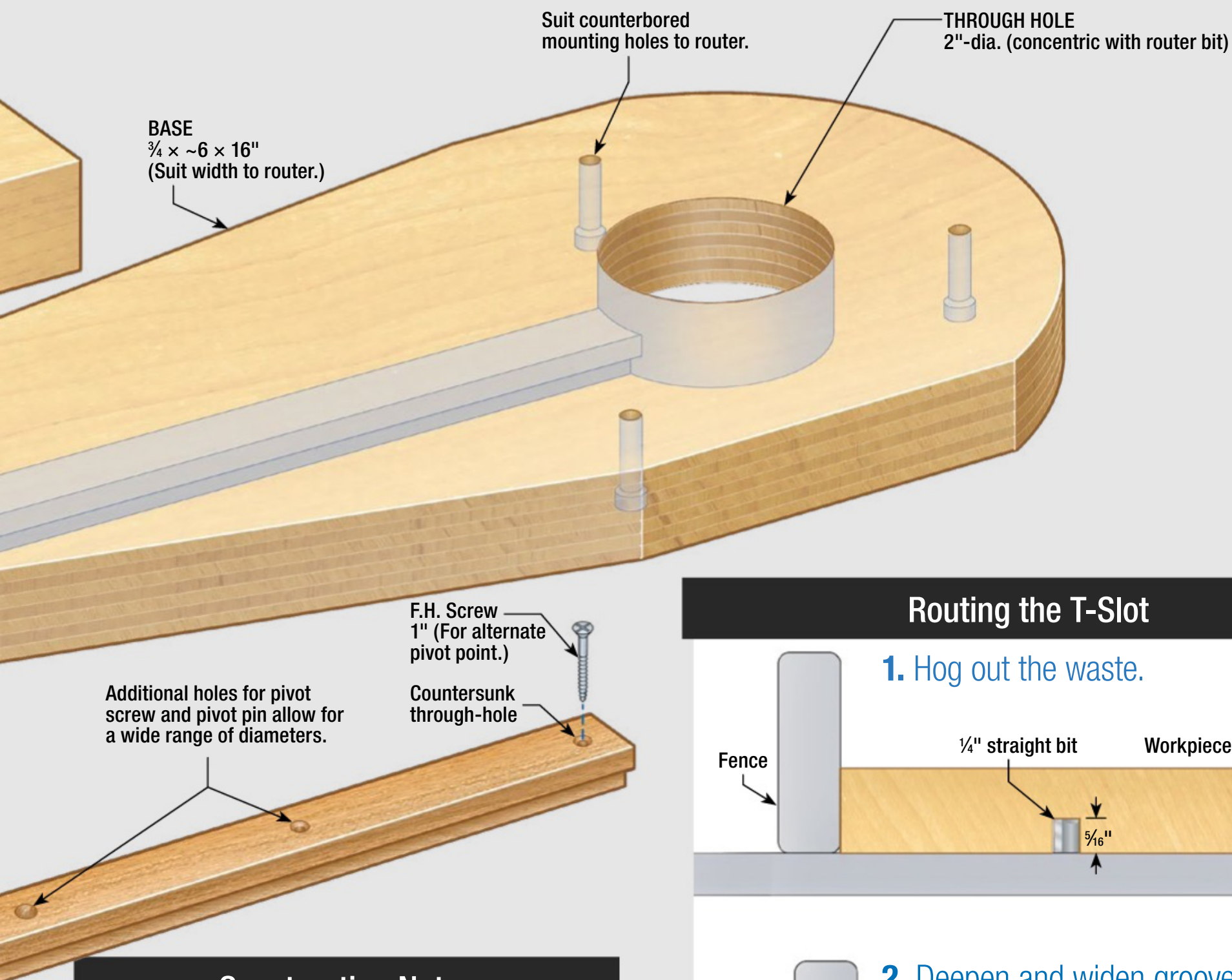
When it comes to routing circles, you need a trammel. While you can quickly make one from a simple strip of plywood, having a more durable, finely-adjustable version makes good sense if you cut more than just the occasional circle. Here's a design that has served me well over the years for cutting circles of all sizes. Its operation is based upon an offset auxiliary base that houses an adjustable sliding bar of any length that suits the job at hand. Unlike many commercial and shop-made models, this one is infinitely adjustable within its range, so it's dead-simple to set up for a precise radius. And you can use either a pin or a screw for your pivot point, whichever suits your workpiece better. As with many jigs, the exact dimensions aren't critical; adapt the design to fit your router and available materials. The jig is not hard to build, and I have provided a few construction tips to help.

Using it couldn't be simpler: Just attach it to your router, install the appropriate bit, and then set the desired distance from the bit to the pivot point. Locate the pivot point on the workpiece, and rout the circle in several shallow passes, pivoting the router counter-clockwise.



Trammel Anatomy

The 5/8"- or 3/4"-thick base includes a T-slot that houses a wooden T-shaped slide bar of any length to suit the job at hand. Appropriately located holes drilled through the bar accommodate either a pin or screw as a pivot point. A studed lock knob extending through a clamp block and T-nut applies pressure against the bar to lock it in place. A nickel or a round electrical box knock-out sandwiched in between serves as a pressure plate.



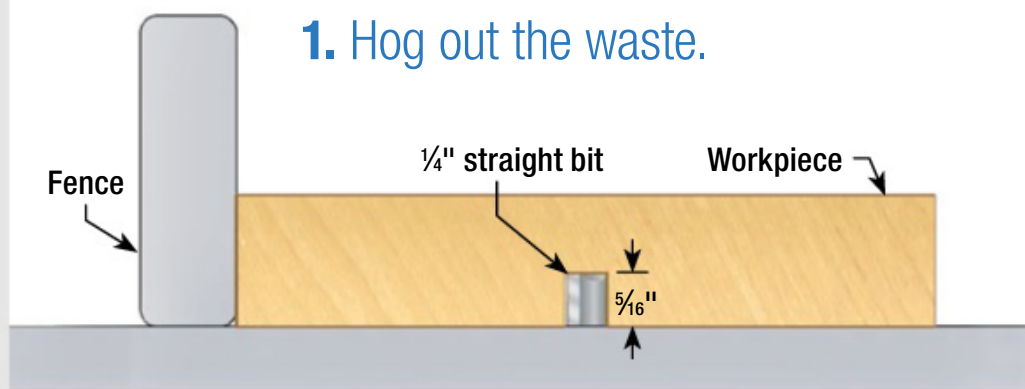
Construction Notes

Begin with a rectangular plywood panel whose width matches your router base. Mount it to your router, trace the base profile, and mark the collet center. Dismount the base, and lay out and drill the 2"-diameter hole, centered on the collet. Then rout the T-slot as shown, centering it on the hole. Drill the 1"-diameter counterbore for the T-nut in the bottom, glue the clamp block to the top side, and drill a $\frac{9}{32}$ " hole through the clamp block at the center of the T-nut hole. Shape the profile of the base, tapering it as shown, and ease the edges with sandpaper.

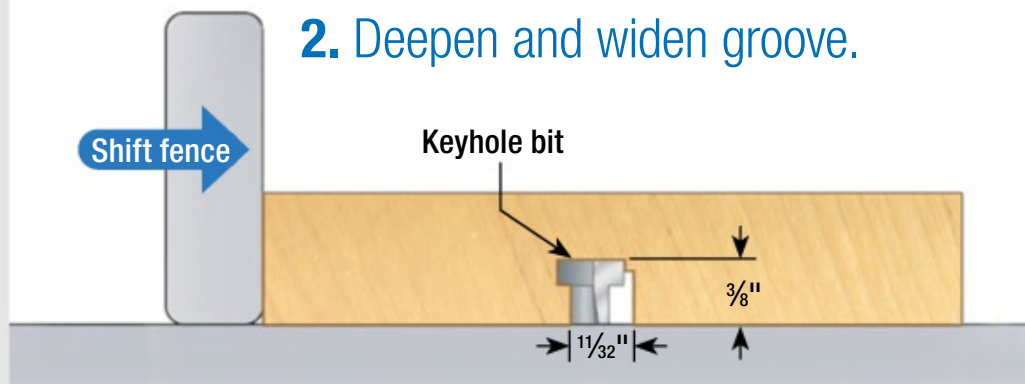
Mill the slide bar material from maple or other stiff, strong hardwood, making enough for a couple long spares too. Then rabbet the material to fit the T-slot. For starters, drill one end of each slider for a $\frac{1}{4}$ "-diameter pivot pin, and the other end to accept a screw. Add other holes as particular jobs demand. ■

Routing the T-Slot

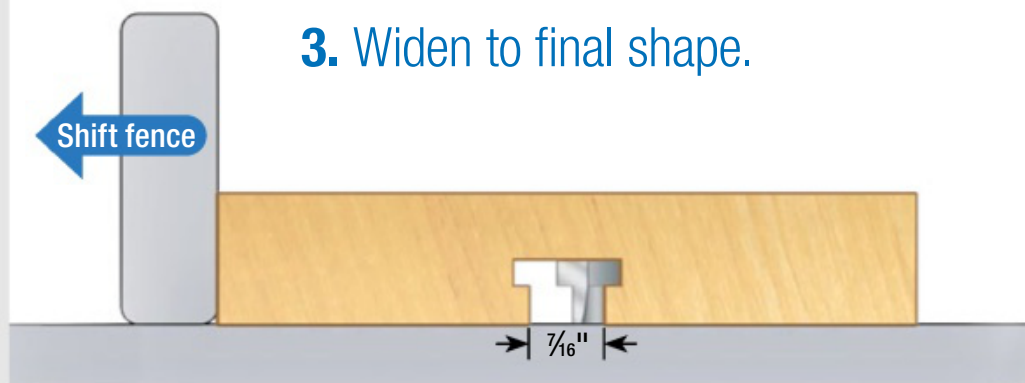
1. Hog out the waste.



2. Deepen and widen groove.



3. Widen to final shape.

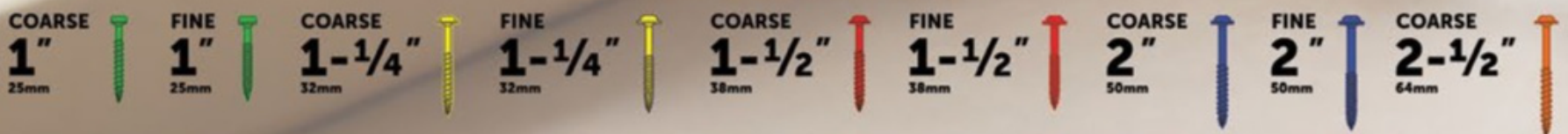


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TWO-SIDED GAMEBOARD

Double the unplugged fun

By Ken Burton



In these days of smart phones and video game consoles, it's easy to forget there are a lot of classic games out there that *don't* require electricity, are lots of fun, and involve some real personal interaction. This double-sided game board has provisions for three such games. One side features a sixty-four square grid for checkers or chess, while the other side is drilled for Chinese checkers. For those unfamiliar with Chinese checkers, the object is to move all your marbles from one side of the board to the other before your opponent(s) can move theirs. The com-

plete rules are available on our website.

Making the board is a straightforward affair that involves carefully constructing some templates and then using them to rout the holes and lines that create the playing areas. Take your time when making the templates so the subsequent cuts are crisp and uniform.

The checkerboard grid is colored with TransTint dyes. These concentrated dyes are mixed with alcohol and make coloring wood a cinch. The routed lines between the squares are painted first to make it easier to keep the colors only where you want them.

I've made several dozen of these boards and find they make excellent gifts for youngsters and newlyweds alike.

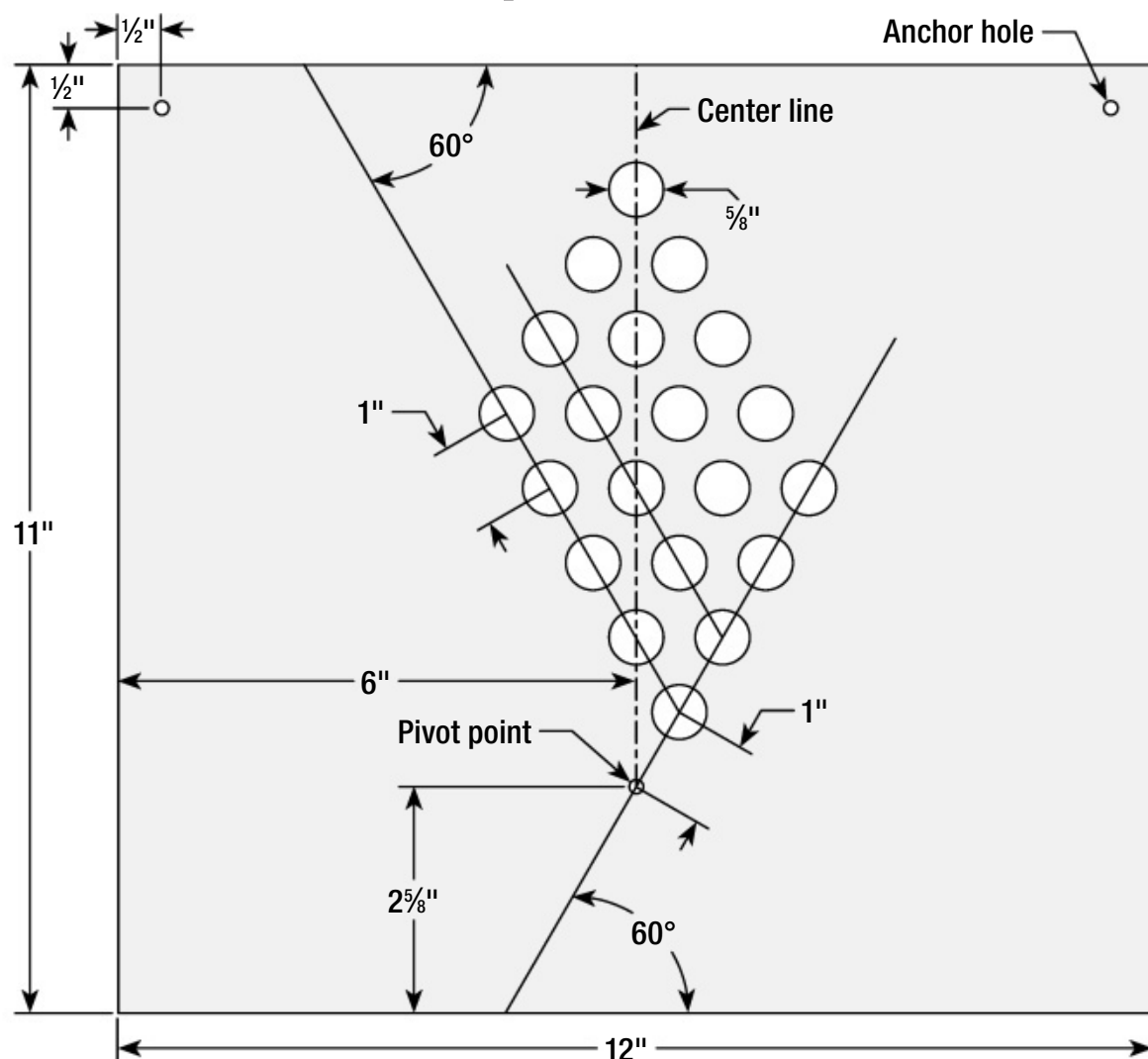


Order of Work

- Make the Chinese checkers template and prepare the blank
- Rout the Chinese checkers holes
- Make the checkerboard template
- Rout the checkerboard grid
- Cut the board round
- Paint the lines and dye the squares

Make the Chinese checkers template

Rather than making a template for the entire Chinese checkers board, it is easier to make a template for $\frac{1}{6}$ of the board (just 20 holes) and then rotate it as you rout all the holes for play. Make your template from an 11×12 " piece of $\frac{1}{2}$ " sheet material such as MDF or Baltic Birch plywood. Lay out the holes as shown, and extend the center line down the outer edge of the template. Drill the pivot point and the two anchor holes with a $\frac{5}{32}$ " bradpoint bit and countersink them so the heads of the mounting screws will sit below the surface. Drill all the remaining holes with a $\frac{5}{8}$ " bradpoint drill bit.



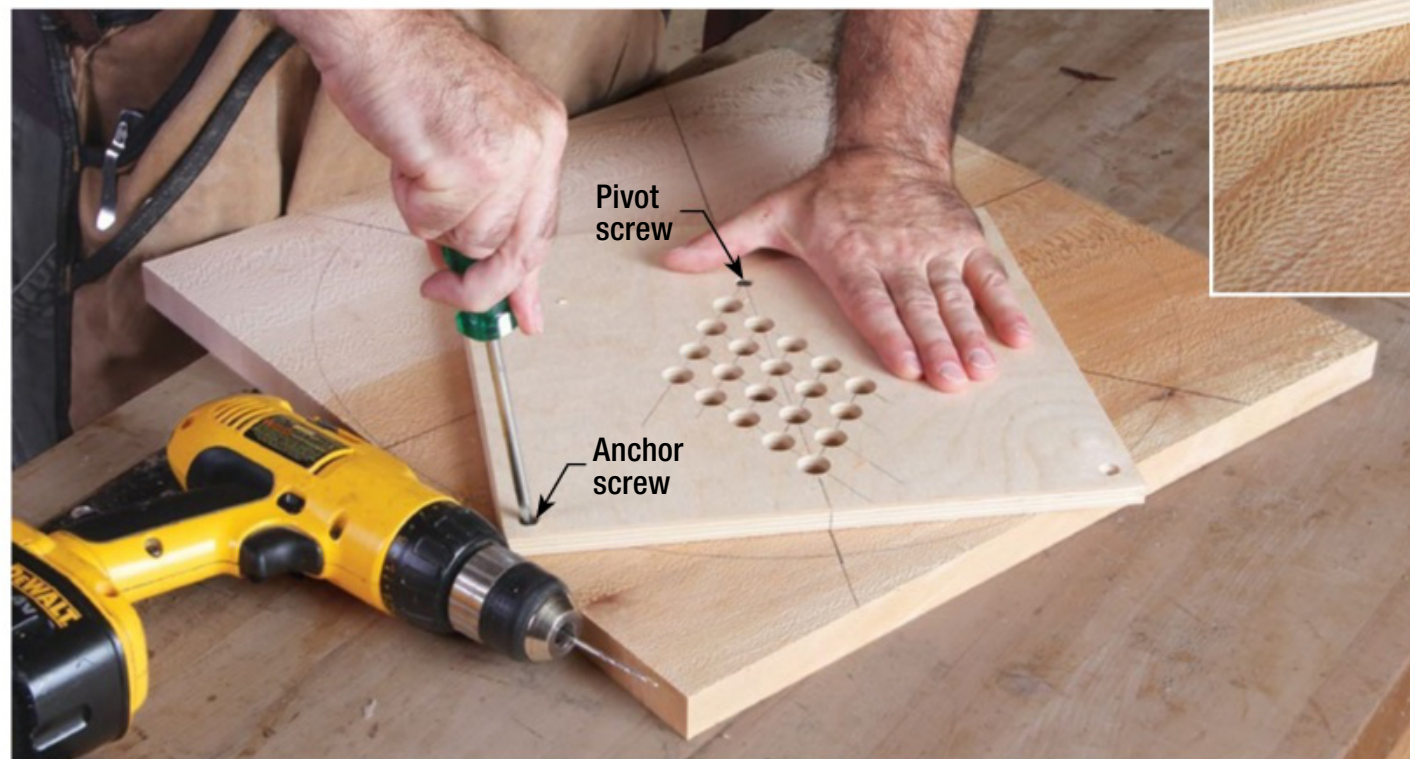
Prepare the blank

Mill and edge-glue enough $\frac{5}{4}$ stock to make up a piece that is $18\frac{1}{2}$ " square $\times$ 1" thick. Try to find quartersawn stock, as it will help keep your gameboard flat for years to come. The gameboards in the photos are made from quartersawn sycamore, which displays striking figure. (See WoodSense on page 64.) Once your piece is cut to size and sanded flat, mark the center of the Chinese checkers side. Work accurately, as any error will ultimately result in the checkerboard on the opposite side being off center. On the Chinese checkers side, lay out six equally spaced radial lines to use as alignment marks for the template. Use a compass to draw an $18\frac{1}{4}$ "-diameter circle to lay out the finished shape of the board.



Rout the holes

Drill a $\frac{1}{8}$ "-diameter $\times$ $\frac{3}{4}$ "-deep pilot hole at the pivot point you marked. Fasten the template to the blank with a 1" screw as shown. Chuck a $\frac{1}{2}$ " core box bit in your plunge router and mount a $\frac{5}{8}$ " O.D. guide bushing on the base. Rout each 20-hole section in turn as shown until all the holes are done.

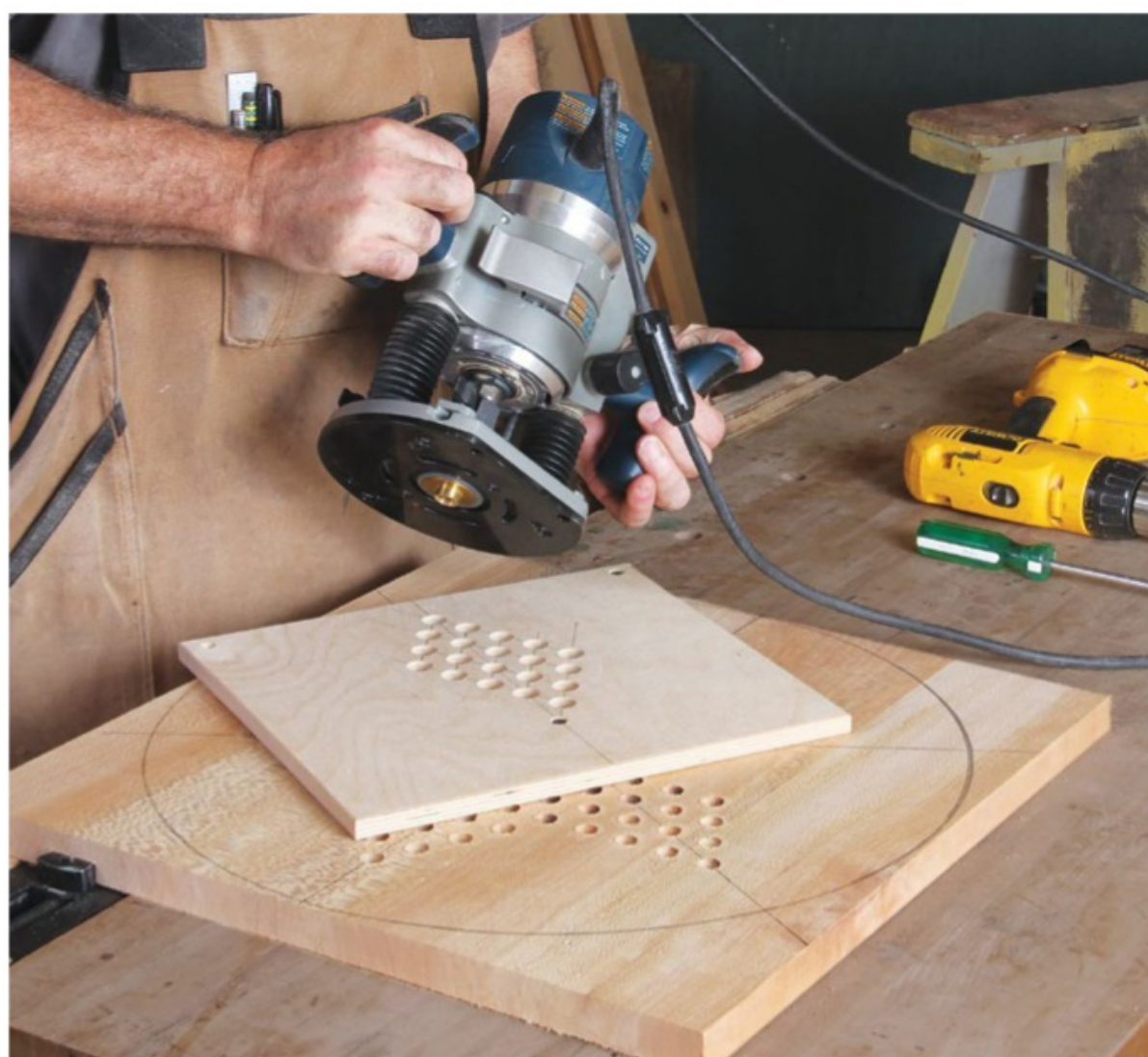


Align the template.

Line up the template's center line with a radial line on the blank. Drill a pilot hole for an anchor screw, and secure the template in place.



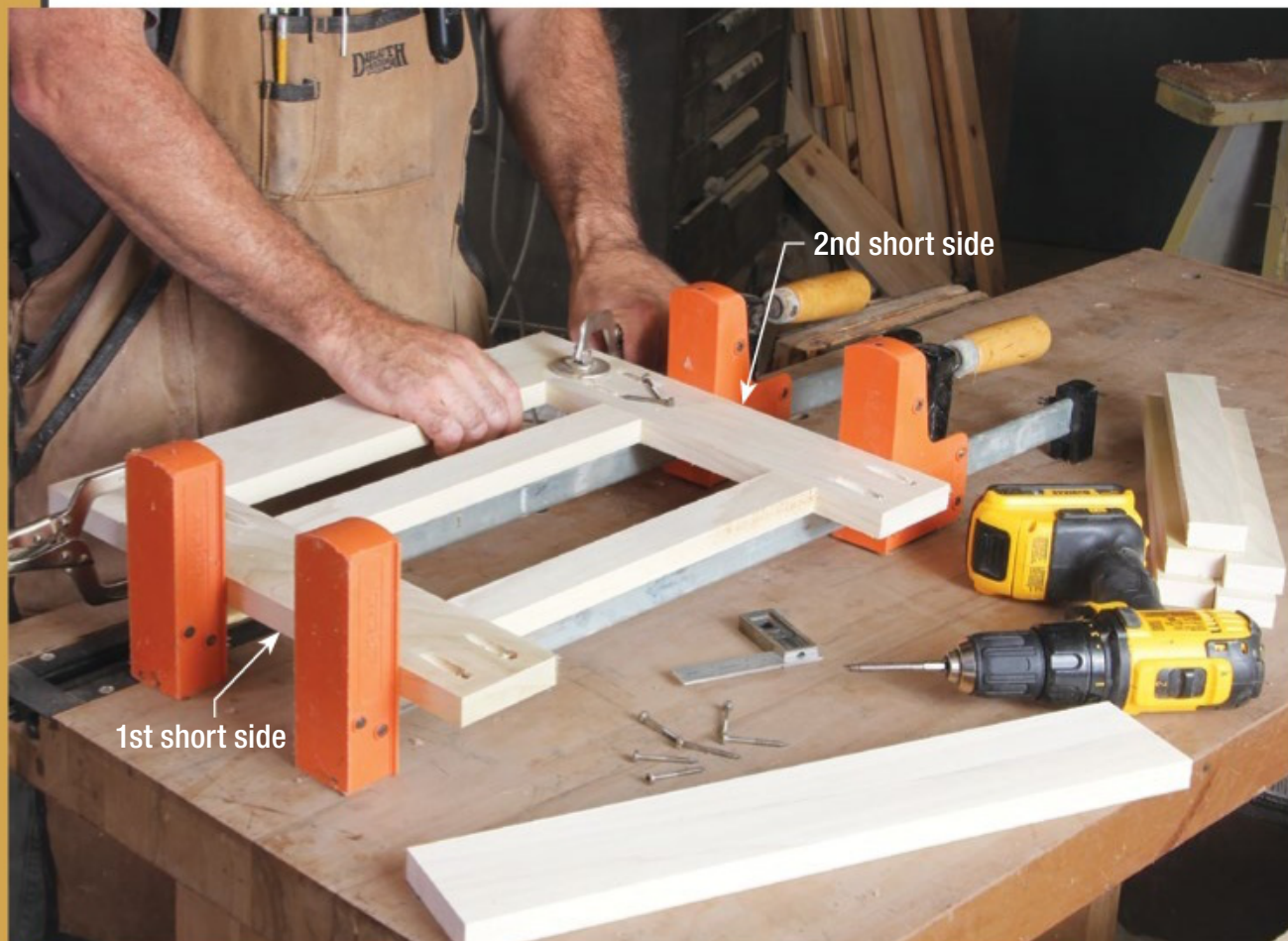
Check for center. Double-check that the guide bushing is concentric to the bit, adjusting the router base if necessary. Set the plunge mechanism for a $\frac{1}{4}$ "-deep cut.



Rout and rotate. Rout each of the six 20-hole sections in turn. After completing each section, rotate the template, align it with the next radial line, and secure it with an anchor screw. Before moving the template, double check that you have routed all twenty holes—it's easy to miss one.

Make the checkerboard template

The checkerboard grid is also template-routed, but using a different bushing/bit combination. The template consists of a frame made from two $\frac{3}{4} \times 3\frac{1}{16} \times 12\frac{3}{8}$ " pieces that are joined to two $\frac{3}{4} \times 3\frac{1}{16} \times 18\frac{1}{2}$ " pieces. Seven $\frac{3}{4} \times 1\frac{1}{2} \times 12\frac{3}{8}$ " spacers complete the set-up. Use a stop block to ensure that the shorter pieces are the exact same length. Note that the sizing of these pieces is critical to the spacing of your grid lines. Take the time to cut them exactly as specified.



Assemble the frame. Pocket screw the frame pieces together. To ensure the inside opening is truly square, clamp two of the spacers between the short sides before attaching the second short side as shown here.



Level the corners. Trim the joints with a block plane to flush the surfaces. Irregularities can result in router cuts of inconsistent depth and width.

Rout the grid lines

Screw the template frame to the checkerboard side of the blank with a $1\frac{1}{2}$ " screw at each corner. To prevent tearout at the corners of the squares, it is important that you rout the crossgrain grid lines first. Chuck a $\frac{1}{8}$ " roundnose bit in your router and add a $\frac{3}{8}$ " O.D. guide bushing to the router base. Check for concentricity and adjust if necessary. Set the depth of cut to $\frac{3}{32}$ " and rout all the grooves as shown.

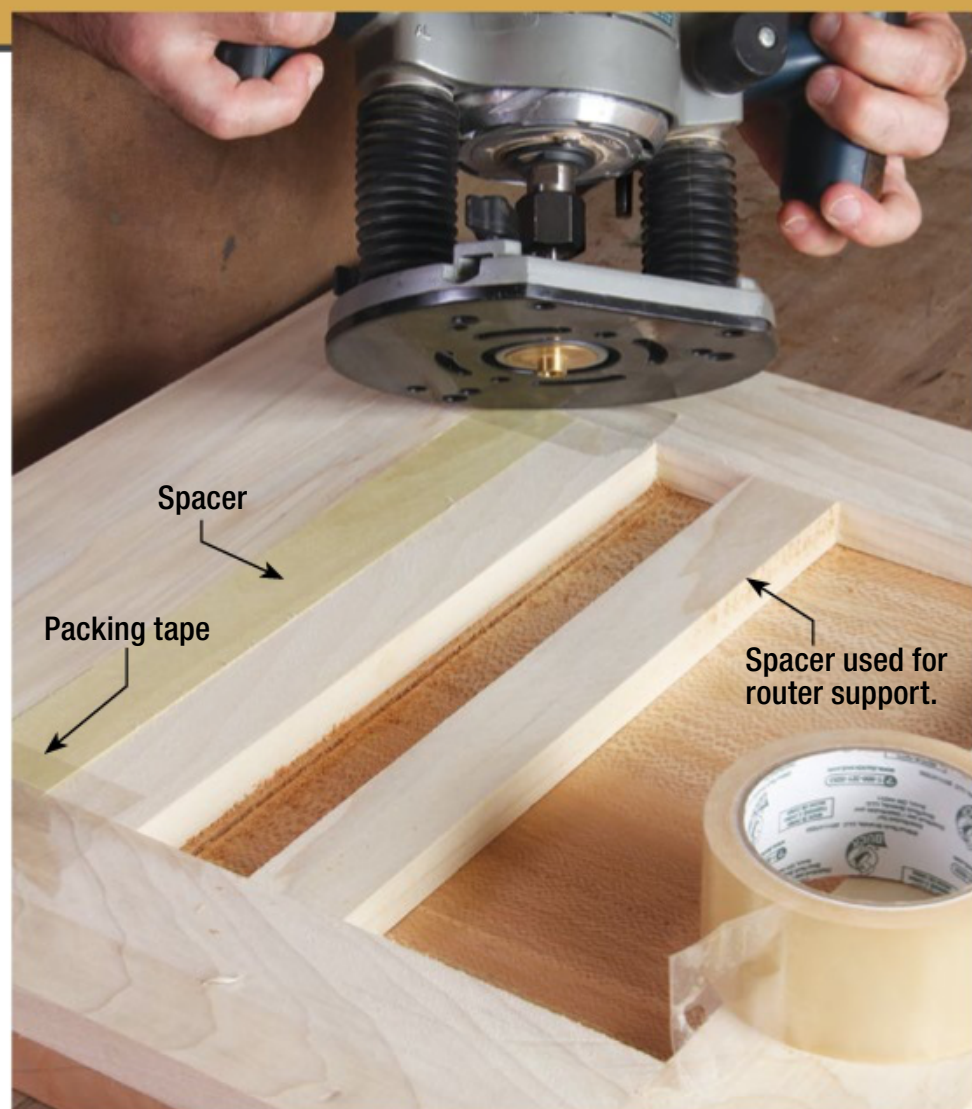


Finish with the grain. The procedure is the same for making the long grain cuts. If the spacers get stuck in place, drive in a screw "pull" (inset) rather than risking pry bar damage.





Outermost crosscuts first. Rout the crossgrain grooves first, beginning with the outermost cuts. Feed against the template frame edges, using a spacer for extra router support.

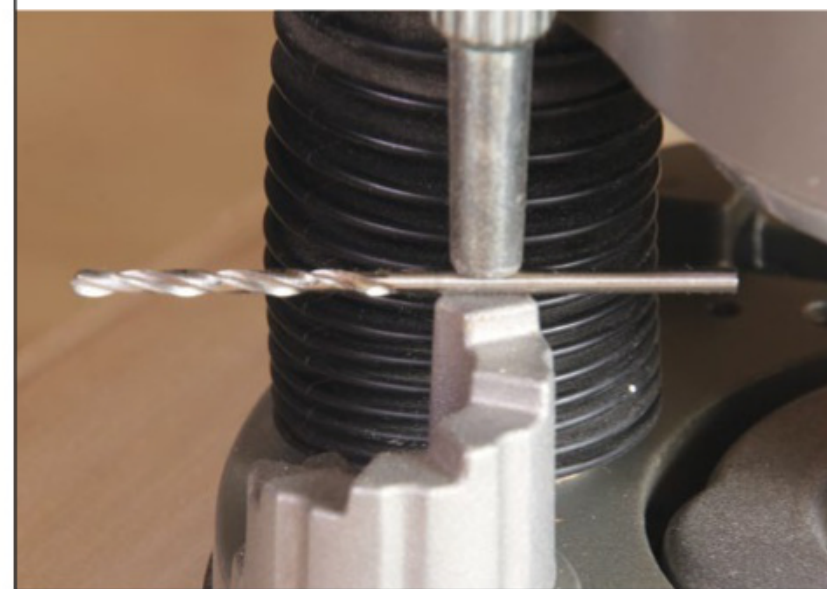


Complete the crosscuts. To rout each additional crosscut, add a spacer, securing it in place with packing tape.



Precise Depth Control

To set your router to cut a certain depth, zero the bit on the surface of your workpiece, then trap a drill bit of the appropriate diameter under the turret.



onlineEXTRA

- Chinese Checkers rules
- Downloadable template pattern
- DXF and Crv3d files for cutting the boards with your CNC machine

Shape and color to wrap it up

Cut the board round. Bandsaw a bit shy of your perimeter line, and then rout to exact shape with a router trammel. (See p. 44.) Finish shaping the piece by profiling the edges with a $\frac{1}{4}$ " roundover bit. Then rout the final hole in the center of the Chinese checkers board as shown. Paint the grid lines on the checkerboard, and dye the squares before applying several coats of your favorite finish. I used an alcohol-based dye (See Buyer's Guide on page 70.) followed by three coats of aerosol lacquer. ■



Round rout. Use the center hole in the Chinese checkers board as the pivot point for a router trammel set for a $9\frac{1}{8}$ " radius. Clean up the bandsaw cut in several successively deeper passes, rotating the router counter-clockwise.



Rout the center hole. Reinstall the $\frac{1}{8}$ " roundnose bit, and locate it over the center of the Chinese checkers board. With the router unplugged, lower the bit until it engages the screw hole, and then corral the router between clamped boards. Switch out the $\frac{1}{8}$ " bit for the $\frac{1}{2}$ " core box bit, and rout the final hole. Plug the screw hole in its bottom with a bit of dowel, and recut with the core box bit to clean everything up.



Paint the lines. Clean up any fuzzies on the checkerboard grid lines with a small folded piece of fine sandpaper. Paint the lines with a fine-tipped brush and artists' dark acrylic paint. (I used mars black.) Try to be neat, but don't worry if you get paint on the surface.



Dying to play. Sand the checkerboard to clean up any errant paint. Pour about an inch of alcohol into a short, wide-mouth jar, and add a squirt of alcohol-based dye. Test the mix on scrap, and add dye (a few drops at a time) or alcohol until you like the intensity of the color. Dye every other square on the checkerboard, using a cotton-tipped swab as an applicator. Mark the alternate squares with masking tape to prevent confusion. (Don't ask...) You can dye the alternate squares a contrasting color or simply leave them natural.

Finial Twist Ballpoint Pen Kits

Kit requires a pen blank, $\frac{13}{32}$ " pen maker's bit, bushings, and pen mandrel, all sold separately.

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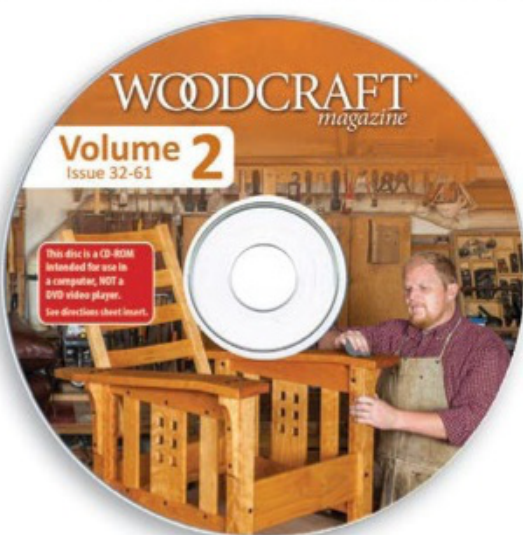
Decorative Band Pattern

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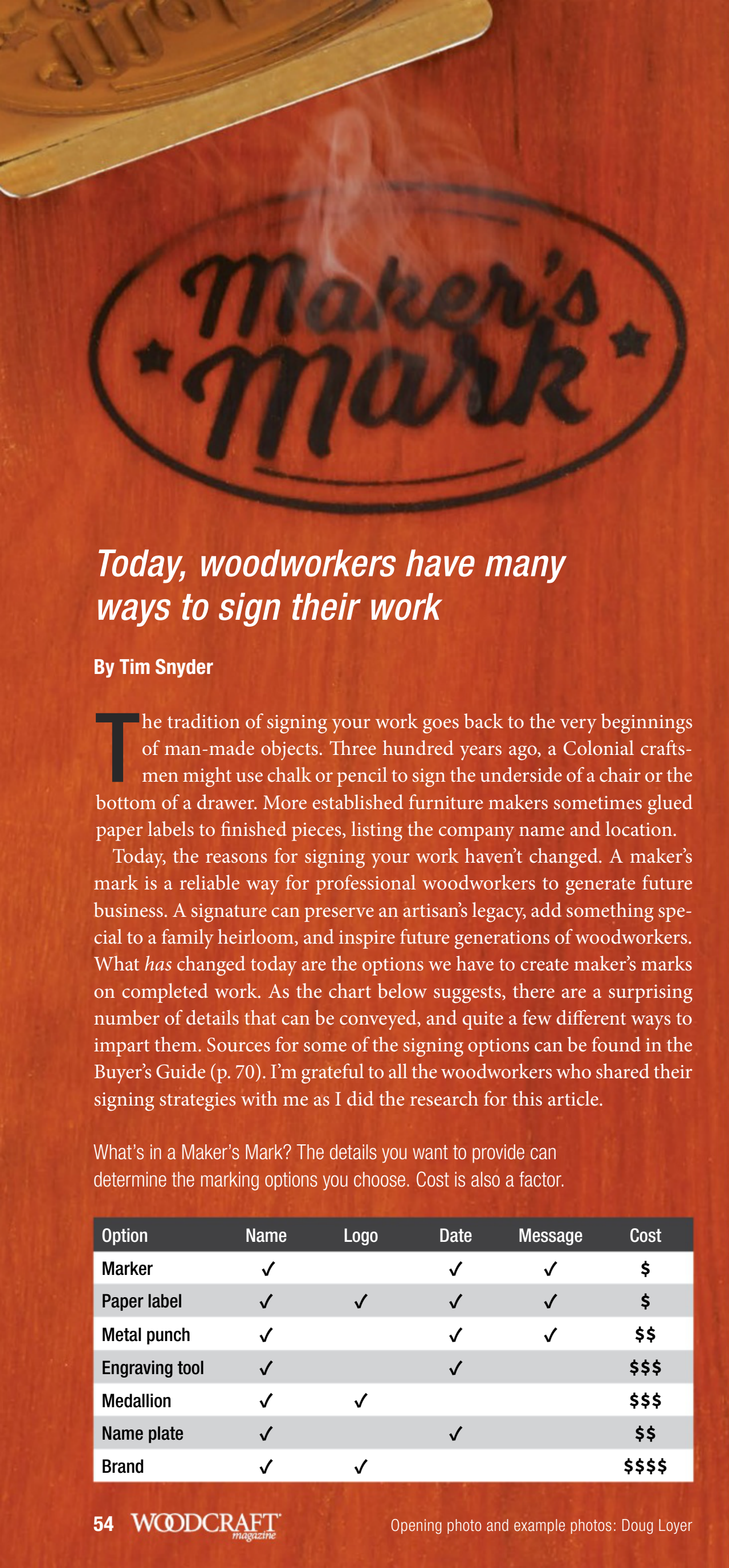


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Today, woodworkers have many ways to sign their work

By Tim Snyder

The tradition of signing your work goes back to the very beginnings of man-made objects. Three hundred years ago, a Colonial craftsman might use chalk or pencil to sign the underside of a chair or the bottom of a drawer. More established furniture makers sometimes glued paper labels to finished pieces, listing the company name and location. Today, the reasons for signing your work haven't changed. A maker's mark is a reliable way for professional woodworkers to generate future business. A signature can preserve an artisan's legacy, add something special to a family heirloom, and inspire future generations of woodworkers. What *has* changed today are the options we have to create maker's marks on completed work. As the chart below suggests, there are a surprising number of details that can be conveyed, and quite a few different ways to impart them. Sources for some of the signing options can be found in the Buyer's Guide (p. 70). I'm grateful to all the woodworkers who shared their signing strategies with me as I did the research for this article.

What's in a Maker's Mark? The details you want to provide can determine the marking options you choose. Cost is also a factor.

Option	Name	Logo	Date	Message	Cost
Marker	✓		✓	✓	\$
Paper label	✓	✓	✓	✓	\$
Metal punch	✓		✓	✓	\$\$
Engraving tool	✓		✓		\$\$\$
Medallion	✓	✓			\$\$\$
Name plate	✓		✓		\$\$
Brand	✓	✓			\$\$\$\$

MARKER

Fast, affordable, flexible, and permanent

If Colonial-era craftsmen had access to permanent markers, it's a sure bet they would have used them instead of pencil or chalk. Permanent markers are inexpensive and available to write in different line weights. Of course, a Sharpie-signed piece lacks the formality and class of some other options. But your flexibility in penning a personalized message can be a great advantage. A Sharpie message can always be put down alongside a branded imprint or inset medallion, providing special occasion details next to a more expensive maker's mark.

PAPER LABEL

Easy to customize and apply

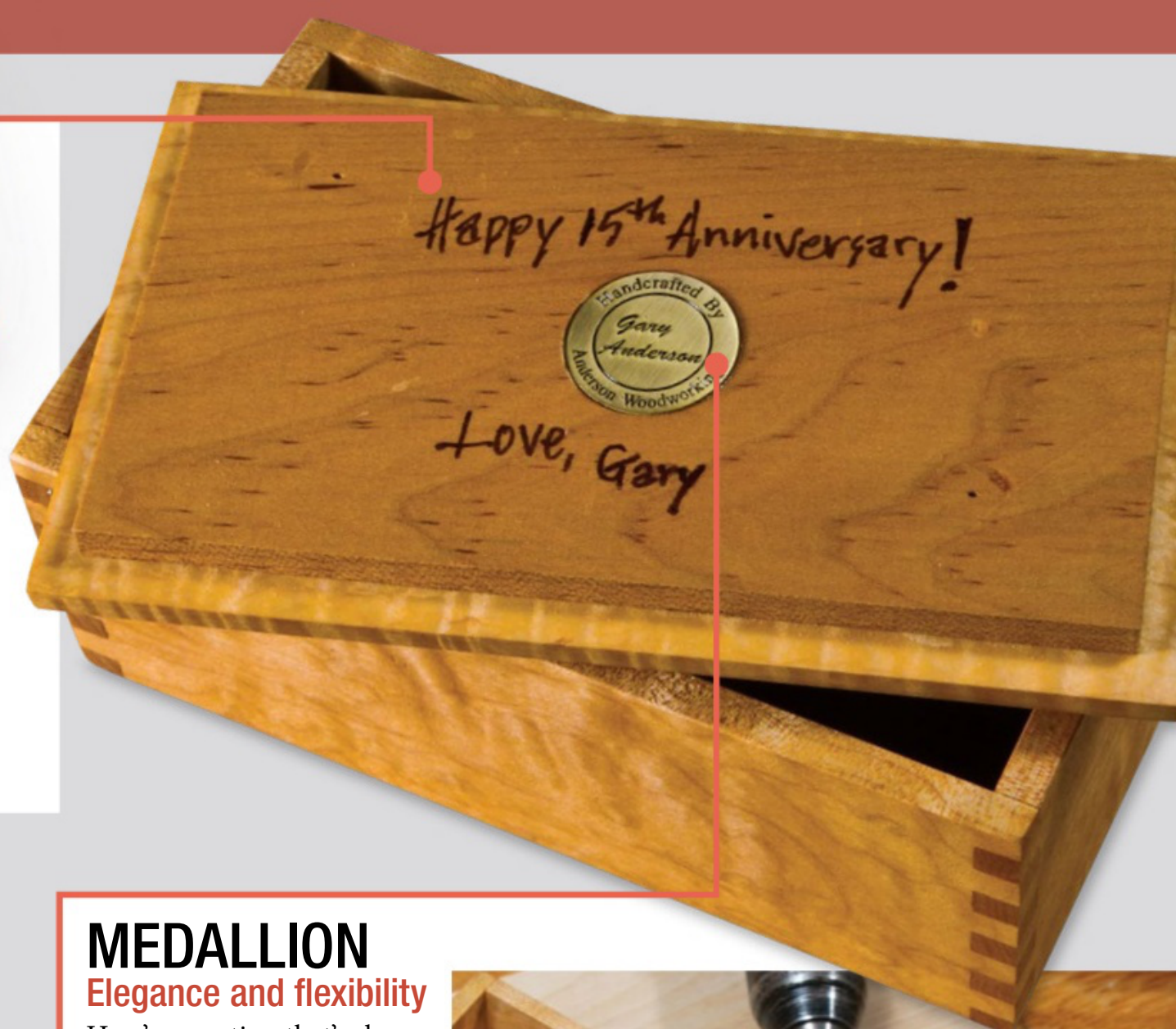
The convenience and economy of a paper maker's mark is nothing new. Well-established Colonial-era furniture makers often glued nicely printed placards to the undersides of chairs and drawers. Today this maker's mark option is easier than ever. Your label can provide contact information, a logo, and even a message to memorialize a special occasion. Ensure label longevity by following some of the tips at right.





Tips

- Black works best. Other colors are more prone to fading over time.
- Try out different point sizes. A fine point is best for small projects.
- Take a practice run on a scrap piece of the same species. If signing on bare wood yields blotchy lettering, give the wood a coat of clear sealer before making your mark, and consider switching to a marker with a finer point.



Tips

- Locate your label where it won't be affected by abrasion or impact.
- Expect colors to fade. Sticking with black ink is your best bet.
- Use decoupage glue (available at craft stores) or wood glue thinned to milky consistency. Apply the glue to bare wood with a foam brush, then press the paper into place, taking care to work out any bubbles. After the glue dries, protect your label with clear shellac or varnish.



MEDALLION

Elegance and flexibility

Here's an option that's classy, compact, durable, and fairly easy to install. You can order medallions that include any combination of details you want to include: name, tagline, logo, location, web address, etc. Metal and wood versions are available. If you've got access to a CNC router, you can create your own stock of custom-made medallions.

Tips

- You can install a medallion before or after finish has been applied to the project.
- Protect the installation area with masking tape, as shown in the photo.
- Use a sharp Forstner bit to drill a recess that matches the diameter and thickness of your medallion. Bed the medallion in clear epoxy.





NAMEPLATE

High class, low price

Laser-engraved nameplates offer an attractive, affordable way to affix your maker's mark. You can buy a 1" x 2½" solid brass nameplate with three lines of text for under \$5.00. This gives you the option of ordering a personalized message for a special occasion; or you can make a bulk order with more standard maker copy. Either way, you've got an attractive way to memorialize a project.

Tips

- Pick your finish. Woodcraft offers nameplates with different metallic finishes, including black, brass, and gold. Different lettering styles are also available.



BRANDING IRON

Heat for a cool impression

For many woodworkers, the best way to brand your work is...with a brand. Most brands sold today include a handle that contains the heating element. An electric brand with basic lettering can cost about \$100. Prices go up if you want to incorporate logo details, decorative borders, or other embellishments.

Tips

- Brand on bare wood to avoid unexpected interactions with finish.
- Expect to vary branding time and pressure to make a clear impression on different woods. Before branding a finished project, make a test brand or two on scrap wood of the same species. This will give you a better idea of the pressure and time required for a clear impression.
- A brand won't show up clearly on dark woods. One solution is to create a branded placard from a thin piece of light-toned wood, and glue it to the darker wood.

METAL STAMPS

Great for dates

Regardless of other imprints or markings that comprise your signature, it can be useful to have a set of metal stamps. Basic sets are available for around \$20. With a few firm hammer taps, you can incise the date, a number designation (if you're making a group of pieces), or even a short message.

Tips

- Before stamping your project, make some test impressions on a piece of scrap wood of the same species. This will tell you how hard a hammer blow is required make a good impression.
- To make a stamp more visible, you can paint over the impressions, then wipe off all finish from the surrounding surface.



ENGRAVING TOOL

Carving done quickly

A powered engraving tool equipped with a ball-nose bit enables you to quickly inscribe a signature or short message on your project. But there are a couple of limitations to this maker's mark option. The first one is visibility: A shallow inscription won't show up as well as a brand, nameplate, or Sharpie signature. Secondly, it takes practice to make smooth, consistent letters and numbers. Use the tips below for best results.

Tips

- Finish first. It's fine to carve into bare wood, as shown here. But a finished surface will show your engraved lettering more concisely.
- Use tape to guide your lettering work. Go ahead and engrave into the tape if necessary; you can always deepen your engraving after removing the tape.
- Find your style. It's counterintuitive, but it's easier to engrave on hard surfaces like steel than it is on soft materials like wood. Expect to put in some practice before you get a feel for engraving a signature or message. ■



Multiple marking options. A single technique or tool may not provide enough information. For a more complete maker's mark, you can exploit the advantages of each marking tool. Here, a brand provides the company name. Metal stamps record the date. Engraving adds the maker's signature.

CIRCLE SANDING JIG

Smooth disk edges with a spindle sander

By Bill Schneider

Before



After



M myriad methods abound for cutting circles. (See page 44 for a router trammel or the last issue for a bandsaw jig.) But whichever approach you take, it's likely to require some clean-up sanding afterward. As with cutting, there's more than one way to sand your circles—typically involving a jig attached to a disk or belt sander.

But this jig is different; it attaches to an oscillating spindle sander and allows for incrementally advancing the work into the spindle without introducing divots.

In operation, your workpiece pivots on a pin at the inner end of a sliding bar while you rotate the disk against the sanding drum. At the outer end of the bar, a knurled knob allows fine adjust-

ment for incremental sanding, having locked in the coarse-adjustment slide underneath the jig. My jig is sized to handle disks from 2" to 22" in diameter. If you need to sand larger-diameter work, simply alter the dimensions provided to lengthen the pivot bar, the deck, and the slide. Each additional inch increases the diameter capacity by 2".

3 steps to smooth circles

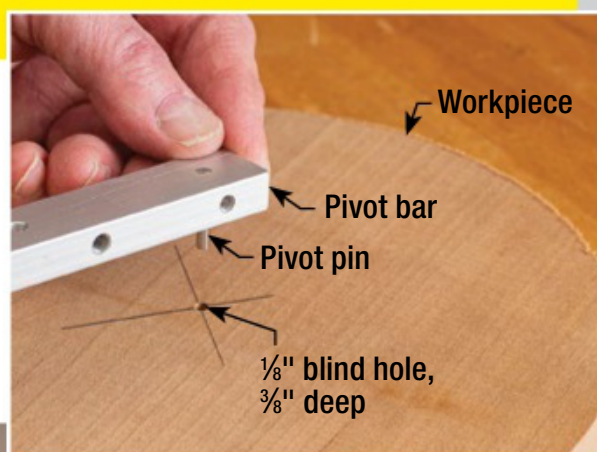
Install your sander's largest drum. Clamp the jig to the sander, with the half-circle cutout concentric to the drum. For small disks, use the pivot hole near the end of the bar.

Load the work and set the coarse adjustment as shown. Pull the work away from the drum, and turn on the sander. Hold the work, and reengage the drum

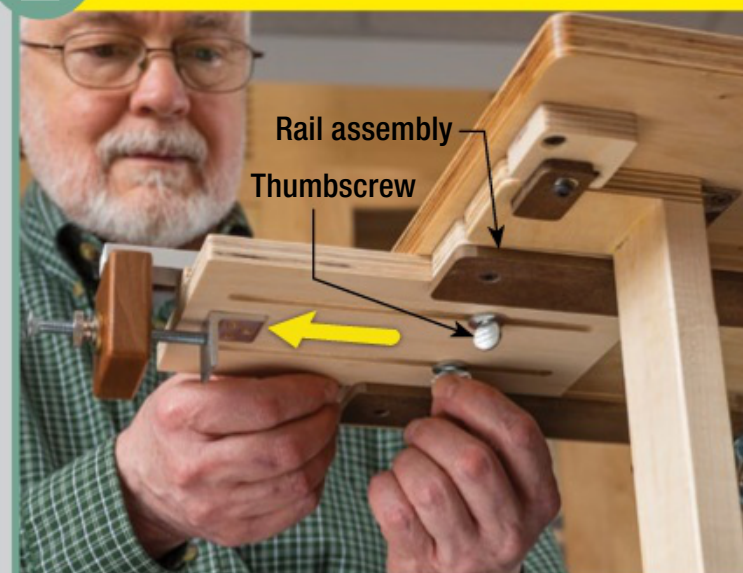
while rotating the work counterclockwise. Retract it when you've knocked down the high spots and are barely contacting the drum. Set the fine adjustments as shown and repeat the process. Small increments here will help you to creep up on your exact diameter.

1 Mounting the work

Lower the bar. It's easier to install the pivot pin and bar onto your disk than the other way around. Place the pin in a shallow hole in your disk, and drop the assembly into the slot, with the piece kissing the drum. Make sure the sander is unplugged.



2 Coarse adjustment



Set it and forget it. Pull the coarse adjustment slide out until the stop reaches the bolt, and tighten the slide's thumbscrews, which will remain locked during the sanding session. A few revolutions of the disk against the drum here will do the bulk of the sanding.

3 Fine adjustment



Sneak up on it. Loosen the knurled fine adjustment knob, turn the bolt counterclockwise a small amount, and retighten the nut. This allows the piece to incrementally advance into the sanding drum. Make a few more revolutions and repeat the process until the entire edge is smooth.

A plethora of parts add up to precision

This jig is designed to fit the WoodRiver spindle sander (Triton, Rockwell, and Shopfox make similar models.) but it can be adapted to fit other spindle sanders.

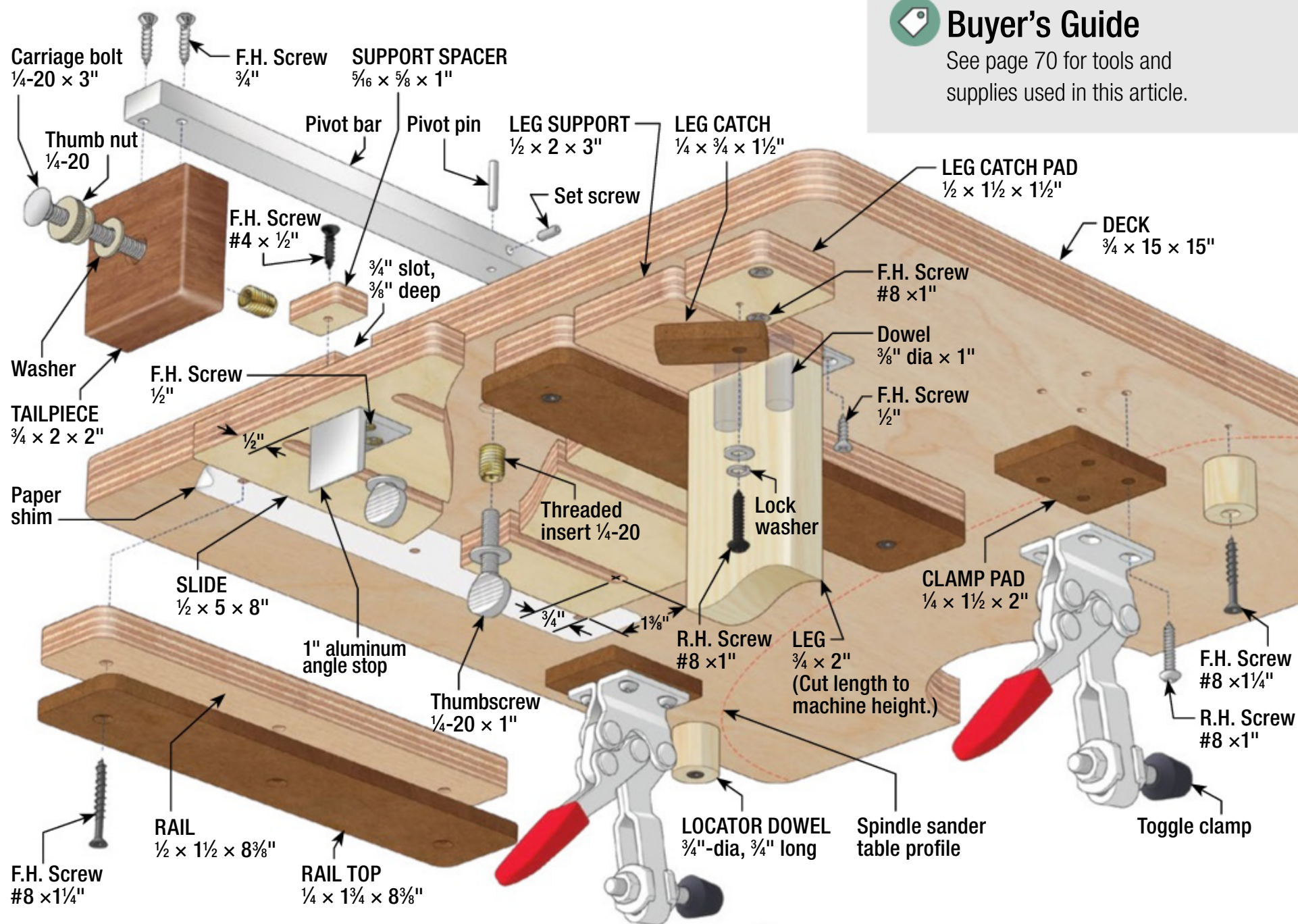
To make the jig, you'll need $\frac{3}{4}$ " and $\frac{1}{2}$ " plywood, some $\frac{1}{4}$ " hardboard, and hardwood stock. The hardware includes two toggle clamps, a Kreg "Jig and Fixture Bar," a steel pivot

pin, set screws, and fasteners. There are a lot of parts, but each one is a simple shape that easily installs to the underside of the jig.



Buyer's Guide

See page 70 for tools and supplies used in this article.



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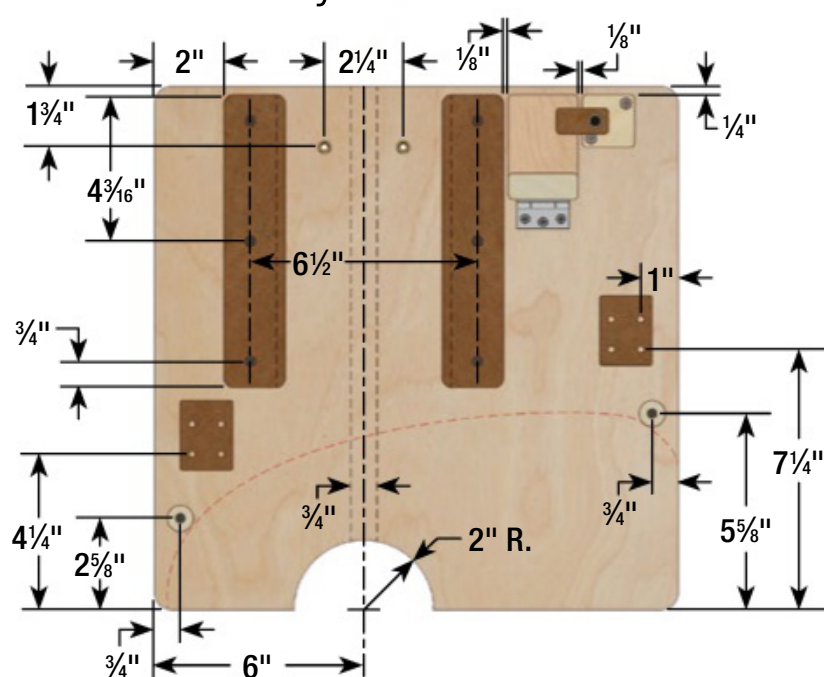
Go online for a complete list of parts and their sizes.



Order of Work

- Cut parts to size
- Shape deck
- Rout slots in slide
- Assemble jig
- Make tailpiece

Layout Details

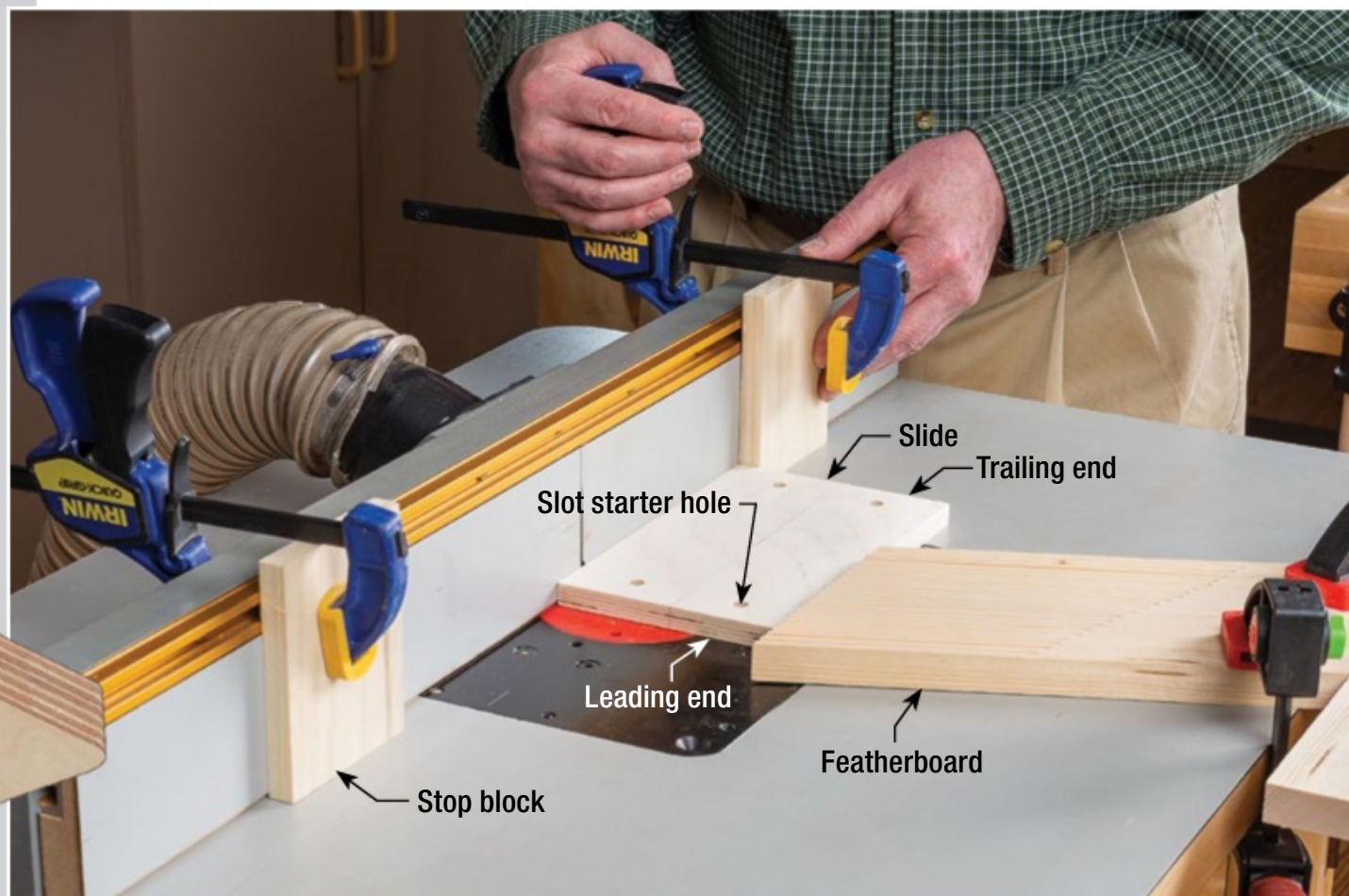


Prepare all the pieces

Cut all the parts except the leg to the sizes listed in the drawing. For safe handling, cut small parts from the ends of longer pieces.

Bandsaw the semi-circular drum opening, and then rout the pivot bar slot on the deck to intersect the circle's center. Rout the slide's slots,

and install the threaded inserts in the deck as shown. Next, make the aluminum angle stop, and install it at the location shown in the drawing.



Router setup. After drilling four $\frac{5}{16}$ " starter holes for the slide slots, chuck a $\frac{5}{16}$ "-diameter straight bit in your table router, and raise it to just over $\frac{1}{4}$ ". With the router off, lower a starter hole onto the bit, and lock the fence in place against the slide's long edge. Then, with the starter hole at the slide's leading end placed over the bit, clamp a stop block to the fence against the trailing end of the slide as shown. The opposite stop block is set up in reverse fashion. Use a featherboard to hold the workpiece tight to the fence.



Rout the slots. Use a push block to hold the piece steady, and turn on the router. To make your first pass, push the slide right to left and against the fence until you hit the stop. Turn off the router, lift and rotate the piece to make the first pass for the second slot. Finally, flip the piece over and repeat the process.



Insert the threads. Position the holes for the inserts using the slide's routed slots and where shown in the drawing, then drill $\frac{3}{8}$ " countersunk holes through the deck bottom. These inserts hold the thumbscrews that tighten the slide for the coarse adjustment.

Bring it all together

Glue the rails to the rail tops. While the glue sets, attach the locator dowels, clamp pads, and toggle clamps to the deck. Test the fit of the jig against the sander, as shown. Measure the distance from the deck bottom to the workbench to determine the length of the leg.

Now, square the slide to the deck bottom, and tighten the thumbscrews.

Shim the slide's edges, and shim and install the rail assemblies as shown.

Fasten the leg support to the leg using dowels, and trim the leg to the appropriate length. Attach the leg assembly to the deck with a butt hinge, and install the leg catch and catch pad where shown.

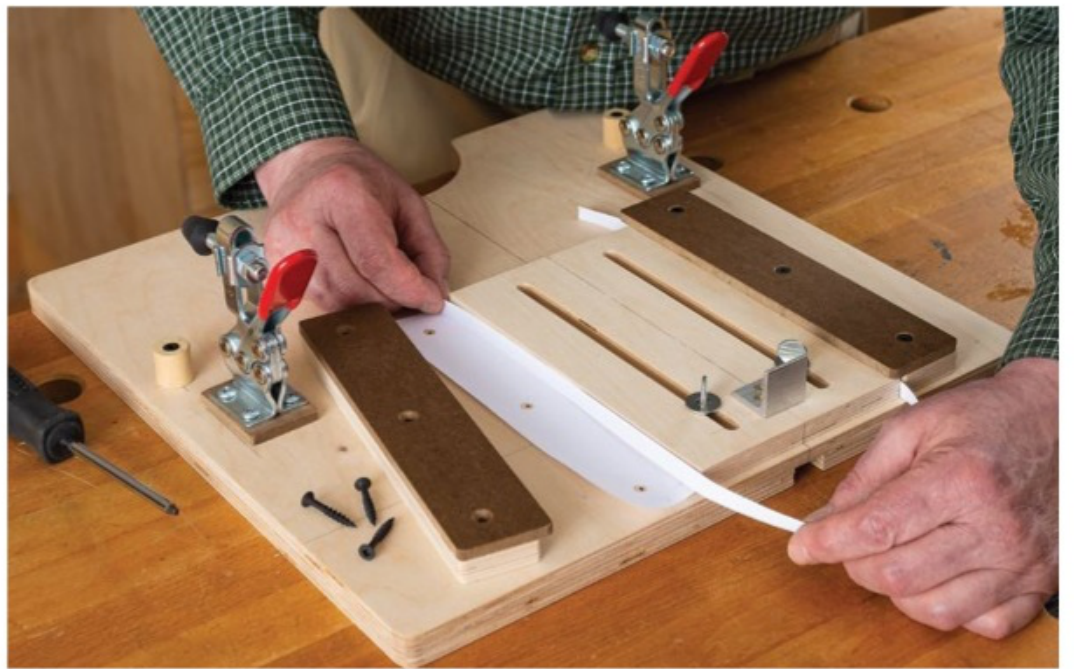
Drill two holes in the bar for the

pin centered at $\frac{1}{2}$ " and $6\frac{1}{4}$ " from the inside end, and cross-drill and tap for #8-32 setscrews to lock it in place. Install the insert into the tailpiece and attach the tailpiece to the bar.

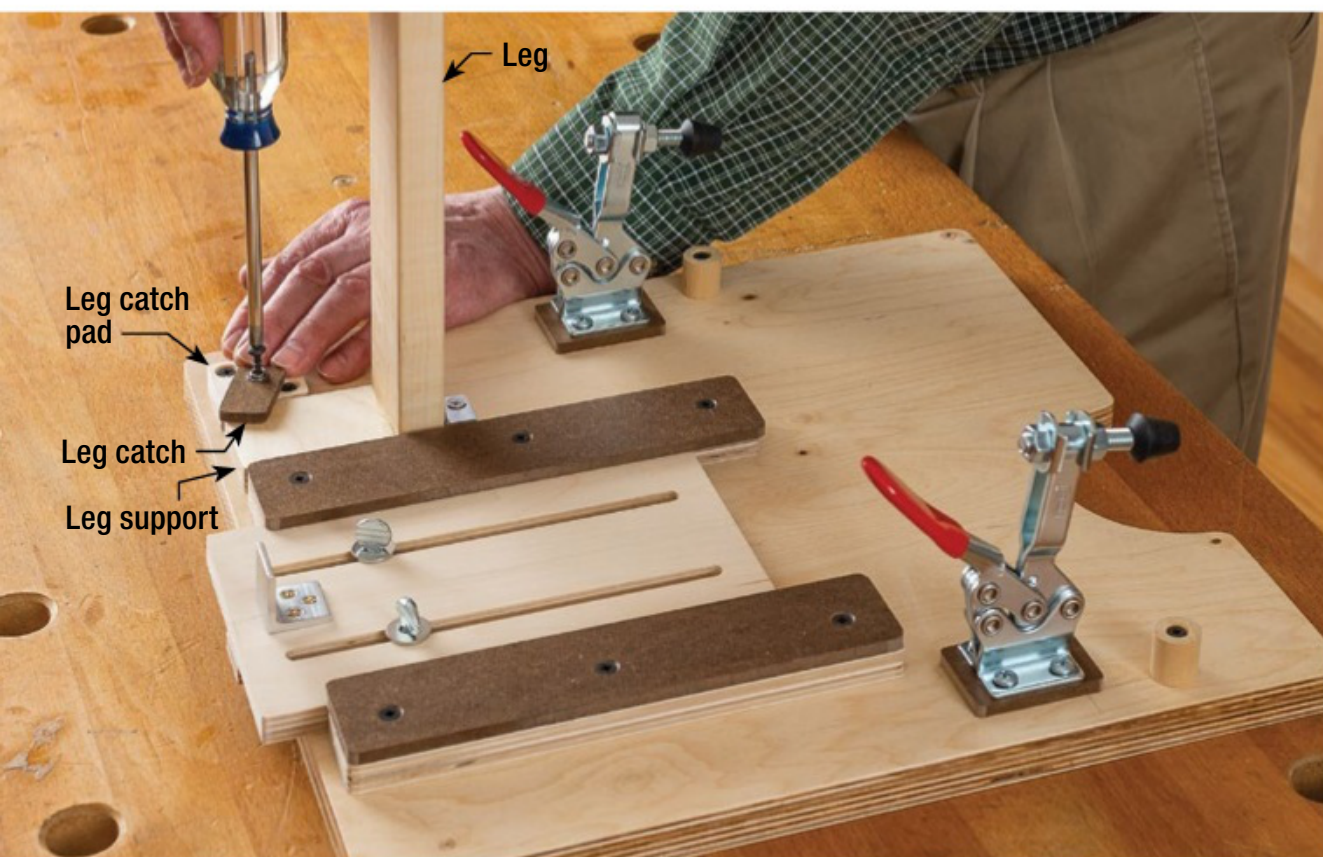
Lastly, make a support spacer and attach it to the slide to prevent the bar from tipping out of its slot when sanding large disks. ■



Check for fit. Position the deck on the sander table with the locator dowels against the table edge, and adjust the toggle clamps for tightness. The jig should snugly grip the sander with no slop.



Shims for the slide. Place a narrow strip of paper on each edge of the slide, and a wide piece under each rail assembly. Install the rail assemblies tight against the slide, and remove the thin strips from between the rails and slide. The shims under the rails stay put.



Catch the leg. Use a round-head screw, a lock washer, and a flat washer to attach the leg catch. The catch swivels over the leg support to secure the leg when the jig is in use.



Attach the tail. Drill and countersink the back of the pivot bar, and screw it to the tailpiece.

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AMERICAN SYCAMORE

Plain or spectacular, it depends on the cut

By Ken Burton

American sycamore is something of a sleeper as far as native hardwoods go. For years it was used as a secondary wood—for drawer sides, web frames, etc.—if it was processed into furniture-grade lumber at all. Often, the wood has served more humbly for items such as pallets, which don't require high-grade stock. One reason is that plainsawn sycamore doesn't dry well, twisting and bowing significantly unless preventative measures are taken. For a wood that is visually about as exciting as white bread, it wasn't worth the effort. However, sawyers eventually discovered that quartersawing sycamore essentially converts it into a “domestic exotic” with a flecked

figure that rivals many overseas imports, and at a much better price. As an important bonus, it's also very stable. These days, nearly all commercially available sycamore lumber is quartersawn.

Where the wood comes from

American sycamore (*Platanus occidentalis*) grows throughout the eastern United States and is most likely the species you'll find sold as sycamore. Its “buttonwood tree” nickname stems from the fuzzy, ping-pong-ball-sized seed pods that drop in the fall. Among the largest trees in the eastern United States, sycamores typically grow over 100 feet tall and 3-8 feet in diameter. They prefer uncrowded conditions, and frequently line stream and riverbanks. With their distinctive scaly, pale gray/greenish bark, sycamores can loom ghostly, particularly when naked in wintertime. As of this writing, American sycamore is not listed in the CITES Appendices, indicating that the current population is not under threat.

Note that, in addition to *occidentalis*, there are five other species of sycamore in the country, including Arizona Sycamore (*Platanus wrightii*) and California sycamore (*Platanus racemosa*), which you may stumble across regionally. European “sycamore” and a variety of Australian trees that carry the name are actually a different genus and species altogether.

History in woodworking

Other than its occasional use as a secondary wood in some old pieces, sycamore doesn't have much of a pedigree in furniture making. But before plastics became ubiquitous, the lumber was used for myriad utilitarian objects including barber poles, washing machines, lard pails, trunks, and butcher blocks (the wood is very difficult to split). Pullman train cars were even paneled with it.

Fleckin' beautiful.

Quartersawn sycamore displays a beautifully flecked pattern reminiscent of lacewood.

Plainsawn sapwood

Sycamore Quick Take

DENSITY	34 lbs./cu. ft.
HARDNESS	Medium
STABILITY	Plainsawn: Poor to fair Quartersawn: Good
ROT/INSECT RESISTANCE	Poor
TEXTURE	Fine to Medium
TOXICITY	Low
USES	Turnings, boxes, small gift items, some furniture



Quartersawn heartwood

Plainsawn spalted sapwood

Not necessarily a wallflower. Sycamore can be a Plain Jane, but when quartersawn and/or spalted, it's dressed to party.

Selecting the best stock

Although not as widely available as red oak and other more commercial species, sycamore is stocked by many lumber yards and online dealers who cater to small shops. Its sapwood runs creamy-white to tan, while its heartwood is a darker reddish brown. The flecks seen in quartersawn stock are readily visible in both the heart and sapwood. It is typically cut in either 4/4 or 5/4 thicknesses, and boards wider than 10" are not uncommon. Due to the color difference between the heart and sapwood, you'll want to be able to carefully select boards, particularly if you plan to edge-glue them to make up wider panels. As seen in the gameboard on page 47, you can often incorporate both sapwood and heartwood into your glue-ups by carefully matching edges. As for price, expect to pay \$5-6 per board foot, though wider stock usually commands more. Be aware that because sycamore has little to no rot resistance and is very susceptible to insect attack, it's a poor choice for outdoor projects. On the plus side, that characteristic also makes it spalt easily, creating attractive black fungus lines that can play well in cabinet doors and other panels.

Working and finishing

Sycamore works well with both hand and power tools, although interlocking grain can make surfacing troublesome, particularly when hand-planing. In that

case, try planing diagonally to the grain or use a sharp scraper instead. When working with spalted stock, keep in mind that sycamore is not a particularly strong wood to begin with, and once it begins to decay it can become brittle and weak. Inspect and flex suspicious boards to make sure they won't snap or

split during machining or afterwards in use. Sycamore finishes easily with all common finishes, both oil and water-based. However, as a softer hardwood, it does seem to soak up finish and may require more coats than usual. It accepts stains well, though staining will tend to obscure the quartersawn flecking.

Sycamore working notes

I use a lot of quartersawn sycamore in my work. Along with its distinctive flecked appearance, I like that it is a native species, isn't remotely endangered, and is relatively inexpensive. Most recently, I selected it as the wood for the gameboards shown on the cover of this issue and featured in the story on page 47. Quartersawn stock is a good choice for a panel such as this, which must remain flat without a frame or battens to restrain cupping. Sycamore's relatively light color also provides a nice contrast for the dye used to differentiate the checkerboard squares.

The stock I used for the game boards was nice to work with and machined well. I might compare its overall working qualities to poplar or even soft maple. The only real problem I experienced was a tendency toward tearout when hand-planing with my trusty, old Bailey #5 bench plane. I switched over to a low-angle jack plane, and found it worked better. It might seem counterintuitive, but the low angle of the blade's attack, combined with a tight throat opening virtually eliminated the trouble I was having with the interlocked grain. Even though it isn't supposed to, the alcohol-based dye I used for the checkerboard did raise the grain more than I expected. Next time, I intend to raise the grain several times before adding color. ■

Light and dark light.

This table lamp is a nice pairing of tawny quartersawn sycamore and black walnut. Note the distinctive color difference between the sycamore's sapwood and heartwood.



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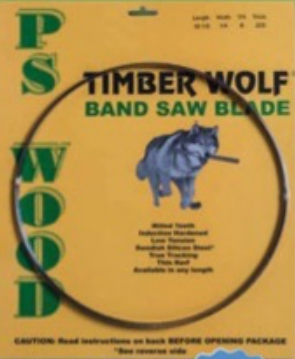
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Flattening water stones with a diamond stone

John Carmona
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Q: I bought a coarse diamond sharpening stone to flatten the water stones that I rely on for sharpening chisels and plane blades. But the diamond stone seems to have lost its effectiveness. Am I better off using a different flattening method?

Cameron Osborne
San Jose, California

A: A coarse or (better yet) extra coarse diamond stone will flatten any water stone. But you can expect the diamond stone to wear more quickly than it would if you're just sharpening steel. The best type of diamond stone to use for flattening water stones is a diamond lapping plate designed for this single purpose. The DMT Dia-Flat® lapping plates rely on a proprietary hardcoat treatment that fuses diamond particles more solidly to the plate's metal base to avoid premature wear. Because diamond flattening plates are expensive (\$135-\$380), some woodworkers opt to flatten water stones using a grooved flattening stone that typically sells for under \$50.

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Build a Classic SPICE BOX Part 1

Master challenging joinery details to create a masterpiece

By Chris Hughes

Today you could easily use a spice box to store more things besides spices. But to appreciate the importance of this classic creation for the woodworker, you have to go back several centuries, when spice boxes were more for their status. Back then, spices were a luxury that only the wealthy could afford. A family in Colonial America with financial means to purchase spices from around the world could also afford to have an exquisite storage cabinet designed and built by the best woodworker in the community.

Just as the spice box became a symbol of affluence for wealthy colonists, it also became a crowning achievement for a woodworker. It's easy to understand why. With its dovetailed case, including details and intricately dovetailed interior, this piece showcases challenging joinery as well as beautiful wood grain.

This article is the first in a two-part series that explains how I build a classic spice box from start to finish. Associated articles are also part of this online project—to ensure special tips and techniques.

Building the spice box from start to finish—a big project with 6 major construction steps

Covered in this issue (Spice Box, Part 1):

1. Make the case (sides, top, bottom)
2. Make and install interior dividers
3. Make and install the cornice and base

Covered in April/May issue (Spice Box, Part 2):

4. Build and install the drawers
5. Make the door, install hardware, and then hang the box
6. Make and install the back, then sand and finish

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Woodcraft is pleased to partner with woodturner Carl Jacobson of TheWoodshop.TV. Carl started woodworking as a young boy with his grandfather and then developed a love for turning as an adult after seeing a turned project in a friend's shop.

When he couldn't find a how-to video for duck calls in the early days of YouTube, he decided to use his passion to share and instruct the craft in his own video, which led him eventually to start his own YouTube channel and instructional website.

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Take a Tree, Leave a Tree

Rooting for the future

By Paul Anthony

I love trees, inside and out. Call me an animist, but I've always found these living beings beautiful and soulful. High branches often called to me as a kid, and I found both solace and excitement clinging to them, swaying in the breeze high above the ground. I learned to recognize and trust strong branches, and to avoid those that weren't ready for me yet. I gained strength and confidence from my efforts, and enjoyed a broader view of the world denied those unwilling or unable to perch. If you never climbed, you'll just have to trust me that being a tree hugger on that level affords something special.

As I grew older and more ground-bound, I learned to appreciate trees from the inside. I don't need to wax poetic about swirling wood grain imbued with luscious colors, or carry on about the value of a material that can be sawn, bent, turned, carved, and fashioned to satisfy a million purposes and pleasures. If you're a woodworker, you already know what I'm talking about. And, as if all those benefits aren't enough, these arboreal wonders also help clear the air for us, quite literally, and cool us in their shade on sunny days.

But there's one aspect of trees that I don't think we woodworkers appreciate enough: their renewability. Jewelers, machinists, and potters might love their material too, but they can't cultivate precious stones, metals, and clay.

Planting a tree requires just a bit of time and maybe a few bucks. And it can even be a celebratory event—perhaps something done with a child, or in a loved one's honor. Some years ago, I participated in a series of tree plantings sponsored by a woodworking guild. It involved members planting trees with elementary students on their school grounds. As someone who has long worked wood for both leisure and livelihood, it was gratifying to give back to the earth and to contribute in some small way to future generations.

I realize that I can never replace the padauk, teak, koa, merbau, and other exotics that I've used in my lifetime, so I guess I'll have to compensate with domestic species. I'm not sure if the dozens of trees that I've rooted over the years have made up for all the wood I've consumed, so I'll keep at it. If nothing else, I figure I'm planting a bit of help and a bit of hope for the future. ■

For more info on planting trees or helping organizations that do, visit:
ArborDay.org
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