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For a cleaner, safer working environment the **TA1200BS** is fitted with a side dust port that connects to the dust bag supplied with the machine, or can be connected to a dust extraction system.



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44 Patio Table & Chair

Instead of buying expensive outdoor furniture, why not build it better, and save? This bar-height table and chair set makes a fine centerpiece on any patio or deck. Construction is strong and straightforward, thanks to the smart use of templates and loose-tenon joinery.



24 Skateboard!

If you can glue and shape a cutting board from hardwood strips, it's a sure bet you can craft a classic sidewalk surfer. Our expert author provides the details on dimensions, wheels, finishes, and more.



36 Build a Wall Organizer... Just the Way You Want It

What better way to corral your daily debris? This compact project combines a bulletin board with drawers, hooks, and shelf space. Easily made dovetail details add interest.



60 Supercharged Sawhorse

Everyone appreciates the convenience of folding sawhorses, but our design puts all others to shame. Your workshop definitely deserves a pair of these thoroughbreds.

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30 Adventure Travel for Woodworkers

Road trip! Summer is the perfect time to get out of the workshop and do some sightseeing that will enrich your appreciation of woodworking. We're providing details on 10 destinations that deserve to be included in your travel plans. You'll find additional adventures on our website.



Contents: Tools & Techniques



16 Hot New Tools: Top dog paint

New paint from Black Dog Salvage is formulated specifically for furniture. With great workability, durability, and color selection, it's worth trying out on your next painting project.

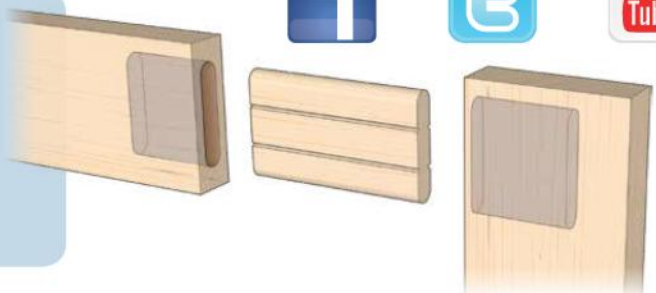


56 Put It on Wheels!

Everyone knows that mobility means versatility in any workshop. But how do you select the right casters for the equipment you want to mobilize? Get the complete wheel deal right here, including specialty casters and cost-saving kits.

66 Joinery Class: Loose-Tenon Joinery

There's a lot to like about "floating" tenons. You get the strength of traditional mortise-and-tenon joints, but cut your setup time in half. Senior editor Paul Anthony shows how to expertly execute this joint.



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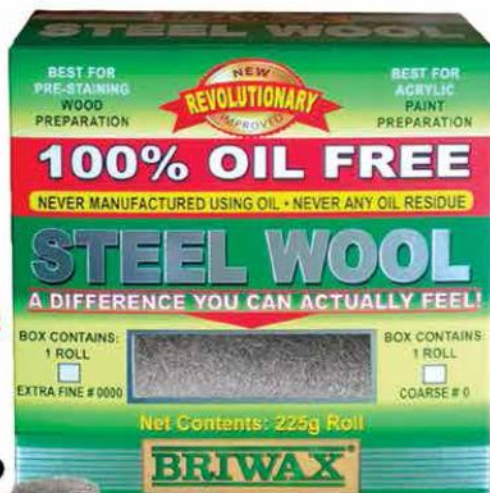
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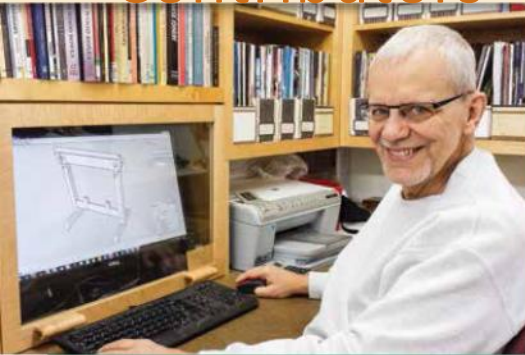
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Contributors



Tom Whalley's design skills go far beyond the practical details he incorporated in this issue's Supercharged Sawhorse (p. 60). He put his playful side to work on the "Dual-Purpose Dollhouse" featured in issue #69. Since his retirement two

years ago, he's spent most of his time experimenting with wood, and playing the occasional round of golf. Nearly every project Tom builds is first designed in SketchUp. "This allows me to work out a project's details and critical angles before making the first cut." Tom is a past president of the Des Moines Woodworker's Association and a member of the Des Moines Woodturners as well as the AAW (the American Association of Woodturners).



In his day job, Silicon Valley resident **Matt Berger** produces content for a major technology company. For fun, he teaches skateboard construction and woodworking classes. A favorite board from Matt's new book, *The Handmade Skateboard*, (Spring House Press) is featured on p. 24. Here, Matt's shown in action with wife Mary, daughters Maddie and Nina, and bike passenger Pepper.



Based in Asheville, North Carolina, **Chris Spoerer** left a career in cooking to found Union Woodworks

in 2009. Current projects include a series of gun cases, a kitchen remodel in an historic home, and the design and construction of a garden shed for a local foundation that transforms school property into thriving, edible landscapes. See his patio table and chair set on p. 44.



A veteran writer and editor with expertise in woodworking and home improvement, **David Schiff** took on this issue's

"Adventure Travel" assignment with great enthusiasm. (The article begins on p. 30.) His most recent book, *A Homeowner's Guide to Built-ins and Storage*, was published this year by the Taunton Press. David lives and works in Warwick, NY.

On the Web



Hanging out. Keyhole slots help you hang stuff on the wall with hidden screws—but how do you get the screws level and exactly spaced? Watch the onlineEXTRA video for a foolproof solution.



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Woodworking information from across the nation

The quest for good information is important if you want to publish a successful magazine. Early in my editing career, I learned that some publications paid “scouts” in different parts of the country to report on trends that might be developed into magazine articles. I also learned how focus groups, composed of magazine readers, could be used to gather useful information about editorial content.

Despite the small size of our staff and budget, we’ve got information-gathering resources that our big publishing competitors can’t match. Let me explain. For starters, we’ve got a great scouting network: over 70 Woodcraft stores spread throughout the country. All stores share the same mission: to support and grow their local woodworking community. Each store offers a variety of woodworking and craft classes taught by local experts, while also serving as a source for high-quality tools and supplies.

We get news from different stores from time to time, but our big information-gathering opportunity takes place every spring. That’s when Woodcraft store owners and employees get together to share ideas and information. OK, there’s some partying too, along with an invitation-only trade show where over 100 companies display their latest woodworking products. I’m really excited to attend this 3-day event because it’s totally packed with energy, enthusiasm, and information we can use to make the magazine better. So stay tuned—we’ll post some highlights from the trade show in the Staff Blog on our website. We’ll also give you the scoop on new tools, accessories, finishes, and more.



Great gear every year. The annual gathering of Woodcraft store owners and employees includes a trade show where manufacturers show off their latest and greatest products.

Above all, don’t forget that you belong to the largest and most important focus group of all—our readers. Let us know what you’d like to see in future issues of *Woodcraft Magazine*—projects, techniques, jigs, or anything else. We’ll do our best to deliver content that will make your time in the shop more fun and more rewarding than ever before.

—Tim Snyder

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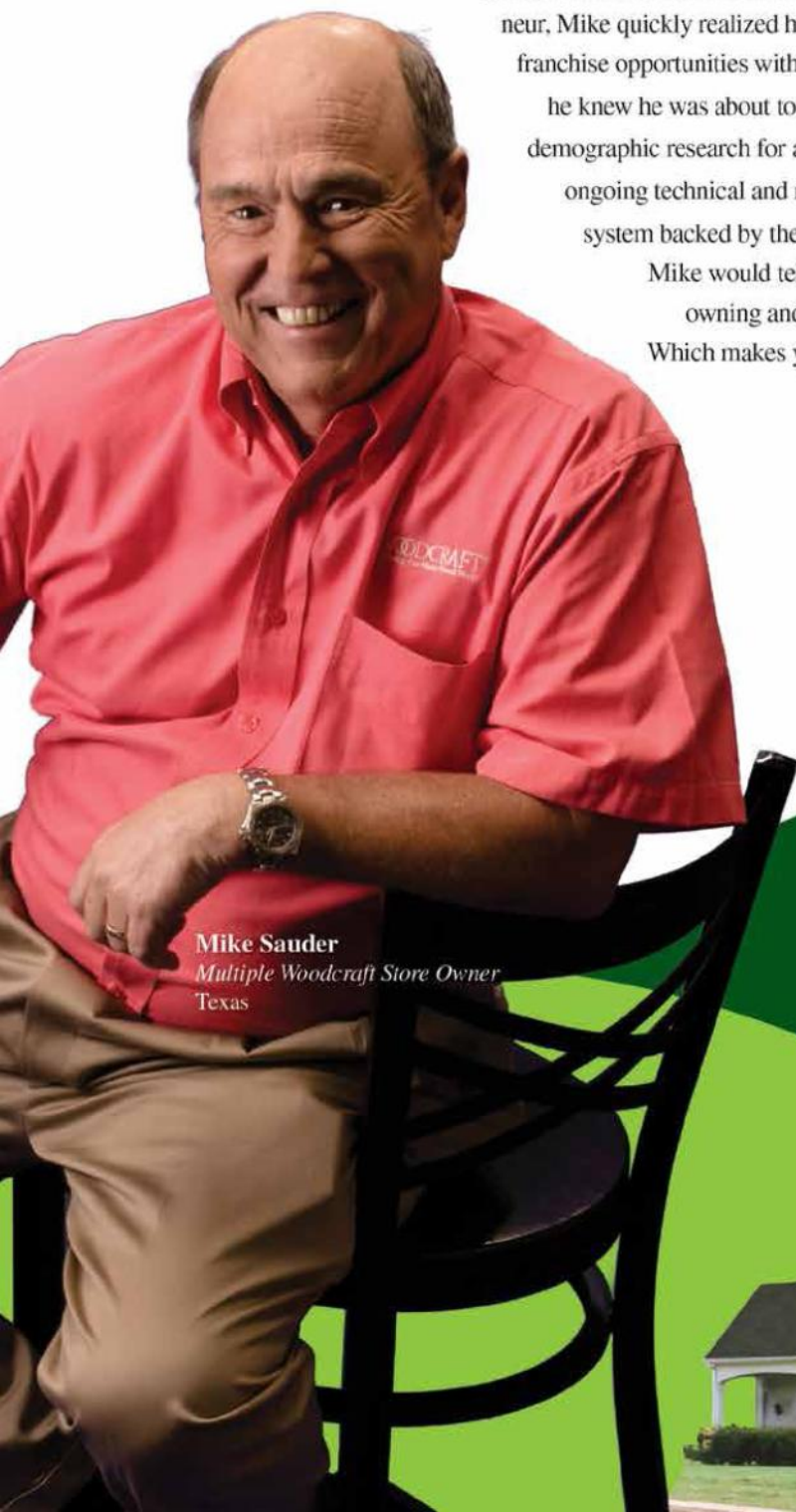
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Safety First! Working wood can be dangerous. Always make shop safety your first priority by reading and following the recommendations of your machine owner’s manuals, using appropriate guards and safety devices, and maintaining all your tools properly. Use adequate sight and hearing protection. Please note that for purposes of illustrative clarity, guards and other safety devices may be removed from tools shown in photographs and illustrations in this publication.

AFTER 30 YEARS IN THE TRAVEL INDUSTRY, IT WAS TIME TO MOVE ON. SO, I TURNED MY PASSION FOR WOODWORKING INTO A SECOND CAREER.

In Texas, you either go big or you go home. And Mike is living proof. After 30 years in the travel industry, he took a swing at improving his golf game. But when that didn't go as planned, he turned all his attention to his other love – woodworking. An energetic entrepreneur, Mike quickly realized he could turn his hobby into a second career. So when he saw franchise opportunities with Woodcraft, one of the most trusted names in woodworking, he knew he was about to carve out a whole new future for himself. No wonder. From demographic research for a store location to a detailed operations manual coupled with ongoing technical and marketing support, Woodcraft provides a complete franchise system backed by the most recognized brand in the industry. If you talked to him, Mike would tell you that thanks to Woodcraft and a lot of seven-day weeks owning and operating *six* Woodcraft stores, he is truly living his dream. Which makes you stop and think, when are you going to start living yours?



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Design details that make a difference



In Chris Hedges's Standing Desk (April/May 2016, #70), why are two tenons used to join an apron to a leg, rather than a single larger tenon? Also, do the pegs play a role in controlling wood movement?

—Mark Philippi, via email

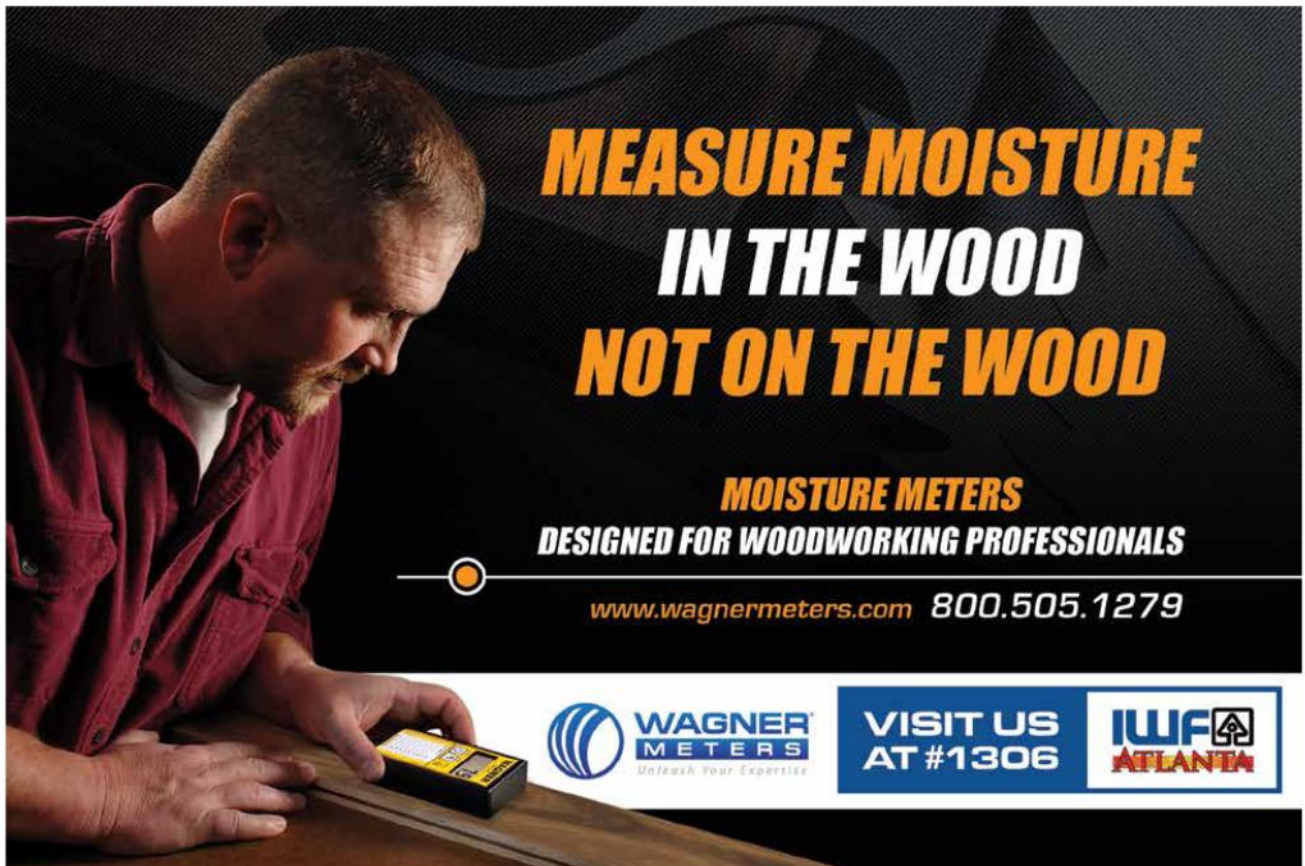
Editors reply:

Chris' choice of joinery addresses two factors that can lead to joint failure or a broken part: joint strength and wood movement.

First, there are the stresses that come from everyday use. Single, full-length mortises in adjacent faces could weaken the leg, allowing it to split in response to racking forces. To prevent this, Chris used a stepped tenon. The shallow-mortised center section leaves more wood in the leg, while still allowing for a continuous tenon. This compromise yields a strong joint that doesn't weaken the leg.

Wood movement isn't a major worry with a 4"-wide tenon. The pins provide mechanical reinforcement (and visual interest in the finished piece), but the glue does the work.

For larger joints, like the breadboard ends on a tabletop (see Chris' Shaker-Style Dining Table, Feb/Mar 2015, #63) pins can play a more important function. For this project, Chris positioned the holes in the top $\frac{1}{16}$ " in from the holes in the breadboard to draw the breadboard tight to the top, and elongated the holes for outermost pins (see photo, right). In this instance, the outer pins allow the top to move without splitting.



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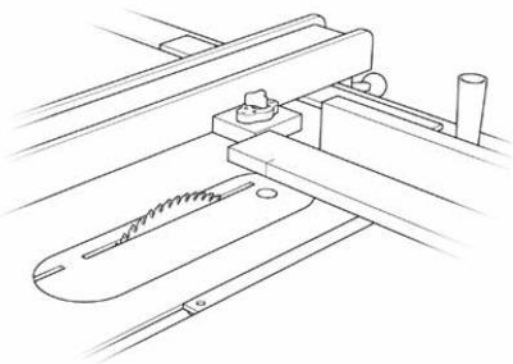


Does building furniture alongside a master woodworker by day and sipping on your favorite red at night, in the heart of California wine country, sound like your dream vacation? Leave it to Woodcraft and SawStop to combine both loves into a

single contest. The winner (and a guest) of "The Jory Brigham Experience" will enjoy a 3-day workshop with the cutting-edge woodworker and walk away with finished pieces of furniture. In addition, the winner will receive a SawStop professional saw and over \$1,000 in additional tools and accessories.

To register and learn more about the contest, go to www.woodcraft.com/CaliforniaDreaming. The deadline is September 30, 2016. For more about Jory and his work, go to www.jorybrigham.com.

K.I.S.S. standoff solution



I liked last month's Magnetic crosscut standoff tip, but being of the K.I.S.S. (Keep It Simple Scotty) school, I think making the block 2" or 3" wide, rather than 2½", would make life a little easier. Should you need a 5⅓/₁₆" cutoff, an even-numbered block would simplify the math.

—Ken Scott, via email

Senior Editor Paul Anthony replies:

You raise an excellent point, and one that, in retrospect, should have been obvious to me when I edited the Tricks column. I appreciate you writing in, as letters like yours help keep us on our toes and remind us to, yes, K.I.S.S.

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Hidden dangers in inherited wood?

My parents had some rough-sawn oak and cherry stored outside under tin for the last 40 years. When I planed a few boards, I found minimal deterioration and some insect damage. I am concerned about using the wood for interior projects. Do you have any suggestions about using this wood, including ways to determine if bugs are still present?

—John Snyder, via email

Senior Editor Joe Hurst replies:

It sounds like you hit the jackpot. The difference between air- and kiln-dried wood is subtle, but I think the better color and easier workability make air-dried wood worth a little extra effort.

There's a good chance that the insect activity occurred while the trees were still standing (this might be why your parents called for a sawyer) or soon after the log was sawn. Bugs feast on wet wood,

but move to greener (wetter) pastures as boards dry out. That said, fresh insect infestations are easy to spot. As you work your way through the stack, look out for piles of sawdust in close proximity to insect holes. Should you spy fresh activity, I recommend building a solar kiln to eradicate these unwelcome guests. A kiln would also help dry out the wood.

Two tools can help you make the most of your windfall. First, you need a moisture meter. Since it was stored outdoors, the wood's moisture content is likely to be higher than the ideal levels for fine furniture. After bringing the boards inside, you'll want to use a meter to check the moisture content and wait until the levels adjust to the indoor. Second, a metal detector can help spot nails, bullets, etc. before your planer finds them. Lumber that's been harvested close to home often has metal hiding within.

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Hot New Tools

Top dog paint

Black Dog Salvage Furniture Paint

A paint that doesn't require standard surface-prep steps like stripping off old finish, sanding, or priming might sound too good to be true, but it isn't. Labelled under different monikers depending on the manufacturer, these hassle-free "furniture paints" are specially formulated to adhere to finished wood, metal, and plastic; provide single-coat coverage; and dry to a smooth, dead-flat finish. Woodcraft has teamed up with the finishing pros at Black Dog Salvage to develop their own low-prep, water-based paint to compete in this popular finishing category. Always looking for a product that promises less prep work and faster finishing, I was willing to crack open a few cans and share my first impressions.

I found that the paint's thickness required time to get used to. Most latex paints have a cream-like consistency, but the

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high-solid content of the Black Dog paint makes this finish more akin to a thick sauce or gravy. The paint was too thick for my entry-level sprayer, but I was able to achieve a satisfyingly smooth finish with a brush by laying on the paint and allowing it to level itself out. While the paint lived up to its one-coat promises, I was also pleased to discover how well it filled and hid scratches. New projects may not need this help, but second-hand furniture often does.

To test the adhesion claims, I pitted Black Dog against my favorite latex paints and traditional milk paint on samples of bare wood, finished wood, laminate, plastic, and glass. While all the



BEFORE



AFTER





paints worked well on bare wood, the furniture paint led the pack on the slipperiest substrates. Where the latex yielded to fingernail scratches, and milk paint fell off in flakes, the Black Dog paint held fast. It's worth noting that excellent adhesion doesn't correlate with stain resistance. Like other flat paints, the furniture paint should be top-

coated, in this case with the Black Dog's compatible acrylic poly, for protection.

Future plans for Black Dog Paints extend beyond one-color paint jobs. The paints are designed to lend themselves to a variety of decorative painting techniques, including distressing and color washing. In addition, the "true" color palette makes it easy to blend the paints to create any custom color or hue. If you've missed this advancement in wood finishing, now's a good time to treat yourself to a can. To learn more about what these paints can do, stay tuned.

—Joe Hurst-Wajszczuk

Established in 1999, Black Dog Salvage is a major architectural salvage company based in Roanoke, Virginia, and is home of the television show, *Salvage Dawgs*. Black Dog's wood and metal shop specializes in saving pieces of history from landfills by transforming them into custom furniture, design accents, and other upcycling projects.

For additional information, see the Buyer's Guide on page 64.

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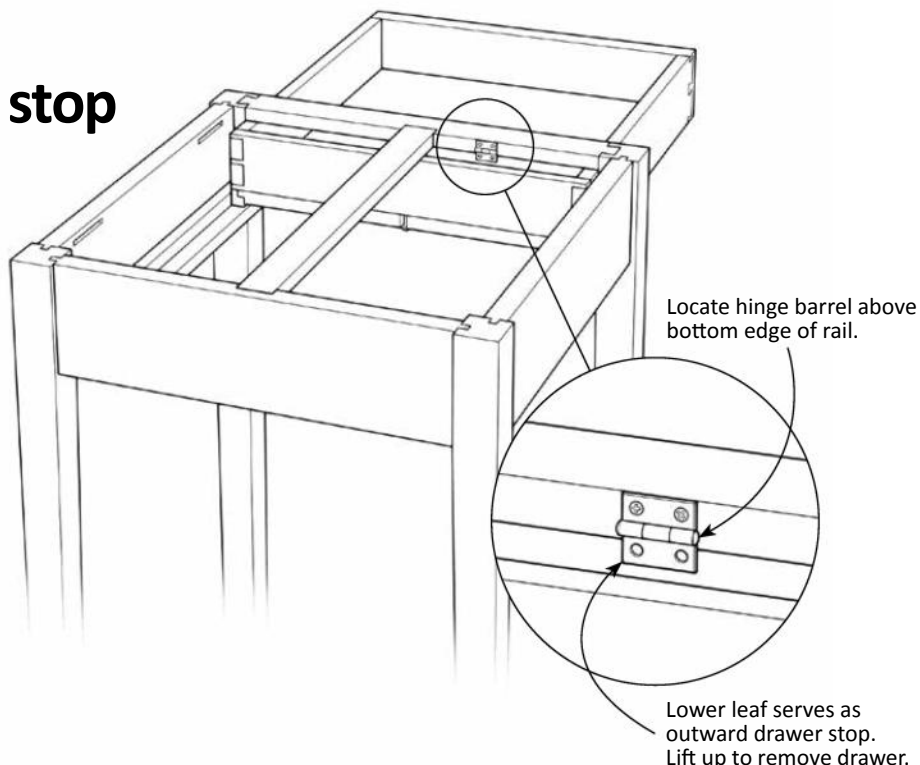
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TOP TIP

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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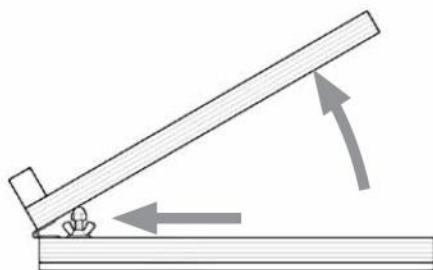
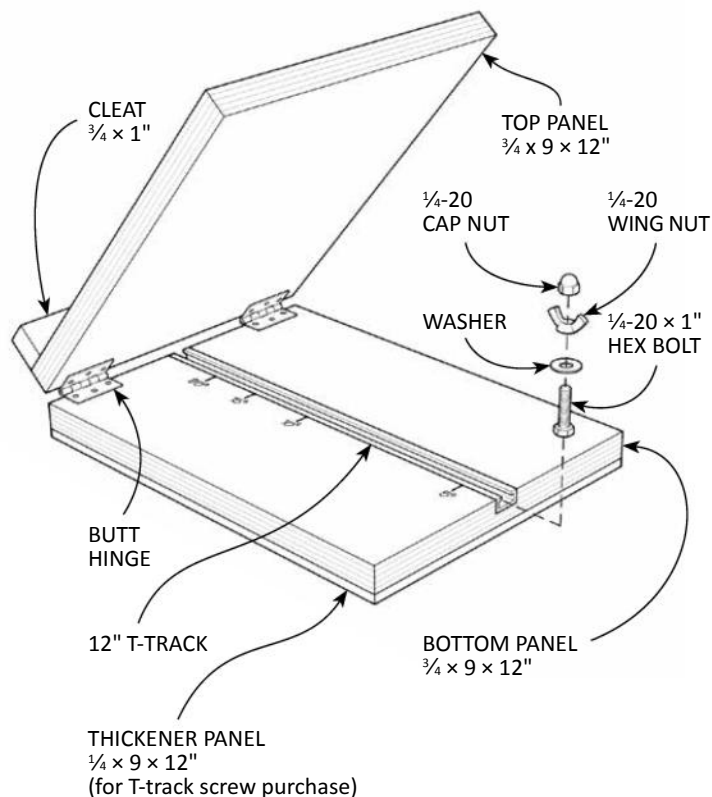
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Position bolt mechanism to create desired platform angle.

Drill press angle platform

It's a hassle to tilt my drill press table for boring angled holes, so I devised this workpiece platform to do the job instead. It's nothing more than a couple of plywood panels hinged together, with a T-track installed in the bottom panel. A bolt and cap nut in the T-track hold the panels apart at the desired angle, with the bolt locked in place with a wing nut. A cleat along the hinged edge of the top panel registers a workpiece to hold it in place for drilling. The jig is easy to make, simple to use, and allows infinite adjustment within a 5° to 45° angle range. Simply slide the bolt assembly to whatever location holds the top panel at the desired angle. For quick setup, I mark the bolt locations for commonly used angles.

—Don Winslow, Indian Trail, North Carolina

Illustrations: Christopher Mills



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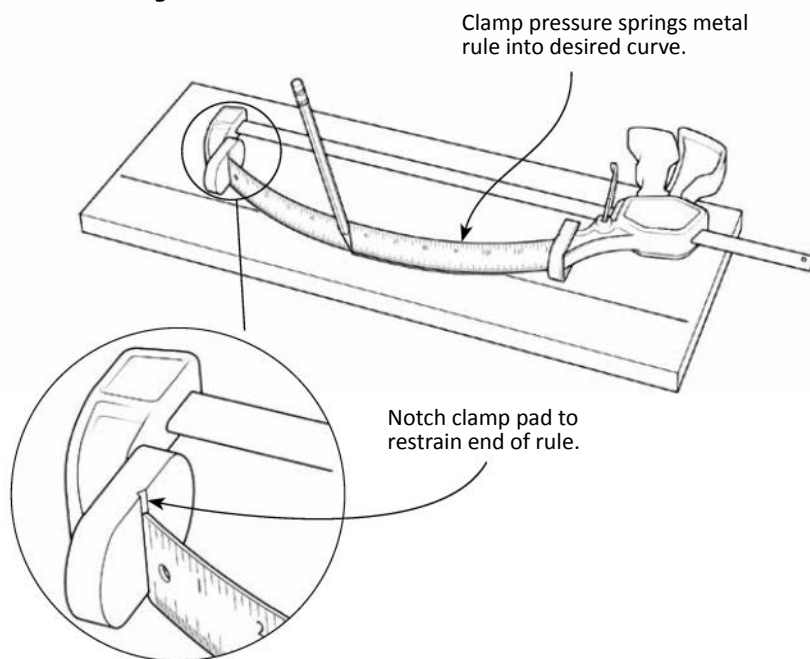


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Clamp-and-rule curve layout

One traditional way to lay out fair curves is to trace against a thin strip of wood bent to the desired shape, with the ends of the strip clamped or tacked in place to the workpiece. This approach works okay, but it can be a bit fussy to get the curve just right, and wood doesn't always bend as perfectly as you might like. I find that a much better approach is to use a thin steel rule, squeezing it into the desired bow between the jaws of a bar clamp whose pads have been notched to prevent the rule from twisting. This allows great control of the curve shape, and holds the rule very firmly for use as a tracing guide.

—Alejandro Balbis,
Longueuil, Quebec



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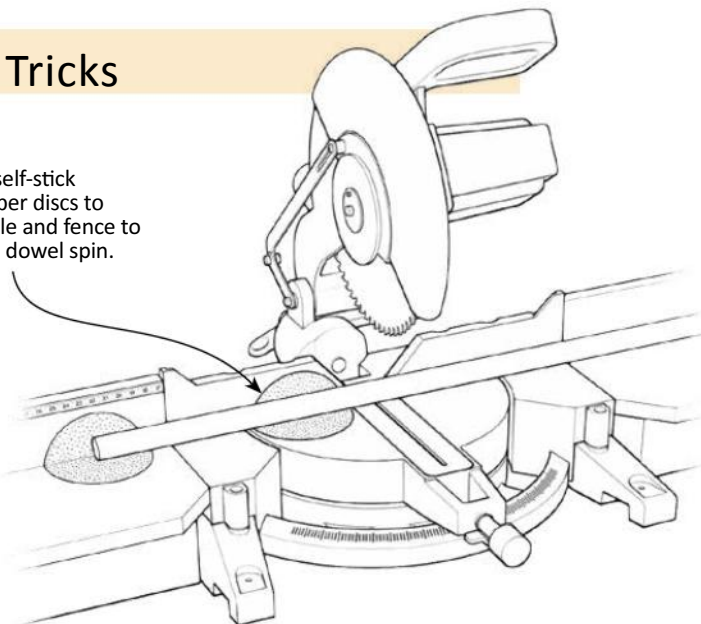
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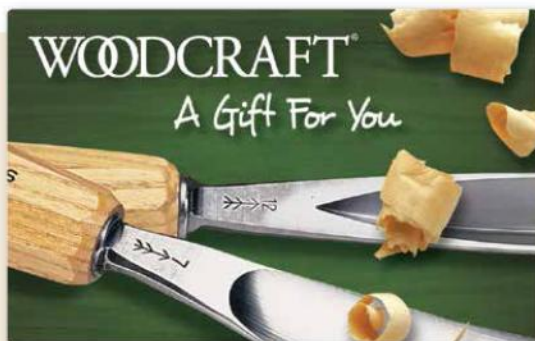
Attach self-stick sandpaper discs to saw table and fence to prevent dowel spin.



No-spin dowel crosscutting

Crosscutting large dowels with a power mitersaw can be a dicey operation. If the workpiece isn't held firmly, the blade can grab and spin it in a flash, shocking you out of your slack-handed reverie. To make sure that doesn't happen, just stick a couple of self-adhesive sanding discs on your saw at the intersection of the fence and table.

—Lonnie Gaye, Baltimore, Maryland



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Plane iron chisel

I had built a small box, and needed to pare away some dried glue squeeze-out from the inside corners. Too bad all of my chisels were too long to fit inside the box. Standing there wishing for a short chisel, I suddenly realized I could just steal the blade from my block plane, which proved to do the job just fine.

—Anthony Warren,
Las Vegas, Nevada



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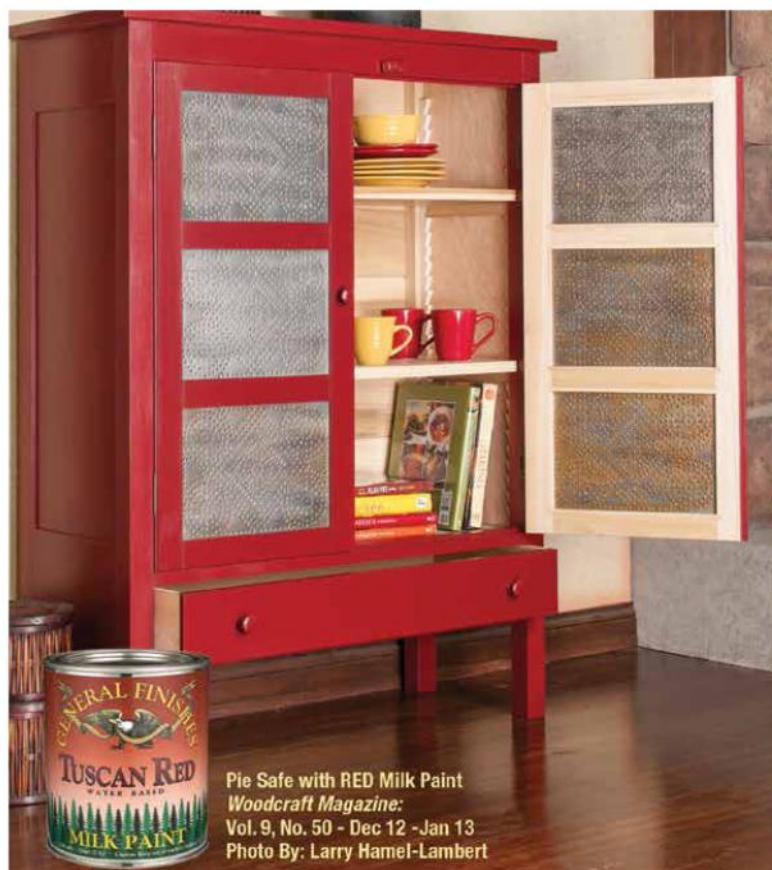
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By Matt Berger

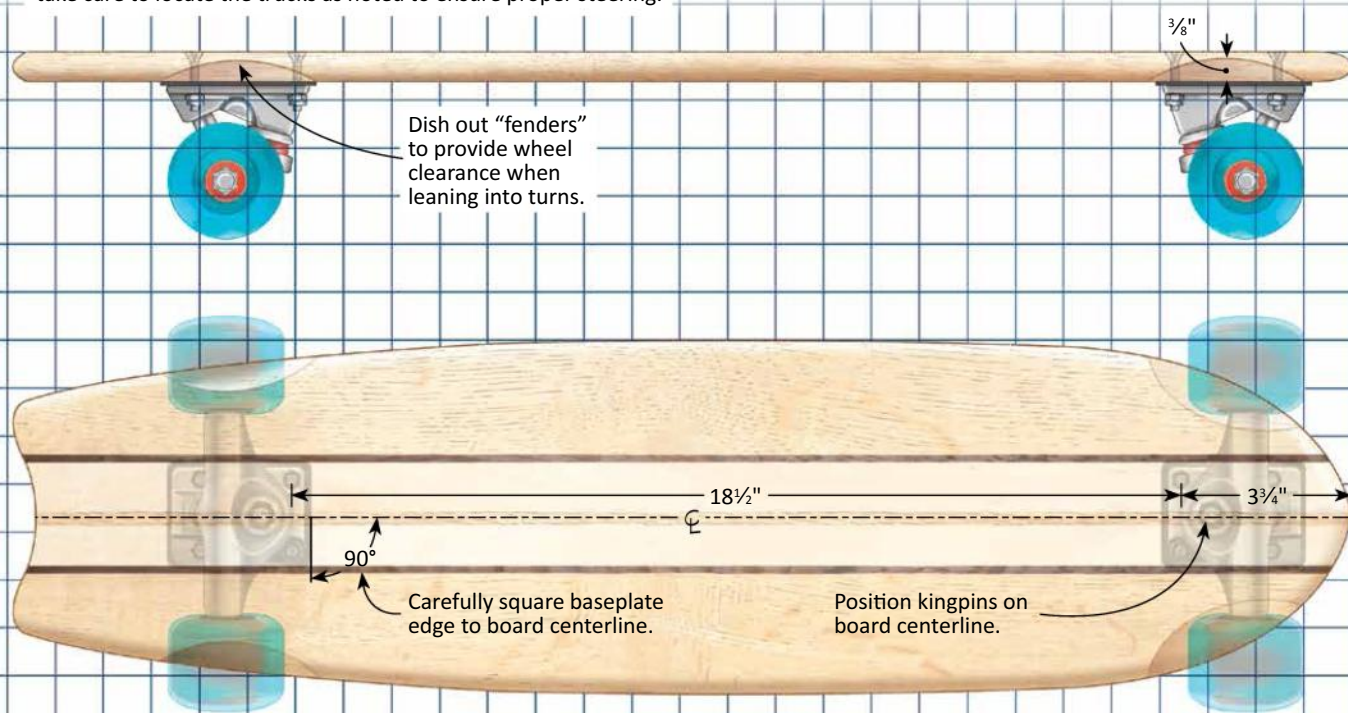


As I note in my book *The Handmade Skateboard* (Spring House Press), the skateboard was born in the 1950s in Southern California, when some teenagers fooling around in a garage nailed a set of roller-skate wheels to a plank of wood. The universally-awesome concept quickly caught on around the world and, as the popularity of the skateboard evolved, so did its design. By 1970 the kick tail was added for leverage to hop up curbs. In the 1980s, skateboard makers added a concave bend for extra strength and maneuverability. Today, skateboard decks are laminated from seven layers of hard maple veneer to create a precision deck with complex bends and curves.

Still, a vintage pin stripe hardwood cruiser like this is fun to ride and easy to make, even with limited shop space and tools. It's great for first-time riders, urban commuters, or for just getting around the neighborhood. And you'll have a good time mixing and matching wood species to create your own unique design that will turn heads wherever you take it.

Vintage skateboard pattern

The overall shape of this board does not have to be precise, but take care to locate the trucks as noted to ensure proper steering.



1 Square = 1"

onlineEXTRA: Full-sized pattern available at WoodcraftMagazine.com.

Build the blank from solid strips

Mill straight, square lengths of stock at least $\frac{5}{8}$ " thick, rip them to widths that suit your design, and arrange them to your liking. Try to slope the wood grain on all the pieces in the same direction for cleaner shaping later. Draw a triangle across the arranged pieces for reorientation, and then practice your clamp-up procedures to prevent any surprises or delays during glue-up. Then liberally apply glue to all the mating surfaces, and clamp up the blank. After the glue cures, plane the blank to $\frac{3}{16}$ " thick.



Dry run. In preparation for glue-up, completely rehearse your clamping procedure, including sandwiching your blank pieces between cauls to keep the parts aligned under clamp pressure.

Make a pattern and saw the profile



Saw the profile. Use a jigsaw or bandsaw to cut just outside your profile line, then follow up by carefully sanding to the line on a stationary belt sander.

Make a full-sized paper pattern (see page 25), and use it to transfer the profile to the blank. Outfit a jigsaw with a clean-cutting blade, and saw to within $\frac{1}{16}$ " of your layout line. Follow up by sanding the edges smooth and then rounding them over top and bottom to create a bullnose profile.



Shape the edge. A stationary belt sander makes quick work of roughing out the bullnose on most of the edge. Round over the tail section using a half-round file, and then refine the entire profile with files and sandpaper.



Fast cut. A spindle sander outfitted with a coarse sleeve makes quick work of sculpting out the fender recesses.

Shape the fenders and drill the truck holes

Referring to your full-sized pattern, lay out the recessed fenders on the underside of the board. Then sculpt them out so that the wheels won't contact the deck when you lean it into turns. To lay out the truck holes, first draw a centerline along the underside of the board. Then carefully position your trucks in perfect alignment with each other, and mark out the bolt locations at the truck mounting holes. (Important: Orient each truck so that its kingpin is toward the center of the board.) Bore out the through holes on the drill press, and then countersink the top ends to create a recess for the flathead machine screws.



Rough it out. Start by roughing out the cove-shaped fenders with a rasp and file.



Scrape it. Use a utility knife razor blade to smooth the surface and fair the curves.



Smooth it. Sand the fenders to a finished surface using a flexible sanding block.

True grit finishing

For a finish, I prefer a fast-drying exterior varnish with UV protection, like the water-based polyurethanes from General Finishes and Minwax.

Apply 3 coats to the underside and edges of the board, sanding between each coat with 220-grit paper. As for the top, rather than covering the pinstripe pattern with black grip tape, brush on a coat of finish mixed with transparent grit. Mix 1 tablespoon of clear silicon grit with 3 tablespoons of finish, and stir it into a thick slurry. Brush it onto the raw wood surface, making sure to evenly distribute the grit.



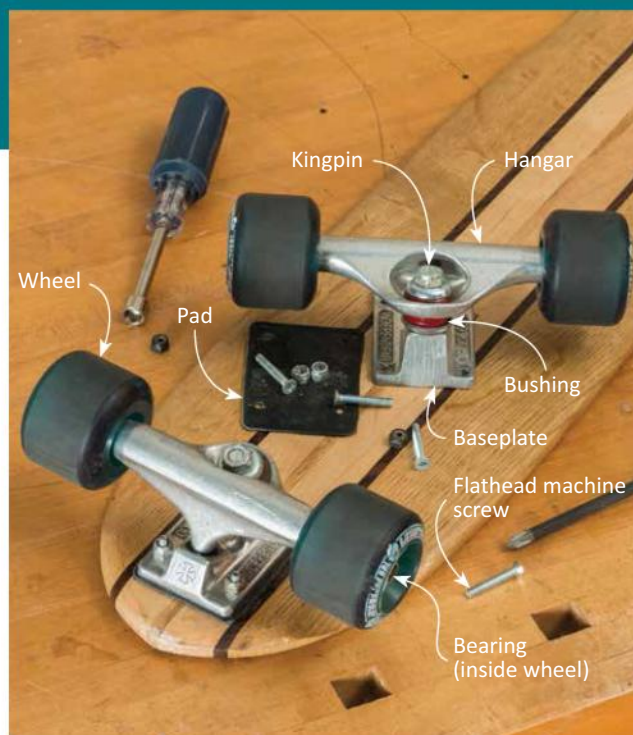
Pretty and gritty. A mixture of silicone grit and varnish creates a lovely, protective, non-skid finish that dries clear.

Selecting trucks and wheel assemblies

It only takes a few minutes to complete your board by setting it up with trucks and wheels. The challenge is selecting from among the array of brands and styles available. Here's how I navigate the options to outfit a board like this designed for cruising.

Start with a pair of skateboard trucks equal to the maximum width of the skateboard deck (8" wide for this design). Independent is the premium brand, but there are alternatives. The trucks mount to the deck with 1" flathead machine screws and locking nuts, with a $\frac{1}{8}$ " riser pad in between to soften the connection. The ideal wheels measure anywhere from 58mm to 60mm in diameter—the softer the better—and they mount to the trucks with a set of precision bearings.

If you don't want to puzzle out the selections yourself, see the Buyer's Guide on page 64 for my specific recommendations for trucks and wheels for this type of board.



Trucks and wheels. A truck consists of a baseplate, bushing, a kingpin, a hangar, and an axle inside the hangar. Trucks, wheels, and bearings are available in a wide variety of types and sizes that will affect the versatility and durability of your board.

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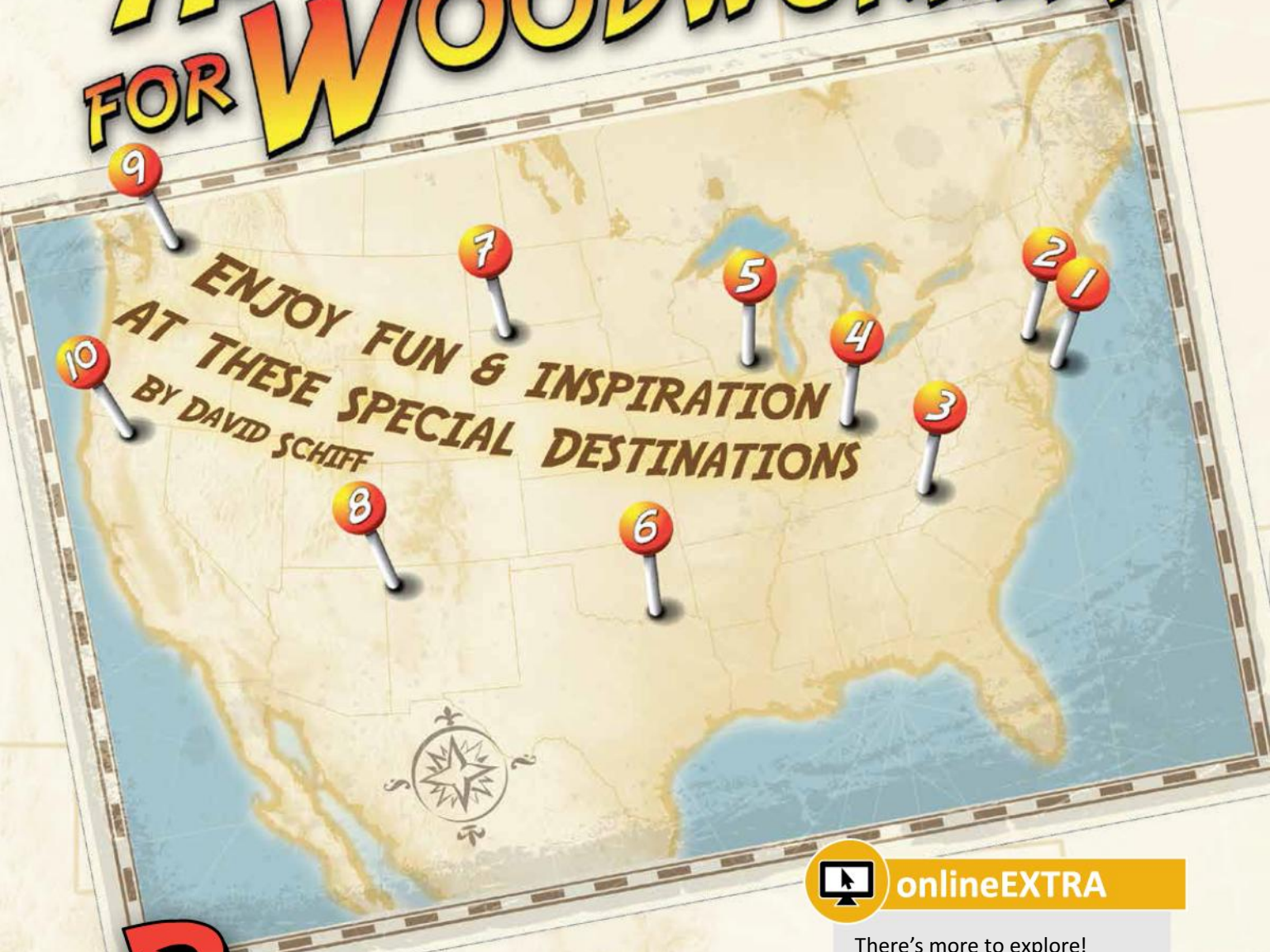


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ADVENTURE TRAVEL FOR WOODWORKERS



Road trip! For any woodworker planning a vacation (or even a business trip), it makes sense to be on the lookout for places that celebrate the craft in different ways. As it turns out, the country is dotted with destinations that are sure to prove fascinating to woodworkers or anyone interested in history, furniture design, and fine craftsmanship. We selected the destinations featured to provide the most variety in terms of subject matter and geographic location. Visit our website for more suggestions, and put some travel plans together that will enrich your enjoyment of our favorite activity. Because fees and hours can change, make sure to visit the listed websites before you finalize your trip.



onlineEXTRA

There's more to explore! We've put more woodworking destinations on our website. And we know that there are plenty of undiscovered places that might be fascinating for woodworkers to visit. Go to www.woodcraftmagazine.com and click on the "Articles" and "onlineEXTRA" tabs to discover more destinations and share your own recommendations.

Winterthur Museum and Gardens

5105 Kennett Pike, Winterthur, Delaware

If you're anywhere near Wilmington, Delaware, it's worth making a side trip to see one of the country's most extensive collections of American furniture and furnishings. Spread out through 175 rooms on the former du Pont estate, you'll find over 9,000 pieces of furniture dating from the mid-1600s to the 1870s.

The collection includes high-style Philadelphia rococo furniture, as well as representative pieces of the finest New England furniture, especially from Newport, Boston, Salem, and Portsmouth. Works by well-known cabinetmakers such as Samuel McIntire, Thomas Seymour, and Thomas Affleck are displayed along with other noteworthy examples.

Other galleries display fine examples of metalwork, ceramics and glass, paintings and prints, textiles, and needlework. You'll also enjoy Winterthur's Dominy clock shop and woodworking shop, which are reconstructions of shops used by four generations of the Dominy family who worked in East Hampton, New York, from the mid-1700s to the mid-1800s.



Hours: Mon.-Fri. 6 am-11 am

Fees: Members, free; adults, \$20; children 2-11, \$5; infants, free; seniors and students with valid ID, \$18. Also available: one-hour and two-hour reserved tours as well as private tours and special rates for group visits.

Phone: (800) 448-3883

Website: winterthur.org

The Wharton Esherick Museum

1520 Horseshoe Trail, Malvern, Pennsylvania



Hours: Tues.-Fri., 10 am-4 pm
Tours by reservation only,
call 48 hours in advance.

Fees: None

Phone: (610) 644-5822

Website:
whartonesherickmuseum.org

"If it isn't fun, it isn't worth doing," said woodworker and sculptor Wharton Esherick, who worked and lived in this studio about 25 miles outside of Philadelphia. It takes just a glance at his whimsical designs to see that Esherick lived by that credo. His work is irresistible to the eye and the hand. It will make you smile. When Esherick began making wooden sculptures in 1920, wood was generally considered to be a material suitable only for crafts. Acceptance of his work into New York City's Whitney Gallery (now known as the Whitney Museum) in 1924

recognized that wood could be a medium for fine art. He went on to apply his sculptural aesthetic to furniture, furnishings, interiors, and buildings. Esherick was largely responsible for the Studio Furniture Movement and helped pave the way for individual woodworkers who build and market works of their own design. Much of Esherick's work can be seen at the studio he built on this rural Pennsylvania hillside. Esherick lived at the studio, making it an exemplar of his philosophy that practical everyday items such as chairs, a bathroom sink, or a door latch could be works of art.



Foxfire Museum and Heritage Center

98 Foxfire Lane. Mountain City, Georgia



Hours: Open year-round
Mon.-Sat. 8:30 am-4:30 pm,
closed Sun.

Fees: Age 11 and older, \$6;
age 7-10, \$3; age 6 and younger, free

Phone: (706) 746-5828

Website: foxfire.org

It all started as an English class project back in 1966. A group of high school students began interviewing their families, friends, and neighbors and wrote articles for a magazine they called Foxfire. The goal, besides learning to write, was to preserve the vanishing pioneer culture of the southern Appalachian Mountains. Oftentimes these folks would give the students old tools or examples of the handcrafted items they were discussing.

By 1972, the demand for back issues of the magazine became so great that students published a compendium called *The Foxfire Book*, which became a best seller. By then the collection of artifacts had become so large the nonprofit Foxfire organization decided to use its considerable book royalties to purchase land and build a museum. The 106-acre site is tucked away on a mountainside in the northeastern tip of Georgia.

The high school students began dismantling log cabins that had been homes for generations and reassembling them at the museum site. There are now about 20 cabins filled with artifacts integral to the lives of Appalachian pioneers. About 10 are complete original cabins, the rest are constructed from usable pieces of barns, homes, and other structures. Among the buildings are a single-room 1820s log home, a chapel, and a gristmill. This ever-changing exhibit includes a great variety of vintage tools for woodworking, farming, and other crafts.



Louisville Slugger Museum and Factory

800 West Main Street, Louisville, Kentucky

The crack of wood against leather. The thrilling vibration of a solid hit shooting right up your arm. For many of us, a baseball bat may have been our earliest exposure to the power and resilience of a solid piece of wood. What woodworker could resist a visit to this five-story building with a giant replica of Babe Ruth's bat leaning casually against it?

Tour the factory and see demonstrations of how woodworkers turned Louisville Sluggers by hand back in the 1880s. Then check out the automated machines that now churn out about 1.6 million wood bats a year, including the mini-bats that are handed out to museum visitors. They also make aluminum and composite bats.

Of course there are plenty of exhibits to appeal to baseball fans of all ages. There's even a batting cage where you can hit with replica bats of legends like the Babe, Ted Williams, and current superstars. Crack!



Hours: Mon.-Fri. 9 am to 5 pm,
Sun. 11 am-5 pm, Christmas Eve
9 am to 3 pm, New Year's Day
noon-5 pm. Closed Thanksgiving
Day and Christmas Day

Fees: Adults, 13-59 \$12; seniors, 60 and older \$11;
kids 6-12 \$7; kids under 5, free

Phone: (877) 775-8443

Website: sluggermuseum.com





The Sawmill Museum

2231 Grant Street, Clinton, Iowa



Located on the Mississippi River, Clinton, Iowa, was at one time the principle sawmilling destination for the trees felled in the "Great North Woods" of Minnesota and Wisconsin. Giant rafts of logs were floated down the river from the north woods, and no fewer than 13 lumber barons established sawmilling operations. The mills attracted furnituremakers and other woodworking businesses.

By 1900 the northern forest lands were depleted, and Clinton's lumber boom was over. But today the Sawmill Museum preserves this rich woodworking history with displays that range from archival photos to working machinery and replicas of loggers' cabins. Visitors can actually go inside cabins to experience what it was like to live in a logging camp.

If possible, plan to visit the museum on the first Sunday of the month; that's when the diesel sawmill exhibit comes to life, milling logs into lumber. Groups who call ahead can sometimes arrange for their own sawmill operation event. The museum also includes a growing display of vintage machines like giant, cast-iron jointers and bandsaws. A special collection of machinery traces lumber from rough boards to finished chair legs.

Kids are sure to enjoy the Sawmill Museum—not just because of the loggers' cabins, but also because of the miniature railroad train that takes visitors around the grounds.

Hours: Tues.-Sat. 10 am-6 pm,
Sun. 1 pm-5 pm, Mon. 1 pm-6 pm

Fees: Age 13 and older, \$4;
children 4-12, \$3;
children under 3, free

Phone: (563) 242-0343

Website: thesawmillmuseum.org



Homestead Heritage Village

608 Dry Creek Rd., Waco, Texas



If you love the whisper of a sharp hand plane, the chop of a chisel and the rhythm of a handsaw, you owe yourself a visit to this unique homesteading community on the outskirts of Waco, Texas. The 1,000 members of this non-denominational Christian community are dedicated to simplicity and self sufficiency. They express this dedication largely through manual labor. Fields are plowed with horses instead of tractors, and wood is worked with hand tools.

Visitors are invited to take self-guided walking tours of the 510-acre village. Guided tours are available by appointment. Here, you won't find museum docents demonstrating traditional techniques. Instead you'll observe community members expertly pursuing their crafts in

blacksmithing, pottery, weaving and other workshops. There's a gristmill, and you can visit a restored, 200-year-old barn that showcases the work of the community's craftspeople.

At the woodworking shop you'll see master woodworkers and apprentices using hand tools to create a variety of furniture pieces for sale. Local wood species like mesquite feature in many projects.

If hand-tool woodworking is your passion, you might be interested in the community's school of woodworking. Courses running from one to six days are currently offered.

Hours: Mon.-Sat. 10 am-6 pm

Fees: None

Phone: (254) 754-9600

Website: homesteadheritage.com



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National Museum of Woodcarving

Hwy 16 West, Custer, South Dakota

Woodcarving virtuosity meets mechanical wizardry at this museum located about 1 mile east of Custer State Park. Get ready to be wowed by over 30 carved diorama-type displays that depict a wide variety of activities typical of the American West. Humor is the dominant theme, whether you're watching cowboys gambling and drinking in a bar or a few revelers playing music outside a log cabin.

The carved and animated displays were created by Dr. Harvey Niblack, a pioneer in animatronics who helped develop some of the first 3-D animation at Disneyland in the 1950s. It's amazing that these intricate mechanisms still work after all this time.

When you are done scratching your head in wonder at how Dr. Niblack pulled off his tricks, you can stroll around the gallery and take in an impressive variety of carvings done by more than 70 artists. If you're lucky, resident carver Keith Morrill or a guest woodcarver will be around to offer some tips. Morrill specializes in carving characters that relate to the local western and Native American history of the Black Hills. You can also sign up for a five-day seminar with a professional woodcarver.



Hours: Open every day May 1-Oct. 20; May 1-May 22, 9 am-5 pm; May 23-Sept. 7, 9 am-7 pm; Sept. 8-Oct. 20, 9 am-5 pm

Fees: Adults, \$9.99; seniors, \$9.49; kids 5-14, \$7.49; kids under 5, free; family admission, \$37.99

Phone: (605) 673-4404

Website: woodcarving.blackhills.com

National Museum of Woodcarving photo courtesy of South Dakota Department of Tourism

8

Petrified Forest National Park

Between Interstate 40 and Highway 180, Arizona

You haven't really experienced hardwood until you visit the Petrified Forest in northeast Arizona. Here you will find the colorful, fossilized remains of trees that were buried in sediment over 200 million years ago. Forget carbide, you'd need a diamond-tipped blade to cut into logs that weigh 168 lbs. per cubic foot. But of course helping yourself to samples is not allowed.

Petrified wood is just one of the fascinating features you'll find in this 146-square-mile national park. A short visit provides ample opportunities to stop your car at overlooks and take in amazing

views of different rock formations caused by water and wind erosion. But it's worth taking some extra time for short walks on maintained trails or (if you're more ambitious) longer backcountry hikes. You'll be amply rewarded, as you encounter ancient petroglyphs and native American settlements, as well as wildlife and wildflowers.

Hours: The park is open year-round except Dec. 25. Park roads are open Sept. 20-Oct. 31 from 7 am to 6 pm and Nov. 1-Dec. 31 from 8 am to 5 pm.

Fees: Seven-day passes to the petrified forest are \$20 for cars, \$10 per person for bikes, \$10 per motorcycle. U.S. citizens over 62 can get a lifetime pass for \$10, and there are free passes for citizens with permanent disabilities and for veterans.

Phone: (928) 524-6228

Website: nps.gov/pefo/index.htm



Northwest Woodworkers Gallery

2111 1st Ave., Seattle, Washington

You can't help but come away inspired by this ever-changing woodworking exhibit in the heart of Seattle. Your head will be crammed with new design ideas about all kinds of woodworking projects—from coffee tables and cabinets to tables, nightstands and jewelry boxes.

Founded in 1980, the gallery is owned and operated by a

cooperative of nearly 50 member-owners, but the items on display come from over 200 talented artisans. As a bonus, the work of top-notch painters and photographers is also displayed.

To deter sensory overload, it's a good idea to click on the gallery's website and check out the artist profiles and current shows. You can even get into the act yourself by submitting a piece to the annual Box and Container Show, a great way to introduce your work to the gallery's clients.

Hours: Mon.-Fri. 10 am-6 pm,
Sat.-Sun. 10 am to 5 pm

Fees: None

Phone: (206) 625-0542

Website: nwwoodgallery.com

Northwest Woodworkers Gallery photos: Hank Holzer



Blue Ox Millworks

One X St. Eureka, California

Strong legs are useful at Blue Ox Millworks, because many of the antique machines used here are pedal operated. But this is more than a museum. At Blue Ox, machines and techniques from the 19th and early 20th centuries are used to produce custom architectural millwork for jobs all over the country. The work includes moldings, balusters, columns, custom windows and doors, redwood gutters, corbels, gable decorations, and Victorian gingerbread. Blue Ox also has its own sawmill, blacksmith shop, and foundry.

"I never have to go to the store for anything," says Blue Ox founder and master woodworker Eric Hollenbeck.

You might get a chance to chat with Eric when you visit.

Blue Ox also operates an alternative high school and a school for veterans.



Hours: Mon.-Fri. 9 am-5 pm year-round, Sat. 9 am-5 pm April-Nov.

Fees: Self-guided tours: Adults, \$10; seniors 65 and older, \$9; children 6-12, \$5; children under 6, free. Guided tours: Arrange in advance, 10-person minimum, \$12.50 per person. Custom-designed workshops are also available.

Phone: (800) 248-4259

Website: blueoxmill.com

Build a Wall Organizer... Just the Way You Want It

Conquer clutter with a project you can customize to suit your needs

By Tim Snyder



3 organizers joined together

Key, coins, caps, coupons... where does all this stuff go? It's not easy to keep track of life's daily debris, but this wall organizer can help. The lumber order is small, but the impact of this project can be big. The nice thing about this project is that it can easily be customized to match up with your organizational priorities. Replace the corkboard panel with a chalkboard or a mirror. Use Shaker pegs instead of metal hooks, or just eliminate the peg rack portion.

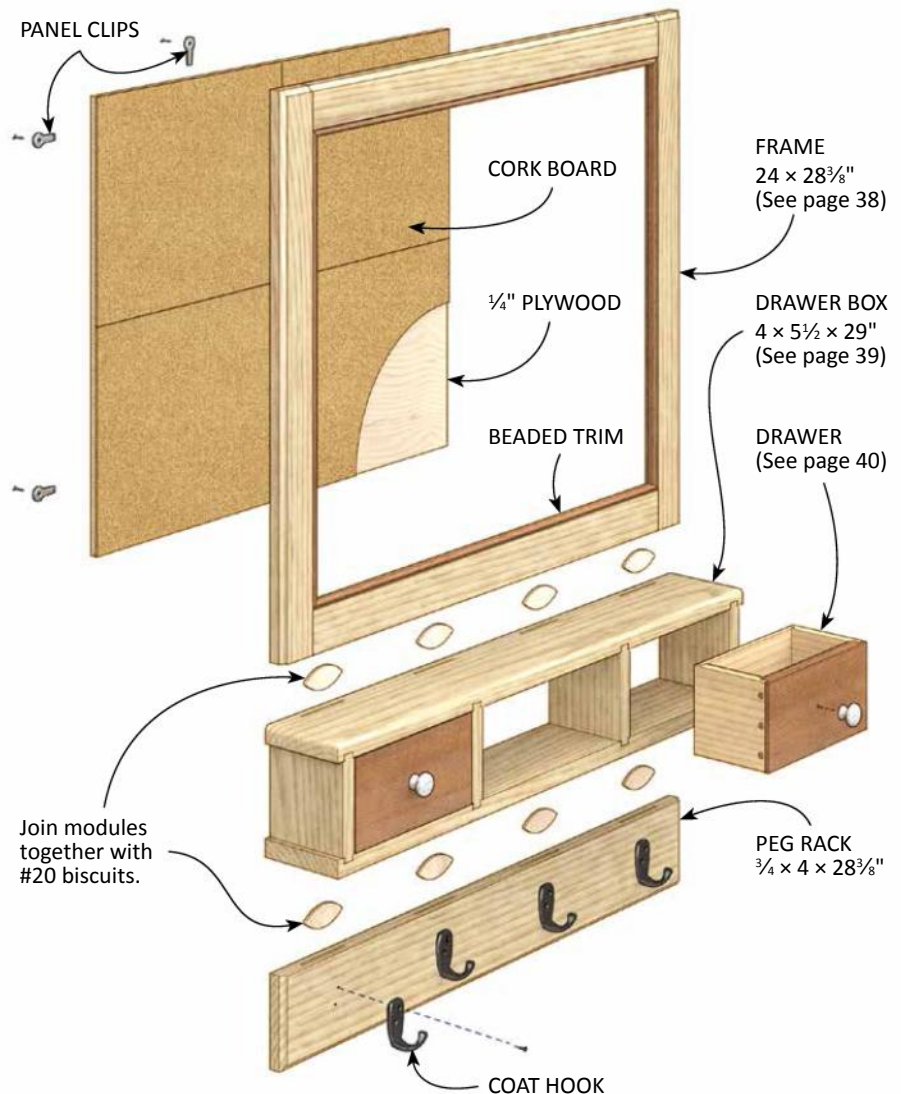
This project provides some good opportunities to both hone and show off your skills. For example, the drawer box features sliding dovetail joints. The beaded frame of the bulletin board is an attractive detail you can use on other projects where face frames are required.



onlineEXTRA

Visit woodcraftmagazine.com to see other design and finishing options that are possible with this wall organizer project.

This project consists of three separate modules: the frame (which can hold a bulletin board, chalkboard, or mirror), the drawer box assembly, and the peg rack. Depending on your needs, you can build just a single module, or combine them. In the different versions of this project that I've made, contrasting wood species are used for the drawer fronts. Personalize your project with your own wood species choices or with different painted or stained finishes.



Construction sequence

- Build the frame, then make the bulletin board.
- Build the drawer box, then make the drawers.
- Make the peg rack.
- Join the frame, drawer box, and peg rack together.

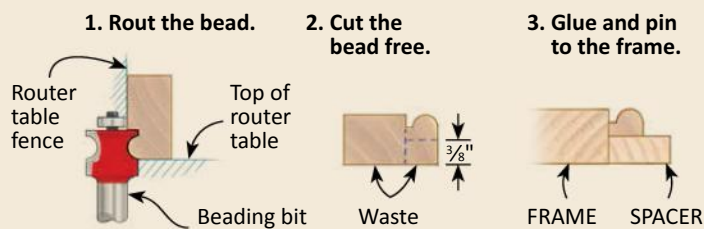
Hardware order

- 2 drawer pulls
- 4 coat hooks
- 6 panel clips
- 2 keyhole plates
(See Buyer's Guide, page 64)

Assemble a beaded frame, then add the corkboard

After assembling the frame, use a $\frac{3}{8}$ "-radius beading bit to mill a bead profile in some clear stock. Cut the beaded trim free, as shown below. The installed trim creates a rabbet to hold your panel. If you want a mirror instead of a corkboard or chalkboard panel, take the completed frame to a glass and mirror dealer.

Making and installing the bead

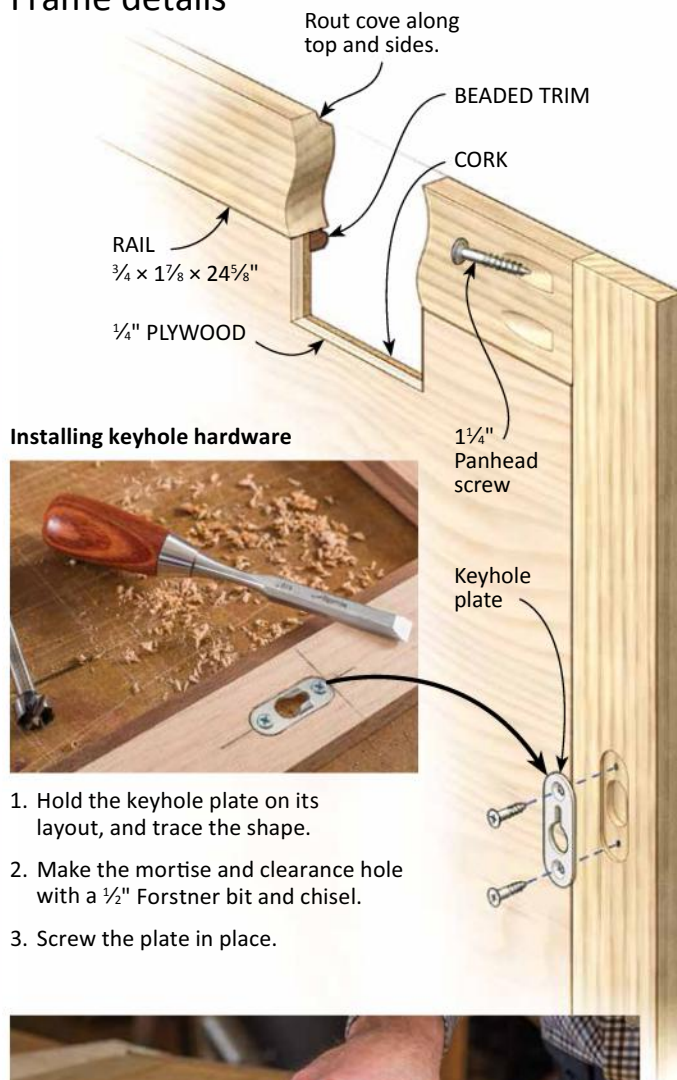


Cut tiny miters with a tiny saw. I screwed the aluminum miter box to a plywood base, then clamped this small workstation to my bench.



Work your way around. Cut each piece of beaded molding slightly long. Miter one end, then fit the piece in place on the frame to mark the opposite miter. Install with glue and $\frac{1}{2}$ " pin nails, using spacers to create a uniform rabbet behind the molding.

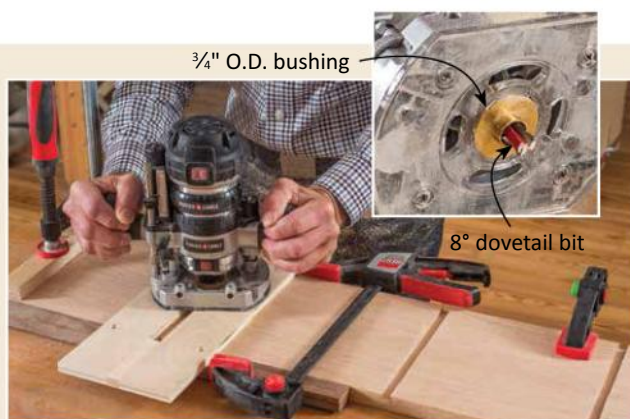
Frame details



Plywood gets a corkboard covering. Use $\frac{1}{4}$ " pine or fir plywood as the backing for a corkboard covering. You can use adhesive-backed corkboard (shown here) or corkboard squares that are glued to the plywood with contact adhesive. Either way, cut the backer board to finished size first, then apply the corkboard, trimming off any excess with a utility knife.

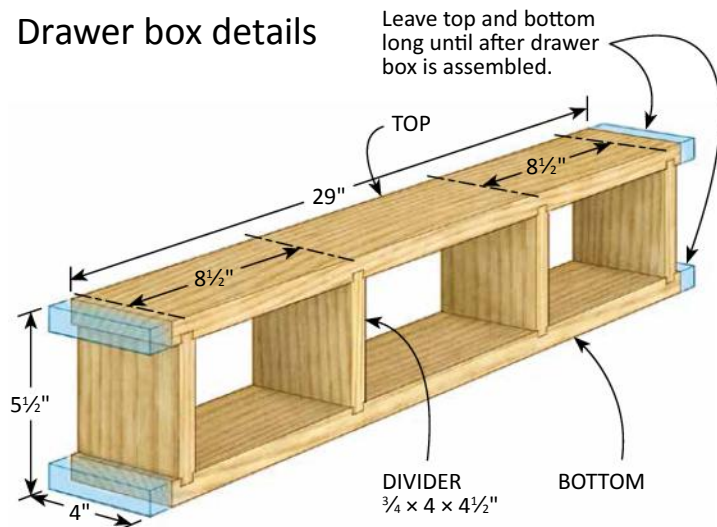
Build a box with sliding dovetails

To prep for this part of the project, cut the top and bottom pieces to finished width, but allow both pieces to run long until after you've assembled the box. The dovetail jig is sized to span the top and bottom pieces and guide a $\frac{3}{4}$ " OD bushing and 8° dovetail bit. Align the jig's open slot over each dado's centerline to set up each cut. Keep the dados shallow (just $\frac{1}{4}$ "). This minimizes the risk of splitting the box ends and eliminates the need for initial routing with a straight bit. Use the same dovetail bit in the router table to dovetail the ends of the dividers. Prepare some test pieces (exactly as thick as your dividers) so you can adjust bit height and fence position until your fit is exactly right.

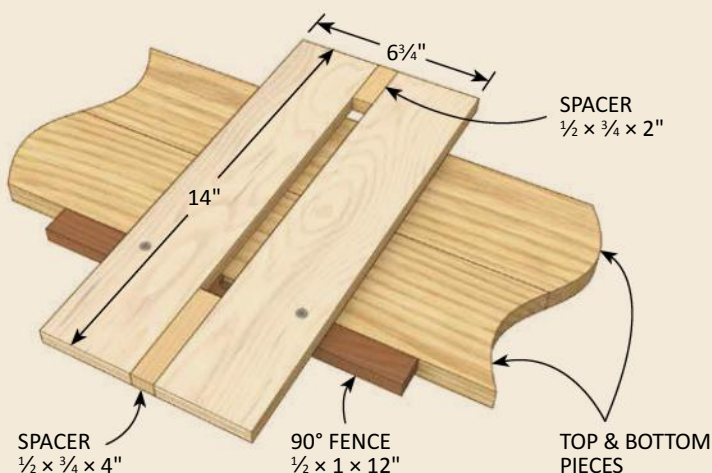


Route dovetailed dados with a right-angle jig. My jig has a slotted platform and a right-angle fence for easy clamping across top and bottom pieces. Make a test cut in scrap stock to make sure the bushing slides smoothly and the dovetailed dado is no more than $\frac{1}{4}$ " deep.

Drawer box details



Dovetail jig details



Test and adjust till the tails fit right.

Using scrap pieces exactly as thick as your dividers, keep fine-tuning your router table setup until your test tails slide snugly in the shelf's dovetailed dados. Then rout the real thing.



Tap together carefully. Coat joining surfaces with glue, then tap each partition into the top and bottom at the same time. Trim box ends to final length after the glue dries.

Make drawers with dovetail rabbit joints

The same dovetail bit used on the drawer box can also make attractive corner joints on your drawers. As shown below, the bit cuts angled rabbets in front and side pieces that mate perfectly. A trio of 1/4"-dia. dowel pegs strengthen and decorate each joint. To create this joinery, first prepare extra stock equal in thickness to your drawer fronts and sides. Use these pieces to test and adjust bit height and fence position. Check the dimensions in the drawing against the dimensions of your drawer openings. Subtract 1/8" from height and width of the opening to get the length and width of a drawer front. Size the sides so that drawer fronts will be flush with the front of the case.

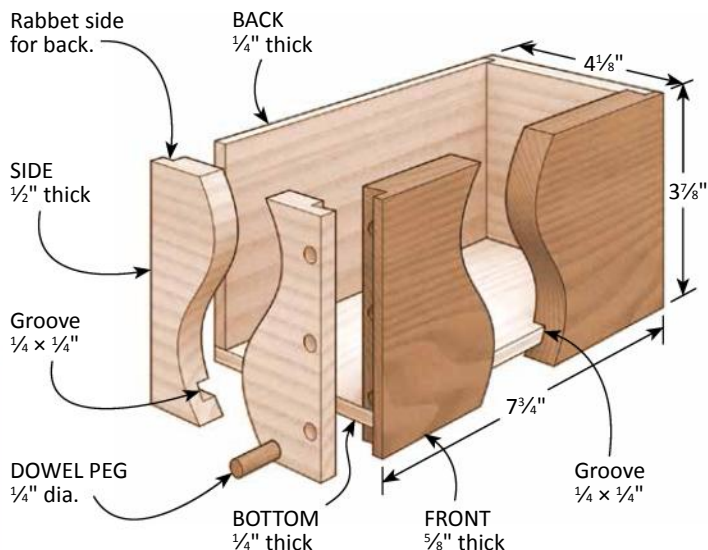


Face up when routing drawer fronts. Adjust bit height to 7/16", and set the fence for 5/16" of cutting depth. The show face of the drawer front should face up as you guide the edge against the fence. Back up each cut with scrap stock to avoid tearout.



Run sides on edge. Keep bit height the same, but adjust fence position for a flush fit when the side dovetail joins the front dovetail. When dovetail cuts are complete, fit a 1/4" straight bit in the router table to rout a slot in each side and front for the drawer bottom. Then rabbet the back edge of each side to hold drawer backs.

Drawer details



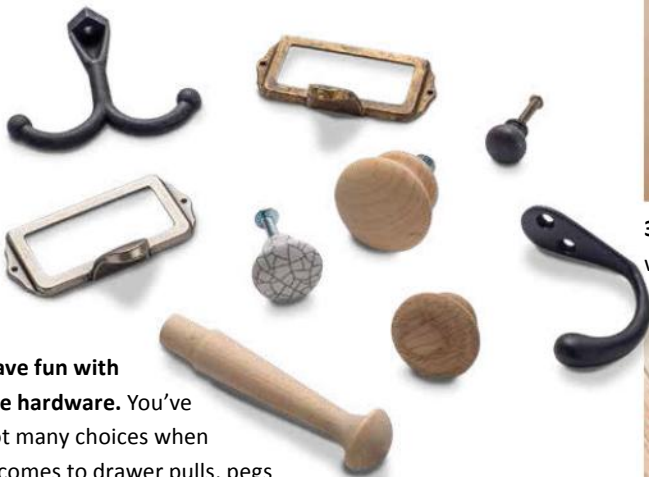
A pair of clamps for each drawer. Glue drawer sides to fronts, but let the bottom float. The angled corner joints naturally pull tight during clamp-up. To finish drawer construction, attach backs with glue and 1/2" headless pins, then rout a 1/8" chamfer along drawer front edges.

Now put it all together

Once you've completed the frame, drawer box and drawers, all that remains is the peg rack—the easiest part of the project. After cutting your peg rack to its finished size, detail the board ends and bottom edge using your router and a cove or round-over bit.

I found it easier to finish each module on its own, then assemble the project. Make sure to remove the corkboard panel from the frame to avoid getting finish on the corkboard. The same advice applies if your frame holds a chalkboard or mirror. Many finishing options are possible for a project like this. For the organizer shown here, I gave the oak a brush-on, wipe-off treatment with oil-base, honey maple stain, followed by a single coat of Waterlox. I finished the drawers with two coats of Waterlox.

If your panel doesn't fit flush with the back face of the frame, don't worry. You can add thin spacers to the frame (shown below) or between the clip and the panel.



Have fun with the hardware. You've got many choices when it comes to drawer pulls, pegs and hooks. The selection shown here comes from Woodcraft and Lee Valley.



onlineEXTRA

Visit our website for a short video that explains how to quickly and easily mount your completed wall organizer (and other stuff) on the wall.



3 into 1. I used biscuit joints for strength and alignment when gluing the three subassemblies together.



Make clips from hooks. If you have trouble finding panel clips, simply make your own from steel utility hooks, as shown here. Flex the hooked section back and forth until it breaks off. Glue a thin spacer strip to the frame beneath each clip if the panel extends beyond the back of the frame.

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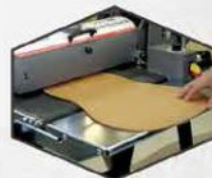
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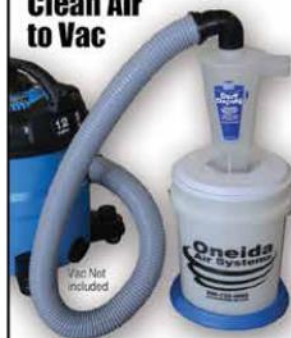
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Patio Table

Build a super-solid, bar-height table that's ideal for outdoor use

By Chris Spoerer



Most outdoor furniture falls into one of two categories: cheap junk that's lucky to make it to the following spring; and better-built furnishings that cost as much as a summer cottage. But if you're a woodworker, you don't need to settle for poor quality, or pay a fortune to enjoy outdoor furniture that's beautiful and durable.

The bar-height table I'm building here is the centerpiece of a patio set that includes chairs, as shown on the cover and on p. 51. I made the entire set from reclaimed cypress, which has good dimensional stability along with excellent resistance to rot and insect damage. Other good "outdoor" woods

include cedar, white oak, teak, and ipe, which is sometimes used as outdoor decking.

Without altering the design or joinery details, you can adjust the dimensions of this table to suit available material. For example, two-by-stock can substitute for the 8/4 lumber I used to make the tabletop frame and rails for the base.

Loose tenons for the top, through tenons for the base

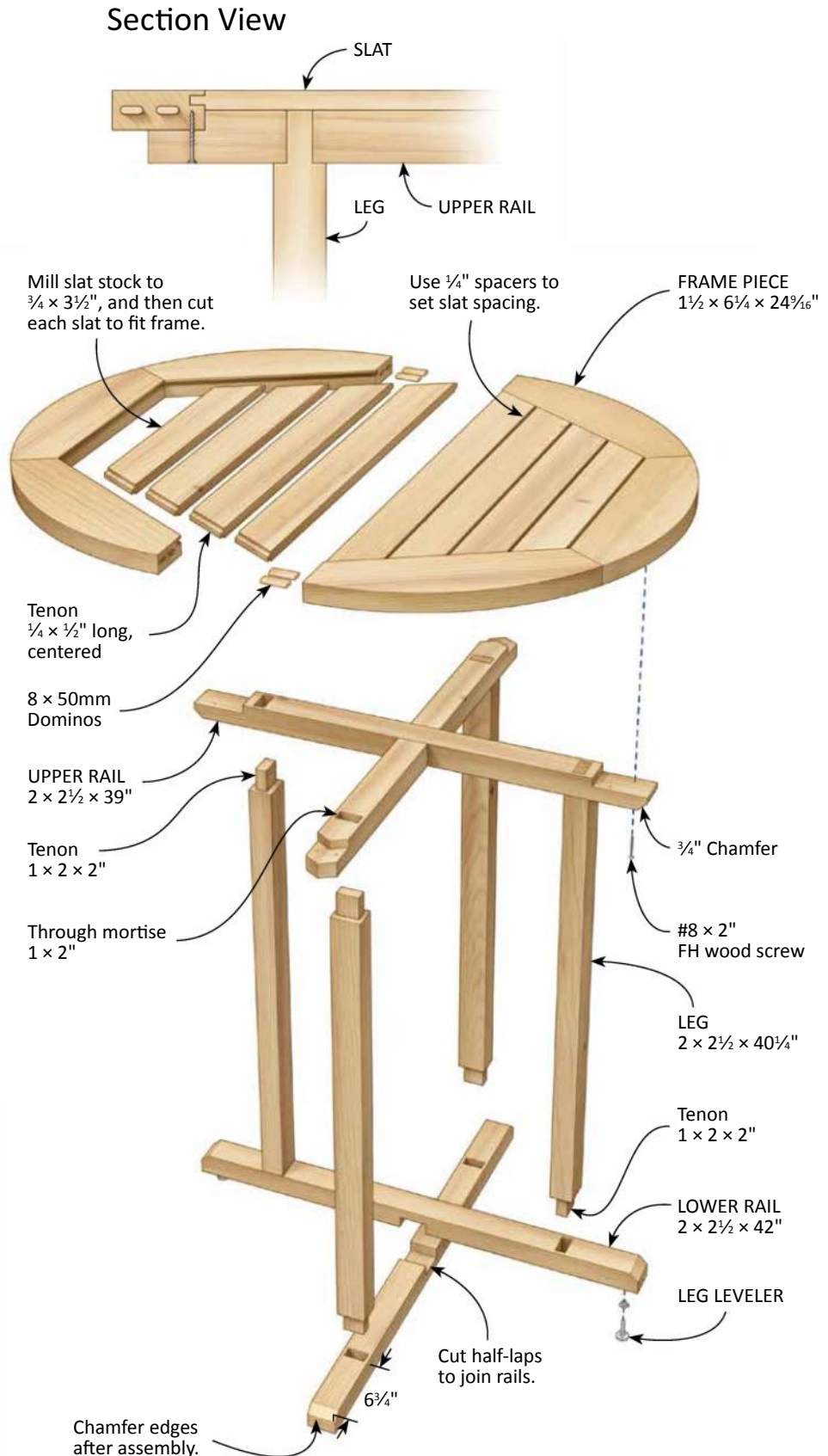
Wooden outdoor furniture needs strong joinery. That's why my patio set goes together with loose and through tenon joints, assembled with Titebond II. I used my Festool Domino to make all the loose tenon mortises, because it's fast, simple, and accurate. If you've been thinking of buying this tool, here's your excuse. But if you don't own one yet, don't worry. You can plunge-rout the mortises using the techniques explained in the Joinery Class that begins on p. 66.

Construction Sequence

- Make the mitered frame for the tabletop.
- Cut the top slats, then assemble the top.
- Shape the top to its final round form.
- Make the upper and lower rail assemblies.
- Make the legs and assemble the table.

Rail Details

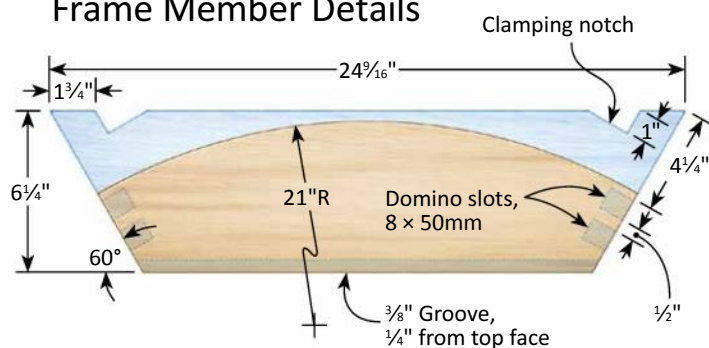
The table's base is made by joining upper and lower rail assemblies together with four identical legs. The mortises and center lap joints are identical in upper and lower rails. The upper rail assembly requires end laps to be cut so that these rails can nest into the tabletop frame.



Make a 6-sided outer frame for the top...

Making a perfect frame requires spot-on miters and identical segments. To fine-tune your miter gauge, test-miter three segments, and dry-assemble them against a straightedge. Adjust the gauge until the outer ends touch the straightedge with no gaps. (Don't reset your miter gauge; you'll use the same setting for the top slats.) After mitering the ends, groove the inside edges for the slats, then mortise the ends. Assemble the frame in two halves, as shown below.

Frame Member Details



Master the miters. After fine-tuning the angle, miter one end of each segment. Next, add a stopblock to your auxiliary fence and cut the remaining end. A mitered offcut makes a perfect stopblock.



Get in the groove. With the segment's top face riding against the fence, cut the 1/4 x 1/2"-deep groove for the top slats.



Make your mortise. A Domino joiner makes short work of the multitude of mortises used to join the frame sections. After applying glue, tap in the tenon, assemble the joint, and move on to the next section.



Assemble half the frame. Use F-clamps to pull together the miters' outer edges, then position a clamp across the outermost ends to draw in the inner edges. Clamping the subassembly against a straightedge prevents excessive clamping and helps ensure that this half will match its mate.

...then fill the frame with slats

With both halves of the top frame assembled, the next step is to fill each half with slats and then glue these two subassemblies together. This work can go quickly if you use your miter saw to make the angled end cuts and your tablesaw (with a dado cutter) for making the tenons that fit in the slotted frame. Install the innermost slat first, then work outward. My cut-to-fit technique ensures accuracy. I cut and tenon one slat end, then lay it in place on the frame to mark the opposite end cut. Insert $\frac{1}{4}$ "-thick spacers between each slat to create a gap for drainage. Then pull the two halves of the top together.



Tenon one end. After mitering an end, use the previously set miter gauge to cut a $\frac{1}{4} \times \frac{1}{2}$ " tenon on your first slat.



Set and scribe. To determine the length of the first slat, register it above the frame's inner edge, and mark the opposite end as shown. Add $\frac{1}{2}$ " to account for the tenon.



Line them up, then lay them out. Position spacers between the slats, set a straightedge against the cut end of the first slat, and extend the line to obtain the exact length of the next. Repeat the process with the remaining two slats.



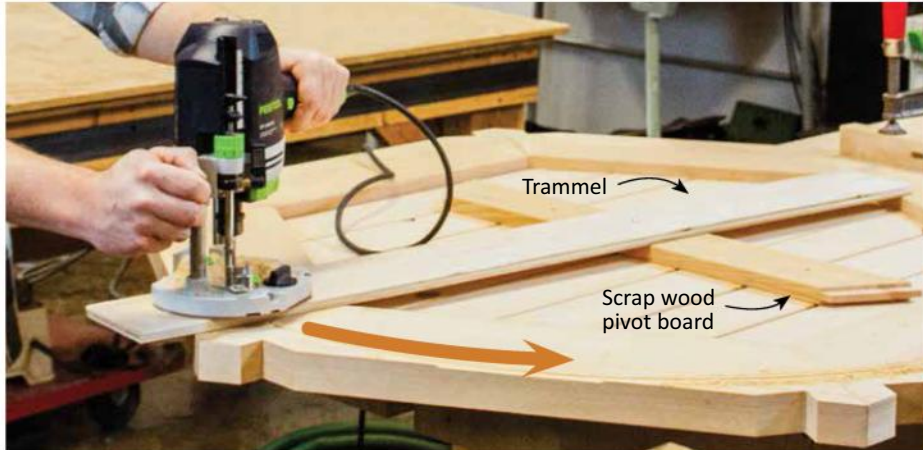
Rip it right. If the outermost slat stands proud of the frame, measure back half the spacer thickness, and rip the slat to width for a perfect fit.



Two halves make it less hectic. After fitting the slats for the matching halves, assemble the top by gluing the tenons into the grooves. Finally, join the two top halves together by using a pair of F-clamps on the outer notches.

It takes three steps to round the top

Trammel-routing is cleaner cutting and easier than wrestling this top over your bandsaw. To do the job, you'll need a plunge router, a spiral bit, and a trammel. (You can make one from a piece of $\frac{1}{2}$ " plywood). Pin a pivot board to the center of the table, then draw lines connecting the top's opposite corners to determine exact center. To ensure your trammel is perfectly centered, check its swing using a pencil before attaching the router. Ease sharp and splintering edges with a chamfer or round-over bit.



Routing in the round. Attach a trammel to a piece of scrap, and determine the centerpoint of the tabletop. Then attach a router to the outer edge of the trammel, and rout a $\frac{1}{8}$ "-deep groove around the outer edge of the tabletop.



Saw in the groove. Keeping the saw in the groove established by your router, cut away the extra wood.



Route clockwise for a cleaner cut. Climb-cutting prevents chipping and tearout, but realize that the bit wants to pull itself into the cut. To maintain control, keep both hands on the router, and take light passes until you reach full depth.

Begin the base by making two rail assemblies

To ensure that the leg mortises on the upper and lower rails match, I started with two identical pairs, cut the mortises, and then trimmed the upper rails to fit the top. Note that one rail's rabbets are mitered to fit between the top's frame. I used a miter gauge to cut the shoulder, then used a dado set to nibble out the waste.



Mortise the corners. For consistency, keep the stopblock clamped in place, and slide in a spacer block to reposition the rail.



Saw out the center. Sawing out the center sections is faster than boring multiple mortises. Clean up to your layout lines with a sharp chisel.



Saw out the shoulders. Rabbetting the square-end rail is simple, but the angled rabbet requires an extra step. Use your miter gauge to trim the ends, then lower the blade and make the shoulder cuts, as shown above.



Dado gets it done. You could nibble out the rabbets and half-laps with a standard blade, but a dado head saves time and produces a cleaner cut.

Make the legs and assemble the table

After milling the legs and cutting the tenons as shown below, you're set for final assembly. As with the top, the secret to a hassle-free glue-up is working in stages. Glue up the upper and lower rail assemblies, then install the legs to join them together. Finally, install the leg levellers, and screw the base to the top. Remember to protect your project with a weather-resistant finish (I used General Finishes' Outdoor Oil).



Tenon tamers. When cutting the leg tenons, use a stopblock and outfit your miter gauge with an auxiliary fence.



Stack, and then put the squeeze on. Insert the legs in the lower rails, and then attach the upper rails. The riser blocks provide necessary clearance for clamps.



Attach the base to the top. Position the base assembly on the top and join the two with 2"-long stainless steel screws.



onlineEXTRA

If you don't own a Festool Domino, you can rout the mortises with a plunge router, a $\frac{3}{8}$ " spiral bit, and a simple shop-made jig. For plans and complete instructions, go to woodcraftmagazine.com and click on the "Articles" tab.

Patio Chair

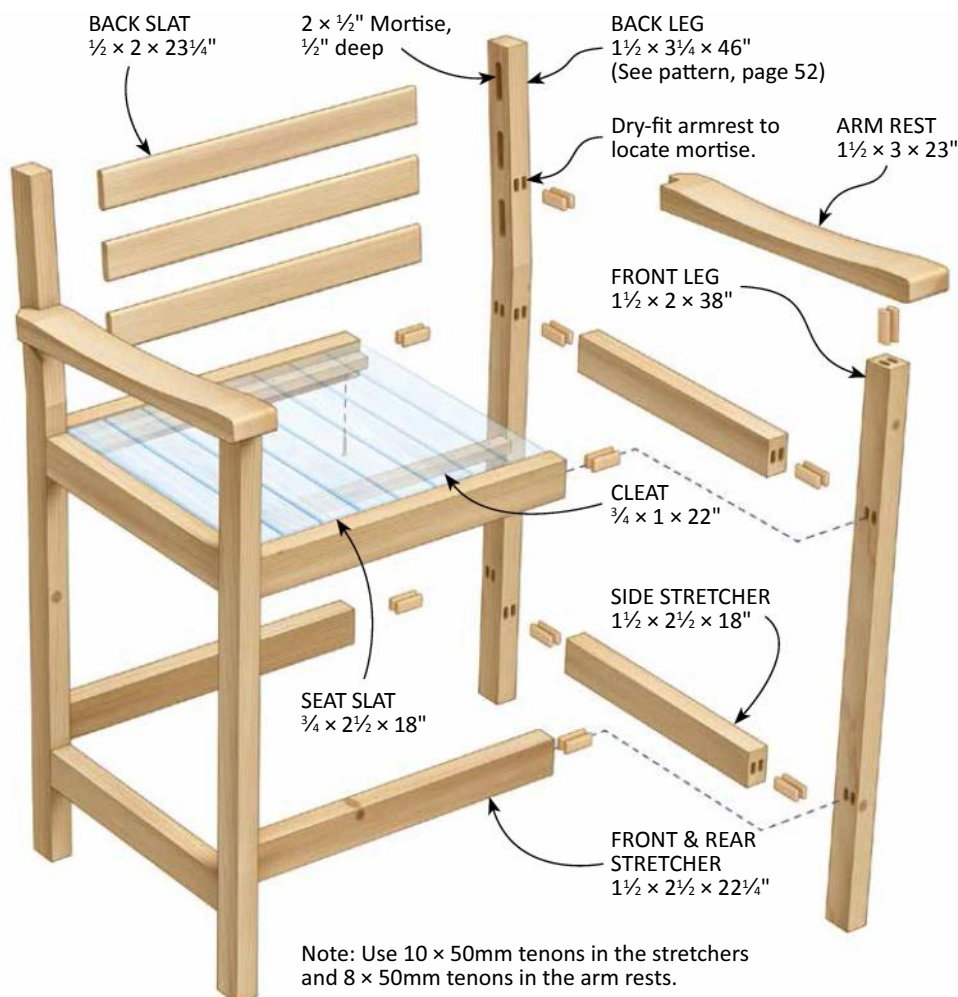
Loose-tenon joinery is fast, strong and simple

By Chris Spoerer

What good is a table without a matching seat or two? I designed these bar-height chairs with comfort in mind. They are wide and deep, with contoured armrests and stretchers to rest your feet. As with the matching table, I relied on loose-tenon joinery. This technique ensures solid construction and streamlines the assembly process: cut the parts, make your mortises, and then piece the chairs together.

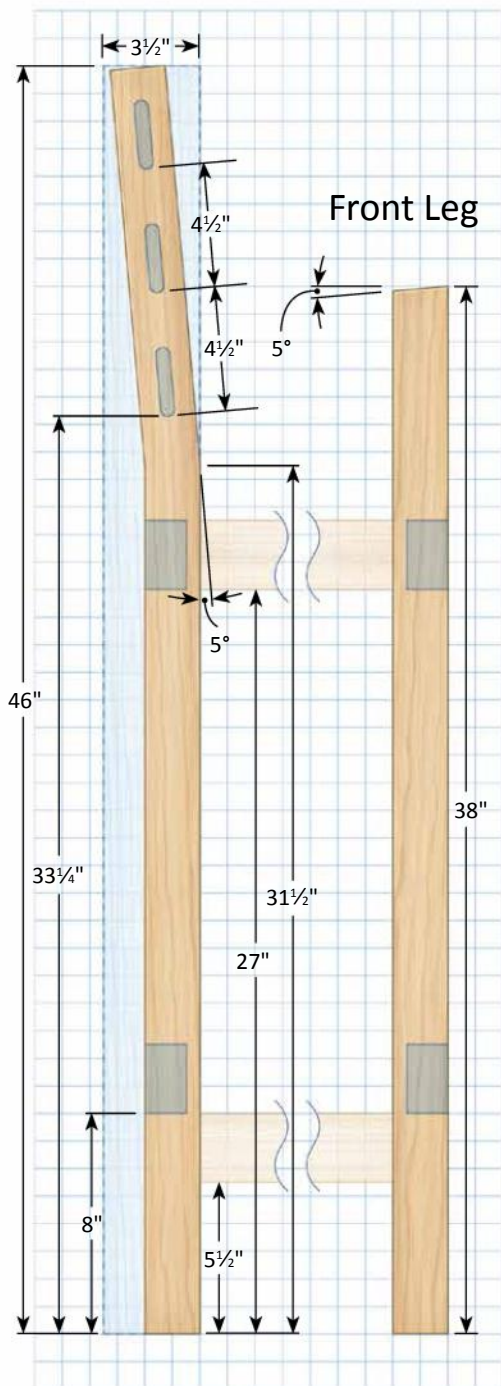
Construction Sequence

- Make the legs and stretchers.
- Cut mortises in legs and stretchers.
- Fit the back slats, then dry-fit the frame.
- Make armrests and cut armrest mortises.
- Assemble the chair and install the seat.



Make a rear leg template for tracing, routing, routing,

Back Leg Pattern



Take your time making a rear leg template from $\frac{3}{4}$ " plywood; it's a critical project ingredient. After making the template, mark the locations of all the slat and stretcher mortises on both faces of the template so you can transfer this layout to your legs. Screw a cleat to the bottom of the template as shown below, to create a stop for quickly aligning the template. Then put your template to work, first for tracing the rear leg pattern, then for template routing and mortise layout.



Line 'em up. A cleat screwed to the bottom of the template simplifies alignment as you trace the rear leg shape onto the workpiece.



Rough 'em out. To make life easier for your router, saw $\frac{1}{8}$ " outside the layout lines.



Now rout away the rest. Attaching handles to the template helps keep hands clear of the pattern-routing bit. To prevent the leg from shifting when routing, I screwed the template to the workpiece at the mortise locations.

and mortise layout

Fitting 40+ loose tenons into matching mortises might seem daunting, but it's not difficult if you follow my simple strategy. First, I cut the legs and stretchers to final dimension, identified the "show" faces, and marked the parts to make sure that they maintained their correct orientation through assembly. Next, I used my template to lay out the locations of the stretchers and back slat locations on the rear and front legs. (Remember that the legs are mirror images of each other, so make sure to mortise the correct faces.) After marking centerlines on the ends of the stretchers, I was ready to start mortising (see photos, below).



Mark your mortises. Register each leg's end against the template's cleat, and mark the mortise locations. Include centerlines for positioning your mortiser.



No Domino? No problem. You can still build this chair by plunge-routing mortises with a simple jig. Find out more on our website.

Stacked for strength. I cut the first mortise on all the pieces first, then shifted the Domino's fence and cut the second ones. Referencing the same face of the leg (rather than flipping the stock) prevents alignment problems.

Cut wider mortises for the back slats

Simply put, the back slats are super-sized loose tenons. To make the 2½"-wide slat mortises, I shifted my Domino and cut overlapping mortises. If you're using a plunge router reposition your jig or use an edge guide.

Once slat mortises are cut, you can cut and rout the slats for a snug fit. A ¼" round-over bit will create a close match for the Domino XL's 12mm cutter.

Tip: Mill an extra slat and use it to sneak up on a perfect fit.



Overlap the slots for the slats. The retractable stop pins on the Domino's front edge register the machine against one side of the mortise so that the machine doesn't shift.



Rout the round-overs. Rout the outer edges to fit. It's better to err on the snug side and sand the ends to fit.

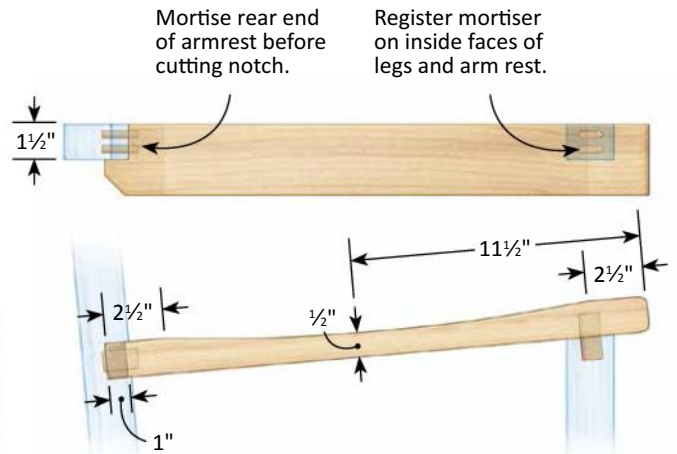
Dry-fit the frame, then make & install the armrests

It's time for a test assembly to make sure your final glue-up will go smoothly. When the chair frame is together, you can mark up the armrests, cut them to fit, and curve them for comfort. It's important to complete the armrest's rear mortise before notching the back of the armrest to fit against the back leg. You'll need to shorten the armrest's rear tenons, but this joint will still be plenty strong. Once the armrest's joinery work is complete, concentrate on curving the top and softening the edges.



Start at the back. Set the armrest flush with the back leg's inside face, then mark for the rear mortises and the notch in the armrest. Mortise the rear end of the armrest before cutting the notch.

Armrest Detail



Now for the front. Fit the notched armrest against the back leg, then lay out the remaining mortises on the arms and legs.



Clamp-made curve. Any thin straight-grained strip can serve as a tracing template. Adjust the clamp's pressure so that the strip matches the desired curve.



Ready to resaw. Maintain a steady feed rate for a smooth cut. You can use the offcut as a custom-shaped sanding block.

Assembly: Start with sides, finish with seat slats

The trick to managing so many loose tenon connections is breaking the process down into easily-managed subassemblies. In this case, I assembled the sides first, and then joined the two halves.

The only parts that require cutting and installation after this major glue-up are the seat slat cleats and the slats themselves. Screw the cleats to the chair's front and back rails so that the slats sit flush with the tops of the rails. After cutting and smoothing the slats, fit them in place with equal spacing between, and install them by driving screws through cleats and into slats—just one screw into each slat end will do.



Side-by-side setup. Assembling the chairs in sections takes the pressure off you so that you can put more pressure on the joints that need it most. Have a few extra clamps and cauls at the ready in case you need to draw the armrests tight to the legs.



Gravity-assisted assembly. Fitting a multitude of tenons into their mating mortises is the trickiest part of the process. An extra pair of hands can help guide the top half into place.



Make (and then take) a seat. I measure for the seat slats when the chair frame is together. Install the slats on top of the front and back cleats.

Put It on Wheels!

How to choose & use casters to improve the mobility and versatility of your workshop

By Tim Snyder

There's a lot to like about casters. Mobile machinery and workstations make it much easier to give your space a thorough cleaning or refinish the floor. Without straining your back, you can open up a big floor area to accommodate a large project or a new machine. With casters on a workbench and assembly table, it's easy to

rework your shop's floor plan for more efficiency. And if you've got a garage workshop like I do, casters will even allow you to use the garage for its original purpose. But all casters aren't created equal; there are plenty of differences in specifications and functionality. Read on to make sure your shop mobilization plan rolls exactly right.

Fixed caster with 8" solid rubber wheel.
9½" height, 4 × 4½" mounting plate.



Caster specs at a glance

- **Wheel diameter:** This describes the size of the caster.
- **Swivel radius:** The minimum clearance required for a swivel-type caster to rotate a full 360°.
- **Height:** The vertical distance between the bottom of the wheel and the caster's mounting plate or flange.
- **Load rating:** The load a caster is designed to carry on a continuous basis.
- **Locking:** Single-locking casters lock the wheel. Double-locking capability is available on some swiveling casters; this locks the wheel and the swivel action.

Swiveling, double-locking caster with 5" polyurethane wheel.
6¼" height, 2½ × 3¼" mounting plate.



All-purpose shop casters

Resist the temptation to buy a set of cheap casters, unless you simply want to mobilize a temporary work platform. If you're aiming to create a permanent mobile workstation, it makes sense to pay a little more for higher quality. In many cases, you'll want a swiveling, double-locking caster with a solid polyurethane wheel and a load rating in the 200-300 lb. range. A 2-3" wheel diameter will suit most applications. Larger wheels can be helpful if you need to roll out of a garage and onto the rough surface of a driveway.

A caster with a mounting plate usually works best on platforms made from wood. The plate provides plenty of surface area for spreading the load, and you get the holding power of four screws in each plate. You can usually find a fixed-wheel caster



Lock it down. The best way to anchor a caster to a wood base is to use lag screws and washers.

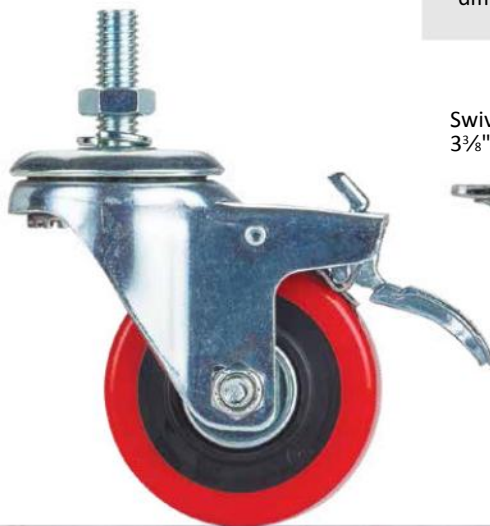
with the same wheel size and mounting height as its swiveling cousin. But keep in mind that combining a pair of swiveling casters and a pair of fixed-wheel

casters will give your machine or workstation the maneuverability of a shopping cart. With four swiveling casters, you're better able to move in a tight space.

Fixed caster with 4" polyurethane wheel. 5" height, 2 $\frac{3}{8}$ " x 3 $\frac{3}{4}$ " mounting plate.



Swiveling, double-locking caster with 3" polyurethane wheel. 4" height, $\frac{1}{2}$ "-dia. threaded stem mount.



Swiveling caster with 2 $\frac{1}{2}$ " wheel. 3 $\frac{3}{8}$ " height, 2 $\frac{3}{8}$ " x 2 $\frac{1}{8}$ " mounting plate.



onlineEXTRA

Visit woodcraftmagazine.com to see a short video explaining how to best use and install different types of casters.

Specialty casters: Look for features that suit specific applications

All-purpose casters (see previous page) can't always live up to their name. Sometimes you need casters with special characteristics. Some of the specialty casters described here might deserve a place in your shop, depending on the equipment you want to mobilize.



Machine-leveling casters. Heavy machines that only occasionally need to be moved are good candidates for this specialized caster. The squat design includes a heavy duty wheel and a solid polyurethane foot that can move up and down. To put the machine in stationary mode, you turn a notched red disk that lowers a broad foot, raising the wheel off the floor. By fine-tuning the foot's elevation, you can level and fully stabilize the machine—a valuable function when you're dealing with a combination of heavy weight and motor vibration.



Threaded stems. This mounting method is better suited to steel stands. When the threaded stem extends through wood, the mounting hole tends to enlarge over time, turning a snug installation into a sloppy one. When installing this type of caster, make sure to use a flanged nut (shown above) or a separate washer beneath the securing nut. Periodically check stem nuts and retighten as necessary.



Retracting casters. If you need to move a heavy workbench around on a regular basis, you'll be glad to know that there's a set of retracting casters designed for this purpose. As shown in the photo, each caster is anchored to a bottom corner of the bench with four lag screws (through bolts could also be used). A foot-actuated lever raises and lowers the compact wheel assemblies, which are just beefy enough to support the bench when it needs to be moved. WoodRiver has a set of retracting casters that functions just like the workbench version shown here, but is designed to mount on the metal legs of a contractor saw stand.

Caster kits save time & money

Sometimes it makes sense to buy casters in kit form rather than individually. As shown below, most kits are designed with a specific purpose in mind. The benefits are easy to appreciate: Simple installation, helpful features, and cost savings over buying casters individually.



You supply the wood. You can often buy woodworking machinery with factory-equipped wheels. But if your machines don't have built-in mobility, look for a suitable mobile base kit. WoodRiver's Universal Mobile Base Kit (shown above and at right) is one of the most versatile versions. With this kit, you begin by cutting a plywood base that's slightly larger than the footprint of your machine. Screw a pair of retracting wheels and a pair of fixed wheels to the corners, and your base is ready for its burden. Each retracting module includes an adjustable foot—a welcome feature if your floors are uneven.



Use corner-mount casters to create a mobile cart.

Small shop carts don't usually need expensive, heavy-duty casters. Instead, you can install a set of 4 corner-mount casters and get your cart mobilized for around \$16. All four casters swivel, providing maximum mobility. The well-designed mounting plate is easy to screw into the corner of a cart base.



Get Rolling!

The casters featured in this article are available at Woodcraft stores and online. For details, see the Buyer's Guide on p. 64.

Supercharged Sawhorse

Build a pair of portable workhorses for jobs in and out of your shop

By Joe Hurst-Wajszczuk

Necessity can be the mother of invention, but in my case, it's also been the mother of a few mistakes. Over the past 20+ years, I've lost count of the times when I've struggled without a sturdy set of sawhorses. When drywall buckets and tailgates failed, I've settled for what I found at the home center. But flimsy, factory-made plastic horses always come up short. So I was spurred to grab the reins and aim for thoroughbred performance. With help from fellow woodworker Tom Whalley, I finally found a horse that will stand up to any project.

While most sawhorses are designed just to provide general-purpose support, these steeds have features that enable you to accomplish specific woodworking tasks, as shown here.

I assembled the frames with Titebond III and finished the legs, rails, and top with General Finishes Outdoor Oil. For extra water protection, I shoed the feet with rubberized paint (see the Buyer's Guide on p. 64). Should a saw blade slice through the top, resaddling is a cinch. Simply remove the screws, install a replacement, and you're back in the race.

Sheet Goods

solution. The top of each horse is grooved to hold an interlocking 4×8 platform—an effective workstation for breaking down heavy sheet goods.



Portability & versatility

These folding sawhorses are sturdier and steadier than store-bought plastic versions. They're also designed with common woodworking tasks in mind—like processing full sheets of plywood, gluing up solid wood panels, and providing built-in clamping capabilities.



Handy hold-down.

While any horse can support a load, this one can also lend a hand. Outfitted with a row of dog holes and a Kreg Klamp Plate, the 5 × 32" top can hold onto workpieces when sawing, sanding, or routing.



Knock-down clamping station. By notching one edge of each crossrail to fit your favorite clamps, you can also put these horses into service when clamping up large frames or panels.

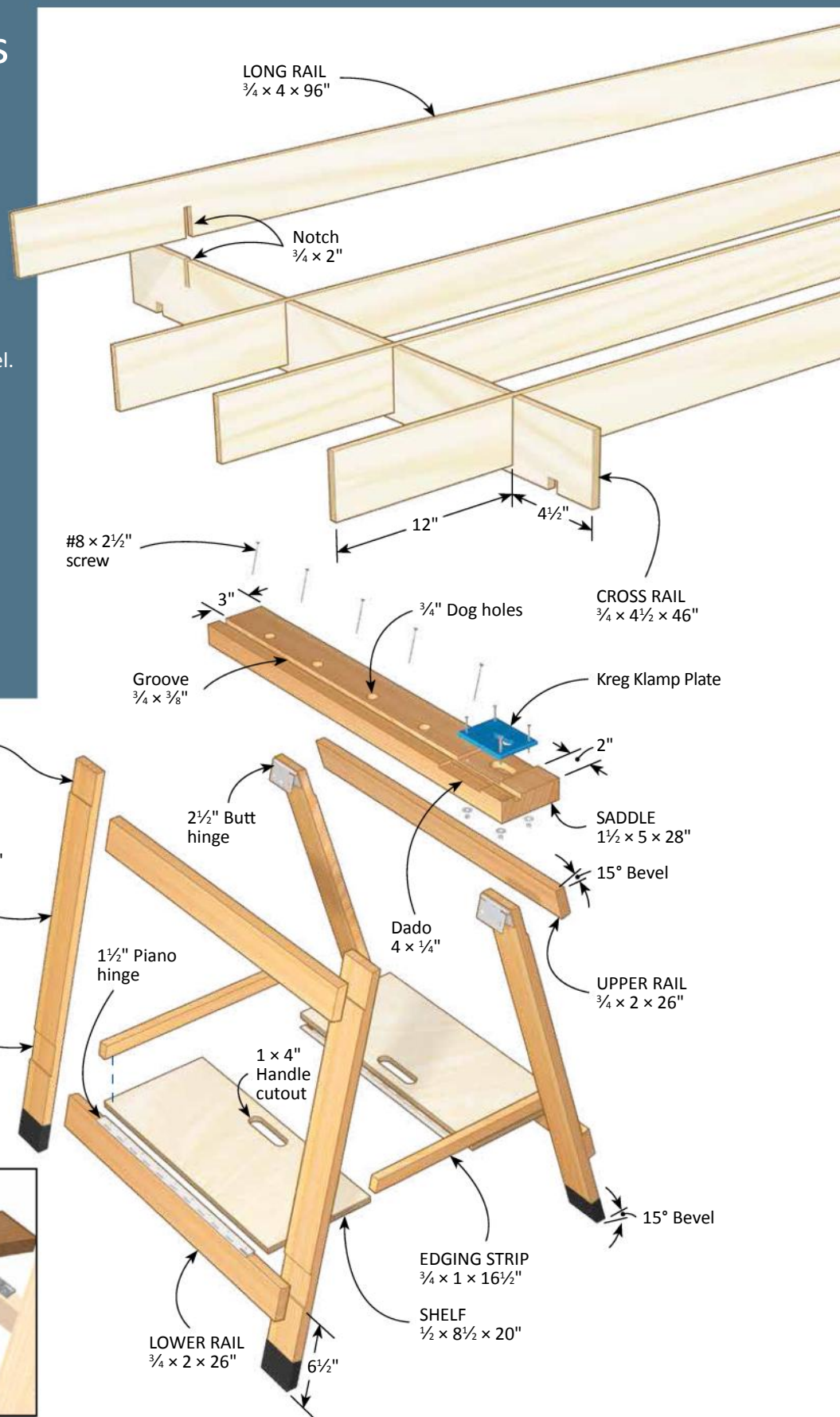


From shop to job site. Transport and storage are easy, thanks to a folding frame with built-in handles.

Hinged frames make a solid folding horse

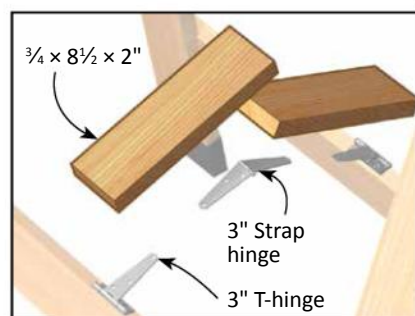
Construction sequence

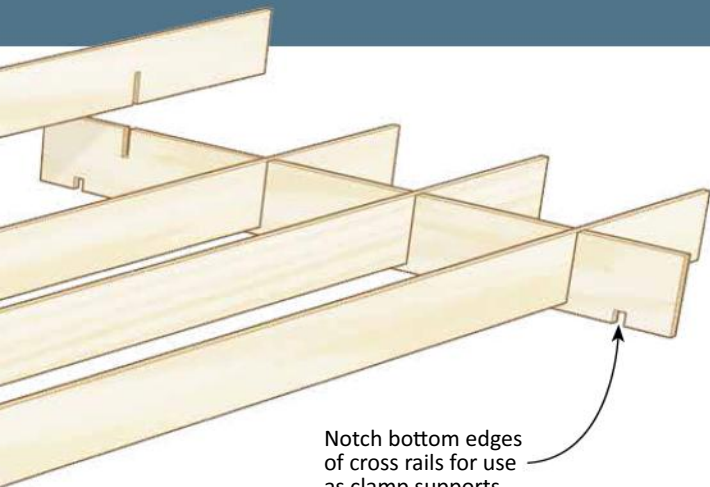
- Select and mill stock for the rails and legs.
- Cut legs to finished length, with leg ends cut to 15° bevel.
- Rip top rails to final size, including 15° bevel along top edges.
- Dado the legs for the rails.
- Assemble the leg and rail frames.
- Install the upper hinges, then attach the shelf.
- Attach the saddle.
- Make and notch the rails for the cutting platform.



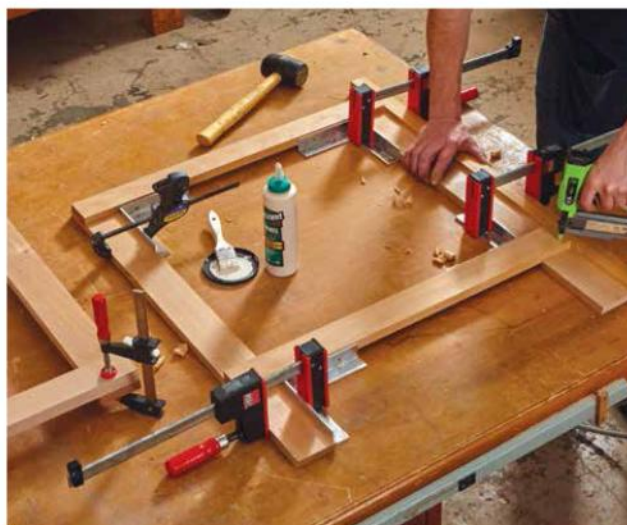
SPLIT RAIL

Can use instead of shelf.





Rout a perfect pair of legs. Making the $\frac{1}{8}$ "-deep rabbets and dados is a cinch with a jig's help. Position the fences to suit your router. Cut the shoulders, then rout out the center section.



Squared, pinned, and clamped. To ensure a square leg frame, I set a leg against a stop, and then squared each leg/rail connection. Clamp the corners, then repeat the process with the remaining frames.



Hinge the top. Set the hinge against a block when drilling pilot holes so that the knuckle won't interfere with the top.



Install the shelf. Open the legs until their beveled ends sit flat against the table, and then trim and hinge the shelf sections as shown. Attach the center hinge last.



Screw on the saddle. A scrapwood drilling guide helps a $\frac{1}{8}$ × 6" twist drill bit hit the rail.

Buyer's Guide

Hot New Tools (p. 16)

- | | | |
|----|--|----------------|
| 1. | Black Dog Salvage Furniture Paint, pt. | \$19.99 |
| 2. | Black Dog Salvage Furniture Paint, qt. | \$32.99 |
| 3. | Black Dog Salvage Guard Dog Topcoat, pt. | \$19.99 |
| 4. | Black Dog Salvage Guard Dog Topcoat, qt. | \$32.99 |

Available soon from *Woodcraft.com*.

Skateboard! (p. 24)

- | | |
|----|---|
| 1. | Rust-Oleum 279847 EPOXYShield Anti Skid, 3.4 oz.
<i>www.amazon.com</i> , \$9.05 |
| 2. | Independent Trucks 139mm Silver, set
#33131523, <i>www.nhsfunfactory.com</i> , \$49.50 |
| 3. | Wheels: Powell Peralta Rat Bones 60mm 85a - Black, 4 pack
<i>www.powell-peralta.com</i> , \$36.00 |
| 4. | Bones Reds Bearings, 8 pack
#BSACBR88, <i>www.bonesbearings.com</i> , \$18.00 |
| 5. | Genuine Parts 1/8" Risers, 2 pack
#33531100, <i>www.nhsfunfactory.com</i> , \$1.95 |
| 6. | Genuine Parts 1" Combi Bolts Hardware, 8 pack
#33531204, <i>www.nhsfunfactory.com</i> , \$2.50 |

Wall Organizer (p. 36)

- | | | |
|----|--|-------------------------|
| 1. | Kreg Jig R3 Kit | #147643, \$39.99 |
| 2. | WoodRiver single hole keyhole hanger, 2 pack | #125505, \$1.75 |

- | | | |
|----|--|-------------------------|
| 3. | Whiteside D8-375 8° dovetail router bit 1/4" SH | #03K62, \$18.20 |
| 4. | Whiteside 3262 edge beading router bit 1/2" SH; 3/8" R | #819417, \$59.99 |

Patio Table (p. 44)

- | | | |
|----|---|-------------------------|
| 1. | Freud 75-106 solid carbide upcut bit, 1/2" SH; 3/8" D | #828779, \$51.47 |
| 2. | WoodRiver bushing lock nut | #144696, \$3.79 |
| 3. | WoodRiver 3/4" OD (2 1/2" ID) router bushing | #144693, \$8.09 |
| 4. | HIGHPOINT T-nut levelers, 4 pack | #160701, \$7.99 |
| 5. | 3/8-16 T-nuts, 10-piece (4 needed) | #130228, \$3.99 |
| 6. | General Finishes Outdoor Oil, qt. | #85F05, \$17.99 |

Patio Chair (p. 51)

- | | | |
|----|--|-------------------------|
| 1. | CMT 806.127.11 flush trim bit, 1/2" SH; 3/4" D; 2" CL | #817512, \$33.99 |
| 2. | WoodRiver 1" OD (7/8" ID) router bushing | #144695, \$8.50 |
| 3. | WoodRiver router bushing lock nut | #144696, \$3.79 |
| 4. | Freud 34-120 Quadra-Cut round-over bit 1/2" SH; 3/4" R | #815157, \$35.97 |
| 5. | General Finishes Outdoor Oil, qt. | #85F05, \$17.99 |

Put it on wheels! (p. 56)

(All casters are WoodRiver brand unless otherwise specified)

- | | | |
|----|--|--------------------------|
| 1. | 3" Caster, double locking, swiveling with 4-hole mounting plate, 4 1/4" tall | #141051, \$18.99 |
| 2. | Machine-leveling Caster Plate Mounted, 4 pack | #149511, \$109.99 |
| 3. | Retracting casters 4-piece set | #141550, \$49.99 |
| 4. | Universal Mobile Base Hardware Kit | #152711, \$64.99 |
| 5. | Corner caster 4-piece set | #153874, \$15.99 |
| 6. | Workbench caster 4-piece set | #158547, \$79.99 |

Supercharged Sawhorse (p. 60)

- | | | |
|-----|---|--------------------------------------|
| 1. | 3D Square, 2 pack | #144041, \$34.69 |
| 2. | Vix bits, 3-piece set | #16140, \$29.99 |
| 3. | Kreg Klamp Plate | #141157, \$13.99 |
| 4. | Kreg 6" Automaxx Klamp | #158505, \$37.99 |
| 5. | 1 1/2 x 48" piano hinge (2 needed) | #152161, \$21.99 |
| 6. | 2 1/2" butt hinges (4 needed) | <i>www.lowes.com</i> , \$2.95 |
| 7. | 3" T-hinge (2 needed) | <i>www.lowes.com</i> , \$3.48 |
| 8. | 3" strap hinge | <i>www.lowes.com</i> , \$2.98 |
| 9. | DeWalt 1/8 x 6" Twist Drill Bit | <i>www.lowes.com</i> , \$2.97 |
| 10. | Plasti Dip Indoor/Outdoor Spray Paint, 11 oz. | <i>www.lowes.com</i> , \$5.98 |

Unless otherwise listed, items above available at Woodcraft stores, at *woodcraft.com*, or by calling (800) 225-1153. Prices subject to change without notice.

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| Oneida | <i>www.oneida-air.com</i> | 15 & 43 |

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| Rustoleum | <i>www.woodcraft.com</i> | 20 |
| Touch-up Solutions | <i>wecare@touchupsolutions.com</i> | 70 |

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Loose-Tenon Joinery

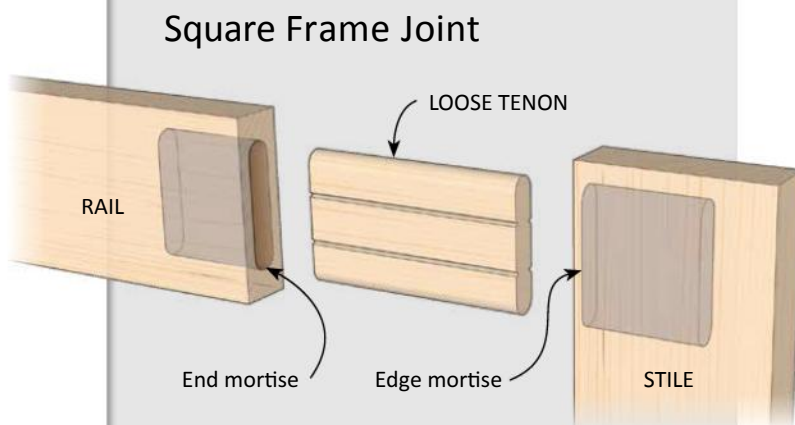
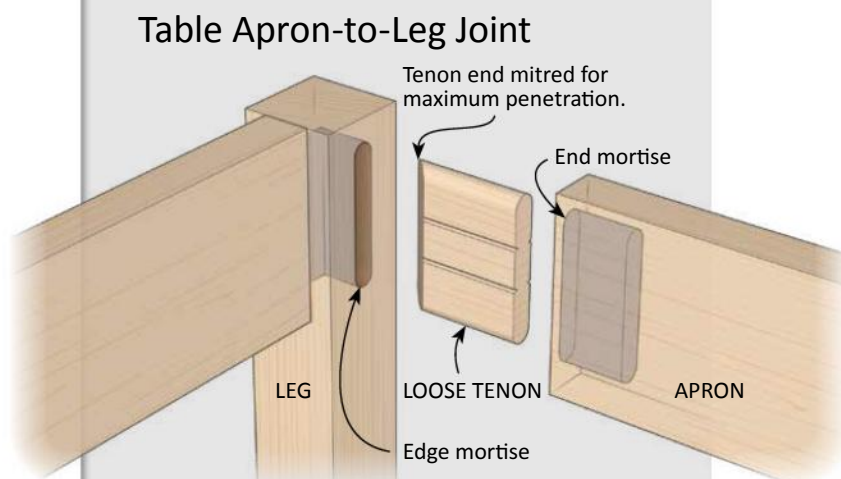
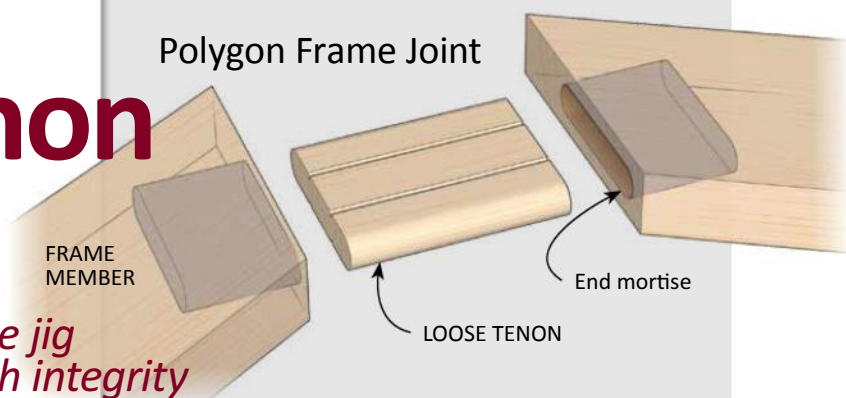
A router and a shop-made jig make for easy joinery with integrity

By Paul Anthony

Despite its odd name, “loose-tenon” joinery is one of woodworking’s tightest methods of joining parts. It’s also one of the most versatile. Structurally, a loose-tenon joint resembles a traditional mortise-and-tenon joint, and it’s every bit as strong. Both joints gain their strength from a thick, solid-wood tenon. The difference is that, in a loose-tenon joint, the tenon fits into mating mortises in the pieces, whereas in the traditional version of the joint, the tenon is integral to one of the pieces.

There’s a big efficiency to cutting both parts of the joint in the same manner, as opposed to having to perform a completely different set-up for one half of the joint. Another advantage to a loose-tenon joint is that connecting work at odd angles is much easier because there are no angled tenon shoulders to cut. Also, it’s a great way to join long boards that are difficult to maneuver on your tablesaw.

One example of loose-tenon joinery can be seen in the Patio Table and Chairs article on page 44, where a Festool Domino machine is used to cut the mortises. However, making loose-tenon joints has long been done with a plunge router and shop-made jig, as I’ll show you here.



Common applications:

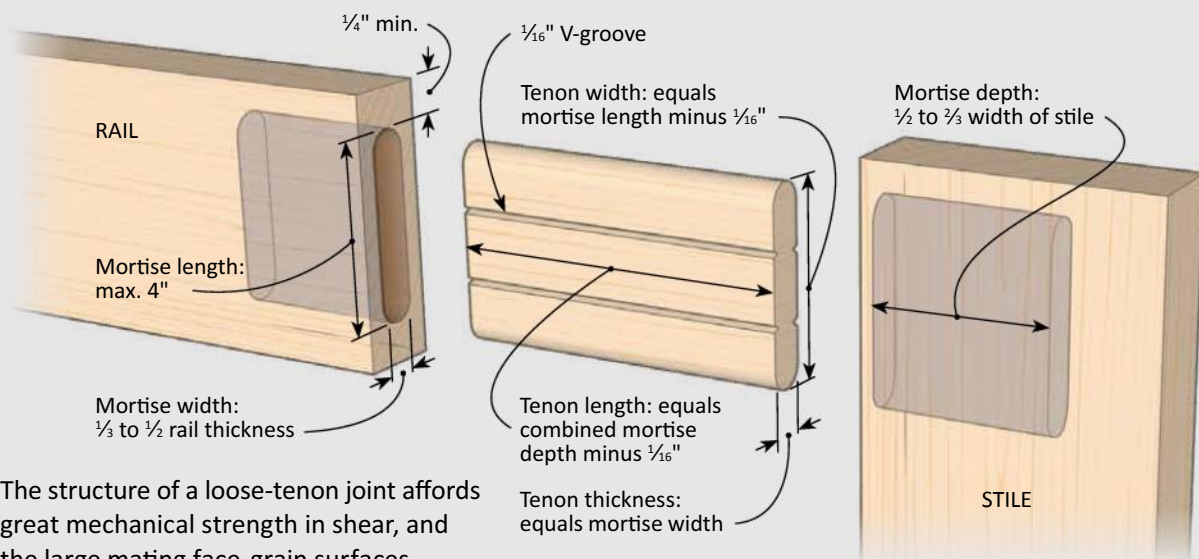
- Frame corners
- Table apron-to-leg joints
- Polygon frames
- Miters
- Stretcher-to-rail connections



onlineEXTRA

Go to woodcraftmagazine.com for a short video showing how to use a mortising T-jig. You’ll also find plans for the mortising fixture shown on page 69.

Sizing a loose-tenon joint



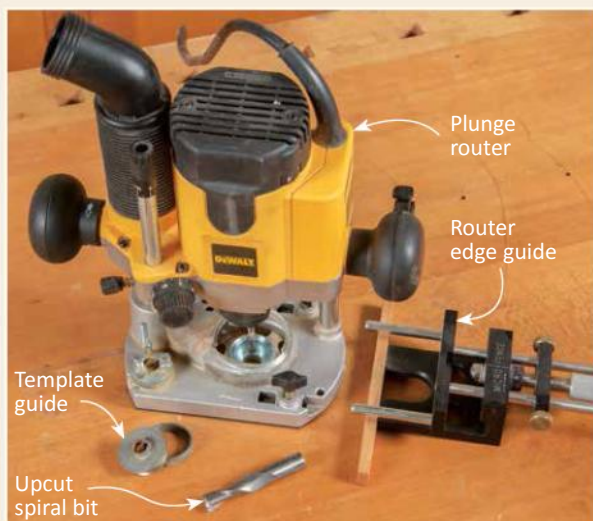
The structure of a loose-tenon joint affords great mechanical strength in shear, and the large mating face-grain surfaces provide great adhesion for glue. When sizing the joint, the goal is to keep the tenon beefy without creating a mortise so large that it weakens its host piece. These notes are general guidelines; size components to suit your particular project.

Jigs allow speedy joint layout

Because loose-tenon mortises are typically cut with a jig, joint layout is minimal. Usually, a simple center mark is all that it takes in order to provide alignment for mounting a jig to the work, as shown on page 68. When using a mortising fixture, you often need to fully lay out only one end mortise and one edge mortise to set up the router edge guide and fixture stops. After that, clamping the work to the fixture automatically registers everything for the cut.

Tools for the job

First and foremost, you'll need a plunge router outfitted with an upcut-spiral bit of a diameter that matches your desired mortise width. To guide the router, you'll need either a template guide (for use with a T-jig), or an edge guide (typically used with a mortising fixture.)



Gang layout. When using a mortising jig, all you generally need is a mortise centerline to set up the cut. For efficiency, gang pieces for marking, such as the stiles and rails shown here.



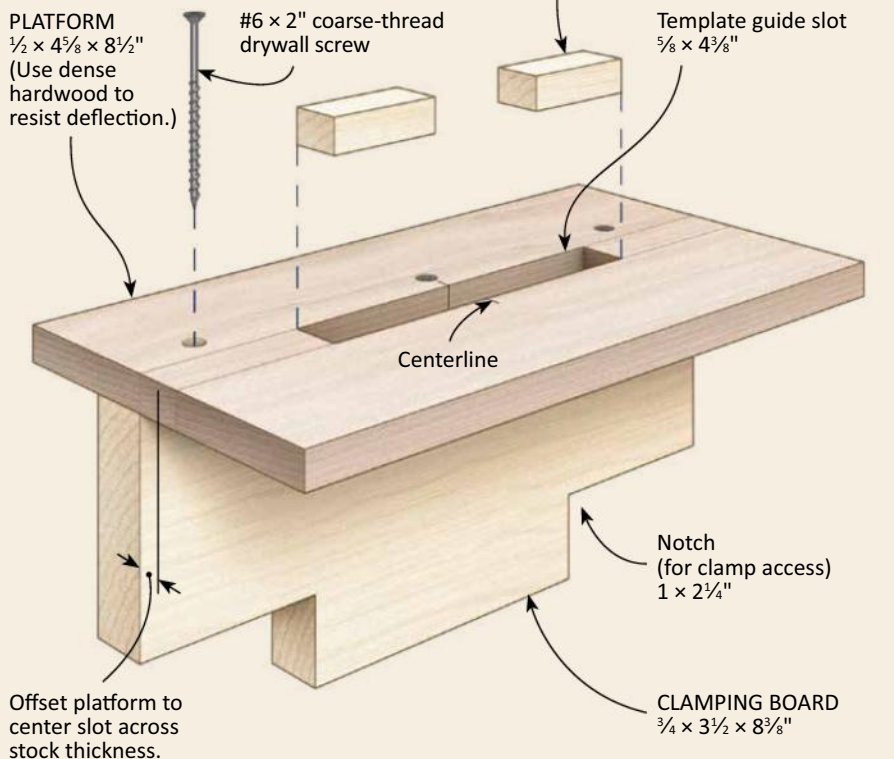
A simple T-jig does the trick

This simple T-shaped mortising jig provides a platform for a plunge router outfitted with a template guide. The jig's slot captures the template guide to control the length and width of the cut. A jig like this is typically dedicated to making centered mortises in stock of a particular thickness. Although it's also often made for a mortise of a particular length, I find that making the slot long, and then filling it in with spacers to shorten it makes the jig more versatile.

It's crucial that the slot width exactly matches the outside diameter of the template guide, so take your time to get that right: Before gluing up the platform pieces, dry-clamp them together to make sure that the template guide travels freely end-to-end without any slop across the width of the slot.

Mortising T-Jig

This jig, which is designed to work with clamps with a 3" reach, allows cutting mortises up to 4" long.



End mortising.

Align the mortise and jig centerlines, clamp the jig to the stock, and rout. For cleanest cuts, first plunge to full depth at both ends of a mortise, and then clean out the waste between with a series of subsequently deeper cuts.

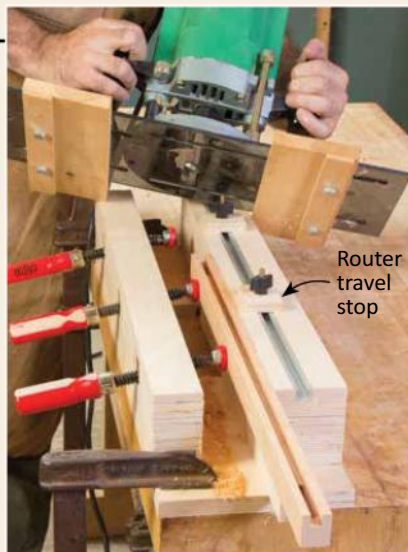


Edge mortising. When edge mortising, you can either cantilever the workpiece out from a vise as shown, or forgo the clamps, and secure both workpiece and jig in the vise jaws. Again, fully plunge at the mortise ends, then clean out the center.



A mortising fixture: The ticket for fast, accurate loose-tenon joinery

This type of mortising jig is really more of a fixture, in that workpieces are clamped to it instead of the other way around. Plans for this particular model are available as a *woodcraftmagazine.com* onlineEXTRA, but there is also a wide variety of other designs available online. (Type “mortising jig” into your web browser.) Fixtures of this sort allow mortising stock of various thicknesses, and usually incorporate adjustable router travel stops for accuracy and efficiency. The jig shown here uses a custom router subbase to guide the tool, but most jig designs incorporate a standard router edge guide instead.



Edge mortising. This mortising jig and adjustable router subbase allow making centered mortises in stock of various thicknesses. Adjustable stops limit router travel, and thus mortise length. (*Note that the full-length panel groove in this workpiece was not made using the jig.*)



End mortising. A vertical fence and clamping block are bolted to the jig base to enable securing narrow pieces for routing end mortises. With the stock set against the vertical fence, and clamped in place with its end flush with the top of the fence, set the stops and you're ready to rout.

Making tenons

Individual tenons are crosscut to length from strips of tenon stock you mill to thickness and width. It's important for joint strength that the tenons are a friction fit in their mortises, requiring just a bit of hand pressure for insertion. If your mortise locations are spot-on in every case, you can make the tenon width match the mortise length for instant alignment and maximum mechanical strength. (Make sure to groove your tenons for air escapement.) However, I find it's usually best to leave $\frac{1}{16}$ " play for joint adjustment.



Round to fit. Bullnose the edges of your tenon stock on the router table using a round-over bit with a radius that's half the thickness of the stock.



Saw to length. To efficiently saw tenons to identical lengths, clamp a standoff block to your rip fence to serve as a stop. This creates a safe “fall-off” area for the freed pieces, preventing kickback that would otherwise occur using just the fence as a stop.

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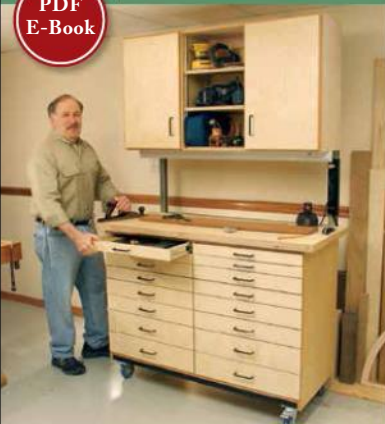
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