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# 2018

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Sanding Disc Attachment	Hook & Loop
Variable Speed	Yes
Dust Extraction	Yes
Accessories	3 x mesh sanding discs (80, 120 & 220 grit), dust bag & dust port adaptor

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Power	6.5A
Stroke Length	1"
Max Cutting Capacity	Wood 4-5/16", Steel 3/8" & Aluminium 1"
Blade Type	T-shank
Product Weight	7.8lb
Angle Adjustment Range	0° - 45°, left and right
Pendulum Mode	Yes - 3-Stage
Dust Extraction	Yes
Kit Contains	Parallel guide, dust port adaptor, track adaptor, 3 x jigsaw blades (wood cutting blade, wood & plastic cutting blade & metal cutting blade)

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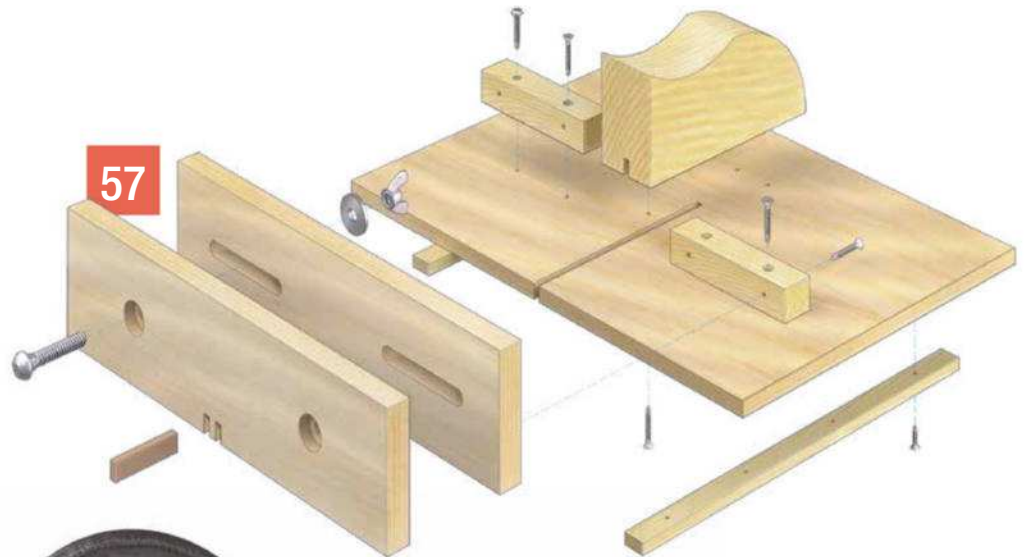
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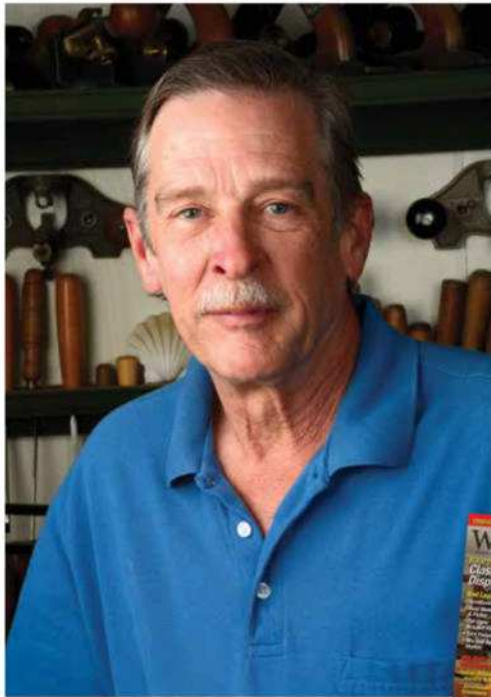
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# Contributors



**Craig Bentley** has never been on the cover of *Rolling Stone*, but we think his reputation in the woodworking world approaches rock star status. Craig, usually accompanied by projects designed for our readers, has appeared on our cover five times. Over the span of his 47-year woodworking tour, Craig has also appeared on the covers of *WOOD* and *American Woodworker*. Working in a shop that's a veritable woodworking museum, Craig's antique restoration and furnituremaking skills keep him in high demand. When time permits, he enjoys teaching at Guilds and Woodcraft stores.



**Doug Loyer** is a photographer, graphic designer, and writer for Woodcraft, and serves as the production manager for the Japan Woodworker catalog. As if that weren't enough, Doug occasionally contributes his photography skills to *Woodcraft Magazine*. But this is the first issue in which his writing has appeared. Check it out on page 8.

When not working, Doug enjoys time with his family, being outdoors, and catching a Steelers game. ■



Being one of those kids who took things apart to see how they worked, and then reassembled them, **Dan Thornton** drove his parents crazy. However, he learned a great deal about how to show others how things are made. Dan's illustrations, of everything from simple jigs to grandfather clocks, reflect his lifelong love of woodworking (pages 27, 45, 58). His latest project was crafting a slab of white pine into a one-piece electric guitar body. Dan and his wife Laurie make their home in western Connecticut.

## On the Web



### Online EXTRAvaganzas.

Visit [woodcraftmagazine.com](http://woodcraftmagazine.com) to find patterns and a cut list for the Grill Cart (p. 36), bonus tips for making the Treasure Box (p. 27), and a sharpening lesson to support the Hand Plane story on p. 50 (see more info at right). Plus, we have a video of the new Leigh Beehive Jig in action (p. 10), and plenty of extras for the giant Pequiá tree (p. 8).



**Sharpening 101.** Mastering a hand plane starts with knowing how to sharpen a blade. This one-page primer shows how easy it is to make a blade shaving-sharp. The bonus story includes a stone-holding fixture that keeps your bench clean and ensures that your stones are always ready to work. ■





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## Navigating the learning curve

When *Woodcraft Magazine* began almost 15 years ago, the editor's column was aptly titled *Cutting In*. After all, our fledgling title was stepping into a crowded market of established woodworking publications. We developed a distinguished dance card, offering woodworkers a fresh take on original projects, shop-tested techniques, and quality products from Woodcraft.

The column's title was later changed to *Staying Sharp* by our last chief editor, Tim Snyder. I thought that was a cool concept. Tim had done a wide range of writing and editing work before coming to Woodcraft. Jumping back into magazines in his 60's was his way to stay on his toes, to keep learning and improving while

making the magazine even better. I've changed the editor's column title to *Getting Sharp*, which is always a good idea, especially in a woodshop. While I've been around long enough to not be dull, I still need to hone my editorial edge. And I'm not as far down the woodworking path.

As woodworkers, we're all driving on the same road, we're just at different points along the learning curve. We can see just far enough ahead to navigate our travels. Some of us are lucky enough to know woodworkers who have already been down our stretch of road. And they'll help keep us from veering too far one way or the other. We can see these more experienced woodworkers ahead of us and not much farther. We have to trek a little more around the bend to reveal the next set of obstacles. With patience and determination, we advance the curve. The best part for me, though, is acquir-

ing knowledge along the way. It's about the journey, not the destination, so I'm going to keep learning.

No matter where you are on the path, you can always learn something new. I love turning rough boards into gifts (p. 26) or useful projects that friends and family can enjoy (p. 36). But what I love most about the craft is learning. Working wood is about problem-solving. You're keeping your mind sharp when you're in the shop figuring out how to solve this problem or that. It's a great idea to keep your mind from collecting dust by creating sawdust. There are loads of lessons to be learned as you build jigs (p. 57) and try new techniques (p. 44 and 50). The best lessons, though, are the hard-earned ones when you make big mistakes (p. 72). I've made plenty so far, and I'll make plenty more. In fact, I look forward to screwing up. Don't get me wrong. I don't try to screw up, although some days, it sure does seem like it. Mistakes can be hard, but the more you make, the more you learn. It's all part of getting sharp. ■



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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.



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# Rocky Mehta



**So many slabs.** Rocky takes a break in the large West Penn Hardwoods warehouse that features over a hundred varieties of exotic wood.

The small North Carolina town of Conover may seem like an unusual location for one of the largest importers of exotic hardwoods. But that's where Rocky Mehta and his wife Kim chose to relocate their lumber business a little over three years ago. Moving from previous headquarters in New York, they were attracted by southern hospitality and better access to southern ports where many wood shipments arrive. Today, West Penn Hardwoods supplies woodworkers with over 100 different wood species from all over the world. Rocky's passion for sourcing specialty lumber has taken him all over the planet, and he's weathered the transition from jetway to jungle more times than he can count. If you believe that every tree tells a story, you'll appreciate the treasure trove of adventures Rocky can relate. Here are a few highlights gathered from a recent visit to West Penn Hardwoods. —Doug Loyer

## *Traveling the world in search of amazing wood*

**WM:** How did you get involved in the wood business?

**RM:** I grew up in India and moved to the states in 1991, after earning my MBA. I first moved to North Carolina and then on to New York, where I met my future wife. My father-in-law exported domestic woods and taught me everything he knew about domestic lumber. But I decided to diversify and explore exotic woods. Kim and I started West Penn Hardwoods in 1995. Today we have 16 employees who we treat like family members.

**WM:** What do you most enjoy about what you do?

**RM:** I have the best job in the world. The travel can be grueling, but it's exciting to visit new places, meet local folks, and eat the native cuisine. It's always interesting to learn about different cultures. Most of the time, I'm interacting with the Mayans or the Indians in Brazil, Mexico, and Guatemala, since they are in charge of land concessions and permits. It's very satisfying to see the wood I buy make its way to our warehouse, and then into the hands of woodworkers who make all kinds of projects –from pens and guitars to pool cues and furniture.

**WM:** How many countries have you been to?

**RT:** I have traveled extensively through Central and South America and to several countries in West Africa. My purchasing trips have also taken me throughout Europe and to India. I've picked up many languages along the way as well; wherever I am I usually can speak enough to get by!

**WM:** Is it difficult doing business in other countries?

**RM:** It takes patience and due diligence. We check all permits and export documents to ensure our suppliers are harvesting legally sourced woods. When possible, I buy trees that are already dead or have fallen. And most countries are very careful about what they're doing, to avoid depleting forest resources.

**WM:** Do you find many similarities from country to country?

**RM:** When you've traveled as much as I have, you start to see the similarities. It strikes me that you can find the same species in different countries. For instance, Monkeypod grows in Mexico and Columbia. It also grows in India, a different continent. And it's found in New Guinea.





## onlineEXTRA

Visit our website for more on this amazing Piquiá tree.

How do these species grow in different areas? You can tell that the whole land mass was together at one time, it's cool to see.

### **WM: What is your most recent "find?"**

**RM:** I discovered a huge Pequiá tree while traveling in Brazil. It was burned and partially hollow but still standing. The trunk measured ten feet, nine inches in diameter, fully covered in burls. I've never seen anything like it in my 23-year career. It was "a tree of a lifetime."

### **WM: Do you know why the tree was burned?**

**RM:** People used to burn down trees so they could raise cattle or grow corn.

### **WM: How old was it?**

**RM:** My supplier tested the tree and found it be 1,000-1,100 years old.

### **WM: How long had the tree been dead?**

**RM:** The owner of that land told me that the tree was standing there dead, burned, and hollow for 60 years. He bought the land from his grandfather. This was the only tree in about 15-20 acres surrounded by swamp. That's how it caught my eye.

### **WM: Did you have any trouble acquiring it?**

**RM:** We had to wait six months to receive the permit. And the base was so big, we had it cut into four sections. The sawmill could cut only 52" wide. It was challenging. But once we cut into it, we discovered that the tree had burl throughout. The slabs are amazing!

### **WM: How does it feel knowing that your customers buy your wood and turn it into something that's treasured?**

**RM:** It's one of the great things about my job. It's amazing how customers want to give me a hug, shake my hand, or take a photo. It's a great reward seeing that what I do makes a difference for so many. Several customers show me pictures of what they've made and even give me things they've created. A 14-year-old boy just gave me a pen he turned from Olivewood. It tells me that they are happy with the wood and with what they're doing. It's very gratifying!

### **WM: Do you have a favorite wood species?**

**RM:** I like Ebony because it's popular and sells well. But personally, I love Cocobolo. ■



**The tree of a lifetime.** Rocky stands next to the huge Pequiá tree in Brazil before it was felled. And below, a few of the beautiful burl-ed slabs after they arrived at the warehouse.





## Sweet and simple box joints

### Leigh B975 Box Joint & Beehive Jig

Leigh may have developed the B975 for the apary box-making community, but other woodworkers can reap the benefits too. This stone-simple router jig makes quick work of  $\frac{1}{2}$ "- and  $\frac{3}{4}$ "-box joints for a fraction of the price of other commercial jigs.

The jig required some assembly (attaching the template and stops to a shop-made beam), but I was ready to rout my first joint in about an hour. Following the provided step-by-step instructions, I achieved tap-together tight joints on my second try, and every time thereafter. My success had less to do with my skill and more to do with Leigh's innovative e10 bushing and the stops that automatically set the correct offset for the mating board.

Unlike standard guide bushings, the e10 bushing uses an elliptical sleeve to guide the bit. Rotating the bushing changes the bit/bushing offset. Using the numbers etched in the bushing, you can adjust the fit of the joint by 0.001" and record your settings in the manual for future work.

The stops are equally clever and clearly labeled. To start, set the stop to "S" ("socket mode"), then center the workpiece between the template fingers, clamp the workpiece to the beam, and slide the stop until it registers against the workpiece. Then, rout the first board as shown above. Before routing the mating piece, flip open the stop to "P" ("pin mode"), then clamp and rout. Repeat the rout-flip-rout sequence three more times, and you're done.

Leigh deserves major kudos for creating a jig that's basically foolproof. After a few test corners, almost anyone can be a pro box-maker. After making a dozen "supers" (part of a beehive used to collect honey) for a bee-keeping friend, handing the router to a helper—without worry—was a real bonus.

*Note: Routing box joints is dusty work. If your router doesn't have built-in chip collection, treat yourself to Oneida's Universal Router Hood (#163363).*

—Tester, Joe Hurst-Wajszczuk



### Overview

- Makes super-easy  $\frac{1}{2}$ "- and  $\frac{3}{4}$ "-box joints on boards from 2"- to 17 $\frac{3}{16}$ "-wide.
- Can be paired with handheld or table-mounted routers.
- Elliptical e10 guide bushing allows dial-in precision.
- Comes with glass-reinforced nylon template and stops, e10 guide bushing,  $\frac{1}{2}$ "-straight bit, cams (not pictured) for routing wider boards, manual, and instructional DVD, for \$99.99.



### onlineEXTRA

To see this jig in action, check out the video at [woodcraftmagazine.com](http://woodcraftmagazine.com).



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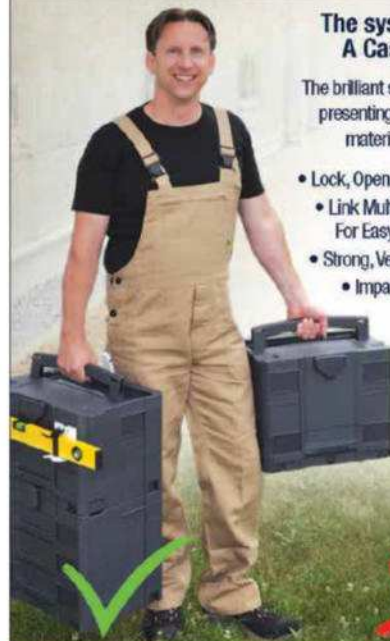


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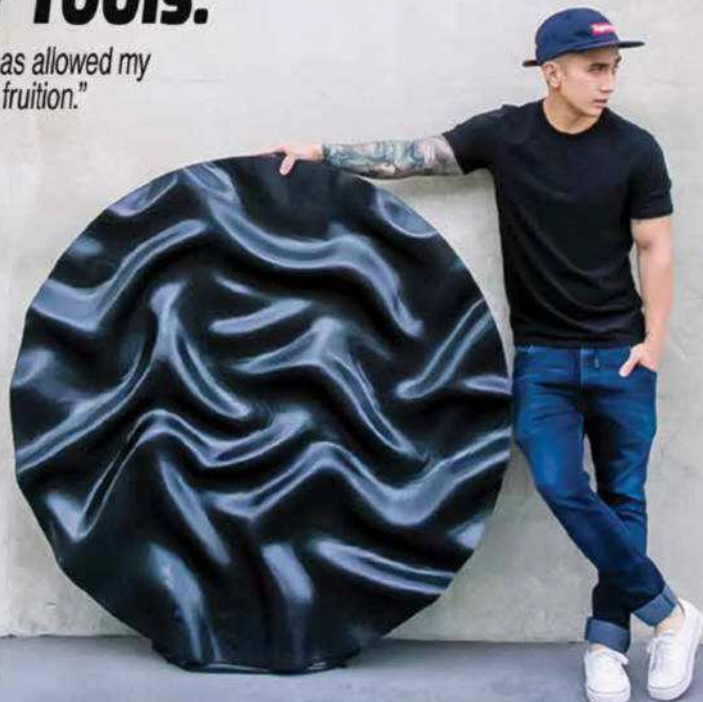
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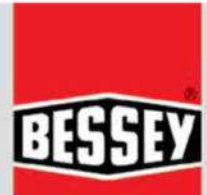
### *WoodRiver Chisel Mallet*

When it comes to chopping with a chisel, you might think that a mallet is a mallet is a mallet. But it ain't necessarily so. I own mallets of various sizes and shapes, and I definitely reach for particular ones, depending on the job at hand. After introducing this 7"-long, 14-oz. aluminum and hard nylon tool to my arsenal a few months ago, I find myself reaching for it more and more. It's solid, compact, comfortable, and terrifically tough. Being relatively small, it's easy to maneuver, but hefty enough to deliver anything from a carefully controlled tap to a fairly vigorous pounding. This makes it great for chopping out everything from typical hardware recesses and dovetails to driving carving tools. Beautifully manufactured and darned hard to mar, this tool will outlast you. Bequeath it to someone you love. ■

—Tester, Paul Anthony



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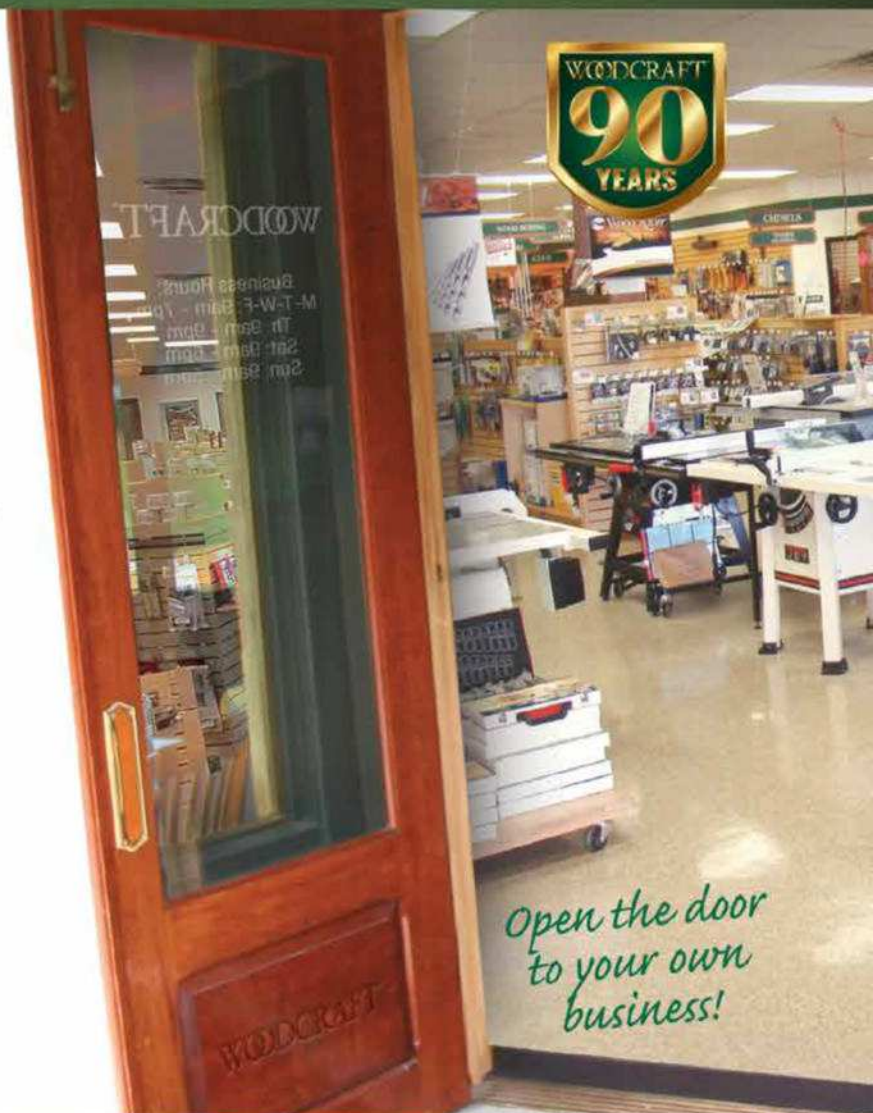
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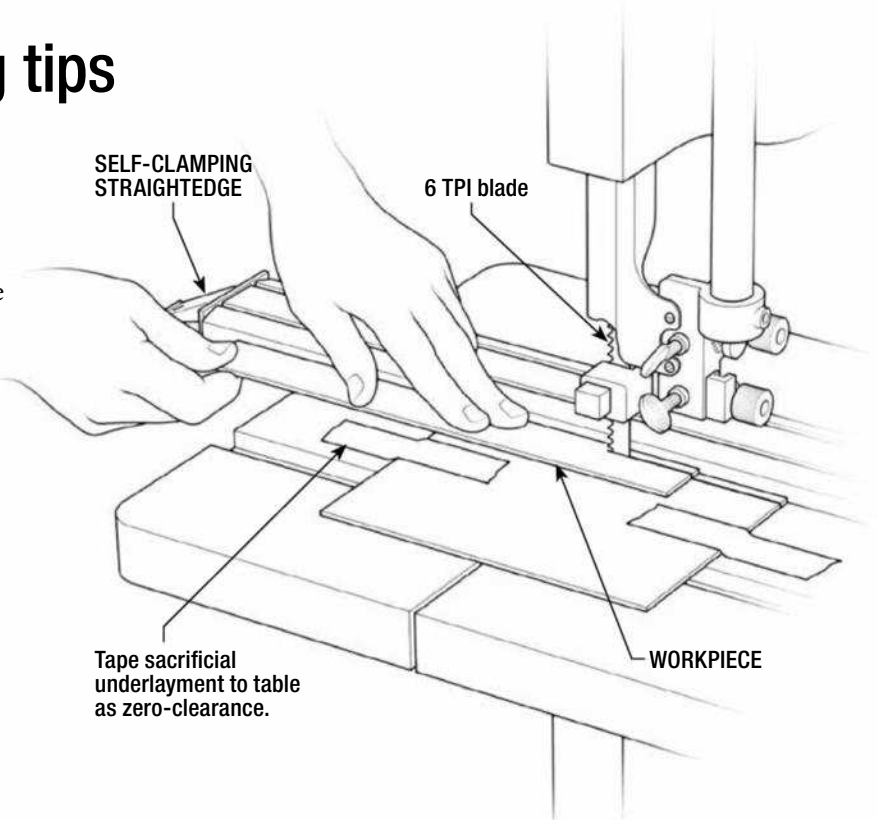


**TOP TIP**

## Small strip ripping tips

My instrument making often involves ripping very narrow strips of wood for use as bindings and inlay, among other things. I find that the safest way to cut these tiny strips is on the bandsaw, using a low profile fence. This allows setting the blade guides very low to keep the blade on track and prevent deflection. For a fence, I use a self-clamping aluminum straightedge, which is quick to set up, and which can be angled as much as five degrees or so if necessary to accommodate blade drift. Using a 6 TPI blade, I can accurately rip strips as narrow as  $\frac{1}{32}$ ". When doing this, just make sure to tape a thin underlying piece of wood to the saw table to serve as a zero-clearance throat to prevent your rippings from disappearing down the saw's throat.

—Bil Mitchell, Riegelsville, Pennsylvania



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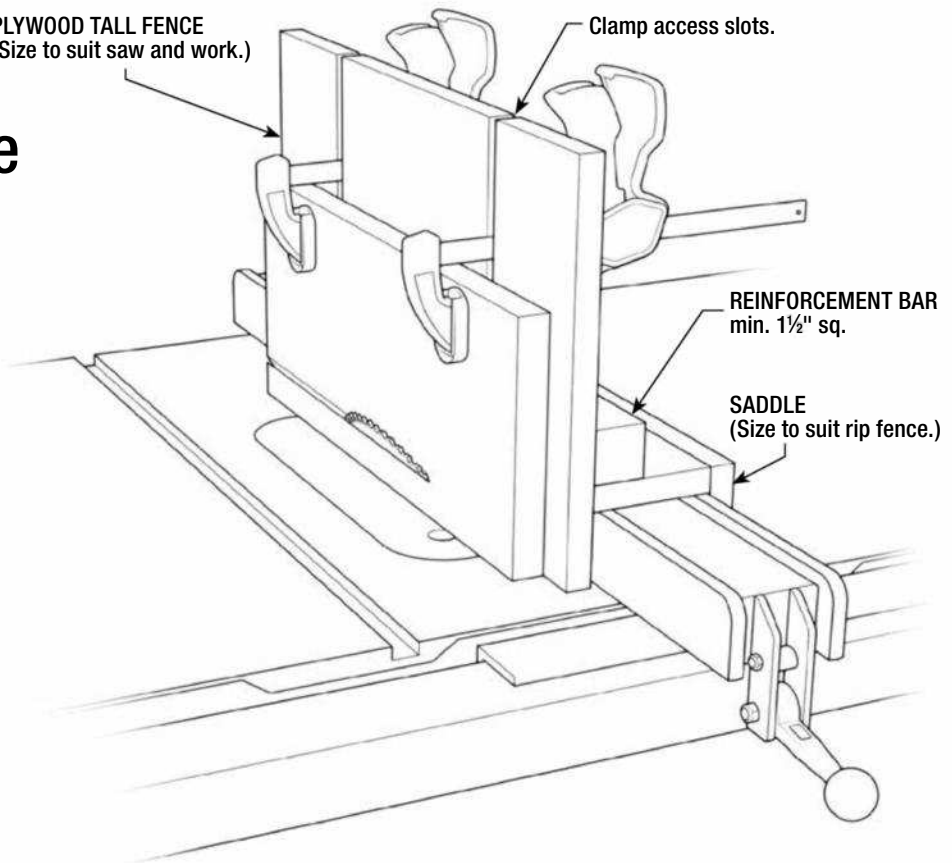


# Sliding tall fence


The “Ripping knife-edge bevels” tip in issue #82 compelled me to share this sliding tall fence jig that I use for similar circumstances. However, in addition to serving as a carrier for ripping knife-edge bevels on smaller boards, it makes a great tall fence for vertically supporting work to saw beveled edges for door panels and traditional solid wood drawer bottoms. The fixture straddles the fence for stability and includes slots for clamp access. Size and slot the unit to suit your work, making the saddle section fit your fence snugly enough to slide easily but without slop.

—Russ Svendsen, Olean, New York

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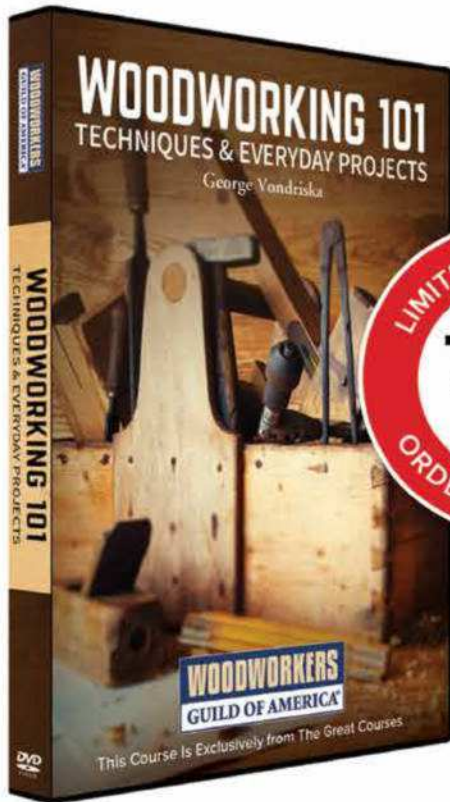
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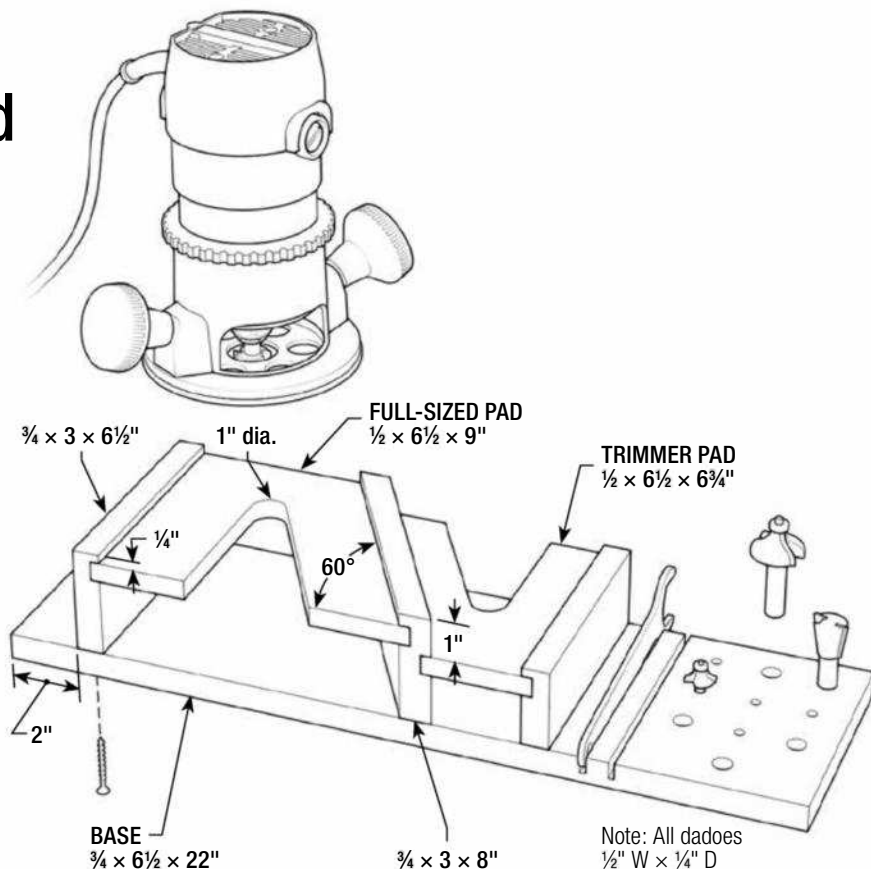
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# Router parking pad

I designed this fixture as a place to park a router in use. It protects the installed bit and provides easy access to collet wrenches and additional bits. Built to the dimensions shown, the larger pad will accommodate most mid-size and large routers, but size your unit to suit your machines. The smaller pad accepts trim routers and other small machines with bases up to about 5" in diameter. Make the 2-tier pad assembly first, joining the parts with dadoes. Then position the smallest router you'll use in each section in turn, and mark the location of each bit centerpoint. Drill a 1"-dia. hole at each of those points, and cut out the pads where shown using a jigsaw. After kerfing and drilling the base for the wrenches and bits, screw it to the pad assembly.

—Joe Hurst, senior editor



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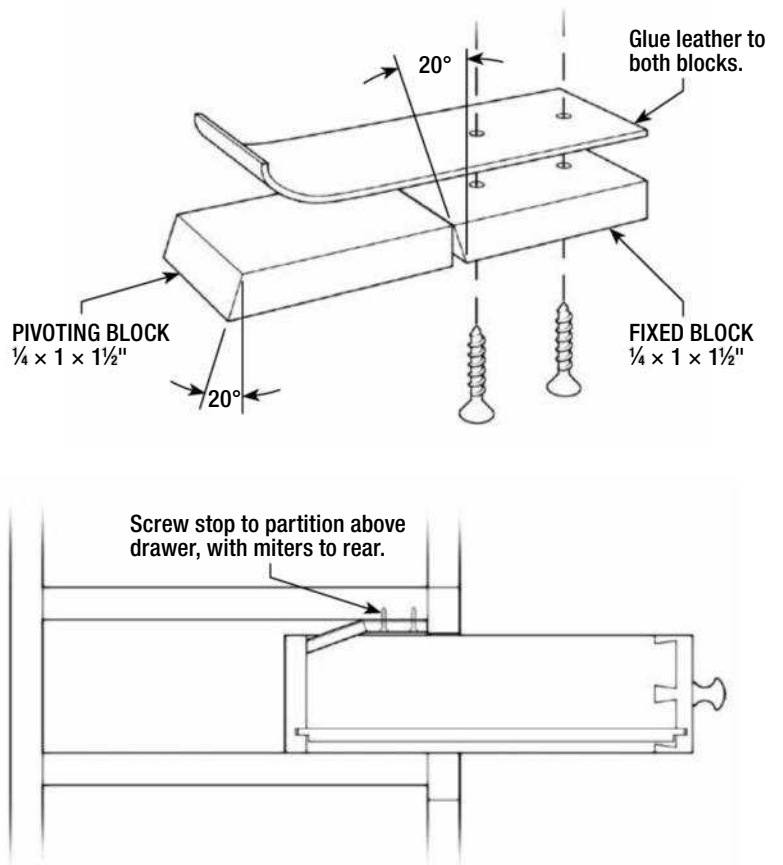




# Leather-faced outward drawer stop

An outward drawer stop prevents content spills while still allowing intentional drawer removal. Here's a clever version of an outward stop that's unobtrusive and simple to make. It consists of two blocks of wood, each mitered to 20° at one end, and glued to a scrap of leather that serves as a hinge of sorts. One block is screwed to the case partition above the drawer, while its partner is free to drop down and butt against the inside face of a withdrawn drawer back. When installing a stop, center it across the width of the opening, and make sure to locate it far enough back to clear the drawer front. Alternatively, for a frameless opening with no space above the drawer, notch the drawer back to clear the stop. To remove the drawer, simply reach inside and lift the pivoting block out of the way of the drawer back.

—Andy Rae, Asheville, North Carolina



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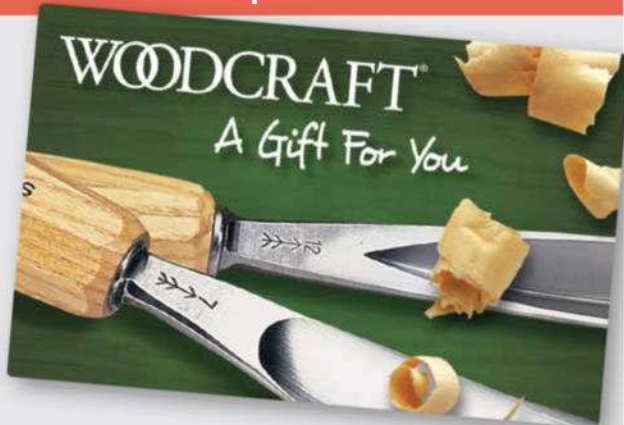


## Fine-tuning sled runners

When making a table saw sled, there's often a bit of final fussing with the wooden runners to ensure that the sled slides easily but without side-to-side play. This usually involves selectively sanding, scraping, or planing away any deviant sections on the runners. I've found that the best way to target the problem areas is to first scrub a wide-lead carpenter's pencil across the shoulders of the saw table slots to load them with graphite. Then, pushing the sled back and forth transfers the graphite to the errant spots for easy identification. ■

—Mark Bannon, Denver, Colorado

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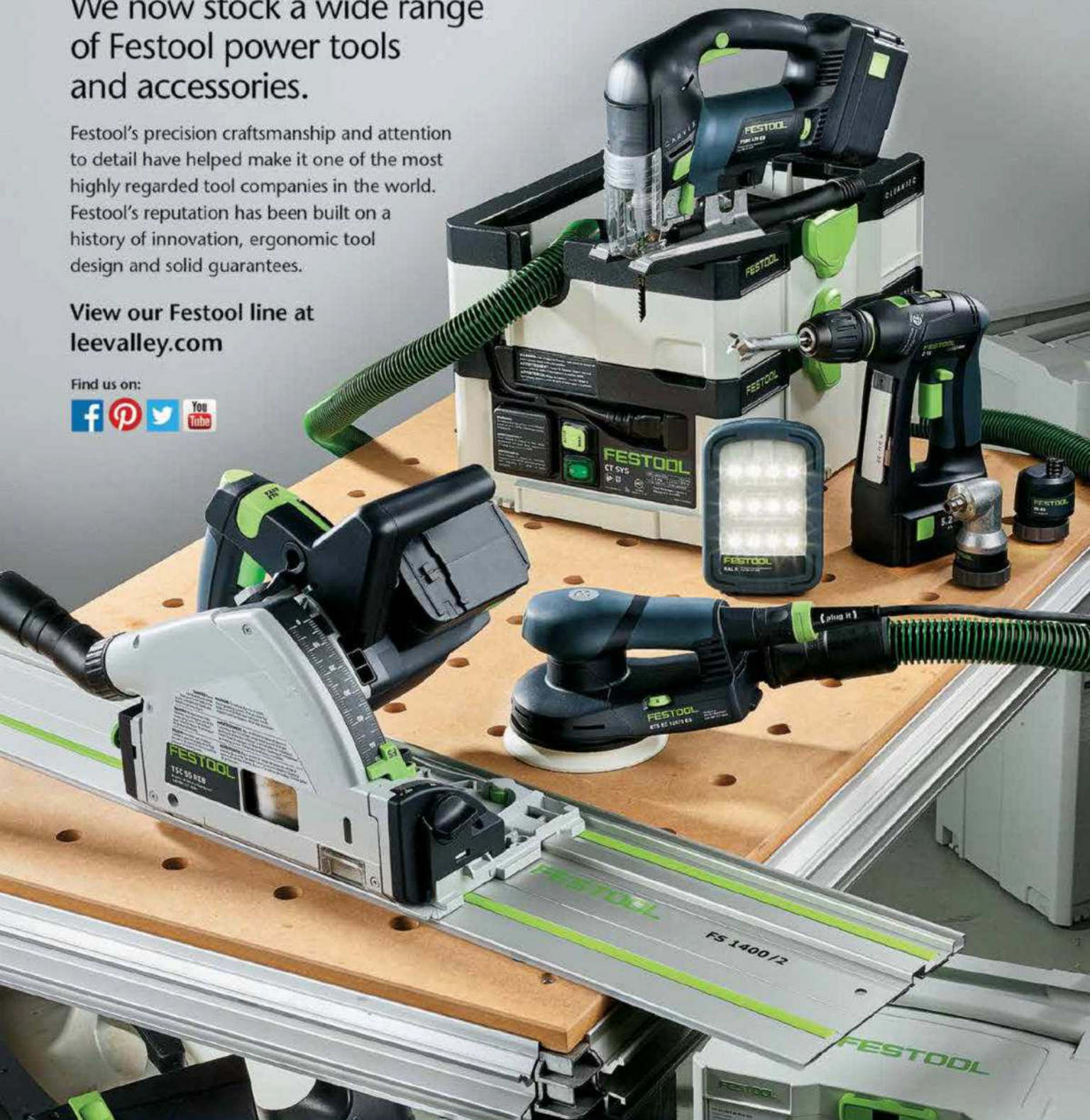
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# Tiny TREASURE BOX

*Shaped sides and box joints make this small-scale container a unique gift.*

By Ken Burton



I developed this small treasure for a class several years ago. I wanted to show students that you could take a relatively simple rectangular box and make it more sophisticated by shaping the sides after assembly. Starting with a rectangle keeps the joinery straightforward. Then the key to success is to make the shaping cuts in the proper order so you don't cut away your reference surfaces before you're finished with them. The corners are joined with box joints. I cut these joints at the table saw with the assistance of a shop-made jig (see page 57). Shaping the box after the pieces are glued also adds another layer of intrigue by adding curves and tapers to what is usually a uniform and rectilinear joint. And making the small parts from longer stock is a great opportunity to make multiples to give as gifts.

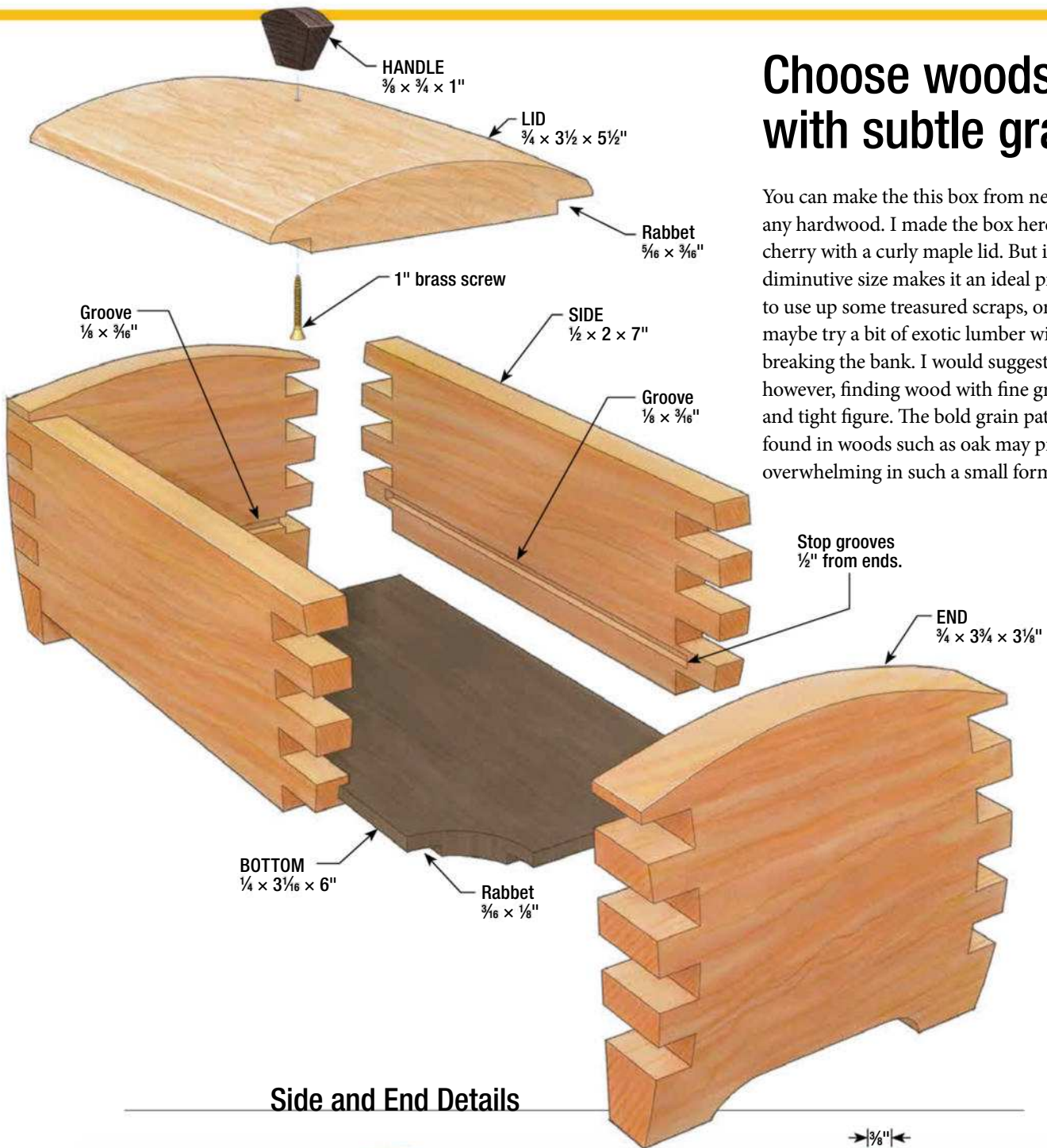
## Order of Work

- Cut the corner joints
- Groove the ends and sides to fit the bottom
- Cut out the feet in the ends
- Glue up the box
- Shape the box
- Make the lid

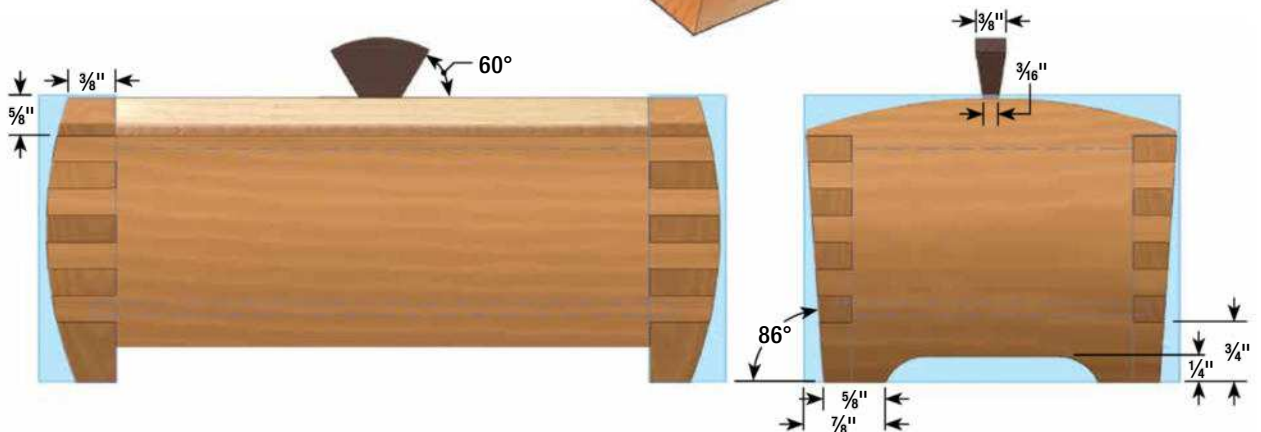


# Choose woods with subtle grain

You can make this box from nearly any hardwood. I made the box here from cherry with a curly maple lid. But its diminutive size makes it an ideal project to use up some treasured scraps, or maybe try a bit of exotic lumber without breaking the bank. I would suggest, however, finding wood with fine grain and tight figure. The bold grain patterns found in woods such as oak may prove overwhelming in such a small form.



## Side and End Details







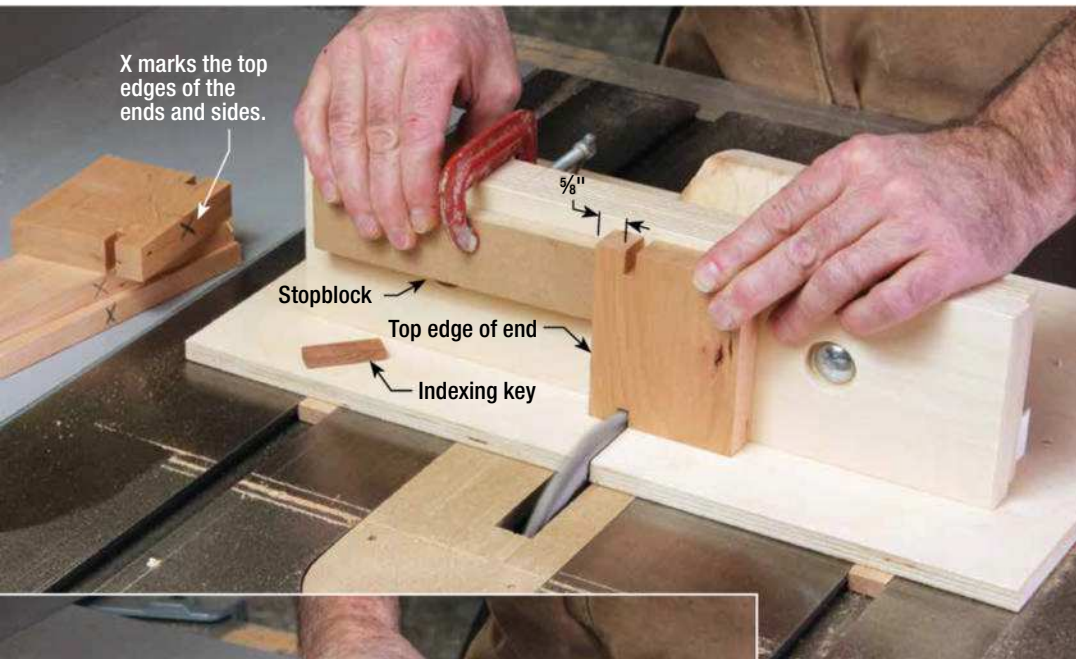
# Cut box joints on the table saw

The final pieces are too short to mill on their own, so begin with stock that's long enough to safely rip, plane, and joint. (For the sake of efficiency, it's wise to make several boxes at a time anyway.) After milling the stock to finished thickness and width, crosscut the parts to final length.

The box joint jig I used (see p. 57) has a removable indexing key, which is necessary to make this box. Arrange the box pieces and mark their top edges with an "X" for proper orientation as you load the

jig. Adjust your dado set for a 1/4"-wide cut. Set the dado's height to slightly less than the thickness of the box sides. Remove the indexing key, and then clamp a stopblock to the jig to make your first cuts. Return the indexing key for the remaining cuts in the end pieces.

Reset the dado stack's height to slightly less than the thickness of the end pieces. Make the mating cuts in both ends of both side pieces, keeping the marked edges to your right.

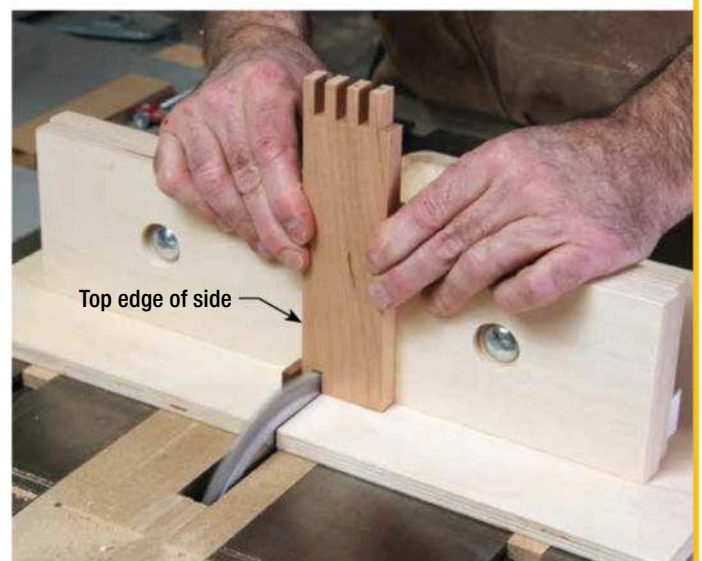


### Start with the stopblock.

Remove the indexing key from your box joint jig, and clamp a stopblock to the jig fence to make a cut 5/8" in from the top edge of the box ends. Keep the marked edges facing to your right. Make the first cuts in both ends of each end piece before removing the stopblock.



**Complete the box ends.** Reinsert the indexing key, and make the remaining three cuts (four cuts, total) at each end of both end pieces.



**Finish the joinery.** Orient each side piece with its top edge against the indexing key. Raise the cutter to match the thickness of the end, and then cut the sides.



# Groove, pre-shape, and assemble

With the joinery cut, it's time to rout grooves for the bottom. Note that the grooves run full on the ends, but are stopped on the sides. To groove the ends, position your router fence so the  $\frac{1}{8}$ "-dia. straight bit is centered in the bottom notch in the end pieces, and groove both end pieces. Making two successive  $\frac{3}{32}$ "-deep passes prevents straining the bit. Then dry-fit a corner and mark the location of the grooves on the sides. Rout the stopped groove as shown.

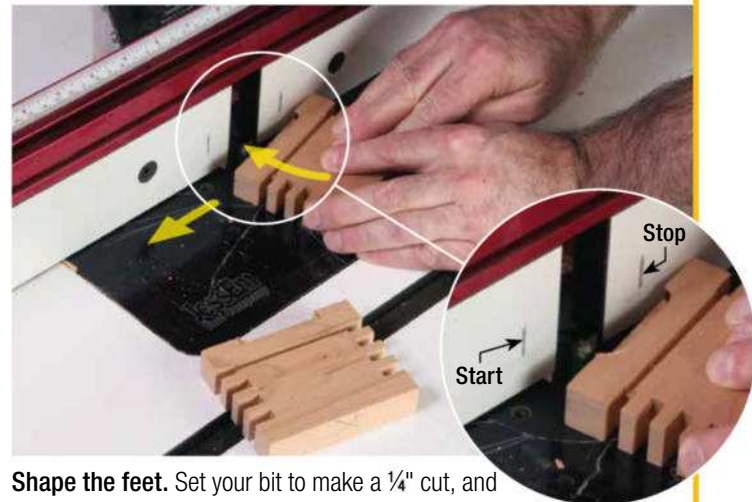
Setting up to pre-shape the feet isn't as tricky as it sounds. Chuck a  $\frac{3}{4}$ " straight bit in your router table to make a  $\frac{1}{4}$ "-deep cut. With the power off, rotate the bit until one of its flutes is about to disappear behind the fence.

Slide the marked end piece along the infeed side of the fence until it contacts the disappearing flute. Make a mark on the fence that corresponds to the layout line for the inside of the leading foot. Repeat the process on the outfeed side of the bit, this time using the layout line for the trailing foot. Now make the cut as shown.

Lay out the curves along the top edges of the ends. Bandsaw along your layout lines, then sand away the saw marks. Finally, cut the bottom to size and rabbet its edges to fit in the grooves you cut earlier. Spread glue on the mating surfaces of the box joints, assemble the box, and clamp the joints tight.



**Groove the sides.** After grooving the ends, relocate the fence and mark on it the bit's outside diameter. On the outside faces, mark the bottom fingers  $\frac{1}{2}$ " in from the ends. Then lower the piece onto the bit, aligning the mark on the face with the left-hand line on the fence. Feed the piece right-to-left, stopping when the right-hand marks align. As with the ends, make the cuts in two successive passes.



**Shape the feet.** Set your bit to make a  $\frac{1}{4}$ " cut, and position the fence so  $\frac{1}{4}$ " of the bit protrudes from the fence opening. Mark on one end piece the foot's inside edges. Use these marks to lay out the start and stop locations on the fence. Align the end's left edge with the left mark on the fence, and pivot the piece from the right into the spinning bit. Then, move the piece left to right, through the bit, stopping as the right edge of the piece aligns with the right most mark on the fence. Now, flip the piece over and cut again. Repeat the process with the other end. Then raise the bit to make a  $\frac{1}{2}$ " cut for the third and final pass.

## Glue up the box.

Clamp the box together using cauls to distribute the pressure. Wrap the cauls with packing tape to keep them from sticking to the glue.





# Shape the box and make the lid



onlineEXTRA

Ripping bevels on the table saw

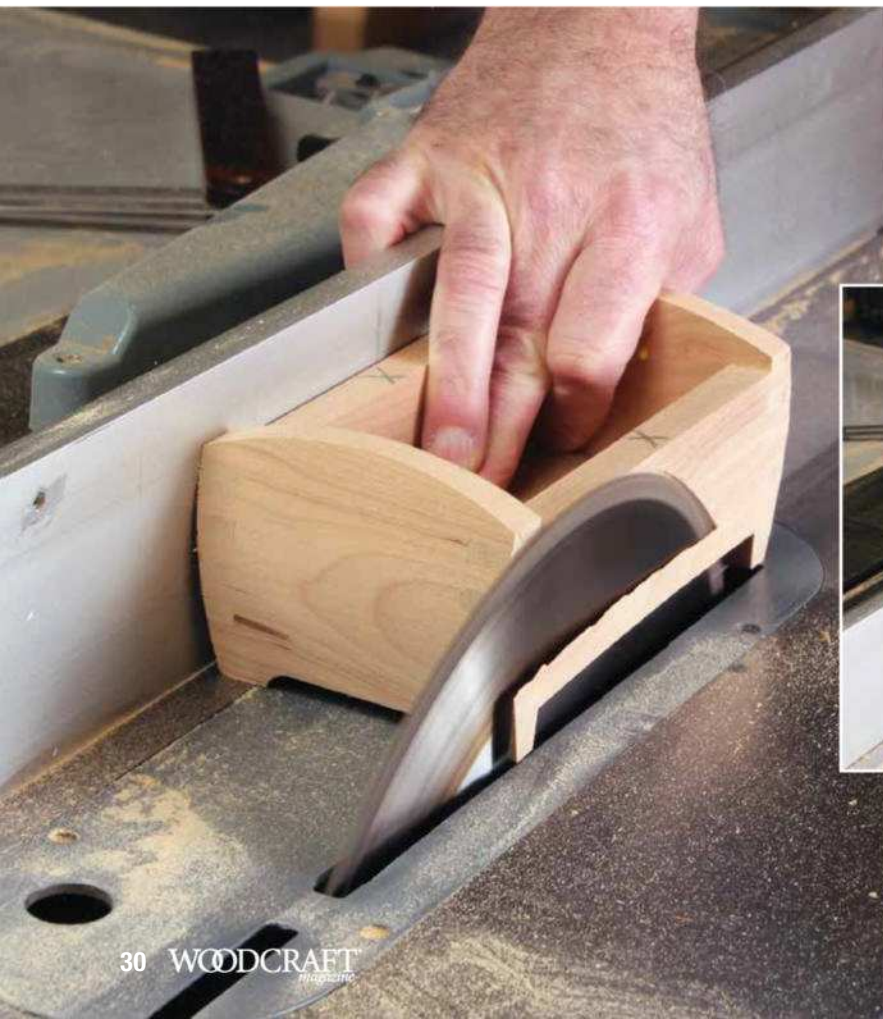
Lay out the end curves and bandsaw them to rough shape, finishing up on a stationary belt sander. Bevel the sides on the table saw as shown, and sand away the saw marks.

Cut the lid to size, and drill a 1/8" hole through the center for mounting the handle. It's easier to do this now while the piece is still rectangular than it would be after it's shaped. Rabbet the long edges of the lid so it sits securely atop the box, nestled in between the ends with

the rabbets resting on the sides. Set the lid in place, and trace the curves from the box ends onto the ends of the lid. Saw away most of the waste, then hand plane and sand to match the end curves. Drill a pilot hole in the handle so you can join it to the lid with a screw. Then bandsaw the handle to rough shape and finish up on the sander. To complete your box, sand everything to 400 grit, and apply several coats of wiping varnish. ■



**Trace the end curve.** Scrape away any excess glue so the box lies flat on its sides. Lay out the end curves on the sides using the dimensions in the Side and End Details (P. 27). Bend a flexible length of scrap at each mark and have a helper trace along the curve.



**Carefully cut the sides.** With the blade angled to 86° and raised to the height of the sides, saw the angle on each side. When cutting the second side, make sure to hold the piece tightly against the fence and firmly against the table.

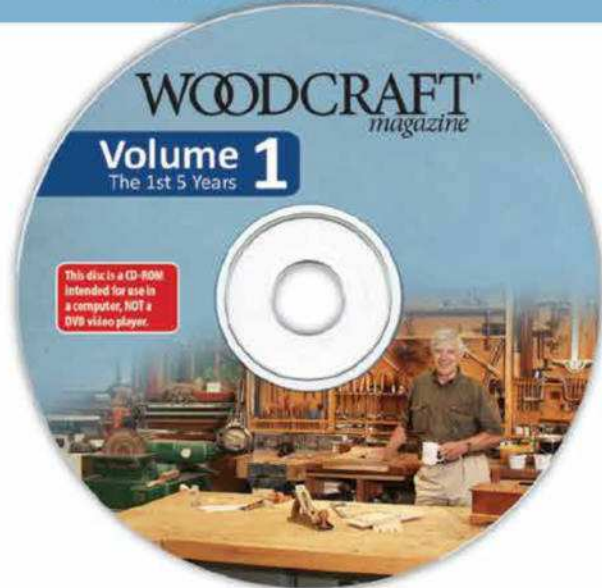


**Shape the lid.** Feed the lid on edge as you cut away most of the waste with the blade angled at 75°. Saw close to the line you traced from the box sides, and then finish shaping with a hand plane.



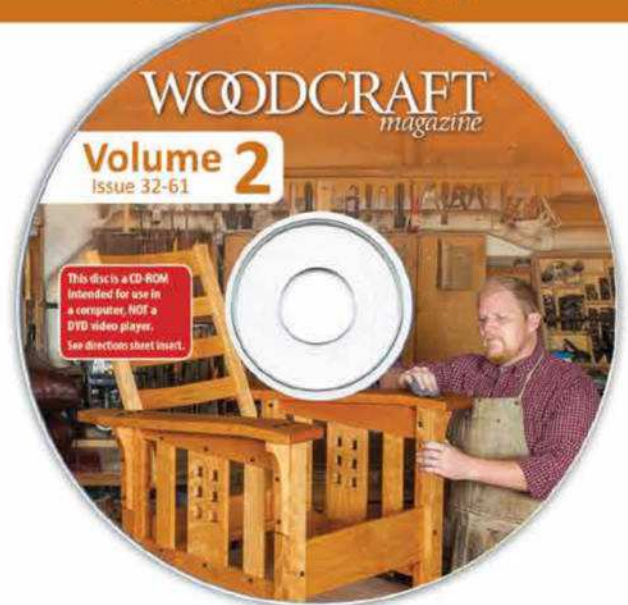
## VOLUME 1 (ISSUES 1-31)

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## VOLUME 2 (ISSUES 32-61)

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# NOW HEAR THIS!

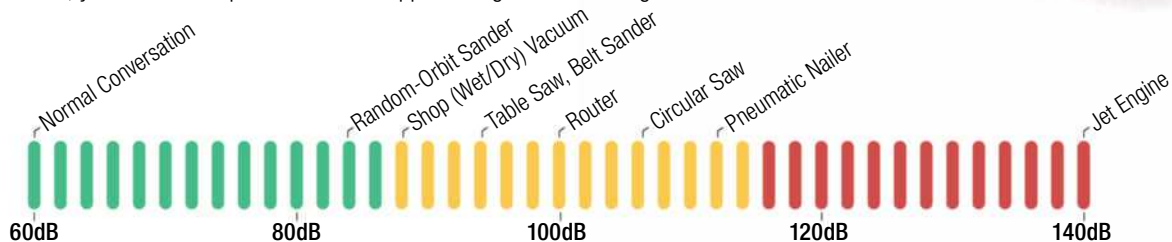
21st Century solutions for today's woodworker

Joe Hurst-Wajszczuk

Unlike a chance encounter with a blade or bit, the gradual and cumulative damage to hearing caused by loud noise makes this injury downright sneaky, but just as permanent. Prolonged exposure to noise over 85 decibels (dB)—about the level of a typical shop vac—can damage the hair cells that transmit vibrations to the nerve fibers within the ear. First, you'll think you've "grown used" to a noise, and perhaps stop protecting your ears when you should be. But this only accelerates loss. By the time you notice the loss outside of the shop, it's too late. Lucky for us, woodworking isn't the only activity that is hazardous to your hearing health. The business of protecting people from life's various booms, roars, and crashes has resulted in an array of comfortable and affordable hearing protection options. If you're tired of removing and reinserting foam plugs, or if your muffs are cracked and stiff, now's the time to step up. Added comfort and convenience ensures that you'll put these new products on when you don't need them so that you're wearing them for all of the times when you do.

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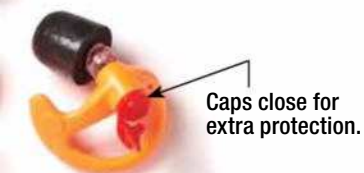




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Caps close for extra protection.

## New Muffs: Comfort and connectivity

Ear muffs are a popular and practical solution for noisy operations. In addition to offering some of the highest noise reduction ratings, muffs are easy to put on and take off. Unfortunately, many hang idle alongside machines waiting to be worn, and that's when hearing damage can happen.

The problem with old-school muffs is that they're hot and heavy, and wearing them cuts off contact with the outside world. In comparison, modern muffs are lighter, slimmer, and available in different sizes. A better-fitting muff ensures that the actual hearing protection matches the stated NRR (Noise Reduction Rating) and encourages users to keep them on, even when the big machines aren't running. Some of these new muffs are designed to keep you connected with the outside world. Pro Ears' electronic ear muffs (see main photo, left), have microphones that amplify safe-level sounds and cut out when the decibels go above the danger zone. This feature is handy in a shared shop where you might not always see when somebody's about to turn on a saw.

By using Bluetooth technology, 3M's WorkTunes offer another solution for woodworkers who work alone, but want to stay connected. Linked to your smartphone, the rechargeable muffs allow you to stream music and take calls.



Bluetooth



### Pro Ears Ultra Sleek

NRR: 26, \$34.99

Comments: Small, light muffs with leather-faced pads are comfortable enough for long-term use.

### Pro Ears ReVO

NRR: 25, \$34.99

Comments: Even smaller muffs provide a better fit and more protection for women and kids.



### FRIEQ

NRR: 37dB, \$11.99

Comments: Comfortable, high-level noise protection for a low price.

### WorkTunes 3M

NRR: 24dB, \$43.59

Comments: Links to your phone, enabling you to wirelessly stream tunes or make and receive calls. Rechargeable.



# Plugs: Better fit, selective filtering



## ETY Plugs HD

NRR: 12dB, \$13.99

**Comments:** Reduces noise levels without muffling speech or music. Can be worn under muffs.

## Eargasm

NRR: 21dB, \$29.88

**Comments:** Reduces noise levels evenly. Can be worn under muffs.



## Hocks Noise Braker

NRR: 19db, \$14.50

**Comments:** Reduces all sound to volume of normal speech, providing more protection at higher dB levels.



## SureFire Sonic Defenders

NRR: 14dB, 28dB, \$17.99

**Comments:** Caps easy to open and close. The hooped "EarLock" ring helps keep them in place.



## Decibullz

NRR: 31dB, \$28.80

**Comments:** Soften tear-shaped insert in hot water, then press in place for a super-comfortable fit.

Disposable foam plugs are a handy solution for shop visitors, but they don't make as much sense in a one-person workshop. Like muffs, disposable plugs can make you feel as if you're stuck in a sound booth. And as the name suggests, disposables are designed for one-time use. Recycled foam plugs lose their elasticity and ability to protect, and can harbor bacteria.

High-tech plugs offer options not found in foam counterparts. For starters, the silicone flanges don't need flattening (often by dirty fingers) before insertion, and they're washable. Premium plugs include different-sized flanges for fine-tuning the fit. These plugs also are available in a range of noise-reduction levels. High-fidelity plugs are designed to offer less protection, but enable the wearer to hear music and conversation, encouraging all-day use. The short stem and low-profile design enables the user to wear muffs for additional protection when necessary. Sure-Fire's Sonic Defenders combine the convenience of high-fidelity plugs with a protection level that matches most muffs when the caps are closed.

Custom-fitted plugs offer the best protection. In the past, this meant a visit to a hearing specialist. Thanks to modern-day thermoplastics, you can do the job at home. Decibullz offers the noise protection provided by custom-fit plugs for less than the price a doctor's visit.

## World's first Bluetooth Earplug Headphones

Wireless earphones have become a ubiquitous smartphone accessory. IsoTunes look and function like the same versions that the hipsters use—you can listen to music and answer calls—but they also provide hearing protection equal to plugs. An additional safety benefit is that there are no wires to dangle near machines.

Iso's don't offer the sound quality found in regular buds, but that's not what they're supposed to do. (In order to be OSHA-compliant, the volume level tops out at 85dB.) Another plus: the passive-protection plugs still work when the battery's dead.



# Bands: Smarter dB defense

In the past, hearing bands weren't much more than tapered plugs on a plastic hoop. Despite their pop-in/pop-out convenience, they didn't generate much of a following with woodworkers. Users discovered that disposable bands offer less protection than other options, and the cost of disposables quickly added up. Today's reusable high-tech bands are different.

Unlike the simple plastic strap on a disposable hearing band, the hollow headband on SensGard Ear Chambers does the real work. These foam-tipped tubes serve as "passive resonant chambers" allowing some sound into the ear, while diverting and canceling out louder noises. The wider bands provide more protection, but I prefer the smaller bands for everyday use because they let in more sound. (By enabling me to hear music and normal conversation, I wear them even when they may not be needed.)

Modern technology offers an affordable option for woodworkers who formerly ignored decibel-related warnings and now struggle with some hearing loss. Designed for hunters, Pro Ears Stealth Bands combine 5× hearing amplification, with protection from loud noises. The band weighs in at only 0.7 ounces, but still offers 18 hours of run time from a single charge. ■



## SensGard Ear Chambers

NRR: 26dB (red), \$21.50

26dB (green), \$39.99

Comments: Lightweight and battery-free. Plastic chamber dampens loud noises.



## Pro Ears Stealth

NRR: 31dB, \$59.99

Comments: Rechargeable band provides electronic amplification and protects hearing.



## IsoTunes Pro

NRR: 27dB, \$89.99

## What you need to know about NRR

Hearing protection products have a Noise Reduction Rating (NRR) on the side of the package. This number indicates the product's hearing potential. In theory, if a tool generates 100dB and the hearing protection has a 31-dB NRR, then the noise level reaching your ear should be around 69dB.

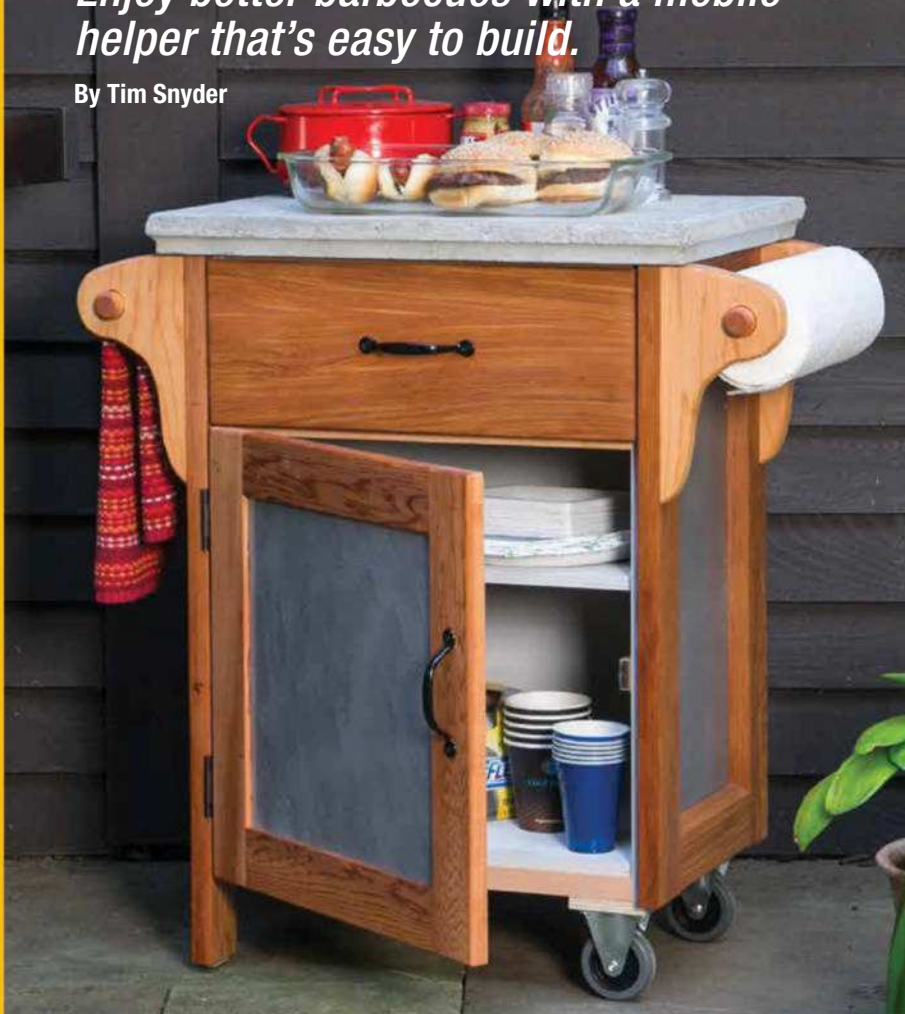
Unfortunately, lab results don't match real world conditions. Actual performance can be affected by fit, the product's condition, and the user's motivation to use it when it's needed. The best protectors are the ones that you wear regularly.



# Build a Great GRILL CART

*Enjoy better barbecues with a mobile helper that's easy to build.*

By Tim Snyder



**W**ell-documented research tells us that July 4 and Memorial Day are the most popular days for an outdoor barbecue. But at my house, grilling has become the most popular way to make dinner all year round. We were overdue for a grill cart that could provide a serving tray top, storage space below, and a ready supply of paper towels. This little assistant was just the ticket. Initially, I planned to incorporate galvanized steel panels in the design for a rugged industrial appearance. But the right sheet metal was difficult to find and even more difficult to cut. Instead, I reached my galvanized goal by coating MDO (medium-density overlay) plywood panels with faux metal finish from a spray can.

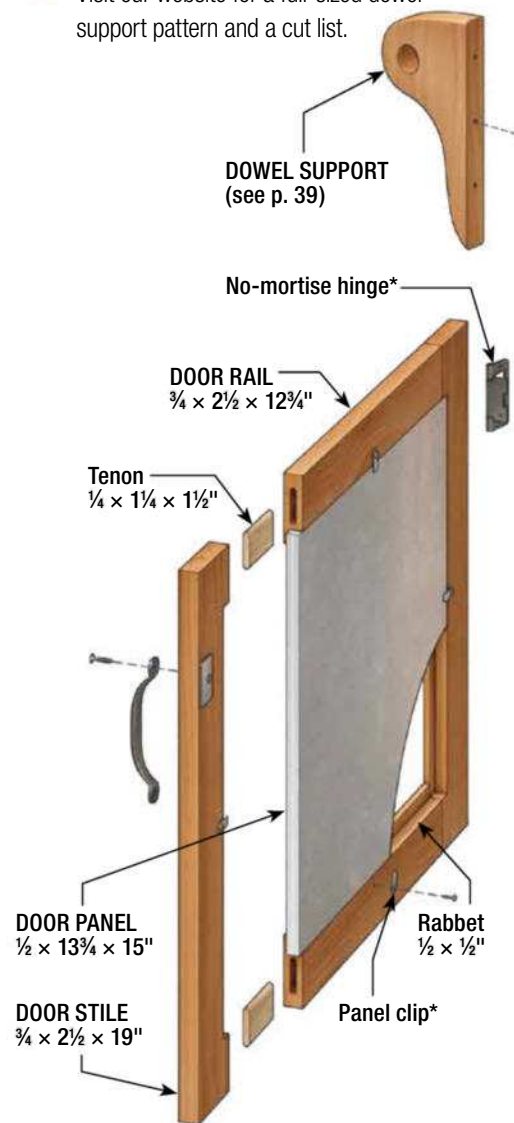
The wood frame for the cart is made from red cedar, a species that stands up to weather and is a pleasure to work. Several coats of marine spar varnish improve its durability. The grill cart's top is cast concrete, formed using a simple mold I made after reading up on concrete countertops (see p. 42). If concrete isn't to your liking, you can get a countertop fabricator to make you a top from stone or solid surface material.

## Solid wood frames,

The cart is designed to be strong, durable, and easy to build. As an alternative to red cedar, you could use cypress or pressure-treated 5/4 pine decking boards. Just make sure to select stock that's clear, straight, and dry. If you use 5/4 x 6" boards like I did, you can minimize waste by ripping legs, rails, and web frame parts to a finished width of 2½". The door frame, drawer false front, and back rails are made from ¾"-thick stock; all other cedar parts are 1" thick.

### onlineEXTRA

Visit our website for a full-sized dowel support pattern and a cut list.

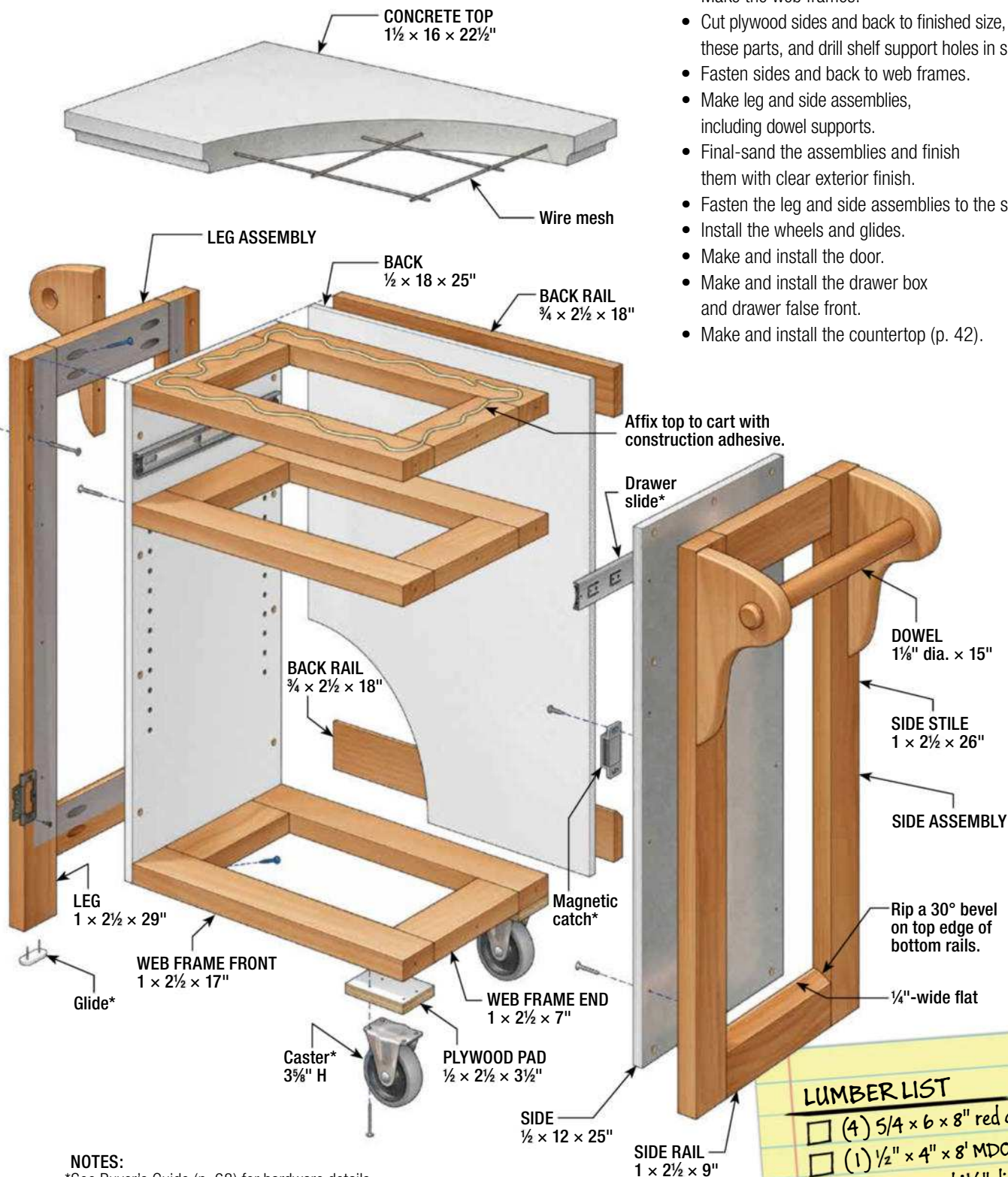




# plywood panels, a pair of wheels, and a concrete top

## Order of Work

- Make the web frames.
- Cut plywood sides and back to finished size, prefinish these parts, and drill shelf support holes in sides.
- Fasten sides and back to web frames.
- Make leg and side assemblies, including dowel supports.
- Final-sand the assemblies and finish them with clear exterior finish.
- Fasten the leg and side assemblies to the sides.
- Install the wheels and glides.
- Make and install the door.
- Make and install the drawer box and drawer false front.
- Make and install the countertop (p. 42).



### LUMBER LIST

- (4) 5/4 × 6 × 8" red cedar
- (1) ½" × 4" × 8" MDO plywood
- (1) Dowel rod 1/8" dia. × 36" L.

#### NOTES:

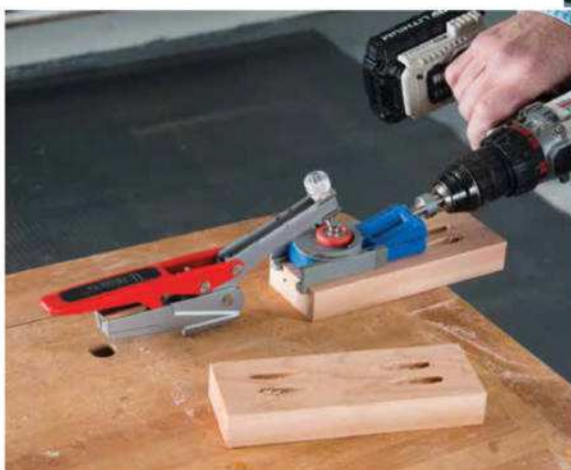
\*See Buyer's Guide (p. 68) for hardware details.  
See p. 41 for drawer construction.  
Use MDO plywood or exterior plywood for case and drawer.



# Web frames first, then sides & back, legs, and wheels

After making the web frames, cut the plywood sides and back to size, and prefinish them. I coated the interior faces of the sides and back with grey milk paint, and applied two coats of Rust-Oleum Silver Hammered aerosol finish to exterior faces. After drilling shelf support holes, you can screw the plywood sides and back to the web frames. Then use pocket screw joinery to make the leg and side assemblies. Follow the

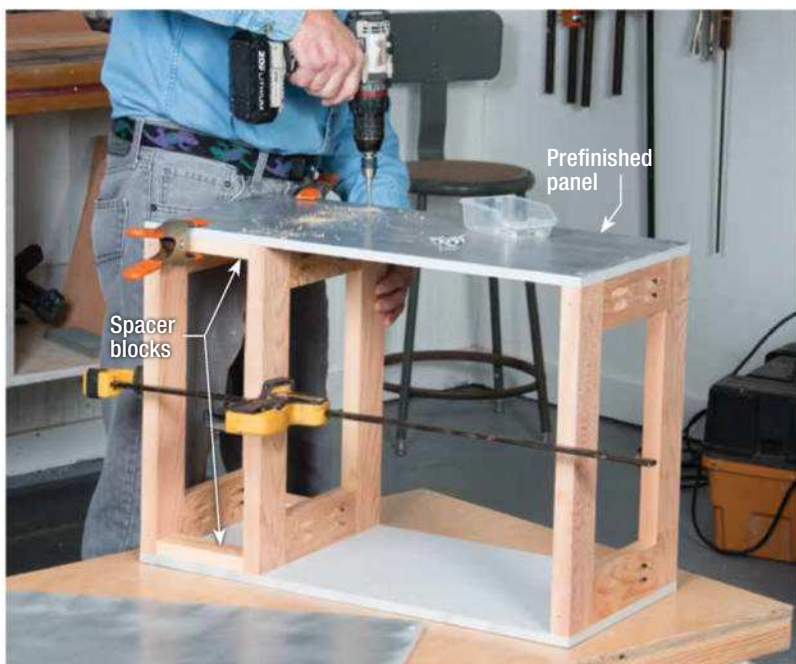
pattern on the facing page to make 4 dowel supports, then attach them to the leg and side assemblies with screws and glue. This gets you set to install the wheels and glides.



**Pairs of pocket screws.** Each joint in the three web frames goes together with two pocket screws. A bench-mounted, fast-action clamp makes quick work of holding the jig in place and keeping joining frame members aligned as you assemble your frames. Use the same pocket joinery technique to build the leg and side assemblies.



**Do the hole job early.** It's smart to drill shelf pin holes in the sides before assembling the case. My shop-made jig places  $\frac{1}{4}$ "-dia. holes  $1\frac{1}{4}$ " from the side's edges. Holes are spaced on 1" centers.



**Create the case around the frames.** Fasten the sides to the top and bottom web frames first, then clamp  $5\frac{1}{2}$ "-long spacer blocks in place as shown to exactly position the middle web frame. Secure each connection with three  $1\frac{1}{2}$ " exterior screws.



## Keys to Success

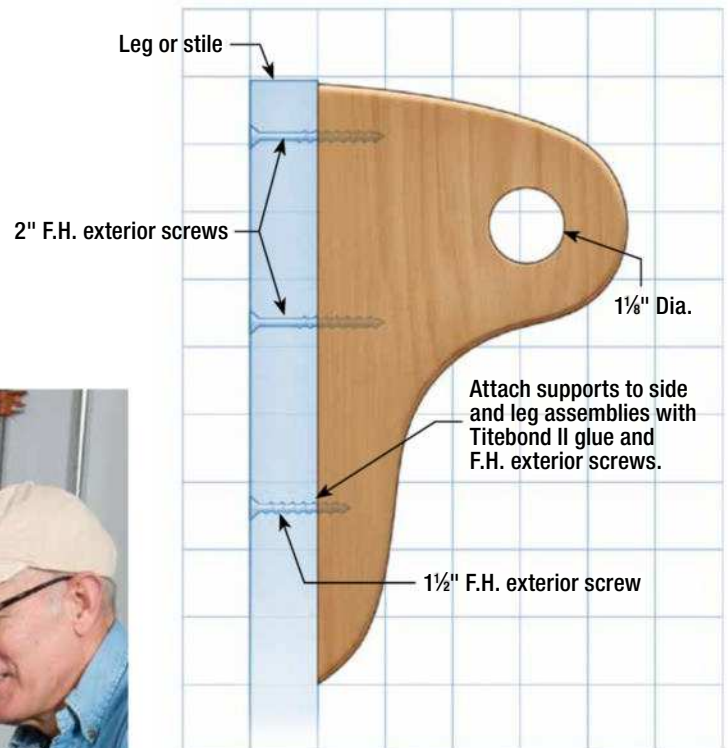
- Use the right screws: 1½" blue exterior pocket screws for all pocket joinery, 2", 1½", and 1¼" outdoor screws for other connections.
- Prefinish the plywood parts, leg assembly, side assembly, and back rails before assembling the case.
- Adjust for a level top. Because caster height can vary, it may be necessary to adjust the thickness of the plywood pad in order to keep the cart's top level.



**Leg and side assemblies go on next.** Before beginning this assembly step, make sure to attach the dowel supports and apply two coats of exterior varnish to the cedar. Place the case upside-down on a flat surface, then clamp the cedar frames to the case. Since these assemblies are sized to extend ¾" beyond the plywood edges, I clamp ¾"-thick spacer blocks to each assembly for easy and accurate alignment. Drive four 1¼" screws through the plywood from inside the case to attach each leg or stile.

Project photos: Paul Anthony

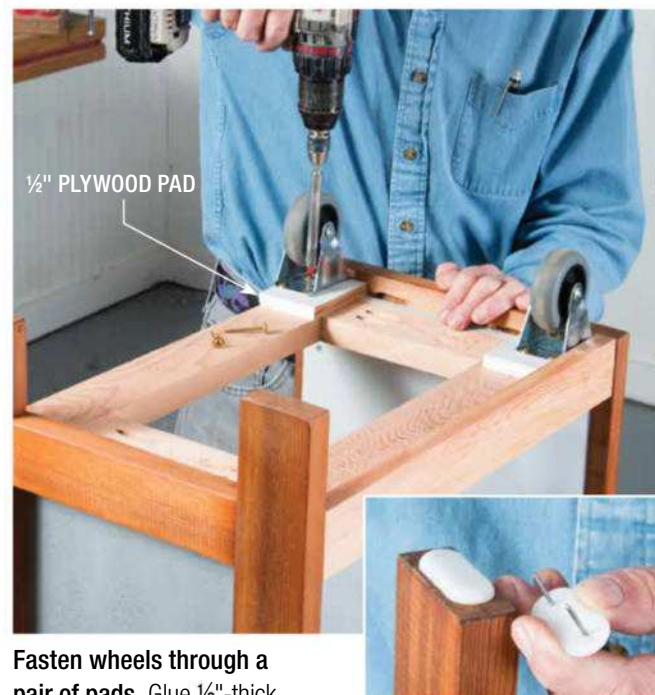
## Dowel Support Pattern



**onlineEXTRA**

Download the full-sized pattern.

1 square = 1"



**Fasten wheels through a pair of pads.** Glue ½"-thick plywood pads into the bottom corners of the web frame, then install wheels with 1½" washer-head screws. Tap a two-prong poly glide into the bottom of each leg. The glides protect the wood from abrasion and moisture damage.



# The door gets stronger joints and an inset panel

The cart's cabinet is complete, except for the door and drawer. While pocket screws are fine for assembling the web frames and the leg and side assemblies, the door requires stronger joinery. I used loose tenons that fit snugly in mortises milled with my plunge router and a simple mortising jig (see photos below). Tenons can be cut from

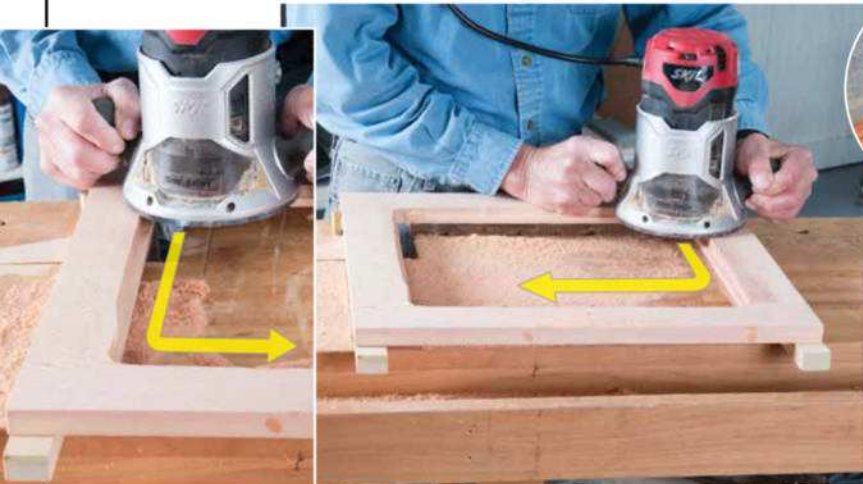
exterior plywood; use exterior glue when assembling the door frame. When the glue dries, rout a rabbet for the plywood panel that will be held in place with panel clips. Square the edges of the rabbet with a chisel, and prefinish the door frame and panel before you install the door.



2 door rails, clamped together



**Plunge-routed mortises.** This mortise-routing setup calls for a  $\frac{1}{2}$ " O.D. template bushing and a  $\frac{1}{4}$ " spiral flute upcut bit. The top of my jig has a  $\frac{1}{2} \times 1\frac{3}{4}$ " slot to guide the bushing, with a centerline marked across the slot. The jig's fence is positioned to locate the mortise in the center of the door's  $\frac{3}{4}$ "-thick stiles and rails. Get set to rout by clamping the fence to the workpiece with the jig's centerline aligned over a centerline drawn on the workpiece.



**Twice-rout to avoid tear-out.** With the rabbeting bit adjusted to cut a  $\frac{1}{2} \times \frac{1}{2}$ " rabbet, make a *climb cut* by moving the router in the "wrong" direction (counter-clockwise, left photo above). Keep a firm hold on the tool, and don't cut the full width of the rabbet. This preliminary cut helps avoid the splintering that can occur if you make a standard, full-depth cut in a tear-out-prone wood like cedar. Follow your climb cut with a full-depth cut, moving the router clockwise.



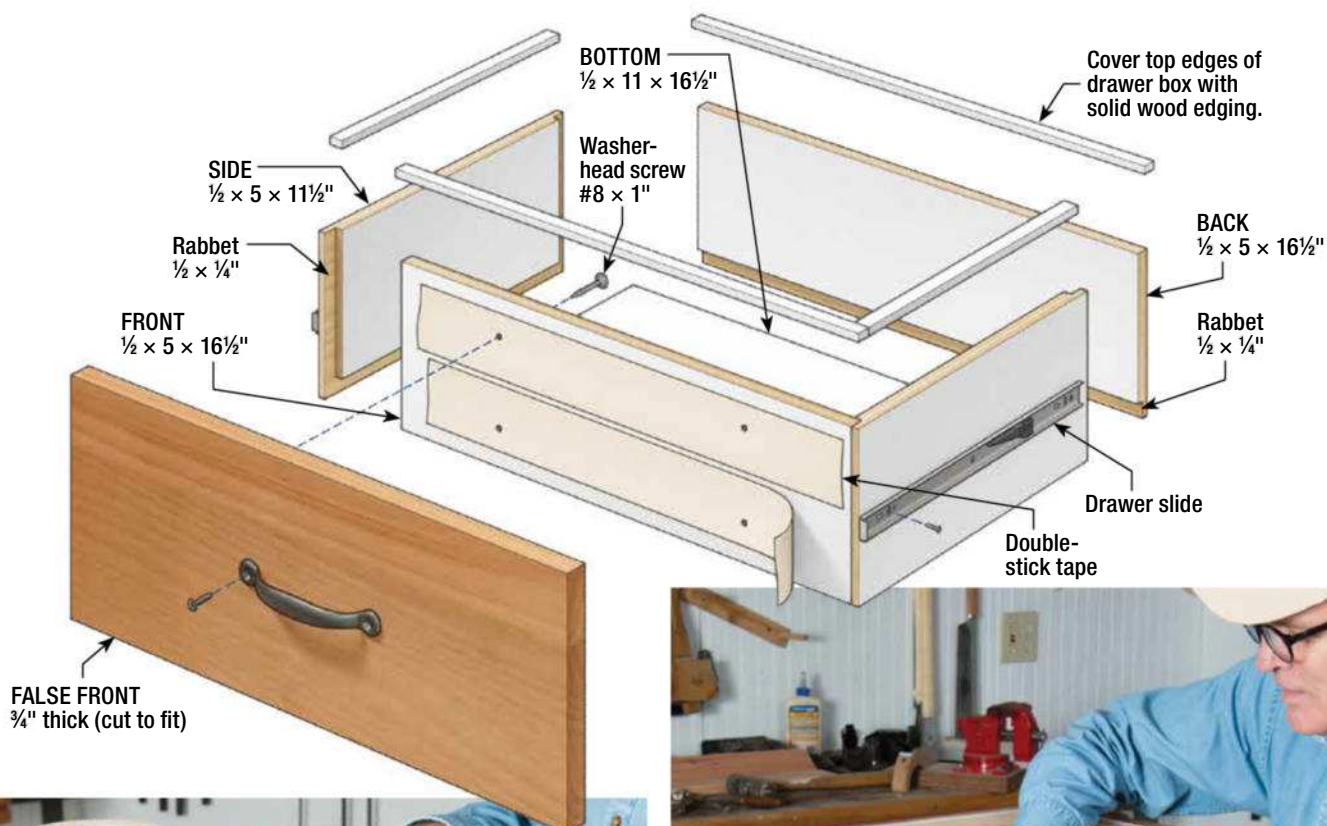
**Easy installation.** Install the door's plywood panel with panel clips, then install the door with a pair of no-mortise hinges. Screw the hinges to the door first, then to the left front leg. Complete your door by installing a handle and magnetic catch.



# A plywood drawer box gets a cedar front

Size the drawer box to accommodate the two ½"-thick drawer slides. It can be built from the same exterior plywood used to make the door and case panels. Screw your slide hardware to the case sides so that the front of the drawer box will sit flush with the front edges of the

plywood sides when the drawer is closed. Once the drawer box is complete and installed, you can make and attach the cedar false front. Make sure to prefinish the false front on all sides and edges before attaching it to the drawer box.



**Stick first, then screw.** Cover the front of the drawer box with double-stick tape after drilling four ⅜"-dia. holes in the front of the drawer box—one near each corner. Position the false front, using ⅛"-thick spacers as shown to ensure equal margins around the edges. Secure the false front by driving washer-head screws through the four holes from inside the box. Install your dowel rods, then take a break before tackling the concrete top.

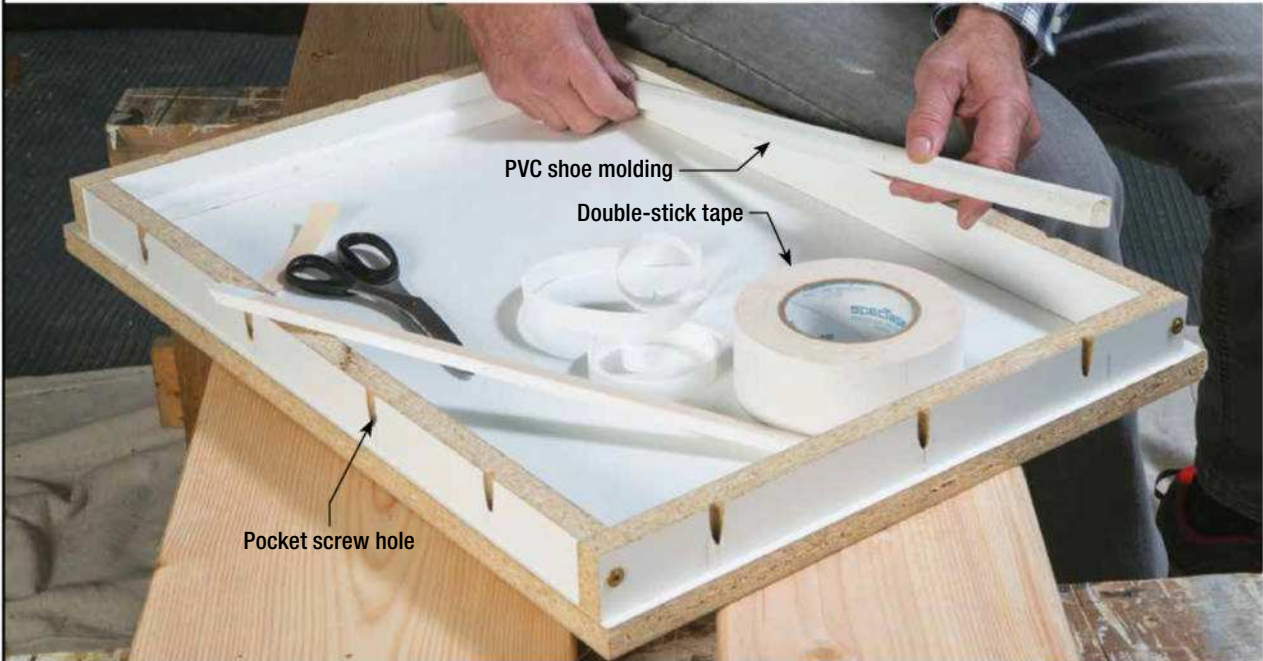




# Now for the concrete top: Create a simple form,

No wonder concrete countertops are popular. A few bucks buys you a 40-lb. bag of high-strength concrete, more than enough to make a small countertop like this one. While professional fabricators customize concrete countertops with pigments and diamond grinding techniques, I just wanted a basic version for my grill cart. The only embellishment I added was a cove along the countertop's bottom edges.

While you can use a concrete mix designed specifically for countertops (see Buyer's Guide, p. 68), a standard "high-strength" concrete mix will also work fine. Make sure to protect your skin with heavy rubber gloves. Add just enough water to make a thick mix that will hold together when you form a ball of concrete in your hand. Pack the mud fully into the form, especially along bottom corners where voids are



**Make the form from MCP.** Melamine-coated particleboard provides a slick surface for the form. Fasten form sides to the MCP base with pocket screws. Then use double-stick tape to fasten four pieces of PVC shoe molding (mitered at the corners) to the inside corners of the mold. Spritz the form interior with WD-40 as additional protection against sticking.



**Work on the top surface.** After screeding, use a broad drywall knife or concrete float to flatten and smooth the top surface. Then let the concrete harden up.



**Ease the edge.** Wait until the concrete has started to harden, then use an edging tool to create smooth, rounded edges where the mud meets the sides of the form.



## then fill it

most likely to occur. If they do, you can fill them in with a patching mortar mix after removing the form.

Standard sandpaper will work for smoothing your top; it just wears out quickly. For best results, use a concrete rub brick, available where masonry supplies are sold. Wait several days for your concrete to cure, then apply a couple of coats of masonry sealer. Attaching the top is easy: Just set it in a bed of construction adhesive. ■

### Order of Work

- Make the form, cut the wire mesh to size and mix the concrete.
- Pack the form halfway full with concrete.
- Press the wire mesh into the concrete, then fill the form.
- Screed the top flat, and trowel the surface smooth.
- When the concrete has hardened, use an edging tool to round over the top corners of the casting.
- Remove the form after 24 hours.
- Smooth edges and surfaces, then let the concrete cure for another day before applying sealer.



**Pack in the mud.** For a strong casting, keep your mix stiff, rather than runny. Pack it into the corners of the form with a broad drywall knife or mason's trowel.



**Place the wire mesh.** When the form is halfway full, press a rectangle of welded wire mesh into the concrete, then pack in more concrete until the form is slightly more than full.



**Screed it level.** Work a wood straightedge back and forth across the form's top edges to remove excess concrete.

**Fire up the grill!** Treating your countertop with a concrete sealer will make it more stain resistant. Secure it to the cart with construction adhesive, and enjoy your new grilling assistant.

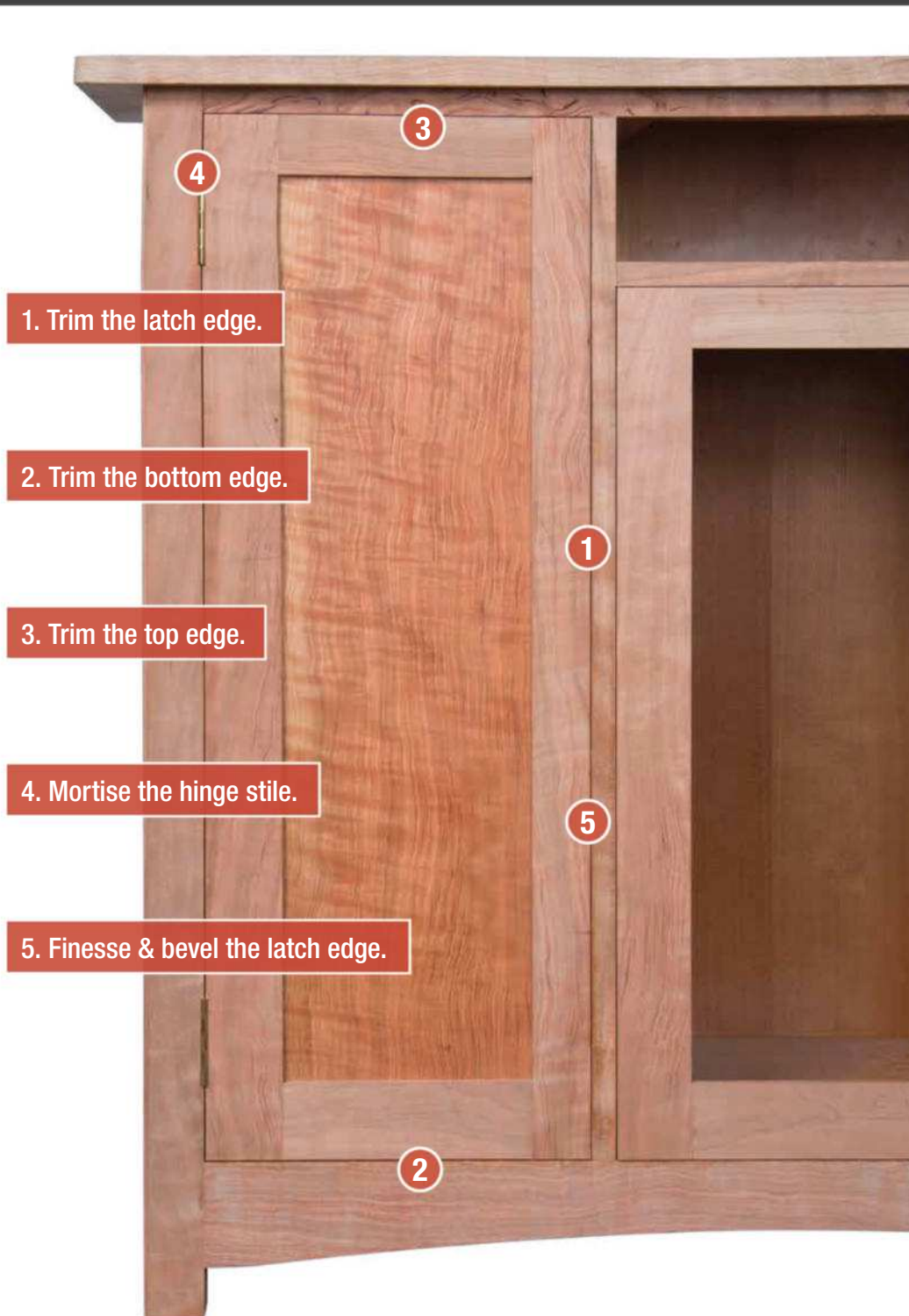




# Installing an **INSET DOOR**

*Get fit with this 5-step program.*

By Paul Anthony



1. Trim the latch edge.

2. Trim the bottom edge.

3. Trim the top edge.

4. Mortise the hinge stile.

5. Finesse & bevel the latch edge.

**W**ell-fit inset doors are a hallmark of fine cabinetry, and for good reason. Installing an inset door requires a bit of skill, some patience, and a methodical approach. But the benefits are well worth the effort; the eye loves a door that's flush with its surrounding surface, and that has a tiny, even gap, or *reveal* all around it. On the other hand, a door that appears undersized or skewed due to overly large and/or tapered gaps might raise eyebrows, at least among fellow woodworkers. Although the process can be a little fussy, it's not that hard when you follow the right sequence. Here, I'll share my approach for creating a neat, consistent reveal of about  $\frac{1}{32}$ ". After you go through the process a couple times, it'll become second nature, and you'll have tucked another serious skill under your woodworker's belt.



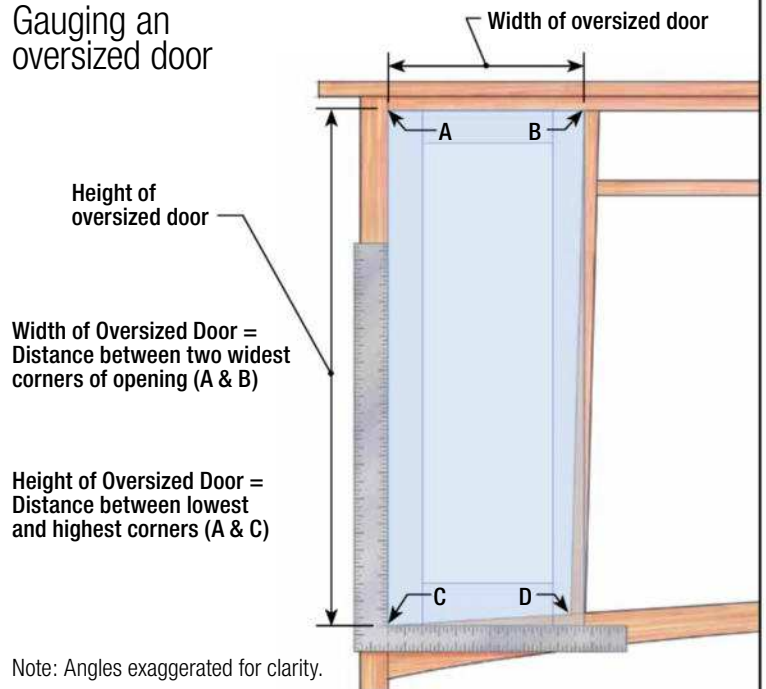
## Smart Prep: A square case opening and a fat door

To minimize aggravation when fitting inset doors, build your case openings as square as possible. When assembling your case, work on a dead-flat surface, use accurate squares, and take precise diagonal measurements to ensure your openings are square under clamp pressure. Also, consider cutting the hinge mortises in the case before assembling it, as it's easier to do the work on the disconnected parts.

To create a narrow reveal all around, you need to start with a door that will completely fill its opening. With a truly square opening, you simply build a square door to exactly match the dimensions. If the opening is out-of-square, however, you'll need to build an oversized square door (adjusting the lengths of the rails and stiles), which you'll then trim to fit the opening.

Before measuring the case opening to size the door, make sure the case is sitting on a dead-flat surface. I temporarily attach the case back with nails or screws at the corners to help keep things square.

### Gauging an oversized door



### STEP 1

## Trim the latch edge for a fat fit

The first order of business is to fit the door fairly tightly side-to-side in its opening. If the door is oversized in height, try tucking in each end individually, marking any areas that need trimming, as shown.

Remove material from the latch edge only. I use a #4 or #5 bench plane for the job because the sole is long enough to maintain a straight line, but short enough to allow creating a bit of curvature if necessary to mirror a slightly curved opening.

**Too tight at the top.** The bottom of this door fits snugly into its slightly out-of-square opening, but the top is a tad too wide. In this case, mark at the point of contact on the latch edge, and then take a few swipes with a hand plane above the mark on the latch edge until the door just slips into its opening.

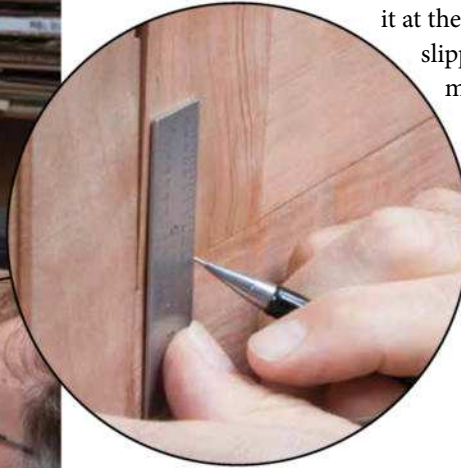


## STEP 2

# Trim the bottom edge

The next step is to mark and trim the bottom edge parallel to the opening, making sure that the hinge stile is pressed tightly against the edge of the case opening. Set up for marking the cut by resting the door on its bottom edge, and shimming against the latch stile to close any gaps at the hinge stile. (Playing cards work well for the job.) If the

door is taller than the opening, tape it at the top to secure it. Tape slipped through the case mortises and onto the back of the door also aids positioning.



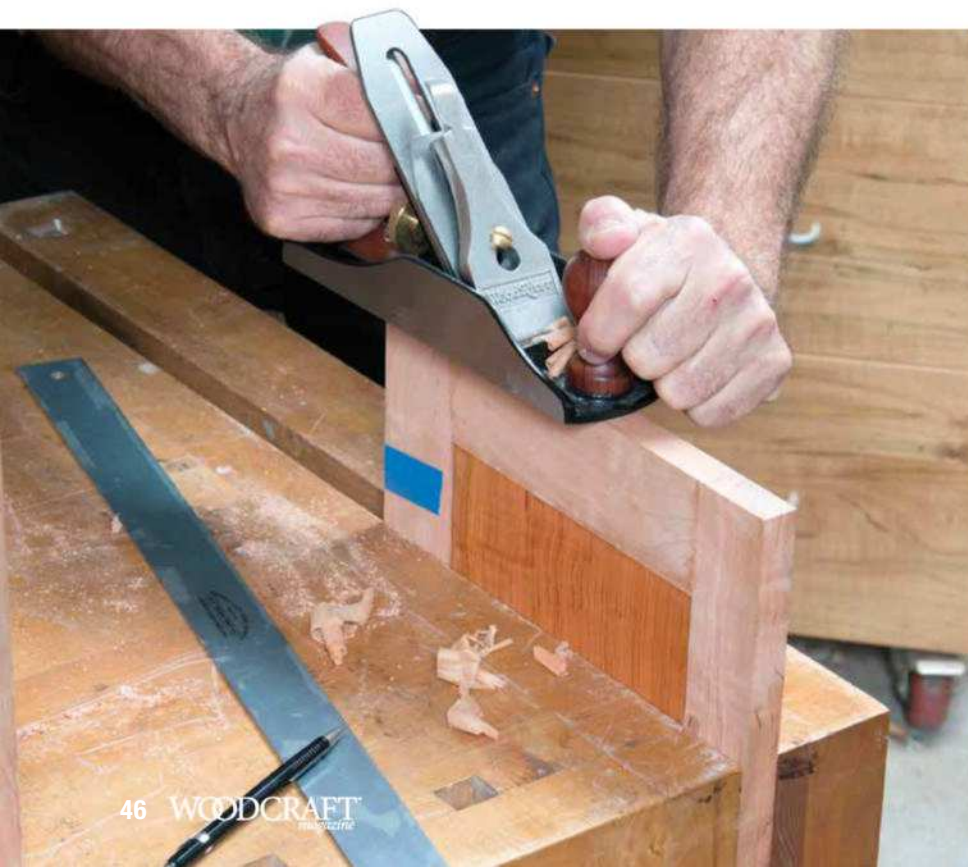
**Mark the bottom edge parallel to the opening.** With the door's hinge stile and bottom contacting the edges of the opening, measure any gap at the bottom at its widest end, and then mark the opposite end of the bottom to match. Extend a cutline from your mark to the opposite end.



Tape secures oversized door at top.

Tape serves as "pull" for maneuvering door.

Playing card shims



**Plane to the cutline.** Use a sharp bench plane to trim to your cutline. Plane inward from the ends to prevent tear-out. Remove as little as possible, trimming and testing as you go, making sure to press the hinge stile firmly against the case as you check for gaps at the bottom of the door. Alternatively, this work can be done on the jointer, taking very light, careful cuts, and backing up the trailing edge to prevent tear-out.

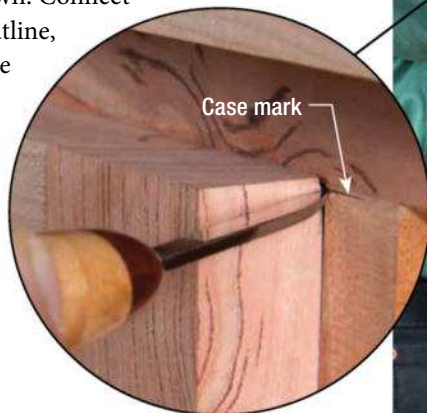


## STEP 3

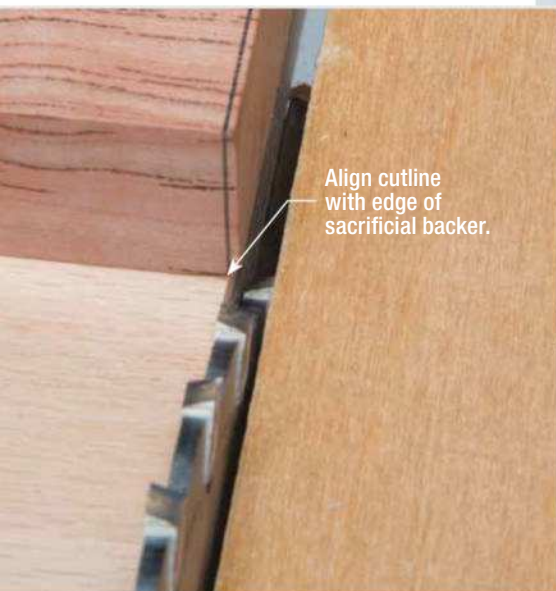
# Trim the top edge

With the hinge stile and bottom edge aligned with the opening, it's time to trim the top edge, at the same time creating the reveal at the bottom. Start by marking the case  $\frac{1}{32}$ " down from the top of the opening at both the left- and right-hand sides (see magnification).

Rest the door on shims to raise it about  $\frac{1}{32}$ ". Then knife the door stiles at the locations of the case marks, as shown. Connect the knife marks with a cutline, and trim to it. You may be removing  $\frac{1}{16}$ " or so, in which case it's best to do your trimming at the table saw, using a sled. Afterward, clean up the saw marks with a few swipes from a hand plane.



**Mark the top edge for trimming.** With the door raised  $\frac{1}{32}$ ", knife each stile at the location of the pencil mark you made  $\frac{1}{32}$ " down from top of the opening. Afterward, connect the knife marks with a cutline that extends squarely across each edge and then across the front of the door.



**Trim the top edge at the saw.** Use a table saw crosscut sled to trim a hair shy of your cutline. To make a tapered cut, place a shim against the fence, positioning it so that the cutline is parallel to the sled kerf. Use double-faced tape to overlay a sloppy sled kerf with fresh sacrificial plywood backers. That way, you can use the freshly trimmed backer as a reference for your door's cutline. Saw with the front face of the door upward so any exit tear-out will be on the rear face.




## STEP 4

# Mark and cut the hinge mortises

At this point, the top, bottom, and hinge stile edges should all be parallel to their mating opening edges. I find that it's best to install the hinges now, and fine-tune the reveal afterward. Install the hinges in their case mortises with just a center screw. Install backer blocks in the corners of the openings as shown, press the hinge stile against the hinges, and shim under the door to create an equal reveal at the top and bottom of the door. If you've done your work well to this point, the latch stile will overhang the case opening by a bit, so tape it to the case to stabilize the door. Pressing the stile firmly against the hinges, precisely knife into the stile at the ends of each hinge. Then lay out and cut the mortises, working to your knife lines. Make sure to test the depth of your mortises in scrap to fine-tune the reveal, which should be about  $\frac{1}{32}$ ". Attach the hinges to the door with one screw each, and then mount the door on the case, again with only one screw per hinge. If slight hinge misalignment impedes installation, lengthen a mortise to suit, and reattach the hinge, drilling for a different screw this time. (This is why you only attach the hinges with one screw per leaf until the door is properly hung.)

## Well-hung doors need well-made hinges

When fitting inset doors, don't thwart yourself by using crappy stamped hinges from the hardware store. Their poorly fit pins often result in sloppy door reveals, and the leaves look shoddy. Well-made extruded hinges cost considerably more, but are well worth it. They're beautifully machined for precise operation, and will stand as lifelong testament to pride in your work.



**Backer blocks for resistance.** Use double-faced tape to attach scrap blocks to the case at the corners of the opening, setting them back the thickness of the door frame. They'll help keep the door in place for final fitting.



### Locate the hinge mortises.

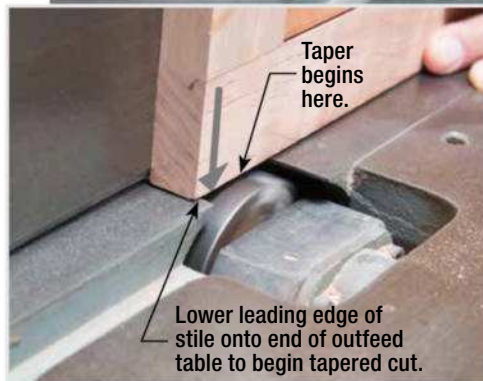
After shimming under the door to create equal reveals at the bottom and top, use a knife to transfer the hinge end locations onto the stile. Work as precisely as possible in order to maintain the reveals you have established at the top and bottom of the door.



## STEP 5

# Trim and bevel the latch edge

The last step is to create a reveal at the latch stile, beveling it at the same time to allow easy door closure. If you've done your work properly to this point, the door won't close at the latch stile. Start by simultaneously trimming and beveling it until it just barely fits into the opening. This is easily done on the jointer, cautiously removing small amounts at a time to avoid overcutting. If the resulting gap at the latch stile is very small, you can use shims as shown to gauge the final reveal. After hand planing to your cutline, rehang the door one last time to check the final fit, and finesse any edges to create consistent reveals all around the door. Keep in mind that some trimming can be done with the door attached, using a block plane. Then step back and admire your work. Nicely done! ■



**Jointing a taper.** If a stile needs a tapered cut, you can do the work easily on the jointer. Simply lower the narrower end of the tapered cutline onto the jointer's outfeed table just past the spinning cutterhead, and then feed normally. Repeat this procedure until the cut is parallel to the cutline, and then take full-length passes to reach the cutline. Here, the fence is angled to produce a 2° back bevel.



**Stamped vs. extruded.** The cheap hardware store hinge at left clearly shows stamping imperfections, poor barrel wrapping, and a sloppily fit pin. The precisely machined extruded hinge at right has thicker leaves, beautiful fit and finish, and a pin/barrel fit with absolutely no slop.

### Perfect reveal scribing.

Relocate the latch stile backer blocks inside the case to allow slightly inseting the door. Then use 1/32" worth of shims as an offset gauge to mark for the latch stile reveal. Finally, hand plane to the cutline. This ensures a perfect reveal, even if the case divider is slightly bowed.





# Mastering the HAND PLANE

*Follow these pro tips, and put this workshop workhorse through its paces.*

By Craig Bentzley



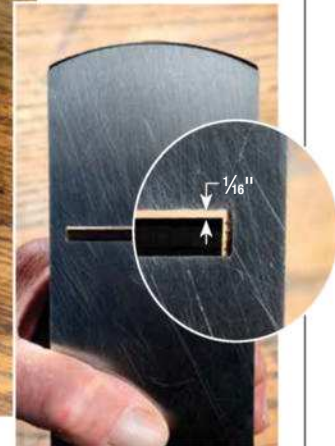
**Start smart.** When plane shopping, avoid cheap hardware store versions; they're junk. Alternatively, many new top-shelf models can set you back hundreds. Rehabbing an old plane can be rewarding, but success is not guaranteed. For starters, I recommend WoodRiver bench planes, which are both economical and reliable right out of the box.

**W**hen I started woodworking nearly a half century ago, I regarded my machines as the cast-iron kings of my workshop, and my collection of hand tools as quaint relics from our past. However, as I discovered how a properly sharpened plane could deliver speed and precision that I couldn't replicate using power tools or abrasives, there was a workshop revolution. The table saw and jointer didn't surrender any territory, but my collection of antiques moved down from the shelf and claimed a regular place at my bench. Partnering the old planes with power machinery was a giant step in my progression from hopeful amateur to fine woodworker.

Planes are surprisingly simple tools but, as with all new things, there's a bit of a learning curve. To start, you'll need to understand the parts and make sure that they are assembled correctly. Next, you'll need a sharp blade and a bit of practice. You can accomplish a lot with one plane, but it's useful to have a longer plane for flattening and a shorter one for smoothing. In short order, you'll be using planes to assist with every stage of a project, from shaving away mill marks and burns, to cleaning up casework, to finessing the fit of doors and drawers.



## Sharpen, reassemble, and start shaving



**STEP 1**

**Attach the chipbreaker.** After sharpening the blade, reattach the chipbreaker. Set the breaker on the iron, slide it forward until it's  $\frac{1}{16}$ " from the edge, and then tighten the screw.

**STEP 2**

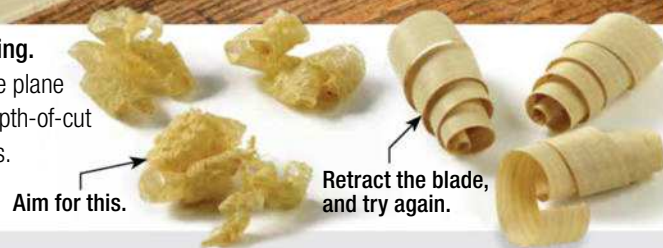
**Install the blade and check the mouth.** To protect the freshly honed edge from contact with the body, set the blade into the mouth opening and then tilt it back until it rests on the frog. After attaching the lever cap, check the mouth.

A  $\frac{1}{16}$ " mouth opening is OK for everyday work. For smoothing figured wood, close the mouth to  $\frac{1}{32}$ ".



**STEP 3**

**Spin the wheel and watch the shaving.** With the blade fully retracted, move the plane across a test board while turning the depth-of-cut knob. Aim for wide, lacey-thin shavings.



Shifting the lateral adjustment lever moves the blade in the opposite direction. Adjust the lever to center the shaving across the mouth.

### 3-Step setup

Even quality planes require some setup out of the box. So before you can start shaving, you'll need to sharpen the blade and reassemble the plane. After joining the blade to the chipbreaker, set the pair on the frog, slip on the lever cap, and set the lever cap screw just loose enough to allow blade adjustment.

Next, check the mouth. Although a narrow mouth opening can help reduce tear-out with figured woods, thicker shavings can get stuck. I find that a  $\frac{1}{16}$ "-wide opening works well with most stock, and lets thicker shavings through without choking. Most planes require removing the blade in order to adjust the mouth. But WoodRiver planes allow mouth adjustment by

loosening two side screws at the rear of the frog and turning a central screw.

To set the cut depth, place a straight-grained test board against a bench stop. While running the plane over the board, slowly turn the wheel until the shavings are thin and wispy. If your shavings resemble thick curls, retract the blade fully and give it another go.



## Simple shaving steps

Assuming that the blade is sharp and properly set, planing shouldn't be a struggle. But, like swinging a bat or golf club, knowing the correct grip, stance, and motion makes all the difference. Once you've mastered the basics, you'll be ready to put your plane to work.

Start with your grip. I prefer wrapping the lower three fingers of my dominant hand around the back handle (or *tote*) and resting my index finger against the edge of the blade. The position of my opposite hand varies. When planing wide boards, I'll wrap it around the front knob. When planing edges, I prefer pinching the side of the casting. This grip allows me to use my index finger as a guide.

Powering a plane across long boards and wide panels is a mix between a dance and a full-body workout. Your arms will control the cut, but your legs and core will provide the real muscle.

To start, stand slightly behind the workpiece, set your feet shoulder-width apart, and put your weight on your rear foot. Set the front of the plane on your workpiece with the blade off the end.

At the start of the cut, press down on the knob. (This counteracts the natural tendency to rock the plane as the blade meets the board.) As the plane moves forward, transfer your weight to your front foot. At the same time, equalize the downward pressure on the knob and the tote. Use your body to drive the tool forward. (For longer boards, you can increase your range by taking small steps.)

As you approach the end of the board, apply more pressure to the tote, and extend your arms. Keep pushing until the blade clears the far end. Now clear the shaving with your knob-hand, return to your starting position, and repeat. To avoid needless blade wear, I raise the sole a bit on the return stroke.



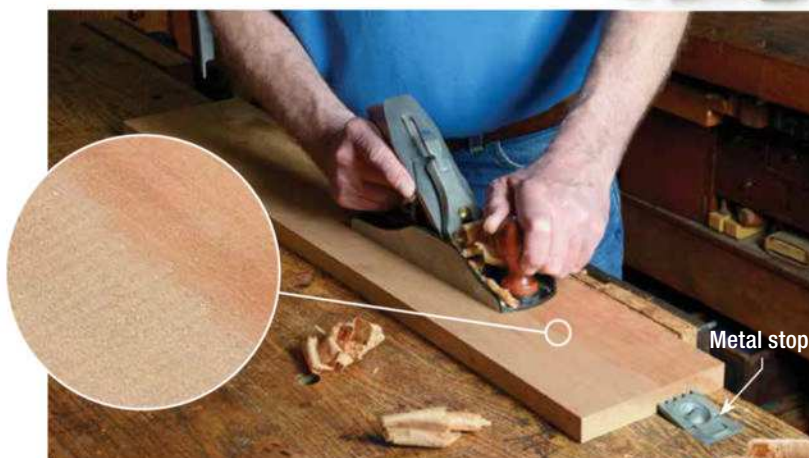
## Master the basic moves

**Take a stand.** With your feet shoulder-width apart, plant your weight on your rear foot and set the front of the plane on your workpiece with the blade off the end. Apply firm pressure to the knob so that the blade makes contact right from the start.

## Banish machine marks



**Go long.** When removing burns, don't focus on one spot. Plane the entire edge to keep it straight and flat.



**Level mill marks.** A #4 removes the mill mark ripples left by jointers and planers. Set your blade to make fluffy shavings, then start on one edge and work your way across the board.





**Balance it out.** Apply pressure equally to both the tote and knob once the plane is completely on the board. Use your body to push the plane. Skewing, or angling, the plane can make it easier to push.



**Maintain contact.** At the end of the pass, ease up on the knob and apply extra pressure on the tote to keep the tool flat on the workpiece. Clear out the shaving, then continue working across the board using consistent, overlapping passes.

## Flatten panels



**Start with an angled attack.** Secure the panel to your workbench. Knock down major misalignments first, then take long, diagonal strokes to level the surface. Pencil lines can help gauge your progress. For best results, use a longer plane, like a #5.

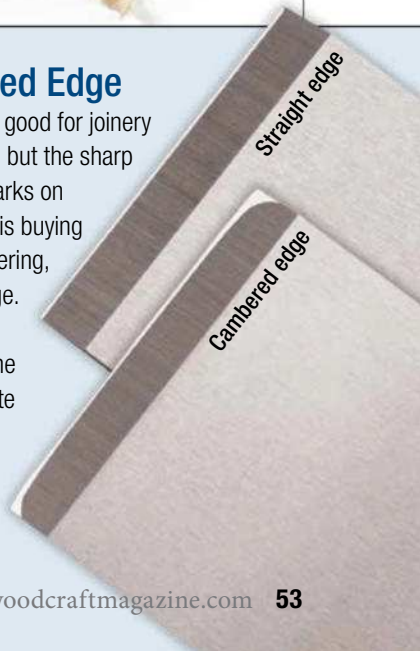


**Finish up with the grain.** A #4 with a cambered blade (see sidebar at right) is ideal for removing remnants of the diagonal passes and smoothing the surface. Finishing up with a sander is perfectly OK.



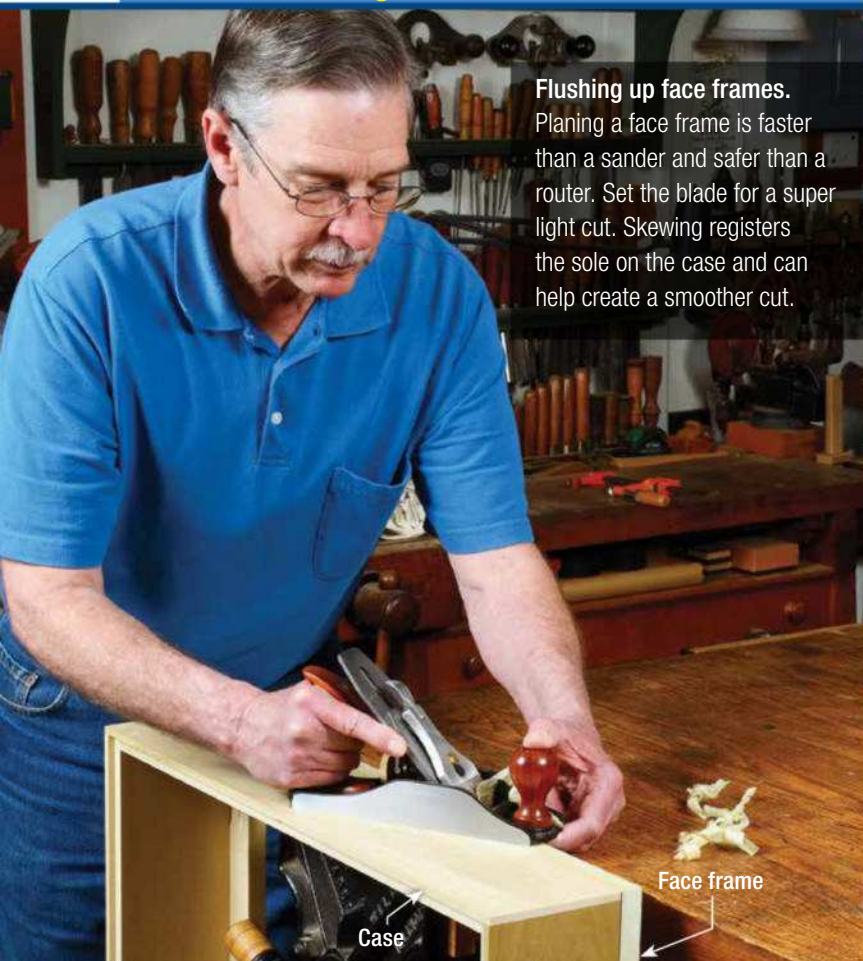
### Pro Tip: Cambered Edge

Straight-edged blades are good for joinery and are easier to sharpen, but the sharp corners will leave track marks on wide panels. The solution is buying a second blade and cambering, or curving, the cutting edge. The trick to cambering a blade for a smoothing plane is not to overdo it. To create a minute camber, I simply apply a bit more pressure on each corner during the honing process.





## Put the finishing touch on cabinets, cases, and doors



**Flushing up face frames.** Planing a face frame is faster than a sander and safer than a router. Set the blade for a super light cut. Skewing registers the sole on the case and can help create a smoother cut.

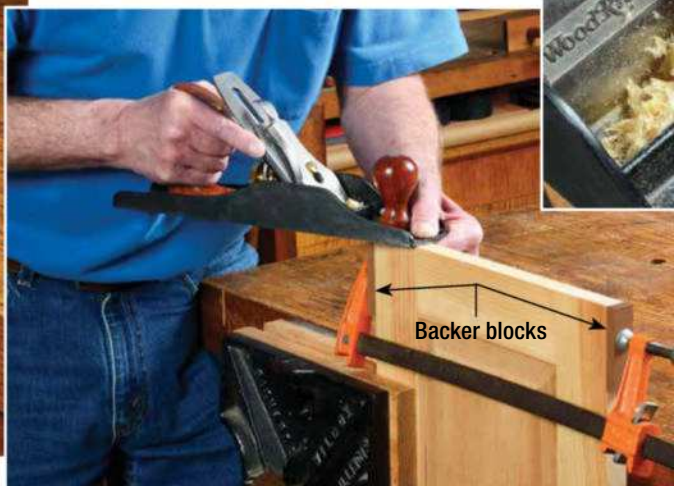


**Levelling rails and stiles.** To correct minor misalignment, clamp the door to your bench and use short, stabbing cuts until the higher end levels out. Stop before the grain direction of the shavings changes.



Face frame

Case



Backer blocks

**Fitting doors.** Planing end grain is challenging, but with a sharp blade set for a super-light cut, it's the best way to achieve a perfect fit. Clamping backer blocks to the ends prevents splitting.

### Fitting & finessing

Hand planes are great for erasing burns and mill marks (after all, who likes sanding?), but in my shop, planes earn their keep when I'm doing casework. When success is measured in thousandths of an inch, such as when fitting face frames, doors, and drawers, nothing beats a well-tuned plane.

Although techniques discussed here are variations of the techniques on the previous page, the stakes are higher because you're working with finished pieces. It's important to start with a freshly honed edge and set the blade for a super-light cut.

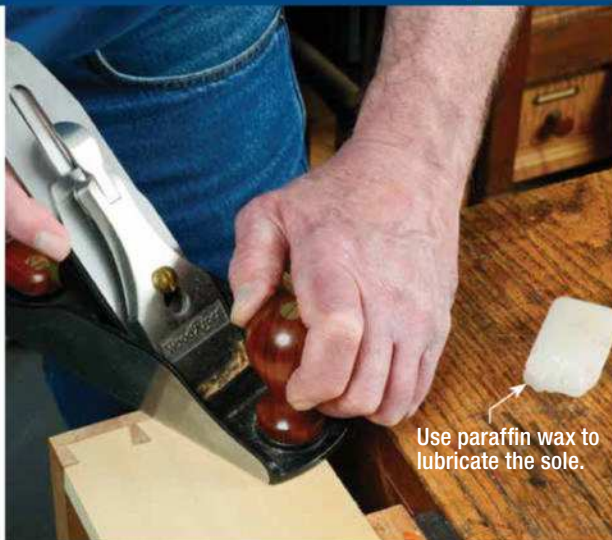
Face frames often end up a little proud of the plywood case. Planing

a face frame flush with a case is easier than jointing an edge because you can rest the plane's sole on the case. Watch the shavings and stop as soon as the blade touches the side.

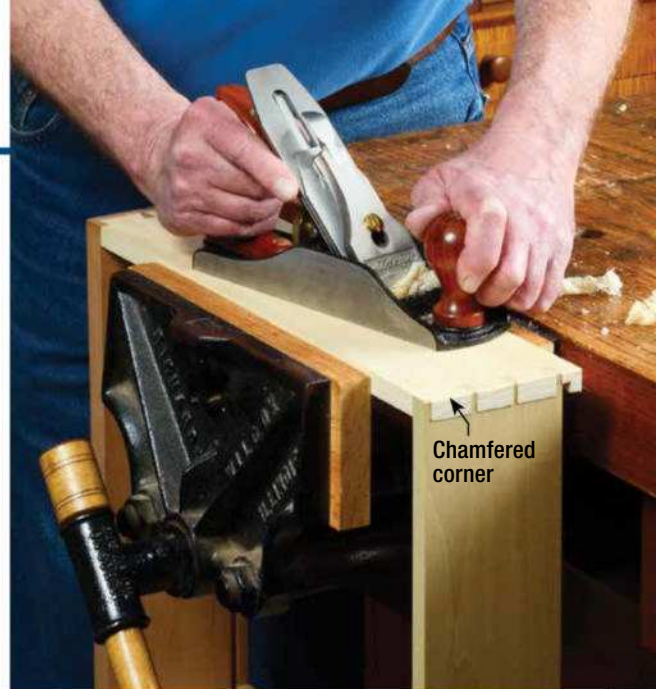
Doors often require some hand plane help. To fix a misaligned stile or rail, start at the high end of the board, and gradually work your way



## Fine-tune the fit on drawers



**Knock down the pins.** A smoothing plane is my go-to tool for flushing the ends of a dovetailed drawer. Stop when the shavings change color.



**Then smooth the sides.** After levelling the pins, take a few long passes across the side. Planing a small chamfer reduces the chance of splitting out the back pins.



**Shave down the edges.** A shorter plane is handy for levelling a proud corner, or sneaking up on a piston-tight fit. To deal with the grain-direction change at the corners, try increasing the skew angle.

back until the ends are flush. If the final pass happens to catch the stile, remove the evidence with a light pass.

Inset doors require an extra step. To achieve an even reveal, mount the door into its opening, mark the tight spots, and then plane the edges and ends. See page 44 for more information regarding inset doors.

Dovetails epitomize fine woodworking, but fancy corners don't count for much if they don't look good or if the drawer doesn't fit.

Whether you cut your dovetails by hand or with a router, a plane is helpful in trimming the pins flush. Using short strokes, plane in from the ends until the pins are flush, then

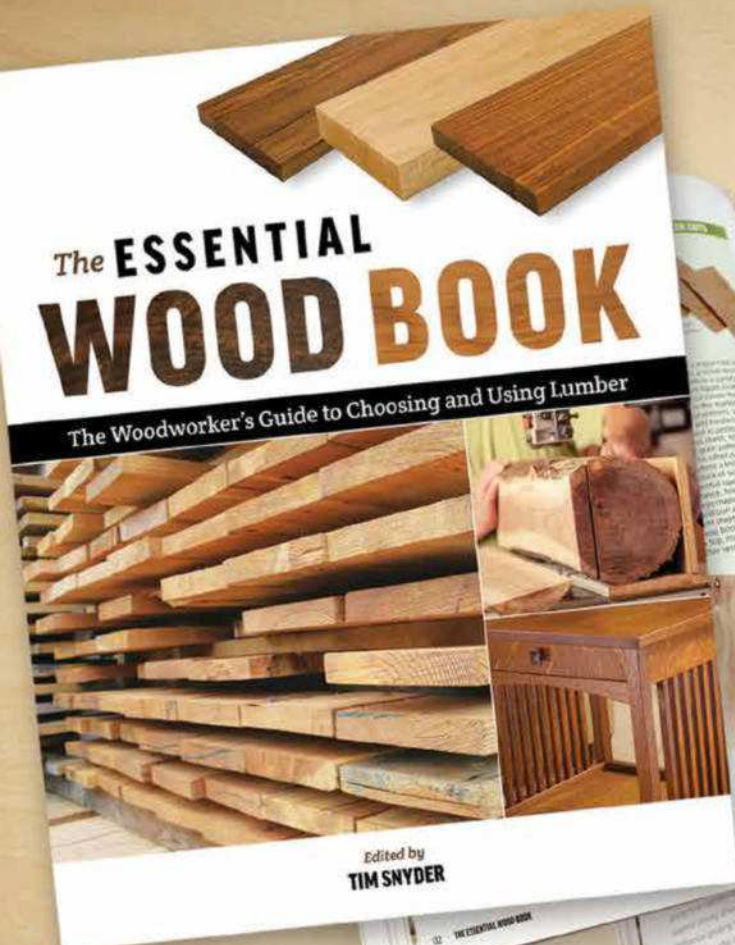
finish the side. To avoid splitting the rear pins, I plane a small chamfer along the drawer's back corner. Skewing the plane can also help.

Finally, check the top and bottom rims. To fix a high spot, set the plane behind the high corner, take a pass, and gradually work your way back until the parts are flush. ■



## A Practical Guide For Building With Wood

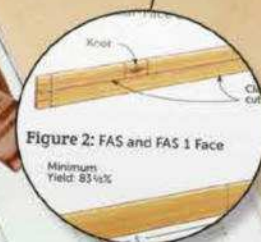
Every project is different, and the RIGHT lumber makes all the difference! *The Essential Wood Book* is about making the basics of using and choosing wood easier to understand. *The Essential Wood Book* is the ideal resource for woodworkers, carpenters, crafters, or DIY enthusiasts seeking the essential knowledge needed to work with wood.



## Images Of Wood Species



## Detailed Illustrations



## SAFETY ALERT

Take precautions when working with decaying woods. Wear a mask to prevent fungus-laden dust from entering your lungs.

## BUYING FIGURE TIPS

While sources for figured woods to a woodworking supplies retailer behind your house, the best source for rare domestics may be a mail-order span the globe, allowing outlets of quality wood and store it in your smart from such outlets, Rocky Mountain Hardwoods (westpenn.com) offers helpful insights.

## Helpful Tips

## Safety Alert Tips

### The Essential Wood Book Includes Helpful Topics On:

- Native American Woods
- Exotic Woods
- Beyond Basic Lumber
- Wood Characteristics
- Drying And Storing Wood
- Working With Wood
- Selecting Wood
- Lumber Grades
- Buying Hardwood Lumber
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- Techniques For Salvaging Lumber
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- Working With Wild, Discolored And Toxic Wood
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- Easy-To-Make Storage Projects

Suggested Retail:  
**\$27<sup>95</sup>**

216 Pages, Softcover  
162072



# Essential BOX JOINT JIG

*Home in on precise finger joints with this table saw sled.*

By Ken Burton



**T**he box (or finger) joint is a remarkably strong, interlocking corner joint that can be quickly made on the table saw. The only catch is that you need a jig to help you hold and position your workpieces as you make the cuts. At its simplest, a box joint jig is an auxiliary fence with an indexing key that you attach to your miter gauge. My version adds the stability of a sled and a sliding fence to make adjusting the fit easier. For additional corner-making options, you can remove the key to create offset box joints, as I did for the treasure box on page 26. The replaceable fence enables you to use this jig to match any cutter width, from  $\frac{1}{8}$ " (the kerf thickness of a standard blade) up to  $1\frac{3}{16}$ " (the



widest dado setup). But I pair the jig with a specialty box joint cutter set that cuts  $\frac{1}{4}$ " and  $\frac{3}{8}$ " fingers, which I find suits most situations. And it eliminates the guesswork.

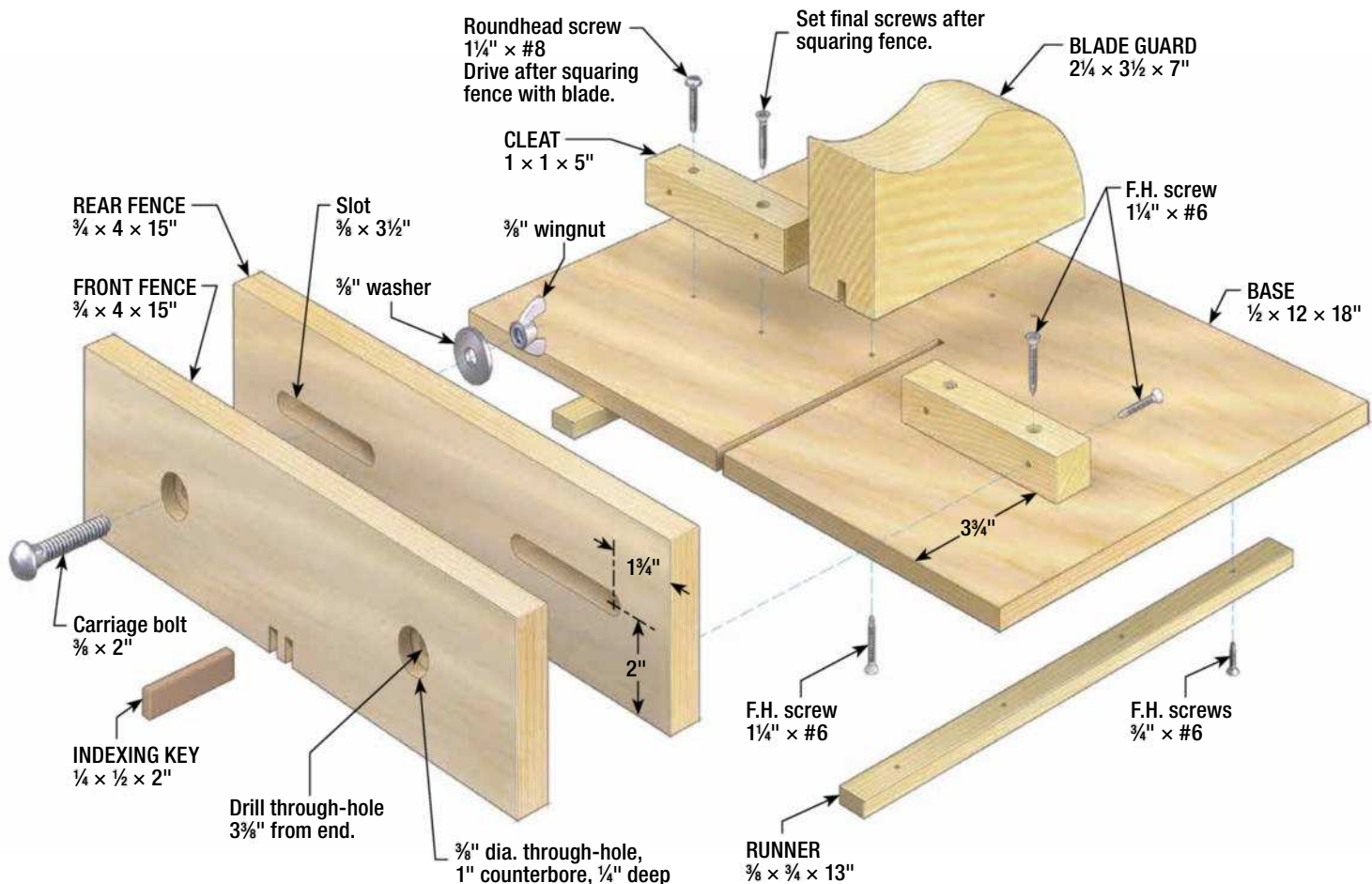


# Adjustable joints on a sled

Box joint jigs can be simpler, but this one is easy to build and will last for years. This simple sled slides safely over the blade, carrying your work through the cut. And an adjustable fence allows you to fine-tune the finger widths.

The base is made from flat sheet material, and the runners of durable hardwood, such as cherry.

The rear fence is slotted to accept carriage bolts, and attaches at 90° to the base with a couple of hardwood cleats. The adjustable front fence holds the bolts and the hardwood indexing key. Tighten the front fence in place when you have the finger width homed in. Make the blade guard from any solid wood.



## Better Blade for Box Joints

Newbies to finger-joining should realize that, for a successful joint, the width of the cutter (and its slot) should result in a very snug fit of the slot over the pin. If there's any slop, the joint won't work, no matter what lateral fence adjustments you make after the fact. So, to prevent problems with the initial construction of the jig, and with subsequent uses, make sure your cutter is set up to a precise, repeatable width.

But if you make a lot of box joints as I do, you'll want to pony up for a dedicated cutter set like the one from Freud (right). The set cuts dead flat slots, and perfectly square fingers at 1/4" and 3/8" wide. CMT and Forrest also make quality box joint cutters. Sets like these eliminate the need for shimming or making awkward adjustments.





# Build the jig

Make the parts as shown in the drawing. Mill the runners for a snug, but sliding, fit in your saw's table slots, and drill and countersink them for screws. Tape the base to the runners as shown, and then install just the outermost screws. After test-fitting, install the rest of the screws, and scrape the edges of the runners if necessary to ensure a freely sliding, but snug fit. Take time to get this right, as ill-fitting runners lead to inconsistent joinery results. See page 24 of Tips & Tricks.

Slot the rear fences at the router table as shown. At the table saw, set up your cutter to your desired finger width, and saw about halfway across the sled.

With the cleats at the drill press, bore countersunk  $\frac{3}{16}$ "-dia. clearance holes where shown in the drawing. The one exception is the right-most top hole: Drill a  $\frac{5}{16}$ "-dia. clearance hole there without a countersink. This will allow fence adjustment. Screw the cleats to the rear fence, and attach the left end of the rear fence to the sled.

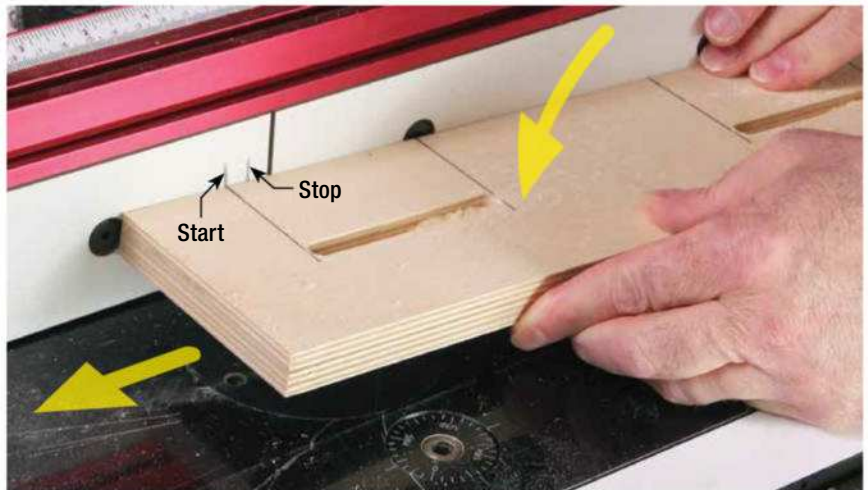
Square the fence to the sled slot, and then, fasten it with a #8 round-head screw through the larger hole in the right-hand cleat. Make a test cut and check for square. Adjust the fence if necessary, and screw it in place with the remaining two holes. Then, using the slots in the rear fence as a guide, drill two  $\frac{3}{8}$ "-dia. counterbored holes in the front fence, and attach the front fence to the rear fence.

Raise the dado to slightly shorter than the thickness of desired stock above the surface of the sled, and cut a notch in the front fence. Trim the key to fit this notch perfectly. Lightly chamfer the top edges of the key, and insert it in the notch. Cut the blade guard to size and screw it to the base from underneath. Finally, position the key for your first cut, as shown.



Double-stick tape is transparent. It's there, we swear.

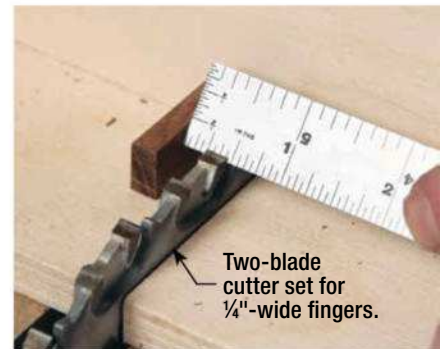
**Attach the runners.** Place the runners in your table saw's miter gauge slots and add a strip of double-sided tape on top of each one. Press the base down on top of the runners using the rip fence as a guide. Afterward, remove the sled and attach the runners with screws from underneath.



**Rout the slots.** Cut two slots in the jig fence with a  $\frac{5}{16}$ " straight bit in your router table. Mark the diameter of the bit on the router table fence, and lower the leading end of the jig fence blank onto the spinning bit to begin the cuts. To avoid stressing the bit, take a series of shallow, successively deeper passes, cutting in from both faces of the piece for efficiency.



**Square the fence.** Having attached the fence to the sled with a single screw through the left-most cleat hole, square the fence to the sled kerf using a drafting triangle. Then install one right-hand cleat screw, and take a test cut to check for square.



Two-blade cutter set for  $\frac{1}{4}$ "-wide fingers.

**Set up for your first cut.** After cutting the slot in the jig, insert the key in the fence. Then adjust the fence laterally to make the distance between the key and cutter exactly match the width of the cutter. Lock the fence in place.



# Cut a test joint

It's time to make a test joint, one piece of which will begin with a finger, and its mate with a notch. Mark the top edges of 2 test pieces with an "X." Set the blade height a scant  $\frac{1}{16}$ " less than the thickness of your stock (see "Innies and Outies" on the facing page). Cut the parts, then check the fit.

Correct an ill-fitting joint by adjusting the position of the key. For tighter joints, loosen the wing nuts slightly, and tap the front fence to your right, moving the key away from the blade. For looser joints, do the opposite. Go easy; tiny adjustments result in big changes, and any error in the position of the key will compound as you work your way across a board. The wider your workpiece, the more important it is to get the setup just right. Be sure to make a new test joint after each adjustment.



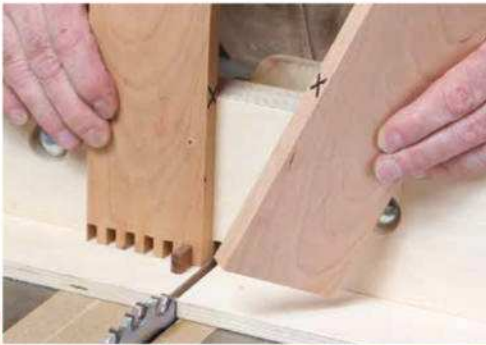
**First cut.** Load the first test piece into the jig with its marked edge against the key. Then make the cut.



**Leapfrog across the width.** After cutting each notch, use it to straddle the key for making the next notch. Be sure to hold the workpiece firmly against the fence and sled platform.



**Cut the mating piece.** To set up to cut the mating piece, use the first finger of the first piece as a spacer, which requires flipping the piece edge-for-edge. After sawing the first notch, remove the first piece, and cut all the notches in the mating piece as before.



**Check the fit.** A properly fit box joint should go together with just firm hand pressure, and hold together with just friction.



## ⚙ Tackle tear-out with a backer

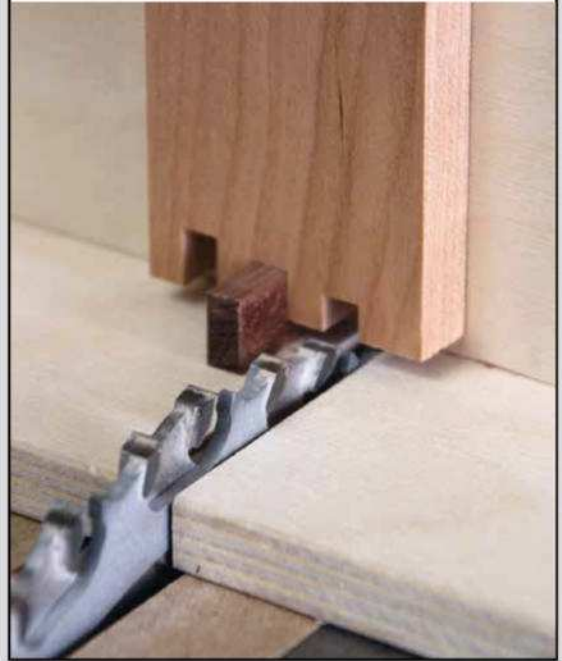


If the fingers you're currently cutting are shorter than the notch previously cut into the jig fence, you'll likely experience exit tear-out. To combat this, back up your cuts with a piece of sacrificial plywood.



## ⚙ Beware shallow notches

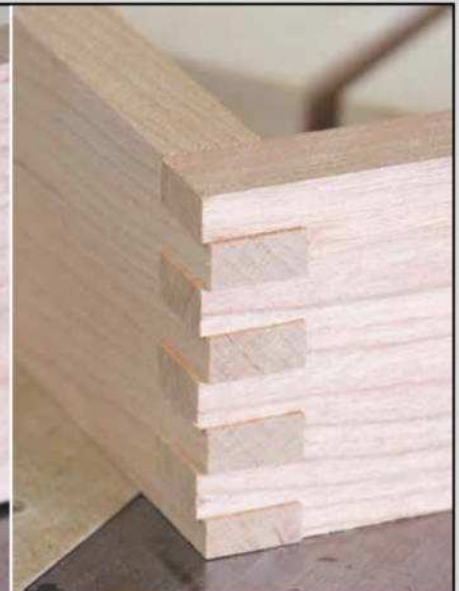
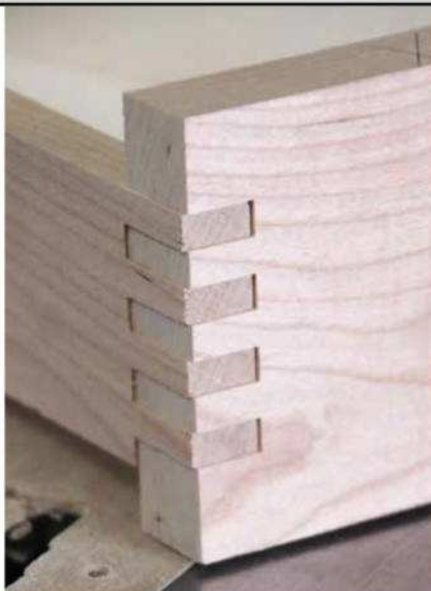
One shallow notch begets the next, and the problem can compound, as shown in exaggerated fashion here. To prevent the error, make sure your key isn't too tall, and that you're holding the workpiece firmly against the sled base with every cut.



## ⚙ Innies or Outies

In an ideal world, fingers would all align perfectly flush with each other in an assembled box joint. But this can be difficult to achieve. Instead, most woodworkers aim for either protruding ends (Photo right) or recessed ends (Photo left). Protruding ends require only minor flush-trimming. But the protrusions are end grain, which can be difficult to neatly trim. Also, they hinder the use of clamping cauls during glue-up.

In the case of recessed finger ends, you have to flatten the whole surface to make the joint flush. This is my preference as face grain is much easier to plane than end grain. And, gluing up using cauls is easy. ■





# Spotlight on CATALPA

*This ornamental tree is a woodworker's delight.*

By David Schiff

*Catalpa speciosa*

If you were to spy a rough-sawn catalpa board, you might mistake it for ash or even oak—it looks quite similar to these more familiar species. But once you picked the board up you'd realize the wood is significantly lighter in weight than ash and much lighter than oak.

Nearly the entire trunk of a catalpa tree is composed of heartwood that ranges in color from tan to golden brown. The growth rings tend to be a bit wider than ash or oak, and they are quite prominent due to lots of contrast between the wider pores of the earlywood and the latewood's smaller pores. When filled with finish, the earlywood pores can take on an almost iridescent shimmer.

## Where catalpa comes from

Unfortunately, catalpa isn't grown commercially for lumber. This is probably because the trees tend to branch out quickly, usually just 4 ft. or so from the ground, so a tree won't produce a lot of usable lumber. However, catalpa has a

history as a popular ornamental tree due to its broad leaves and showy white flowers (see photo, opposite). Two species of catalpa are native to the eastern United States—*Catalpa bignonioides* (southern catalpa) and *Catalpa speciosa* (northern catalpa). Both species have been planted ornamentally all over the United States. The southern catalpa is smaller and is the preferred ornamental tree because it tends to produce more blossoms. The northern variety can grow up to 100 feet tall and 2-4 feet in diameter.

So, while you won't typically find catalpa at your local lumberyard, savvy local sawyers will often harvest trees that become available to them. Search online and you'll find catalpa for sale in sizes ranging from small turning blanks to wide planks. The working characteristics and appearance of both species of catalpa are very similar and sellers usually don't specify which you are getting. Of course if you find wide planks, they are probably northern.

**Contrast is key.** Large-pored earlywood absorbs more finish than latewood, causing grain patterns to show up in dramatic fashion.

## History in woodworking

With the expansion of railroads in the 1870s, large tracts of *Catalpa speciosa* were planted with the intention of producing railroad ties. The hopes were pinned on the fact that the trees are fast growing and rot resistant. Also, unlike harder species such as oak, it's easy to drive spikes into catalpa timbers. However, it soon became evident that the wood was too weak to support rail traffic. Most of these trees were planted on large tracts of mid-western prairie land owned by railroad companies. Much of this lumber found use as posts to support barbed-wire fencing.

In the late 1800s, catalpa became very popular as an ornamental tree and it was during this period that many trees were planted all around the country. While catalpa trees are no longer as popular as

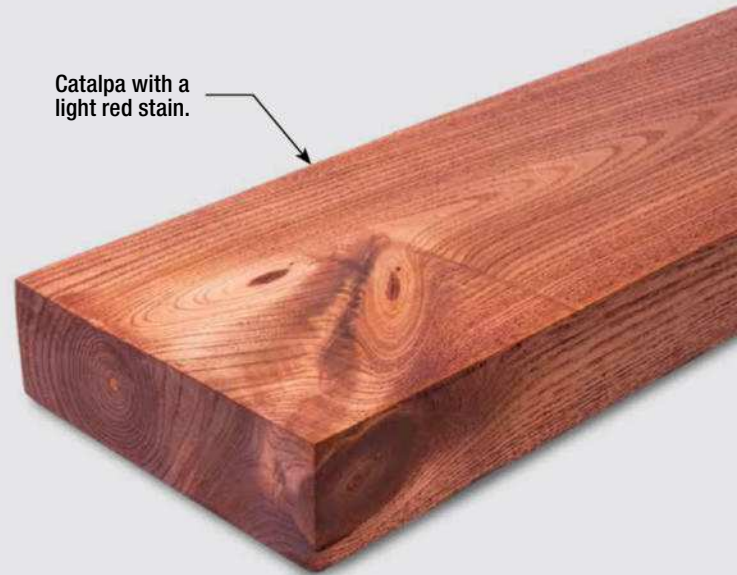
### Catalpa Quick Take

<b>DENSITY</b>	29 lbs./cu. ft.
<b>HARDNESS</b>	Soft
<b>STABILITY</b>	Excellent
<b>ROT/INSECT RESISTANCE</b>	High
<b>TEXTURE</b>	Medium
<b>TOXICITY</b>	Low
<b>USES</b>	Fence posts, turning, carving, furniture





**Beautiful blooms**



they were during that 19th century fad, they have self-propagated extensively, which is why the wood is now available to those willing to seek it out.

### How to select the best stock

Because there is no organized retail market for catalpa, prices can vary greatly. A recent online check found prices ranging from \$2.50 to \$12.40 per board foot. The problem with buying online is that unless the buyer posts good pictures of the specific boards you will get, or is willing to send you photos, you won't know the quality of the stock you are purchasing. To make matters worse, there is no standard grading system for catalpa. On a positive note, because of its stability, catalpa doesn't usually twist or check, so your chances of receiving stable stock are pretty good.

If you'd like the opportunity to select your boards and you are not in a hurry, call some local sawmills and ask them to let you know if a log or two comes their way.

Some of the most interesting and shimmery grain forms around knots, so you might find tight knots to be desirable. However the wood around knots tends to be brittle and can chip out, leaving divots that you may need to fill because they are too deep to sand away.

### Working catalpa in the shop

Catalpa is very easy to work with both power tools and hand tools—shavings whisk off a sharp hand plane with little effort. It carves easily and holds a crisp edge. Turners often seek out catalpa because it is so easily worked. They also like the interesting patterns produced by catalpa's bold grain.

Once dried, catalpa is a dimensionally stable wood—a nice feature if you want your turned bowl to stay round. It's also rot resistant, even in ground contact. These qualities put catalpa alongside cedar and cypress—excellent choices if you want to make durable outdoor furniture.

### Finishing catalpa

Catalpa can be tricky to finish, mainly because the fine-pored latewood absorbs much less finish than the large-pored earlywood. When spread across the surface of a board, this uneven absorption will create a blotchy appearance. You can avoid this by conditioning the wood—with a wood conditioner or by applying several light coats of shellac. Follow this treatment with several coats of oil finish and you'll have the best way to bring out catalpa's natural shimmer and orange/yellow tone. Staining catalpa isn't recommended because it usually results in a muddy appearance. If you must stain, stick with a light application after conditioning the wood surface as described above (see photo, top right). ■

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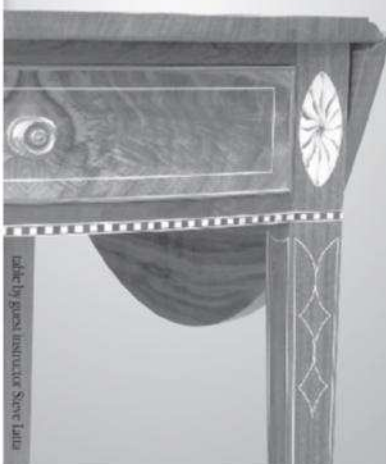
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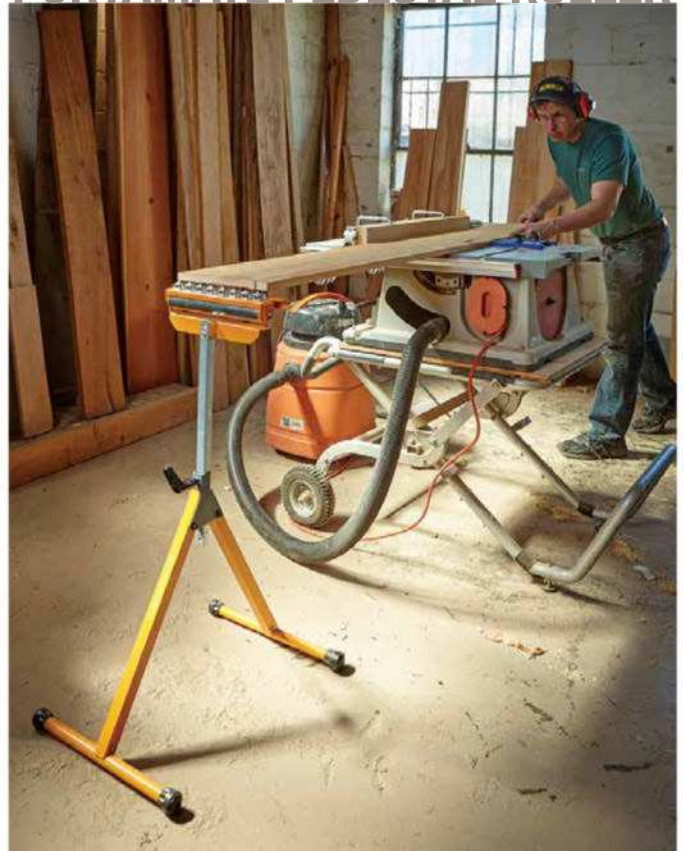
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# Great Mistakes

*Flubs and fixes as curriculum*

By Robert Spiece

Jim was pretty upset. He was calling about a recent class project he was finishing up at home. A beautiful wall-hung cabinet, it had book-matched birds-eye maple panels set into precisely fitted doors, for which he had shaped delicate walnut pulls. He said, “Rob, I’ll tell you, I was installing the pulls in the detached doors, and things were looking great. I’m thinking ‘Phew, that’s it! Finito!’ I was feeling proud of myself when, all of a sudden, I realized that I had just—AUGHHH!—drilled the holes for the pulls in the wrong stiles!”

After a bit, I was able to talk Jim down. I’m practiced at it, since we get calls like this from former students all the time. But in addition to discussing repair options, this time I decided to show some real solidarity with our alumnus. “Jim, maybe you wouldn’t feel so bad if you realized how many mistakes we make every single day in our high-end custom furniture facility, and we’re really good!”

It’s true. As with Jim, I could regale you with stories of the horrible missteps that have happened in our shop, but I only have this one page. So here’s the short version of a recent single day’s errors made while working on a cherry and curly maple sideboard commission:

Jason was fitting ship-lapped panels for the back of the cabinet. In spite of careful measurements (twice) and a full-scale drawing, he ended up with a  $\frac{3}{4}$ " gap. Damn. As for Larissa, who was drilling pilot holes for the door’s precision-fit knife hinges, well, she neglected to flag the bit, and drilled straight through the door frame. Ouch.

Me? I was creating tenons for the breadboard ends, using a template for fast, repeatable layout. Unfortunately, my template wasn’t so accurate, and I cut way too much off a couple of the tenons. #\*@%!!

Of course, being the pros that we are, we performed the necessary unnoticeable fixes. The point is, no matter how good you are, you are going to screw things up. A lot. It’s an integral part of the building process. Artfully performing fixes is a skill that is required of any fine cabinetmaker, and it’s nothing to be ashamed of. Truth is, I sometimes get more gratification from a flawless fix than I do from executing something perfectly in the first place.

Jim will probably do a remarkable repair job. And when someone is marveling at the figured maple and caressing those delicate pulls, he may interrupt, “Yeah, but look at this spot right here...” But it’s because he’s proud of the struggle—of the fact that he has wrestled with the piece. Sure, he’ll make worse mistakes, and he’ll recover from those too. And in the process, he’ll gain the confidence and power that comes from the deep understanding that you can fix anything. As for me, I have yet to make a perfect piece of furniture, but that doesn’t mean I won’t stop trying. ■



Jason facin' a fix



Larissa's miss



Rob's flub recovery





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